

Using Design Science Research to Develop a Framework for Effective Business Model Design

Zur Erlangung des akademischen Grades eines

Doktors der Wirtschaftswissenschaften
(Dr. rer. pol.)

von der KIT-Fakultät für Wirtschaftswissenschaften
des Karlsruher Instituts für Technologie (KIT)

genehmigte

Dissertation

von

M.Sc. Markus Lau

Tag der mündlichen Prüfung:

23.04.2021

Referent:

Prof. Dr. Orestis Terzidis

Korreferent:

Prof. Dr. Stephan Lengsfeld

“Every search begins with beginner’s luck. And every search ends with the victor’s being severely tested.”

Paulo Coelho, *The Alchemist*

Acknowledgments

A Ph.D. thesis is more than just a few pages and more than just the work of one person. It is a long, often rocky, exhausting, but also a beautiful journey that holds quite a few challenges and lessons. I am very grateful to everyone who has contributed to my work and walked this path with me.

I would like to thank my supervisor, Prof. Dr. Orestis Terzidis, who guided me in my scientific endeavors. Orestis, you have supported my work not only with your great scientific expertise, open discussions, and constructive feedback, but also with your warm, open, and supportive nature. I thank you for giving me the freedom to set and pursue my own research agenda. You have been a true mentor to me.

I would like to thank Prof. Dr. Stephan Lengsfeld, my external supervisor and reviewer. Thank you for your interest in my research, fruitful discussions, and valuable input. I would also like to thank Prof. Dr. Steffen Rebennack and Prof. Dr. Hagen Lindstädt for being part of the board of examiners.

To all my EnTechnon colleagues: Thank you for the great fun and lively discussions. You have always challenged and encouraged me to think beyond my research area. We had many intense discussions, feedback sessions, coffee breaks, and overall, a very good time. Thank you all for sharing your knowledge with me and giving me valuable feedback. Not least because of you, the time at the institute will remain in my best memory!

My special thanks also go to all Master and Bachelor students who wrote their theses under my supervision. With your excellent work, you have actively supported me in the various phases of my dissertation project.

Finally, I would like to thank my family. Thank you, mom, dad, and Christoph, for supporting me in every situation of my life. I know, no matter what may happen you will be there for me. Thank you for cheering me up during difficult times and for celebrating the good times with me.

Most of all, I feel deeply grateful to my beloved partner, Bine. You shared all the ups and downs with me and gave me strong support, calmness, confidence, and a lot of joy in life. Thank you so much for your unconditional support over the years!

Abstract

The ever-changing and increasingly complex business world makes new successful business models a key challenge for entrepreneurs. Accordingly, business model design is an essential task for startups to explore, define and communicate new business opportunities. Simultaneously, there has been insufficient knowledge, either in theory or in practice, on how to realize an effective business model design process.

Therefore, this dissertation's approach was to develop a framework with the support of which startups can effectively design their business model. For this purpose, the thesis identified content and process steps necessary for an effective business model design. Furthermore, based on a literature review, the business model concept, as well as the basic steps of an effective process for designing a business model, were defined. Furthermore, through the analysis of existing frameworks and the examination of entrepreneurial practice in the context of a quantitative survey, insights were gained into how startups currently design their business models, and for which reasons the existing frameworks have so far been assessed as not effective enough.

Methodologically, the work was guided by a design science research approach. In all steps of this work, the Design Science research framework and guidelines found on the principle that new knowledge and understanding are derived from the design, application, and evaluation of an artifact, were strictly followed.

Based on the theoretical findings of the literature and the study's practical insights, the requirements for the design of the framework were derived. Its initial design was developed with the help of a group of experts. It was then tested in two iterative evaluation cycles with 42 startups in seven multi-day workshops in different accelerator programs. After each application, the framework was evaluated through interviews and questionnaires and adapted based on the lessons learned. This iteration was conducted until the previously defined requirements for the artifact were fully met. Within the work scope, it was thus possible to develop an artifact that contains significant structural and content-related enhancements compared to existing approaches to business model design. The developed framework can support startups, regardless of their development stage and economic background, in effectively designing their business model.

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List of Abbreviations

ADR	Action Design Research
BM	Business model
BMD	Business model design
BMDF	Business model design framework
DSR	Design Science Research
e.g.	exempli gratia/ for example
i.e.	id est/ that is to say
MVP	Minimum viable product
OMG	Object Management Group

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1 Introduction

1.1 Background and Scope

Every company is an interplay of activities and resources carried out and used to achieve a defined goal or follow a purpose. This interaction is orchestrated by a logic - a master plan - of the relevant business activities to create value and achieve competitive advantages (Taeuscher 2016). Strategic management is the discipline that has been responsible for aligning and formulating this logic over the past decades. Therefore, the strategy was generally regarded as an essential source of competitive advantage (Porter 1991). Since the 1990s, however, another concept has been steadily gaining in importance and is now considered an equal competitive advantage source (Casadesus-Masanell und Ricart 2011; Teece 2018). For this concept, the term Business Model (BM) has evolved and has gained increasing importance ever since (Liyanage und Uusitalo 2017).

The BM is essentially a model - a simplified, idealized, and aggregated representation - of a company's value logic that describes how a company creates, delivers, and captures value for itself and all relevant stakeholders. Hence, every business follows a specific BM, either explicitly formulated or lived by implicitly (Spremann und Frick 2011). Today, BM design, development, management, and innovation have become famous for startups and established companies. In practice, BMs are closely linked to a firm's strategy, firm performance, survival, and the underlying opportunity the firm exploits (George und Bock 2011). Referring to a global study by IBM in 2006, BM Management is not only a new trend but strongly interrelated with financial success (Wirtz et al. 2016).

Whereas sustainable BMs have always been critical for long-term success (Eisert und Doll 2014), companies today are confronted with market environments of temporary competitive advantages (D'Aveni et al. 2010). The business environment is becoming more complex, increasingly uncertain, and faster changing.

In this context, the companies' value logic is continuously growing in complexity. Understanding the business environment and the interactions and dependencies between external partners, suppliers, customers, and markets is becoming increasingly important. For this volatile business environment, the main drivers are technological change, the expansion of global processes, and stakeholders' changing needs. Consequently, the entire logic of business activities is continually being questioned. To adapt their activities to the dynamic market conditions, companies need to rethink and redesign their business activities and, therefore, their BM in a more extensive way as well as in shorter cycles than ever before (Wirtz und Daiser 2018; Gorevaya und Khayrullina 2015; Tewes et al. 2018). This redesign requires greater corporate

flexibility and a new way of thinking about how companies are managed. More and more, competition no longer takes place between products or processes but rather between BMs (Gassmann et al. 2014).

Simultaneously, changing market conditions increase the chances of the emergence of completely new business activities, making the BM concept extremely interesting for startups. The main difference between startups and established companies is that startups search for a sustainable BM, whereas established companies execute an already implemented BM (Blank und Dorf 2012). Therefore, for startups, it is primarily a matter of designing an initial BM for their company. It is more relevant for established companies to question their existing BM constantly and, if necessary, to convert, redesign, or completely innovate it. Thus, the term Business Model Design (BMD) has been established mainly for the startup world, whereas the term Business Model Innovation (BMI) is mainly used in the context of established companies. In both cases, the BM concept guides the business process by evaluating companies' configuration effects and describing and forecasting business results (George und Bock 2011).

The primary goal of this work is to develop a framework for effective BMD. Therefore, the focus is on the startup world, where BMD is one of the key challenges for the company's future (Tiwari und Buse 2020). In the case of a completely new invention of a BM, there are certainly similarities between an existing company's tasks and those of a startup. From a conceptual point of view, the BM's innovation corresponds in some aspects to the design and development of a new BM (Wirtz et al. 2016). Therefore, it can not be excluded in the course of the work that the results to be developed can also find their use cases in the environment of the established companies.

1.2 Problem Statement and Research Question

With the increasing importance of the BM as a management discipline and the increased support of startups through accelerators and incubators, various approaches have been developed in recent years to help startups with their BMD. However, these approaches still lack consistency, and an acceptable method that supports startups in designing their BM is currently not existent (Chesbrough 2010; Spremann und Frick 2011; McDonald und Eisenhardt 2020). Many of the existing approaches, e.g., the well-known Business Model Canvas by Osterwalder und Pigneur (2010), originate primarily from theoretical considerations and have not been specifically developed for the startup sector. Therefore, they do not or only insufficiently consider the needs of tool users as well as essential aspects of BMD, such as competitive analysis, an in-depth analysis of the target market, financing strategy, or alignment with the overall strategy or vision of the founders (Maurya 2012b; Fauvel und Hong 2013; Coes

2014). Based on these insights, future research should examine the design process of BMs in entrepreneurial practice. This research should include the planning and execution around BMD, possible levers and barriers of the design process, and key actors' identification. Further emphasis should be placed on the tools and management practices that align the designed BM, corporate strategy and processes, the value chain, and the company's ecosystem (Nielsen et al. 2018). Consequently, more comprehensive guidance on designing, adapting, and changing BMs efficiently and effectively is needed (Fielt 2014; Wagner et al. 2015; Spieth und Schneider 2016; Nielsen et al. 2018; Snihur und Zott 2020).

The goal of this doctoral thesis is to develop and validate such comprehensive guidance. This work is based on the hypothesis that existing approaches for the BMD of startups do not best support this task and need to be revised.

Hence, the thesis's general research field is defined by the overarching question, *'How can an effective BMD process be realized?'*. This field is more specified with the questions, *'What are the requirements of an effective BMD framework?'* and, *'Why are existing BMD approaches not effective?'*. Because this thesis aims at developing generalizable guidance for startups, it needs to answer the questions *'What is the relevant content of an effective BMD framework?'* and, *'What are the appropriate process steps of an effective BMD framework?'*.

From the point of criticism of the strong theoretical nature of the existing approaches, this work follows an intensive examination of the entrepreneurial BMD practice. Therefore, this thesis will provide insights into the question: *'How do startups conduct their BMD?'*. It should be clarified which BM components are considered and how important the different elements in BMD are. Ultimately, the thesis's overall goal is to develop a framework for effective BMD that has been derived from theoretical and practical findings and tested in practical applications. Therefore, the final question to be answered in this thesis is *'What should a practical framework for effective BMD look like?'* Overall, this results in the question structure shown in Figure 1.1.

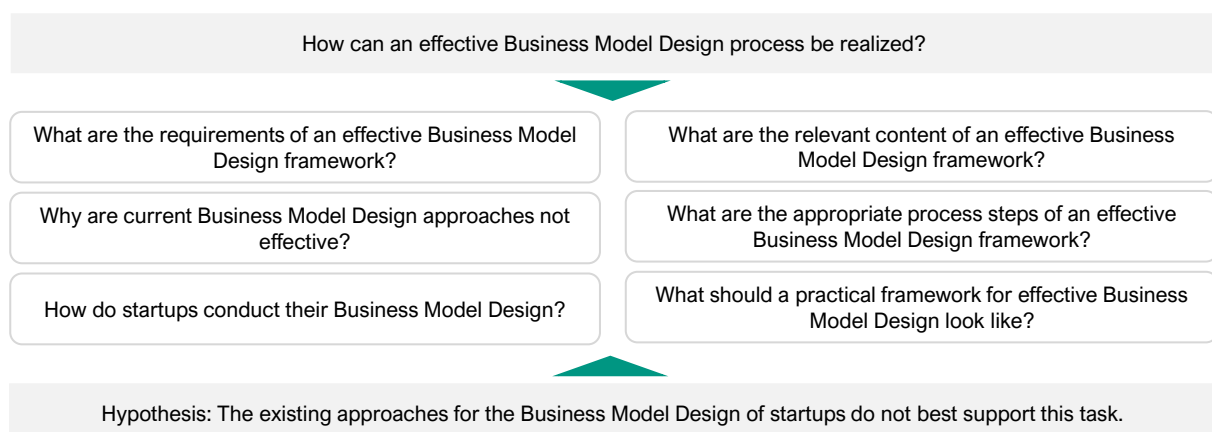


Figure 1.1: Research questions of the thesis

From a theoretical point of view, the dissertation attempts to contribute to the interface between strategic management, business development, and entrepreneurship. A quantitative analysis will add an empirical perspective to the existing research, following the goal of further analyzing the relationship between entrepreneurs' individual BMD requirements and the BMD process. Besides, the theory results will serve as input for developing a holistic approach to effective BMD. From a practical point of view, the principles and guidelines should provide entrepreneurs with orientation and guidance to implement more effective BMD processes. In summary, the dissertation aims to (1) improve the understanding of effective BMD, (2) provide new insights from BMD practice in startups, (3) build on a combined view of qualitative and quantitative analysis of BMD, (4) provide principles and guidelines in BMD for both practice and academia, and (5) develop comprehensive guidance in the form of a framework that startups can use for effective BMD.

1.3 Research Strategy

Therefore, a research strategy is needed that is built on a very solid theoretical foundation yet still allows the end-users to be incorporated into the framework's development. A research strategy is, first of all, an overall plan for conducting a research study. It provides guidance on planning, conducting, and monitoring the study without specifying which methods should be used to answer the research questions. Therefore, such research methods must complement the strategy that define exactly how data is to be collected and analyzed, e.g., through interviews, questionnaires, or statistical methods (Johannesson und Perjons 2014).

One research strategy that can fulfill the requirements mentioned above is the design science research (DSR) approach. This approach will be explained in more detail below and fitted into the context of the present work. The research methods used in each case are explained in the respective chapters.

DSR is strongly characterized by its broad application in the field of information science. One of the most common definitions of the research approach goes back to Hevner und Chatterjee (2010, S. 5), who define DSR for information science as follows:

“Design science research is a research paradigm in which a designer answers questions relevant to human problems via the creation of innovative artifacts, thereby contributing new knowledge to the body of scientific evidence. The designed artifacts are both useful and fundamental in understanding that problem. [...] Design science [...] is fundamentally a problem-solving paradigm whose end goal is to produce an artifact which must be built and then evaluated.”

Johannesson und Perjons (2014, S. 13–14) define an artifact "as an object made by humans with the intention that it be used to address a practical problem."

As possible types of these artifacts, Hevner und Chatterjee (2010) define constructs (vocabulary and symbols), models (abstractions and representations), methods (algorithms and practices), and instantiations (implemented and prototype systems).

Since the present work is located in the management discipline of entrepreneurship, it is worth considering the definitions of DSR for this discipline. For the management discipline, van Aken (2004, S. 224) defines design science as follows:

"The mission of a design science is to develop knowledge for the design and realization of artefacts, i.e., to solve construction problems, or to be used in the improvement of the performance of existing entities, i.e., to solve improvement problems."

The term artifact is less rigidly described here and is defined more by its effectiveness in solving a specific problem.

According to Denyer et al. (2008), research in design science is characterized by research questions driven by an interest in field problems, i.e., real-life problems. The research focus is on producing prescriptive knowledge that links different systems to achieve results and thus provides a path to the solution of field problems. The validation of the research results is largely based on pragmatic validity, i.e., whether the actions based on the research findings lead to the intended results.

From the management perspective, the most relevant question is whether the artifact effectively solves a real problem. However, for the designer of such an artifact, determining the artifact's type or form is already an essential part of the way to effectiveness. If, e.g., a computer-readable problem has to be solved, the artifact itself has to be computer-readable, i.e., it has to correspond to a formal method. If the problem has to be solved by human interpretation and intervention, the artifact must allow these interventions. Therefore, a semi-formal method is required, which provides a basic structure, but leaves certain freedom for the user's requirements and interventions within this structure.

An artifact can be described by specifying its following aspects (Johannesson und Perjons 2014, S. 13–14):

- The function of the artifact, i.e., what the artifact does for its users
- The structure of the artifact, i.e., the components it consists of and how they are connected

- The environment of the artifact, i.e., the conditions in which the artifact will work
- The effects of the artifact, i.e., how the use of the artifact will change its environment

BMs per se and their design are based on human decisions. Although clearly defined calculations of certain key figures can support these decisions, the decision itself is up to the entrepreneur. Therefore, the present work does not focus on developing a formal method but on developing a framework. In contrast to a method, a framework provides a structure that combines several methods or concepts (Jayaratna 1994). On the other hand, a method is defined by a prescriptive character and defines clear guidelines to achieve certain goals (Goldkuhl et al. 1997; Cronholm und Ågerfalk 1999). In other words, a framework provides a structure that can be used to combine suitable methods. These methods serve to address partial problems within the framework and solve the overall problem by combining them. However, a framework is not method independent because it should have the same underlying perspectives or philosophies (Cronholm und Göbel 2016). In this case, the explicitly underlying philosophies are entrepreneurship, strategic management, and design science.

The aspects of an artifact described above first describe requirements that the designer makes on the artifact. However, the essential criterion of effectiveness remains. This effectiveness is ultimately validated by whether the artifact fulfills the underlying purpose. According to Ziegler (2020), there is a purpose surplus of artifacts, i.e., an artifact can be used for more than just the purpose imagined by the designer. Ultimately, the user defines the artifact's essential purpose and validates whether it has effectively fulfilled this purpose.

From these considerations, two categories of requirements for the artifact result. Johannesson und Perjons (2014) define a requirement as "a property of an artefact that is deemed as desirable by stakeholders in practice, and that is to be used for guiding the design and development of the artefact."

The first category of requirements concerns the design aspects of the artifact, determined by the designer. For this purpose, different sources name different properties that artifacts should have. Table 1.1 gives an overview of some of these sources.

The second requirement category results from the fact that it is mainly the "stakeholders", i.e., the artifact's users, who define its requirements.

Table 1.1: Different requirements for the artifact.
Source: composition based on Ziegler (2020)

Exemplary requirements for artifacts	
Source	Requirements
Hevner et al. (2004)	Efficacy, Quality, Utility
Ahlemann et al. (2013)	Innovation, Performance, Usability, Flexibility, Reliability
Johannesson and Perjons (2014)	Efficiency, Effectiveness, Elegance, Ethicality
ISO 9126	Changeability, Efficiency, Functionality, Transferability, Reliability, Usability

Thus, a good artifact has to consider general requirements for the design of the artifact itself and the requirements of the users of the artifact. Since the definition of the requirements is an essential part of a DSR project, a catalog of requirements from theory and practice for the artifact is created by combining different quantitative and qualitative methods.

The elaboration of this catalog of requirements is an essential part of the effective implementation of research in design science. In recent years, several process models have been developed to guide researchers through their DSR project (e.g. (Ahlemann et al. 2013; Hevner et al. 2004; Johannesson und Perjons 2014; Peffers et al. 2007)). According to Bider et al. (2013), a design research project typically contains four activities: Problem analysis, the definition of the artifact requirements, development of the artifact, and evaluation of the artifact.

The structure of this work is based on the approach of Peffers et al. (2007) (see Figure 1.2).

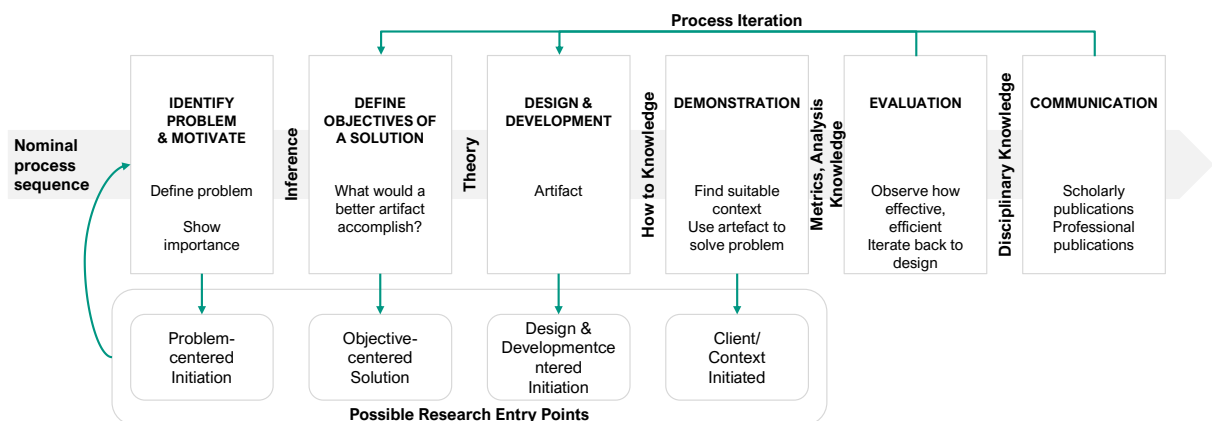


Figure 1.2: Approach to research in Design Science
Source: based on Peffers et al. (2007)

Even though the approach presented here seems to be very sequential, a design science project is usually carried out iteratively and moves back and forth between all activities of problem analysis, requirement definition, design, and evaluation (Johannesson und Perjons 2014). The approach of Peffers et al. (2007) provides a framework for the present work. The actual design of the research steps and the addition of suitable methods must be specified more precisely for the present work, done in chapter 1.4 by defining the structure of the thesis.

For the sake of completeness, another DSR approach that would also apply to the present work must be briefly discussed at this point, namely the Action Design Research (ADR) approach by Sein et al. (2011). The ADR approach was developed to address the fact that artifacts in design science often emerge from or are modified by interactions with the organizational context.

When applying the ADR approach, a so-called ensemble artifact emerges based on social collaboration that considers the realities of a context (Maccani et al. 2015). The ensemble artifact emerges successively from an iterative stakeholder collaboration and represents an improved response to a problem statement. The ensemble artifact is an IT-based development in a social context that favors the development of holistic and user-centered solutions to problems (Goldkuhl 2013). To structure the ADR method's application, Sein et al. (2011) developed a framework that guides users through the four phases and associated principles of the iterative process. According to Sein et al. (2011), the ADR approach consists of four phases:

1. Problem Formulation
2. Building, Intervention, and Evaluation
3. Reflection and Learning
4. Formalization of Learning

Implementing the ADR project requires various groups of stakeholders to work together to develop the ensemble artifact. Individual and successive *Building, Intervention, and Evaluation* cycles may change their form depending on the knowledge acquired to incorporate changing requirements that arise into the successively developed artifact. The number of cycles depends on the progress of the project and cannot be predicted. The *Reflection and Learning* component of ADR is an ongoing process to remind stakeholders and scientists to reflect on and internalize the progress and the new knowledge gained repeatedly. Tasks for this component include reflecting on the artifact design, adjusting it, verifying that all design principles are being applied, and reflecting on lessons learned from interventions that must be aligned with the project goal. Compared to the approach of Peffers et al. (2007), the focus is thus on interaction with different stakeholders of the ADR project and iteration and continuous adaptation of the artifact. An iterative approach with accompanying adaptation of the artifact is also the focus in the artifact's design and evaluation phase in this thesis. Hence, the use of the ADR approach would be considered possible. However, the ADR approach advocates a fixed research team of researchers, practitioners, and end-user. While the same person may well fill the roles of researcher and practitioner, Sein et al. (2011) recommend separating them to also benefit from iterations between the two roles. The approach is therefore primarily suitable for projects in which teams collaborate rather than individual researchers. Nevertheless, the inspiration of the

successive and highly iterative approach is adopted for the present work, and the intensive exchange between researcher and end-user of the artifact is emphasized.

The above descriptions and the definition of the work structure in chapter 1.4 focus on the explanatory context, i.e., the methodological steps by which the problem is to be investigated. The central starting point of a DSR project is real existing problems. Therefore, the context of discovery, i.e., the reason that led to a research project, is essential.

This discovery context is the focus of Hevner (2007), who describes three independent research cycles of a DSR project. The relevance cycle connects the application domain with the development of the artifact. It is intended to ensure that a problem that is relevant for business practice is solved. The rigor cycle connects the knowledge base with the development of the artifact to ensure that the artifact's development is based on scientific knowledge. The design cycle combines artifact design and its validation against artifact requirements (Hevner 2007; Hevner et al. 2004; Gregor und Hevner 2013; van Aken und Romme 2009).

In connection with these three cycles, Hevner et al. (2004) offer seven guidelines to answer the question of what constitutes a "good" research process in design science. Table 1.2 shows how these guidelines have been fulfilled for this paper.

The research strategy of the present study thus follows the guidelines of a good DSR process both in its context of discovery, i.e., the question of what should be investigated, and in its explanatory context, i.e., how it should be investigated.

Table 1.2: Guidelines for DSR and their fulfillment in the context of the present work.
Source: based on Hevner et al. (2004)

Guidelines for Design Science Research	
Guideline	Justification
1. <i>Design as an Artifact</i> : Design-science research must produce a viable artifact in the form of a construct, a model, a method, or an instantiation.	Development of a framework consisting of several methods.
2. <i>Problem Relevance</i> : The objective of design-science research is to develop technology-based solutions to important and relevant business problems.	Relevance and importance of the problem are ensured by theoretical and practical evidence. The framework is based on proven scientific management and creative methods of design science, strategic management, and entrepreneurship.
3. <i>Design Evaluation</i> : The utility, quality, and efficacy of a design artifact must be rigorously demonstrated via well-executed evaluation methods.	The three mentioned requirements as well as further requirements were evaluated with scientific methods (see point 5 in this table).
4. <i>Research Contributions</i> : Effective design-science research must provide clear and verifiable contributions in the areas of the design artifact, design foundations, and/or design methodologies.	The work derives clear, application-oriented research gaps from both theory and practice. These are specifically addressed with the developed artifact. Thus, the thesis contributes to a better understanding of the BMD process for startups as a whole and provides a solution approach for implementing effective BMD for startups in practice.
5. <i>Research Rigor</i> : Design-science research relies upon the application of rigorous methods in both the construction and evaluation of the design artifact.	Used scientific methods for validation are questionnaires, semi-structured interviews, qualitative content analysis, primary case studies, observation.
6. <i>Design as a Search Process</i> : The search for an effective artifact requires utilizing available means to reach desired ends while satisfying laws in the problem environment.	The artifact was developed in three design-test cycles.
7. <i>Communication of Research</i> : Design-science research must be presented effectively both to technology-oriented as well as management-oriented audiences.	This dissertation will be published as Open Access in the KITopen repository. Presentation at the scientific conference G-Forum (2020) in Karlsruhe. Presentation in numerous Entrepreneurship and Intrapreneurship projects with startups and industry.

1.4 Structure of the Thesis

According to Gutmann et al. (2020, S. 2–3), a DSR approach can enable researchers in the field of entrepreneurship “to develop purposeful, grounded and evidence-based interventions that serve practitioners to solve problems and that at the same time contribute to the body of knowledge.” According to the authors, purposeful means that a designer developed the artifact with a specific purpose in mind. Grounded means that the artifact was developed by a designer who has or collects scientific knowledge regarding the artifact's domain and uses this knowledge effectively to achieve his or her goals. Evidence-based means that the designer has used accepted scientific methods to validate that the artifact meets the designer's requirements.

This description again reflects the triad of relevance, scientific rigor, and practice-oriented design. The structure of the present work follows this triad. It is divided into five main chapters: Introduction, State-of-the-Art, Quantitative Pre-Study on BMD Practice, Design of the Artifact, and the Conclusion and Outlook (Figure 1.3).

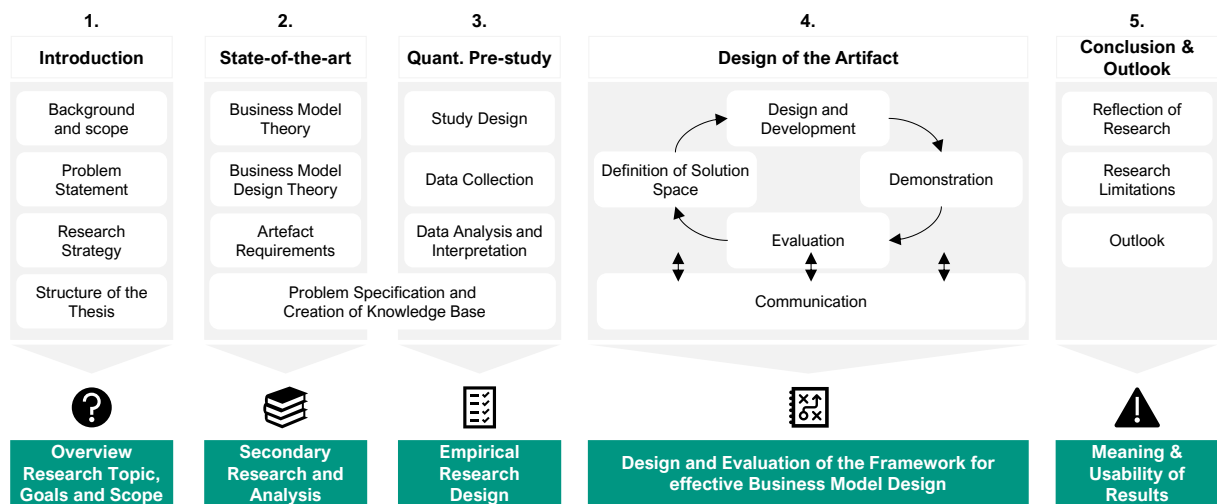


Figure 1.3: Research structure, along with five main chapters.

In chapter 1, the topic is introduced and placed in its practical and scientific context. Besides, the problem definition, the research strategy, and the structure of the thesis are specified.

Chapter 2 deals with the literature-based analysis of the state-of-the-art on the BM concept and BMD. The relevant sources consist of literature, journals, case studies, and research papers in BM research, business development, entrepreneurship, organizational theory, and innovation management. Keyword searches mainly identify relevant sources in scientific databases such as ScienceDirect, Google Scholar, JSTOR, ResearchGate, and general Google searches. Starting with a broad overview of the status quo in BM research, the chapter continues with an understanding of the role of BMD in the entrepreneurial process. Furthermore, it discusses how BM and BMD concepts are seen in the context of this thesis. It evaluates what is crucial for an effective BMD process from a literature-based perspective.

Moreover, the concept of the entrepreneurial context is conceptualized for further analysis, followed by an overview of selected BMD frameworks. The chapter ends by discussing the secondary research results and refined assumptions for the subsequent empirical investigation.

Chapter 3 deals with developing the empirical research study on the status quo of BMD in startups, accompanied by a specification of the empirical goals and research priorities. As recommended in the literature, a standardized questionnaire is used for empirical-quantitative research. The questionnaire allows for collecting a large number of data points in a short time and systematically analyzing specific characteristics. During the development of the questionnaire, the literature on quantitative study design is included, and the survey's preliminary tests are conducted to ensure validity. The next step is to present the questionnaire to the startup target group in an online survey. Various sources such as lists of institutions, startup events,

social media groups (LinkedIn, Xing, Facebook, Slack), university startup companies, startup associations, and personal contacts will be addressed to achieve a broad spectrum of startup diversity. After consolidating the collected quantitative data, descriptive and explorative statistical analyses are performed using SPSS and MS Excel, aiming at identifying relevant data patterns that allow conclusions to be drawn about entrepreneurial BMD requirements. Afterward, the results of the literature analysis and the quantitative analysis are compared. Both matching results and inconsistencies between the research results are relevant. As an outcome, a combined view of the entrepreneurial BMD process is introduced. On this basis, the requirements for an effective BMD will be derived.

In chapter 4, the actual work of artifact design begins. Based on the created knowledge base from the literature's theoretical findings and the study's practical insights, the effective BMD framework's final design requirements are derived. These requirements serve as the basis for the design and evaluation cycles in which the framework is developed. At the beginning of these cycles, a first version of the effective BMD framework is developed with a group of experts. In two intensive evaluation cycles, this design is tested, adapted, and retested several times together with the user group, i.e., startups. After each application, the framework is evaluated through interviews and questionnaires and adapted based on the insights gained. This iteration is done until the artifact's requirements are fully met, and the targeted theoretical saturation in the development of the artifact is achieved.

Finally, chapter 5 reflects the entire research process, challenges, and results. A critical discussion follows it in connection with the research questions. It also outlines the limitations of the results and the lessons learned from the research process. The chapter concludes with an outlook and recommendations for the future course of entrepreneurial BMD research and practice.

2 State of the Art

2.1 The Business Model Concept

Since the turn of the millennium, researchers and practitioners have been increasingly concerned with BM's topic. Moreover, against the background of an increasingly globalized world and rising customer requirements, companies of all sizes are more than ever dependent on their ability to quickly adapt strategies and BMs (Heuser et al. 2007). For this reason, BMs are becoming more and more popular and are becoming increasingly important as a competitive factor (Onetti et al. 2012). Every company has at least one BM, be it at the company or business unit level or connected with a specific product or service (Wirtz 2018). Some companies formulate their BM explicitly and communicate it openly, while others keep it to themselves or implicitly act on it (Lambert 2003).

This chapter introduces the BM concept comprehensively and defines its understanding for the present work from two aspects. Firstly, the BM's formative aspect is defined in chapter 2.1.2, describing the overall structure of the BM. In chapter 2.1.5, this aspect is then extended by a resultative aspect. From combining these two aspects, the final definition of the BM term for the present work is derived.

Before introducing the BM concept's underlying definition, the origin and the timely change of views and interpretations will be explained. These are based on an intensive examination of the BM literature. Numerous authors have already conducted such examinations in recent years based on systematic literature research. The present work takes advantage of this fact by using these reviews as a starting point for literature research. Table 2.1 contains a selection of the literature on which this chapter is based. For each of these literature analyses, forward and backward citations were performed. In the further course of preparing the State of the Art, own literature analyses were carried out where necessary. To ensure that the work also includes publications that were published during the period in which this work was written, search alerts for the terms "business model" and "business model design" were placed in various databases, e.g., EBSCOhost, Google Scholar, and ScienceDirect. Literature found in this way was examined for relevance and, when appropriate, incorporated into the theoretical knowledge base. The resulting literature basis covers more than 20 years of research in the field of the BM concept.

Table 2.1: A selected overview of the underlying literature reviews

Selected overview of underlying literature reviews

Osterwalder, Alexander; Pigneur, Yves; Tucci, Christopher L. (2005): Clarifying business models: Origins, present, and future of the concept. In *Communications of the association for Information Systems* 16 (1), p. 1.

Al-Debei, Mutaz M.; Avison, David (2010): Developing a unified framework of the business model concept. In *European Journal of Information Systems* 19 (3), pp. 359–376.

Zott, Christoph; Amit, Raphael; Massa, Lorenzo (2011): The business model. Recent developments and future research. In *Journal of management* 37 (4), pp. 1019–1042.

Burkhardt, Thomas; Krumeich, Julian; Werth, Dirk; Loos, Peter (2011): Analyzing the Business Model Concept - A Comprehensive Classification of Literature. In *ICIS 2011 Proceedings* (12).

Krumeich, Julian; Burkhardt, Thomas; Werth, Dirk; Loos, Peter (2012): Towards a component-based description of business models: A state-of-the-art analysis. In *AMCIS 2012 Proceedings* (19).

Wirtz, Bernd W.; Pistoia, Adriano; Ullrich, Sebastian; Göttel, Vincent (2016): Business Models: Origin, Development and Future Research Perspectives. In *Long Range Planning* 49 (1), pp. 36–54. DOI: 10.1016/j.lrp.2015.04.001.

Foss, Nicolai J.; Saebi, Tina (2017): Fifteen years of research on business model innovation: How far have we come, and where should we go? In *Journal of management* 43 (1), pp. 200–227.

Nielsen, Christian; Lund, Morten; Montemari, Marco; Paolone, Francesco; Massaro, Maurizio; Dumay, John (2018): *Business models: A research overview*: Routledge.

2.1.1 The Origin of the Term

The origin of the term has not been conclusively clarified (Bieger und Reinhold 2011; Wirtz 2018). Although many researchers associate it with the rise of the New Economy in the years 1998-2000 (Wirtz 2018), the term's earlier uses can be found in the literature¹. However, in the years just before and after the dotcom bubble in 2000, the term BM was the central aspect for companies and their investors (Lambert 2008). Since then, the term BM has also found its way into the old economy's business language and management practices (Wirtz 2018). Due to its widespread use, several attempts have been made to develop a common definition of the term (Hwang und MacInnes 2003; Pateli und Giaglis 2004; Al-Debei et al. 2008)².

The most obvious way to define the term BM is to break it down into its two components, i.e., the terms business and model. According to the Oxford Dictionary, the term business is defined as follows (Oxford University Press 2020):

“Business: the activity of making, buying, selling or supplying goods or services for money; work that is part of your job; [...] a commercial organization such as a company, shop/store or factory [...].”

Thus, the term covers activities carried out by a company within the creation, acquisition, sale, and delivery of goods or services. Monetary transactions compensate for these activities.

¹ Previous uses can be found in scientific articles such as Bellman et al. 1957; Jones 1960; McGuire 1965 see Osterwalder et al. 2005 and Wirtz 2018.

² Several listings of existing definitions of the term BM can be found in the literature reviews of e.g. Deelmann und Loos 2003; Scheer 2003; Jonda 2004; Bieger und Reinhold 2011; Zott et al. 2011; Wirtz et al. 2016; Wirtz 2018.

The concept of the model was strongly influenced by the philosopher Herbert Stachowiak, who characterized a model by the following three features (Stachowiak 1973, S. 131–133)³:

- a) the mapping feature, because "models are always models of something, namely mappings from, representations of natural or artificial originals, that can be models themselves."
- b) the reduction feature, because "models generally do not capture all the attributes of the represented original, but only those that are relevant to the respective model creators and/or model users."
- c) the pragmatic feature, because "models are not per se uniquely assigned to their originals. They fulfill their substitution function (1) for certain - recognizing and/or acting, model-using - subjects, (2) within certain time intervals and (3) under restriction to certain mental or actual operations."

When these two terms are combined, a BM thus essentially describes a simplified, idealized, and aggregated representation of a company's business activities.

However, in literature and practice, a much more heterogeneous understanding of the term, its essence, structure, function, and representation has developed in recent decades. This understanding is primarily due to different currents and different scientific disciplines that have influenced and still influence the term's use (Ghaziani und Ventresca 2005; Baden-Fuller und Morgan 2010; Bieger und Reinhold 2011; Zott et al. 2011; Wirtz 2018).

Thus, BMs are discussed in various disciplines such as management, entrepreneurship, innovation, strategy, organizational design, and economics. Depending on the context chosen, the BM construct is interpreted differently and is associated with various characteristics and purposes (Fielt 2014; Gorevaya und Khayrullina 2015), which led to a very fragmented view and a complex understanding of the BM concept.

A detailed comparison of different interpretation streams can be found in (Wirtz 2018). He traces the different theoretical approaches for defining the BM concept back to the three basic currents of information technology, organizational theory, and strategy theory. The following discussion of these three streams is a summary of the work of (Wirtz 2018) and serves to understand the term's current use better.

In the information technology approach, the BMs come from the research area of management information systems. In this stream, the focus was on business modeling and the resulting

³ In his 1973 book "Allgemeine Modelltheorie" (General Model Theory) Herbert Stachowiak describes the fundamental properties that define a Model. Unfortunately, this book is only available in German language. The following quotes are therefore translated from the original book into English by the author of this work.

business process model. These business processes were mapped with structured methods (e.g., UML or BPMN) to increase the company's information system's efficiency and effectiveness. The BM itself formed a simplified representation of the business processes on which the system developer built the information system (Wirtz 2018). Over time, however, there has been a shift in the BM's meaning and function in the information technology approach. Instead of merely describing existing processes and structures for technical system development, the BM itself became the first step in the modeling process (Wirtz 2018). Thus, the BM developed from a purely operative planning instrument of system development to an integrated organization's representation as a management tool (Schoegel 2001).

Since BMs were no longer limited to the conceptual, preliminary stage of system development, this led to the organizational theory approach. Here, BMs developed into an independent analysis instrument that served to understand the mechanisms of companies. In this context, BMs were understood as abstract representations of a company's internal structure and architecture. As such, the BM was seen as an important support for management decisions (Al-Debei et al. 2008).

With the BM's functional transformation into a support tool for management decisions, strategy theory gained importance as a related theoretical approach (Wirtz 2018). Since 2000, BM and strategy, especially corporate strategy, have been closely related in more and more papers (Chesbrough 2002; Kagermann und Österle 2006; Wirtz 2018). In the strategy-theoretical approach, BMs became an aggregated description of entrepreneurial action and provided information on which combination of production factors can be used to implement a company's business strategy (Wirtz und Kleineicken 2000). In addition to the company's internal perspective, this also led to an increase in competitive strategy components (Hamel 2002). Therefore, BMs became a management concept for the cross-company description, analysis, and design of business activities.

2.1.2 Current Understanding of the BM

Depending on the research field, these different currents still exist today, which means that even after twenty years of increasing relevance, a uniform definition of the term BM has not yet been established (Wirtz et al. 2016; Foss und Saebi 2018; Nielsen et al. 2018).

Thus, even the basic structure of the BM is still assigned a wide range of meanings in the literature, such as concept (Al-Debei und Avison 2010), method (George und Bock 2011), logic (Linder und Cantrell 2000; Osterwalder und Pigneur 2010; Tauscher 2016), tool (Al-Debei und Avison 2010; Demil und Lecocq 2010), configuration (Morris et al. 2005), model (Stähler 2002), composition (Fieft 2014), representation (Shafer et al. 2005), overview (Aarntzen 2016),

architecture (Timmers 1998; Dubosson-Torbay et al. 2002), staging (Spieth et al. 2014), frame (Chesbrough und Rosenbloom 2002), history (Magretta 2002) or system (Tikkanen et al. 2005; Zott und Amit 2010; Amit und Zott 2015; Foss und Saebi 2018).

Despite these different views, an increasingly homogeneous understanding of the form and structure of a BM is developing in literature and practice (Burkhart et al. 2011; Zott et al. 2011; Wirtz et al. 2016).

Thus, the BM is largely understood as a separate analytical unit of management, which differs from product, company, or industry (Burkhart et al. 2011; Zott et al. 2011). In this context, two predominant views for the analysis can be found, divided into a financial and a value-based interpretation. Both the financial and the value-based interpretation of the BM usually refer to the configuration of a specific business opportunity (George und Bock 2011). According to Mariotti et al. (2010), a business opportunity can be defined as “a consumer need or want that can potentially be met by a new business.”

At the fundamental level of the financial perspective, a BM is compared to an "economic model" that defines the logic of profit-making (Morris et al. 2005). More explicitly, Wheelen und Hunger (2006) describe a BM as a "method for making money".

In the value-based perspective, however, the term BM is associated with an architectural configuration that defines the processes relevant to customer and stakeholder value (Morris et al. 2005). This perspective has become increasingly popular in recent years, and many researchers acknowledge that BMs typically describe not only how customer and stakeholder value is created but also how it is delivered and captured (Al-Debei und Avison 2010; Zott et al. 2011; Wirtz et al. 2016; Foss und Saebi 2017).

Based on this consideration, three essential dimensions of a BM have been established: *Value Creation*, *Value Delivery*, and *Value Capture* (Johnson et al. 2008; Spieth et al. 2014; Foss und Saebi 2017; Nielsen et al. 2018).

- The *Value Creation* dimension describes the structure underlying the company's value creation, i.e., what the company must do and use to create value for the customer (Chesbrough 2010). This dimension defines, e.g., capabilities, the use of resources, partnerships, technologies or equipment, certain core activities or processes, and the organizational structure of the company.

- The *Value Delivery* dimension defines the offerings and how these are delivered to the customer. Therefore, it includes the description of the customer and market segment, the competitive positioning, the sales channels, and the customer relationships. This dimension is often called the value proposition dimension (Morris et al. 2005). However, since this often leads to confusion with the actual value proposition of a company or product and since the dimension itself comprises more than just this value proposition, the term value delivery is used in this work.
- The *Value Capture* dimension represents how the company creates value for itself, i.e., how it generates higher revenues than its expenditures (Johnson et al. 2008). It thus describes, e.g., the revenue strategy, pricing, cost structure. Hence, this dimension integrates the purely financial interpretation of the BM as an economic model.

Thus, the BM describes all entrepreneurial activities aimed at implementing a specific corporate goal, ensuring sustainable corporate success, and gaining a competitive advantage (Al-Debei und Avison 2010; Doleski 2015; Wirtz et al. 2016), in short, the value logic of a company.

Based on these considerations, this first partial definition of the BM concept is derived from a formative aspect⁴:

A Business Model is a model - a simplified, idealized, and aggregated representation - of a company's value logic, describing how a company creates, delivers, and captures value for itself and all relevant stakeholders.

For the development of the desired framework, an understanding of the BM's form and structure is essential. However, the degree of abstraction used in the above definition is too high for elaborating the artifact. At this point, it is referred again to Stachowiak's model theory, according to which the model must describe all attributes of the value logic that are relevant to the creator of the model or its user (reduction feature). It is, therefore, necessary to investigate in more detail what functions a BM has, how the BM can be classified, or delimited from other concepts such as strategy, what the concrete content of the three dimensions consists of and what degree of abstraction of the corresponding information content is necessary.

2.1.3 Functions of the Business Model

Following the description of the BM functions of Al-Debei und Avison (2010), BMs are used in different application areas and thus pursue different goals.

The overriding goal of a BM is to ensure the company's long-term profitability and competitive advantages over its competitors (Teece 2010; Clauss 2017; Wirtz 2018). In addition to this core

⁴ This definition is oriented on the work of Osterwalder und Pigneur 2010; Teece 2010; Wirtz et al. 2016.

objective, other objectives are derived primarily from the BM's role as an analysis and management tool. For example, BMs serve to support the analysis, design, communication, and implementation of a current or planned business activity (Bieger und Reinhold 2011; Wirtz 2018).

As an abstract yet holistic representation of the corporate logic, the BM provides a comprehensive understanding of a company's business activities. This holistic understanding, combined with a high degree of abstraction, provides management with the necessary information about customers, market, competition, processes, resources, competencies, and finances without going into too much detail. This presentation significantly reduces complexity and increases the understanding of the interrelationships within and outside the company. Thus, the BM makes it possible to simplify the management of interactions, processes, etc., and thus helps the management of a company develop a better basis for decision-making. This reduction in complexity and the associated simplification of decision-making are further goals of the BM (Deelmann 2004; Wirtz 2018).

Besides, the BM serves as a communication tool to communicate the company's core aspects to employees, investors, or other stakeholders. The BM should be understood as a consistent and concise picture of current and planned business activities (Lindström 1999; Meinhardt 2002; Doganova und Eyquem-Renault 2009). In this context, Al-Debei und Avison (2010) speak of the BM as knowledge capital, representing an information value to support strategic decision-making functions. They argue that an explicitly described BM can be a critical organizational asset that enables managers to manage the enterprise better.

The holistic understanding also aims to identify potential and assess risks more accurately (Eriksson und Penker 2000). Internal and external potentials and risks have a considerable influence on the decisions a company makes. Therefore, identifying opportunities and risks is an important goal of the company's BM (Wirtz 2018). Besides, it serves as an intermediate framework between a solution's potential and the realization of benefits for the customer group. Hence, a technology, a product, or service alone is not sufficient but can only create value in conjunction with an appropriately coordinated BM. Therefore, Al-Debei und Avison (2010) describe the BM as an alignment instrument for harmonizing strategy and business processes, including information systems, as a mediating framework between "technological potentials and innovations with the realization of economic value and the achievement of strategic outcomes". The BM is thus a central component for achieving the strategic goals of a company.

Here it becomes clear that the BM is closely linked with other management concepts, especially with strategy and business processes. Many researchers and practitioners classify BMs

as an intermediate layer that forms an interface between business strategy and ICT-supported business processes (Morris et al. 2005; Osterwalder et al. 2005; Al-Debei et al. 2008; Wirtz et al. 2016; Wirtz 2018).

Concerning strategy, several authors debate if it is part of a BM, forms an intersection with the BM, or represents a completely different superordinate level (Seddon et al. 2004). The overall goal of a strategy is to create a unique and valuable position - with a different set of activities from the competition - to perform better in the markets in which a company operates (Barney und Arian 2001; Porter 2004). Barney und Arian (2001) imply that this superior performance can be understood as the combination of sustained economic profitability and sustainable competitive advantage. Also, there are different levels of strategy hierarchy that distinguish between corporate strategy, which is directed at the organization as a whole, business unit strategy, which is inherent in each subordinate business unit, and functional strategies, which support their parent business units by developing functional competencies (Hax und Majluf 1991).

As mentioned above, the BM is also striving for competitive advantages through an exceptional value proposition for customers and value-added partners (Teece 2010; Clauss 2017; Wirtz 2018). Besides, the BM is a multi-level concept that can also include the corporate level, the business unit level, and specific products and services. In principle, both concepts have similarities and pursue a similar goal.

Seddon und Lewis (2003), therefore, also speak of two identical concepts. However, many management researchers regard strategy and BMs as two different concepts due to significant differences in consideration of competition, financing, and knowledge (Chesbrough und Rosenbloom 2002; Zott und Amit 2008). Alt und Zimmermann (2001) see value contribution as the only overlap between strategy and BM and therefore speak of two independent concepts with a common intersection.

According to Magretta (2002), Zott und Amit (2008), and Teece (2010), a BM provides the value creation architecture for the implementation of a strategy - they see the BM as a component of the strategy. For Deelmann und Loos (2003), a BM provides the basis for developing corporate and functional strategies, according to which the strategy is part of the BM.

However, an increasingly homogeneous understanding of the interrelationships between the two terms is emerging. As described above, many authors see a hierarchical rather than a partial dependence between strategy and BM. According to many authors, the BM explains how the company's activities work together in the implementation of its strategy and thus bridges the formulation with the implementation of the strategy (Richardson 2008; Zott et al. 2011). Similarly, Shafer et al. (2005) and Casadesus-Masanell und Ricart (2010) describe the

BM as a reflection of a company's strategy. According to Osterwalder und Pigneur (2002), the BM is an instrument for the coherent implementation of a strategy, based on which the operational implementation can be carried out within the framework of organizational design or the business process model. Both Zott et al. (2011) and Wirtz et al. (2016) understand the BM as a link between future planning (strategy) and operative implementation (business process management). Bieger und Reinhold (2011) conclude that the strategy is the frame of reference for the development and design of a BM. The framework of a strategy thus represents the starting point for the development of a BM. Thus, BMs serve to implement strategies and are influenced by the company's goals, strategy, and environment (Afuah 2018; Nielsen et al. 2018). Figure 2.1 shows these dependencies.

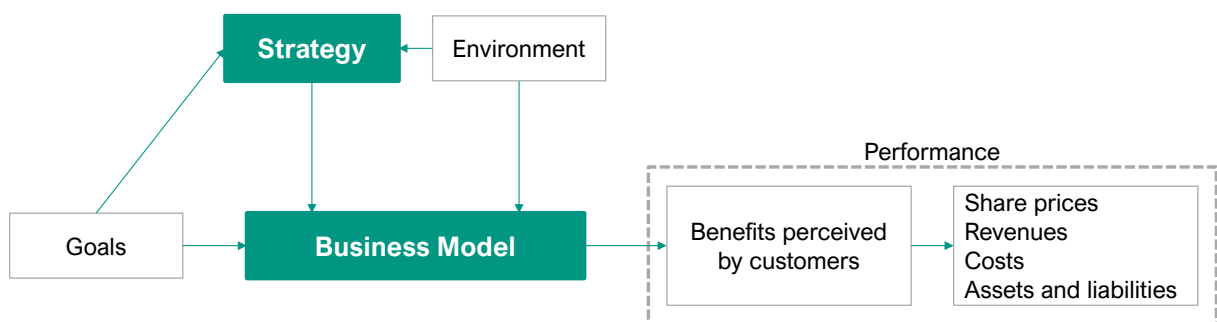


Figure 2.1: Relationship between strategy, BMs, and performance
Source: based on Afuah (2018)

2.1.4 Content of Business Models

Wheelen und Hunger (2008) find that a BM consists of important structural and operational company characteristics on a more detailed level. Zott et al. (2011) emphasize the operational perspective of a BM in this context, stressing that "the business model [...] involves simultaneous consideration of the content and process of 'doing business'". Al-Debei und Avison (2010) see the links between different BM aspects as an essential principle to achieve an overall consistent BM. Besides, the necessity to link the BM with its peripheral business relationships is mentioned. Heikkilä und Heikkilä (2013) outline that BMs are "boundary-spanning concepts" in which value activities are linked.

Consequently, some authors see the need to define and specify the relevant BM content and stress that both the internal constitution and the external conditions of a company should be considered. For example, Wheelen und Hunger (2008) mention that each BM refers to a specific business environment. Furthermore, Casadesus-Masanell und Heilbron (2015) highlight two different BM areas involved in the decision-making process - the internal constitution of a company and its relationship to external market actors. These views can be captured by linking the BM concept to a concrete business context (further analyzed in chapter 2.1.5).

A BM is integrated into a large overall system and should be linked to external actors, processes, and results (Zott und Amit 2010). From this, it can be deduced that a BM has to be adapted to its environment utilizing a specific hierarchy. Furthermore, it can be seen that individual structural and content-related BM elements must be linked with each other. These perspectives add a systemic characteristic to existing BM definitions.

According to Ropohl (2009), a system is the model of a part of reality that (a) has relations between attributes (inputs, outputs, or states) consisting of (b) interconnected parts or subsystems, and (c) whose environment is delimited by a supersystem. In this definition, three system terms are combined; (a) defines the function, (b) the structure, and (c) the hierarchy of a system. If all three system aspects are described, a complete system model is available (Ropohl 2009).

System concepts were used early on to examine the concept of the BM. These include, e.g., Afuah und Tucci (2001), who conceptualized a BM as a "system that is made up of components, linkages between the components, and dynamics." More recently, it is mainly the work of Zott und Amit (2010) that has expanded the concept of the BM as a holistic system, emphasizing the interdependencies between organizational activities and the system level. Some authors describe BMs as open systems that are integrated into a larger ecosystem (Jensen 2014). Foss und Saebi (2017) specifically define the dimensions mentioned above of *Value Creation*, *Value Delivery*, and *Value Capture* as the BM's subsystems. These subsystems, in turn, are composed of clusters of activities (Santos et al. 2009).

In connection with these clusters of activities, the term 'BM component' has been increasingly used. Structuring BMs' content based on such defined components is the most common way to describe BMs in the literature. These BM components are often referred to as BM elements, dimensions, or building blocks and are usually used synonymously (Osterwalder et al. 2005; Ballon 2007; Schallmo 2018). There are still some major differences between the individual components, e.g., the number of components included ranges from four (Value Architecture, Value Finance, Value Proposition and Value Network) in Al-Debei und Avison (2010), through nine components (Customer Segments, Value Propositions, Customer Relationships, Sales Channels, Revenue Systems, Key Resources, Key Activities, Key Partners and Cost Structure) in Osterwalder und Pigneur (2010), up to more than 20 components in, e.g., Krumeich et al. (2012).

However, common to these approaches is that the components are consistently understood as interdependent elements (Burkhart et al. 2011). Depending on the number of components, the detail and abstraction level may vary depending on the description. For the further course

of the work, it must therefore be determined which components are necessary for developing the artifact.

In the following, existing approaches to the description and development of BMs and some extensive literature research on BM components are compared. The state-of-the-art component-based view is also presented.

The three BM dimensions of *Value Creation*, *Value Delivery*, and *Value Capture* introduced in this chapter 2.1.2 serve as the basic structure for deriving the relevant components. To categorize individual BM components and thus assign them to specific dimensions, Fritscher und Pigneur (2014) classify four main questions: '*What?*' (offer), '*Who?*' (customer), '*How?*' (activities) and '*How much?*' (finances). They thus describe the dimension *Value Delivery* with the question of '*What?*', i.e., which product or service will be offered and '*Who?*' the recipient of this offer is, i.e., which customer and which market is to be delivered. The dimension *Value Capture* is addressed with the question '*How much?*' the customer has to pay for the offer and '*How much?*' the company's creation and delivery costs the company itself. The *Value Creation* is described with the question '*How?*' the offer is created, i.e., which activities and processes must be carried out for it. The concept of the four main questions is taken over and extended for the present work by the two questions '*With whom?*' (partners, networks & infrastructures) and '*With what?*' (physical & human resources) to improve the granularity of the Value Creation.

Based on the three BM dimension and the six associated questions, a more detailed level of components is derived from the literature. For this, five extensive systematic literature searches are consulted, analyzing the literature on BM components between the years 1996 and 2019. These are the studies by Shafer et al. (2005), Osterwalder und Pigneur (2010), Krumeich et al. (2012), Wirtz et al. (2016), and Fedorovsky und Treml (2019). Shafer et al. (2005) consolidate a total of 12 studies on BM components for their research. Osterwalder und Pigneur (2010) base their derivation of BM components on the consolidation of 14 studies. Krumeich et al. (2012) consider 34 studies. Wirtz et al. (2016) consolidate 16 studies for and Fedorovsky und Treml (2019) a total of 35 studies.

After adjusting for studies analyzed by several of the authors above, this procedure combines 62 studies. A list of these studies is given in Appendix A.1. Despite the different scopes, timelines, and component descriptions of the five syntheses, there is a common intersection of the most frequently mentioned components. A detailed analysis of the components shows that several different terms contain the same information, which allows those terms to be more

consolidated for further analysis. For example, the pricing and profit model's information is an essential component of the revenue model and can be summarized under this term.

Similarly, the funding and finance model's information is almost identical and can also be combined into one term. In market analysis, the two components market and competitors are often used in different constellations. Here, a closer look at the components shows that the competitive environment analysis is usually understood as part of the analysis of the market segment. Thus, these terms are also consolidated into one component. Based on the five syntheses, a BM component overview with a total of 14 BM components can thus be derived, as shown in Table 2.2.

Following this consolidation, the question of what is to be offered as part of the *Value Delivery* dimension will be further described by the components *Value Proposition* and *Strategy & Vision*. The *Value Proposition* is represented in most concepts through different areas and seems to play a central role within the BM (Zott et al. 2011). It contains a detailed description of the products and services that are or will be offered, especially the added value for the customer (Doleski 2015). Therefore, it defines the benefits the customers receive in the form of products and services, which solve problems and satisfy needs (Osterwalder und Pigneur 2010).

The *Strategy & Vision* component is in some ways a special case. Depending on the interpretation of the definitions, this component could be assigned to several questions. For example, on the one hand, the strategy is about defining the direction of the company and, concomitantly, answering the question of what goals the company is pursuing (Porter 1991). Likewise, the strategy is about how resources are allocated to achieve those goals (Barney und Arian 2001). The vision is about determining why the founders and employees should feel motivated to perform (Watkins 2007).

In this work, the purpose of the *Strategy & Vision* component is to establish coherence between the values, vision, mission, and strategic goals of the organization by defining the corporate values as a starting point. From there, management can develop and formulate the organization's vision and finally derive a mission statement. Afterward, the strategic goals to fulfill the mission can be determined, including setting goals and creating a plan (Shafer et al. 2005; Krumeich et al. 2012; Fedorovsky und Tremel 2019). The component could therefore be assigned to both the 'What?' and the 'How?' questions. It would even be possible to introduce a seventh question, namely the 'Why?' question.

Again, this special case highlights the sometimes blurred boundaries between BM and strategy (Globocnik et al. 2020). According to Blank (2013), strategy and BM are not distinguished in new companies but are fully integrated and developed together. Thus, as described in the

previous chapter, the strategy impacts different areas of the BM. However, according to Chesbrough und Rosenbloom (2002), new ventures must focus primarily on commercializing their idea when making strategic decisions. Once a market or technology opportunity is identified, the value proposition and target market are immediately defined. Strategy development is initiated but focuses on validating the opportunity and refining the value proposition. Thus, the entire strategy development process focuses primarily on validating a value proposition and its realization or commercialization (Cortimiglia et al. 2016). Thus, the *Strategy & Vision* component is linked to the company's value proposition and is therefore assigned to the question of what in the following.

The question of who this offer or value proposition is to be offered will be described by the components *Customer Segment*, *Market & Competitor*, *Customer Relationship*, and *Distribution Channel*.

The *Customer Segment* defines the various customer segments for which the company wants to provide products and services. To serve customers better, they may be segmented into groups with mutual attributes such as customer needs, profitability, or willingness to pay (Osterwalder und Pigneur 2010; Krumeich et al. 2012).

The *Distribution Channel* describes the communication, distribution, and sales channels through which an organization communicates, sells, and delivers the value propositions to the individual customer segments. These channels represent an organization's interface with its customers (Osterwalder und Pigneur 2010; Krumeich et al. 2012).

The *Customer Relationship* outlines the customers' relationship types, the ones already implemented, and their integration with the BM. Customer relationships can vary in their type from being personal to being automated. Their implementation is driven by the motivation to acquire and retain customers and to increase sales. Accordingly, the relationship between a company and its customers has a major impact on the customer experience (Shafer et al. 2005; Osterwalder und Pigneur 2010; Krumeich et al. 2012; Wirtz 2018).

The component *Market & Competitor* is about the analysis of the market structure and the competitive landscape. Moreover, it describes the market potential and demand forecasts. This component aims at achieving a good product-market-fit and competitive advantage (Shafer et al. 2005; Krumeich et al. 2012; Fedorovsky und Tremml 2019).

The *Value Creation* dimension, i.e., the questions how, with whom, and with what the proposed value is created, is described by the components *Activities & Processes*, *Value Network*, *Partnerships*, *Resources & Assets*, and *Competencies*.

The *Activities & Processes* define the activities and processes required to execute the BM successfully. They enable an organization to offer value propositions on the markets, establish customer relationships, and generate revenue streams (Shafer et al. 2005; Osterwalder und Pigneur 2010; Krumeich et al. 2012).

The component *Value Network* describes the position and the role of the company in the market. By analyzing the organization's environment, the value exchange links to other companies, and their roles in the network can be determined. Additionally, possible strengths and weaknesses in the market positioning can be analyzed (Shafer et al. 2005; Al-Debei und Avison 2010; Wirtz 2018; Fedorovsky und Treml 2019).

It is, therefore, directly linked to the *Partnerships* component. This component has the purpose of describing strategic alliances between organizations with possibilities for joint ventures or coopetition and determining procurement methods and the corresponding buyer-supplier relationships (Osterwalder und Pigneur 2010; Wirtz 2018). Therefore, both components help determine whether necessary resources and competencies can be generated through the organization or acquired from external sources.

Table 2.2: Synthesis of BM dimensions and related BM components in literature

Source: own compilation based on Shafer et al. (2005), Osterwalder und Pigneur (2010), Krumeich et al. (2012), Wirtz (2018), Fedorovsky und Tremi (2019)

Business Model Dimension	Business Model Questions	Shafer et al. (2005)	Osterwalder and Pigneur (2010)	Krumeich et al. (2012)	Wirtz et al. (2016)	Fedorovsky and Tremi (2019)	Consolidated Components
Value Delivery	What?	<ul style="list-style-type: none"> Value Proposition Strategy Product & Service Offering 	<ul style="list-style-type: none"> Value Proposition Competitive Advantage Product & Service Offerings 	<ul style="list-style-type: none"> Value Proposition Competitive Advantage Product & Service Offerings 	<ul style="list-style-type: none"> Value offering/ products & services Value Proposition Product & Service Value Creation Strategy 	<ul style="list-style-type: none"> Value Proposition Product & Service Value Creation Strategy 	<ul style="list-style-type: none"> Value Proposition Strategy & Vision
	Who?	<ul style="list-style-type: none"> Competitive Model Customer Relationship Channels 	<ul style="list-style-type: none"> Customer Segments Customer Relationships Channels 	<ul style="list-style-type: none"> Customer/Market Segment Customer Relationship Competitive Model Communication & Distribution Model 	<ul style="list-style-type: none"> Customer relationships Target groups Channel configuration Competitors Market structure 	<ul style="list-style-type: none"> Customer Market Relationship Competitors Market structure 	<ul style="list-style-type: none"> Customer Segment Market & Competitors Customer Relationship Distribution Channel
	How?	<ul style="list-style-type: none"> Activities & Processes 	<ul style="list-style-type: none"> Key Activities 	<ul style="list-style-type: none"> Organizational Structure Activities & Processes 	<ul style="list-style-type: none"> Manufacturing model Value generation Strategic Positions & development paths 	<ul style="list-style-type: none"> Channels & Logistics Activities Organization & Governance 	<ul style="list-style-type: none"> Channels & Logistics Activities Organization & Governance
Value Creation	With whom?	<ul style="list-style-type: none"> Infrastructure Value Network 	<ul style="list-style-type: none"> Key Partners 	<ul style="list-style-type: none"> Coordination Maturity Cooperation Structure & Position 	<ul style="list-style-type: none"> Business Model Network Business Model Partners Cooperation Structure & Position 	<ul style="list-style-type: none"> Value Network Partnerships 	<ul style="list-style-type: none"> Value Network Partnerships
	With what?	<ul style="list-style-type: none"> Resources Model Competence Model 	<ul style="list-style-type: none"> Key Resources 	<ul style="list-style-type: none"> Resources Model Competence Model 	<ul style="list-style-type: none"> Core competencies Core assets Resource acquisition Information 	<ul style="list-style-type: none"> Resources Competencies 	<ul style="list-style-type: none"> Resources & Assets Competencies
Value Capture	How much?	<ul style="list-style-type: none"> Revenue & Pricing Model Cost Model Profit Model 	<ul style="list-style-type: none"> Revenue Streams Cost Structure 	<ul style="list-style-type: none"> Pricing Model Funding Model Revenue Model Cost Model Profit Model 	<ul style="list-style-type: none"> Revenue streams Revenue differentiation Financing model Capital model Cost structure model 	<ul style="list-style-type: none"> Finance Revenues Revenue Streams Cost Factors Funding 	<ul style="list-style-type: none"> Revenue Streams Cost Factors Funding

The *Resources & Assets* describe the main resources and assets required to execute the BM (Shafer et al. 2005; Krumeich et al. 2012; Wirtz 2018). They can be divided into three categories. There are physical assets, such as buildings and plants, machinery, and vehicles. Secondly, there is intellectual capital, which includes protected knowledge, patents, and databases. Financial assets represent the third category. These resources and assets can be company property or obtained from partners (Osterwalder und Pigneur 2010).

The necessary human resources are described in the component *Competencies*, defining the people and their know-how necessary to create the proposed value (Shafer et al. 2005; Krumeich et al. 2012; Wirtz 2018).

Within the third dimension, the *Value Capture*, the questions regarding revenues and costs are specified by the components *Revenue Streams*, *Cost Factors*, and *Funding*.

The *Revenue Streams* define the revenues generated by the company from each customer segment (Wirtz 2018). It needs to be defined for which values the customer segments are willing to pay for respectively. Based on these findings, each customer segment can generate up to several revenue streams. A stream can be categorized as transaction revenues from non-recurring customer payments or as recurring revenues from repeating payments. Each revenue source can be characterized by different pricing mechanisms that can either be fixed or dynamic (Osterwalder und Pigneur 2010).

The *Cost Structure* defines all relevant costs incurred by operating the BM (Osterwalder und Pigneur 2010). These costs can originate from the development and the delivery of customer benefits, the formation and maintenance of customer relationships, and the revenue stream generation. Once the resources, activities, and partnerships are set, the incurring costs can be calculated (Doleski 2015).

The incoming revenues and the incurring costs are necessary information for the *Funding* component. It describes the company's overall financing strategy and includes other financial resources and plans for refinancing or fundraising. By applying management accounting methods, forecasts can be made to meet the liquidity requirements (Doleski 2015). In summary, this component's functions are controlling and financial planning (Wirtz et al. 2016).

Derived from the three BM dimensions of Value Creation, Value Delivery, and Value Capture, a total of 14 potential BM components were thus identified from a broad spectrum of studies. These components are used to specify the BM dimensions in more detail. Thus, if these components are defined during the BMD, the three dimensions themselves are also elaborated.

Even though the overview summarizes the component-based consideration of BMs in the literature, this is not a validated and generalizable constellation of all relevant BM components.

Therefore, the question of a more precise definition of "all relevant BM components" cannot be answered uniformly. Likewise, there is no approach on how to identify the relevant components in the existing literature. Rather, the various syntheses indicate that a variable constellation of business components defines the BM. However, it is noticeable that some components are always present, while other components differ. Based on this observation, it can be assumed that the BM is brought together by essential core and flexible BM components. While core elements are always part of the design of a BM, flexible elements may not always be considered in the BMD or only to a lesser extent (Fieft 2014). The literature results will be supplemented by practical insights into this work's further course to conduct further research regarding this assumption. Concerning the component-based view, particular attention will be paid to what is perceived in practice as a more or less important component. Hence, the 14 consolidated BM components in the overview in Table 2.2 are used as the basis for the analysis of the conception of relevant components in practice (see chapter 3.2).

2.1.5 The Environment of Business Models

The content analysis of the BM components shows that the BM may be regarded from the enterprise's internal perspective but must be set in relation to the enterprise environment and into the business context. Therefore, the following section deals with a closer look at what the business context means for a BM and how the BM and the business context relate to each other. In general, context is defined as "[b]ackground, environment, framework, setting, or situation surrounding an event or occurrence" (Businessdictionary 2020). Accordingly, a context analysis scans the entire environment in which business activities occur, including the industry context, market trends, and the role of the company in the supply chain. Therefore, the business context of a BM can be understood as the environment⁵ in which a BM should be implemented (Adrodegari et al. 2017).

The BM first describes an abstract constellation of what is needed to realize value-adding activities, i.e., the BM could define, e.g., that a machine is needed to produce a product (Burkhardt et al. 2011; Lahn 2015). In comparison, the business context provides the conditions for the development and establishment of the BM, i.e., to provide the necessary machines, both internal procurement strategies and external procurement options must be coordinated to realize this BM aspect. In this context, Slávik und Bednár (2014) emphasize that the BM environment determines the BM's characteristics, but is not part of it. This distinction means that the environment is not directly described as a separate component in the BM but indirectly influences the essential components' design. This understanding is shared for the present work.

⁵ Please note that the term environment, in this case, does not refer to the ecological or bionomical use of the term.

From the companies' perspective, the business context is perceived on two levels - firstly on the internal and secondly on the external business environment. Spieth und Schneider (2016) stress that the BM concept integrates both internal company elements and external environmental factors. Accordingly, Wirtz et al. (2016) emphasize that both internal and external factors must be considered when designing a BM to derive a BM's holistic picture. Similarly, Adrodegari et al. (2017) divide the BM context into three streams of influence, the industry context, market and customer, and internal environment.

The internal BM environment is represented by the corporate organization, with the main dimensions being strategy, capital, know-how, human resources, physical resources, structures & processes, and infrastructure (Ravanfar 2015; Lev et al. 2016). These organizational dimensions represent the internal influencing factors for establishing a new BM and should be considered in BM's decision-making process. Therefore, an appropriate organization is required to define and operationalize a BM concept. In line with the BM's description as a system concept, the organization describes the open system⁶ boundaries within which the BM should be realized or fulfilled. At the same time, it provides the internal framework for the design of BMs.

The external view describes all factors outside the organization that influence this open system. It can be divided into influences on the micro and macro level. The micro-level consists of the closer industry environment and is also known as the operating environment (Thomas 1974) or task environment (Cummings und Worley 1993). It is often described with Porter's Five Forces' concept according to which the immediate market environment is made up of threats from existing competitors, potential new entrants, substitutes, the power of customers, and the power of suppliers (Porter 2008). According to Zott und Amit (2007), the success a BM can achieve depends largely on the dominant market structures in which it is located or placed. Abstracted from this narrower external business context, the macro-level provides a "big picture" of both the global market effects and the comprehensive stakeholder requirements that can influence a BM's success. It is also referred to as the global environment (Thomas 1974) and can be put together by the PESTLE⁷ framework as a synonym for the six factors politics, economics, socio-economy, technology, law, and environment (Schallmo 2018).

⁶ Open systems are those that have any number of relations to their environment (Ropohl 2012).

⁷ The PESTLE framework was developed for conducting an analysis of the external environment (Johnson et al. 2011). In detail some exemplary factors are listed in the following:

- Political (subsidies, trade policy, tax rules, legislation, political stability, etc.)
- Economical (growth, key industries, interest rates, inflation, exchange rates, unemployment, taxation, etc.)
- Socio-economic (population structure, education, demography, mobility, values, attitudes, behaviors, etc.)
- Technological (research, new products and processes, product life cycle, new information and communication technologies, innovations, energy supply, etc.)
- Legal (legislation, patent protection, competition law, certification, etc.)
- Environmental (manufacturing processes, environmental requirements, presence of raw materials, emissions trading, etc.)

Overall, the internal organization and the external business environment form the business BM context and govern both opportunities and constraints for business opportunities. As shown in the previous chapter, the company's internal environment can be described by the three sub-systems *Value Creation System*, *Value Delivery System*, and *Value Capture System*, and the corresponding elements or components. Furthermore, the entire BM construct is embedded in a specific business context, consisting of relevant internal and external conditions, opportunities, and risks.

The system concept is again used here to describe the organization's interactions with the business context, more precisely, the action system's theory. An action system, or sometimes also referred to as an activity system, is an instance that performs actions. They have their theoretical roots in Talcott Parsons's structure of social action from 1937 and his action frame of reference from 1951 (Parsons 1937; Parsons und Shils 1951). Ropohl (2009) defines acting as transforming an input into an output, according to pre-set goals or conditions. This view offers a more dynamic perspective on the relationship between the organization and its environment. The focus is on the direct interactions of the internal company with closer external market actors. In this operational environment layer, the different market actors exchange information, energy, and physical mass (e.g., documents or products) (Ropohl 2012).

Consequently, this exchange influences the internal business activities of companies (Zott und Amit 2010). Following this, Brandenburger und Nalebuff (1996) analyze the effects of such mutual influences between different actors by describing what they call the value net surrounding each company. The value net is formed around the company by four actors: customers, suppliers, competitors, and complementary partners and is considered an integral part of each company's environment. Consequently, the actors' movements and decisions in the value net constantly influence the basis of a company's decision. In this context, suppliers bring together all the players who make all kinds of resources available to other players, such as materials, intermediate products, workforce, and services. A distinction can generally be made between suppliers of physical resources, financial resources, and human resources or labor force. By combining the value net theory with the theory of the firm as an action system, the following six sub-systems can be defined as part of the operational environment of the firm, i.e., those that are directly related to the firm: *Financial System*, *Supplier System*, *Complementary System*, *Competitor System*, *Customer System*, and *Labor System*. From these observations, a generic abstraction of the BM and its context can be derived, as shown in Figure 2.2.

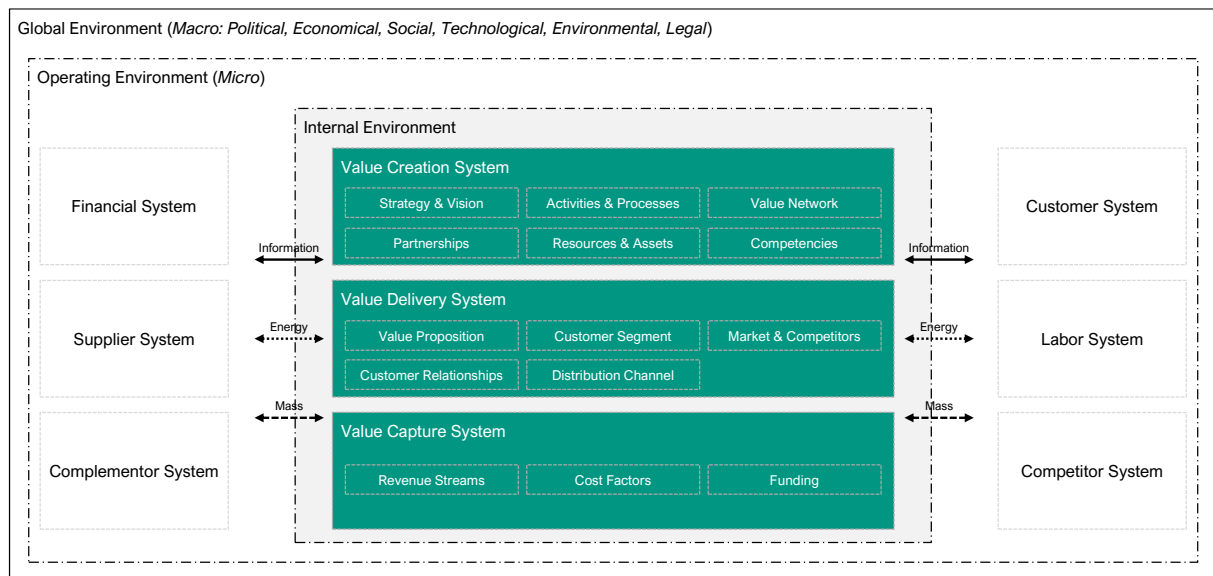


Figure 2.2: Conceptualization of the relation between BM and business context

Source: own presentation inspired by Thomas (1974), Ropohl (2012), Foss und Saebi (2017)

Depending on the companies' BM, the frequency and type of exchange between the company's internal environment as the system boundaries of the BM and these six sub-systems vary (Zott und Amit 2010). Considering this approach from the BM's point of view, the BM is extended to a multi-sided system in which business decisions should always be made in coordination with all relevant market actors. Hence, the risk of BM concepts failing due to BM decisions that are made in isolation from business reality can be reduced. At the same time, cooperation opportunities and alternative BM ideas can be discovered within the value net. Kaeser (2017) argues in this regard that "business is about creating intelligent networks in which interactions with customers and suppliers take place on various levels and at every stage of the value chain."

In summary, it can be said for the business context that there are influences on both the internal and external micro and macro environment. When designing BMs, the business context limits the design possibilities but also serves as a "source of inspiration and creativity [and triggers] opportunities for designing innovative solutions" (Amit und Zott 2015). There is a very specific set of influencing factors from the business context for each company in terms of individual growth potential and market barriers (Zott und Amit 2007). The business context is thus directly linked to the BM and vice versa.

In addition to the component-based BM view, two modes of BMs can be distinguished concerning a concrete business context and a concrete business opportunity. On one level, an operational BM stands for an implemented and running business in the real world. It describes the decisions behind a realized business opportunity in a real business context. In contrast, the abstract BM in the sense of a theoretical level only exists on "paper".

Similarly, Fritscher und Pigneur (2014) distinguish between an "as-is" BM and a "to-be" BM. Since the abstract BM is often developed considering different business scenarios, the term scenario-based BM links an abstract BM solution with a specific future business scenario. Thus, an operational BM describes a realized business opportunity, while an abstract BM describes the decisions for a possible BM solution of a business opportunity (Osterwalder 2004).

Casadesus-Masanell und Heilbron (2015), therefore, also limit a BM to "a constellation of decisions that are enforced by the authority of the firm." Besides, Casadesus-Masanell und Ricart (2011) conclude that between all existing definitions, a BM consists "of a set of managerial choices and the consequences of those choices." Similarly, Al-Debei und Avison (2010) point out that BMs "provide powerful ways to understand, analyze, communicate, and manage strategic-oriented choices [...]".

The BM concept analysis makes it clear that a BM illustrates a series of decisions about how a company should function. On the one hand, it includes decisions about the content for all relevant business components and, on the other hand, it requires decisions about the alignment and interaction of the different BM components, both internally and in exchange with the business context. Finally, the comprehensive set of decisions represents a specific business opportunity in a concrete business context. From these BM perspectives, the following partial definition of the BM concept results from a resultative aspect:

A Business Model documents a set of decisions on all relevant business components, their alignment, and their interactions, responding to a specific business opportunity in a concrete business context.

This partial definition leaves one point open, namely by whom these decisions must be made. Depending on the context, the decision-maker can be, e.g., the CEO or manager of an established company and the founder of a new company. In the following chapter, the BM concept will be more strongly put in context to the research topic, namely startups and entrepreneurship.

2.1.6 Business Model and Entrepreneurship

Following on from the basic concepts of BM research, it has become obvious that BMs are strongly linked to the discovery and development of opportunities. Likewise, recognizing opportunities is the starting point of every entrepreneurial adventure and a popular term in entrepreneurship literature (Baron 2006). Many researchers have discovered this connection, and a combined research stream of BM and entrepreneurship has been established. Furthermore, BMD approaches are considered relevant concepts in entrepreneurial practice. Accordingly, in this section, the most important links between BM and entrepreneurship are examined in

more detail. First, three forms of entrepreneurial BMD can be distinguished. First, a company can imitate an already existing BM. For this purpose, an operational BM is copied and realized in a new way. Second, companies can create new markets or innovatively shape transactions in existing markets. Third, companies can conceive and adopt completely new ways of economic exchange. In the last two options, at first, an abstract BM is developed that turns into an operational BM once it is implemented in the market (Zott und Amit 2007). Although all three situations can occur when a new company is created, entrepreneurship is particularly linked to creating new innovative market activities. According to Gartner (1990), "Entrepreneurship is the sum of the qualities and activities of a person who establishes, and assumes the risk for, a new or innovative business venture". Such persons, the entrepreneurs, "identify opportunities, mobilize resources, execute on their vision and manage risks." (Byers et al. 2011).

An opportunity is the chance to fulfill a market need (Baron 2006; Khin und Lim 2018). Two different causes can drive it: market-pull and technology-push. A distinction is made as to whether the business idea reactively satisfies an existing and perceived market need or whether a discovery proactively creates a new market need that has not been known before. In the first case, the market drives the business process; in the second case, it is technological innovation. Closely related to this, the BM concept is seen in the entrepreneurial context as a structured approach to planning strategic decisions by designing and simulating new business ideas.

The entrepreneur and, accordingly, the concept of entrepreneurship are directly linked to starting a business or creating a company. In German usage, a distinction is made between the two terms "Existenzgründung" and "Unternehmensgründung" in this context. The former refers to any form of professional self-employment, such as the founding of traditional businesses, for example, crafts enterprises, used car dealers, or other service providers. The latter are usually long-term and geared to special product and market combinations (Fallgatter 2007). They show planned growth in employees or sales and are often related to (highly) innovative products or services and scalable business ideas (Kollmann 2019). Moreover, such companies are often founded by a team and less often by individuals (Metzger 2020). For this type of business, the term "startup" has become established in general usage. Whenever reference is made to the founding of new companies or a startup, this always refers to such young companies with an innovative or scalable business idea.

In literature, the creation of a startup is usually divided into different phases. Although there is no uniform standard for these phases to date, classifications based on the maturity of the idea or the product, market interaction and the amount of external capital raised have become

established. Concerning the maturity of the idea, Kollmann (2019) defines the phases of *Idea Generation*, *Idea Formulation*, *Idea Implementation*, *Idea Intensification*, and *Idea Continuation*.

A well-known distinction for product driven development stages, especially for technology based new ventures, are the four stages defined by Kazanjian und Drazin (1990), namely *Conception and Development*, *Commercialization*, *Growth* and *Stability*.

In the context of a distinction based on the financial aspects, Schefczyk (2010) describes the three phases of the *Early Stage*, *Expansion Stage*, and *Later Stage*. The *Early Stage* deals with basic development, first product concepts, and the company's actual founding and is further divided into the *Seed-* and *Startup-Phase*. According to Kollmann (2019), another phase can be defined before the actual company-related activity called *Pre-Seed-Phase*. This phase deals with the first ideas and first interactions with the market to test these ideas without showing first defined product concepts. It is, therefore, primarily a phase of creative work. In startups' daily practice, the term *Growth-Phase* has become established as a synonym for the *Expansion Phase* (*Startup Commons 2020*). Whenever startup development phases are mentioned in the following, it is referred to the terms *Pre-Seed-*, *Seed-*, *Startup-* and *Growth-Phase* (Table 2.3).

Table 2.3: Startup development phases

Source: own compilation based on Schefczyk (2010), Kollmann (2019), and Startup Commons (2020)

Startup Development Phases						
Phase	Early Stage			Expansion Stage	Later Stage	
	Pre-Seed	Seed	Startup	Growth	Bridge	MBO/MBI
Characteristics	<ul style="list-style-type: none"> • Period before the foundation • Founding team is formed • First draft of the business model • First product sketch, first prototype 	<ul style="list-style-type: none"> • Product concept • Market Analysis • Creating legal basis for foundation 	<ul style="list-style-type: none"> • Foundation of the company • Development up to production readiness • Marketing concept 	<ul style="list-style-type: none"> • Start of production • Market launch • Growth Financing 	<ul style="list-style-type: none"> • Preparation of an IPO • or sale to industrial investor 	<ul style="list-style-type: none"> • Management Buy Out • or Management Buy In

The main difference between established companies and startups concerning BMs is that established companies already perform a proven BM, while startups are searching for a promising BM (Blank und Dorf 2012). Accordingly, entrepreneurs look for ways to turn an idea into an ongoing business. Decisions on the design of the business logic have yet to be made. Similarly, George und Bock (2011) argue that a BM is a form of creating entrepreneurial opportunities, where the BM "narrows entrepreneurial ideation to a definable opportunity [...]". It considers both enabling and limiting structures for the activities of the company and the use of resources.

Furthermore, Zott und Amit (2010) underline a "business model is a key decision for an entrepreneur". Also, BMs help founders communicate their business ideas to potential stakeholders, e.g., investors (Burkhart et al. 2011), because identifying efficient and sustainable BMs can be

crucial for attracting and retaining investors. In addition to the team-related factors for an investor's acceptance of an investment proposal, such as whether the team can deliver sustained and focused effort and whether the team is familiar with the target market and industry (Macmillan et al. 1985), recent studies also consider the strengths of the BM's market opportunity and its design as essential criteria (Mishra 2015).

Finally, the strong link between BM and entrepreneurship is reflected in some definitions of entrepreneurship itself, as the following example shows⁸: "Entrepreneurship is the recognition or creation and exploitation of market opportunities through the development and implementation of a [...] business model." (Lahn 2015). Both in startup theories and practice, a strong correlation between a BM solution and the startup's success is recognized (Faltin 2013). It becomes clear that the BM concept can make a valuable contribution to the development of startups and is omnipresent in the entrepreneurs' world, again underlining the need to understand startups' BMD practice better to sound out unused potential and optimize BMD processes.

In the context of the current research topic, the aforementioned resultative aspect of the BM definition can thus be specified as follows:

*A Business Model documents a set of decisions **by an entrepreneur** on all relevant business components, their alignment, and their interactions, responding to a specific business opportunity in a concrete business context.*

If this resultative aspect of the BM concept is combined with the previous formative aspect from Chapter 2.1.2, the following definition of the term, on which this work is based, results:

A Business Model is a simplified, idealized, and aggregated representation of a company's value logic, describing how a company creates, delivers, and captures value for itself and all relevant stakeholders, documenting a set of decisions by an entrepreneur on all relevant business components, their alignment, and interactions - altogether responding to a specific business opportunity in a concrete business context.

2.2 The Business Model Design Process

The following section explains the relationship between the BM and its design. The aim is to better understand what constitutes the BMD⁹ process and which process steps are associated with it. Furthermore, it is recognized that the terms BM development and BMD are often used

⁸ This definition by Lahn 2015 is only available in German. It was therefore translated by myself for this context.

⁹ BMD refers solely to the term Business Model Design.

synonymously. However, there is a crucial difference in the delimitation of the process phases. For this reason, this section will also examine and clarify the difference between BM development and BMD.

An empirical study by George und Bock (2011) emphasizes that the two constructs are often used together. Their analysis consists of both content and textual analysis of the responses of managers interviewed in a survey. The resulting database of 152 cases was analyzed concerning the frequency of BM-related terms. As one of the categories, the term "design", including the subcategories structure, selection, configuration, emergence, plan, map, time, and others, was considered. The results show that the design category has the highest occurrence rate compared to all seven categories analyzed and achieves the highest frequency of approximately 27.8 % normalized counts. Ultimately, this is a good indicator of the close correlation and the importance of design-related research in the BM sector.

In addition to the term design, the term development is also used equally for the same investigation object, even if clear differences between the terms can be seen. In organizational theory, the term development is understood as "a systemwide process of data collection, diagnosis, action planning, intervention and evaluation" (Beer 1984). It is more an adaptive process of planning and implementation than a design. Furthermore, it includes both design and implementation processes (Cummings und Worley 1993).

In contrast, the definition of design is seen as a "plan or drawing produced to show the look and function or workings of [something] before it is built or made" (Lexico 2020). Design "is concerned with how things ought to be, with devising artifacts to attain goals" (Simon 1996). Just as the BM is linked to several decisions, so is the design process." Starting from an idea, the design specifies how it works, how it looks and what it symbolizes [and within this process] decisions have to be made" (Kasper et al. 1999). Besides, Simon (1996) sees the logic of design in finding alternatives.

Similarly, in software development, there is a clear distinction between the two terms. Here design and development are even considered as two separate and consecutive concepts. In the design phase, a design concept is created. In the subsequent development phase, the design specifications are converted into a functional system (Sofroniou 2009). Translated to the topic at hand, BMD represents a systematic process for creating (alternative) BM concepts. Zott und Amit (2010) emphasize that BMD thus plays a key role in entrepreneurs' decision-making processes.

2.2.1 BMD Phases and Process Steps

Frankenberger et al. (2013) identify four steps in their "4I-framework of business model innovation" to move from starting the design process of a new or at least largely new BM to the successful realization of this BM: (1) Initiation (analysis of the ecosystem); (2) Ideation (generating new ideas); (3) Integration (building a new BM) and (4) Implementation (realization of the new BM). The (1) initiation phase aims to gather information and analyze the business context to prepare decisions on the BM concept. The (2) Ideation phase aims to generate different BM ideas and concepts to create a solution space of possible BM alternatives. In the (3) integration phase, the actual BM concepts are designed by presenting selected BM ideas and alternatives from the previous phase. In the final (4) implementation phase, the BM concept is transformed into a realization plan and executed. They summarize the first three phases as the meta-phase "Design". The implementation or realization phase is excluded from the design phase (see Figure 2.3). Following the view of Teece (2010), who argues that BM development contains both design and implementation phases, the entire process drawn in the 4I-Framework from Frankenberger et al. (2013) can be interpreted as BM development processes. Accordingly, the BMD process is part of the BM development process, but excluding the implementation phase (Gassmann et al. 2014). As the term "design" reinforces, it is the process of shaping a concept, but not its fulfillment (Amit und Zott 2015).

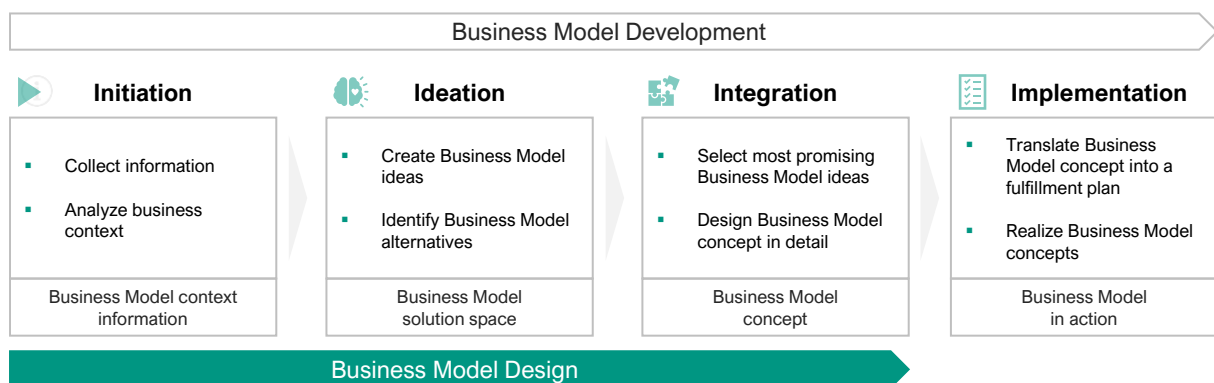


Figure 2.3: BMD as a subprocess of BM development
Source: based on Gassmann et al. (2014)

Similarly, Osterwalder und Pigneur (2010) describe a process for designing a BM in their well-known book Business Model Generation. They also clearly distinguish between design and implementation and divide their BM process into five phases: mobilize, understand, design, implement, and manage. According to the authors, the process is primarily aimed at established companies that want to innovate their existing BM, but it can also be applied to startups. The individual steps of the process are summarized in Figure 2.4. The first two phases, mobilize

and understand, aim at similar outcomes than the initiation phase from Frankenberger et al. (2013) and are therefore assigned to this phase in the further course.

	Mobilize	Understand	Design	Implement	Manage
Objective	Prepare for a successful business model design project.	Research and analyze elements needed for the business model design effort.	Generate and test viable business model options, and select the best.	Implement the business model prototype in the field.	Adapt and modify the business model in response to market reaction.
Focus	<i>Setting the stage</i>	<i>Immersion</i>	<i>Inquiry</i>	<i>Execution</i>	<i>Evolution</i>
Description	Assemble all the elements for successful business model design. Create awareness of the need for a new business model, describe the motivation behind the project, and establish a common language to describe, design, and analyze and discuss business models.	You and the business model design team immerse yourselves in relevant knowledge: customers, technology, and environment. You collect information, interview experts, study potential customers, and identify needs and problems.	Transform the information and ideas from the previous phase into business model prototypes that can be explored and tested. After an intensive business model inquiry, select the most satisfactory business model design.	Implement the selected business model design.	Set up the management structures to continuously monitor, evaluate, and adapt or transform your business model.

Figure 2.4: Five BM development phases

Source: based on Osterwalder und Pigneur (2010)

In the design phase, the third phase of the entire process, the focus is on generating new BMs. The project team members must brainstorm different BM ideas, define BM prototypes, test these, and finally select usable models, requiring people from all relevant areas to work together and evaluate the various BM ideas. The most important thing in this step is not to commit to individual ideas too early but to look at all the ideas on hand objectively. Therefore, in the design phase, it is primarily a matter of creating many BM ideas from which the most promising ones are then selected. To generate these ideas, Osterwalder und Pigneur (2010) suggest the Ideation Process, which also consists of five steps, each with a key question to be answered from the project team:

- (1) Composition of the team: Is our team diverse enough to generate fresh BM ideas?
- (2) Immersion: Which elements do we need to examine before generating BM ideas?
- (3) Expanding: What innovations can we imagine for each BM component?
- (4) Selection of criteria: What are the key criteria for prioritizing our BM ideas?
- (5) Prototyping: What does the complete BM for each short-listed idea look like?

Again referring to Teece (2010), the first four phases (mobilize, understand, design, implement) described by Osterwalder und Pigneur (2010) can also be interpreted as a BM development process. New to this BM development is the fifth phase, the manage phase, which means that the BM is not only implemented but, after this, continuously adapted and modified in response to market reactions. Hence, the overall process of Osterwalder und Pigneur (2010) is also referred to as BM management.

Wirtz (2018) also introduces a process of BM management and, within this process, clearly distinguishes between a "design phase" and an "implementation phase". Overall, he defines five phases of BM management, namely (1) design, (2) implementation, (3) operation, (4) adaptation and change, and (5) controlling. However, within his framework, the design phase is again divided into the four sub-processes idea generation, feasibility analysis, prototyping, and decision making. In each of these sub-processes, design decisions have to be made. Accordingly, within each step of the BMD process, certain decisions have to be made about the BM components' design, leading to a final decision about the abstract BM (Wirtz 2018). The components defined by Wirtz (2018) are outlined in Table 2.2. The entire design process, as part of BM management, is shown in Figure 2.5.

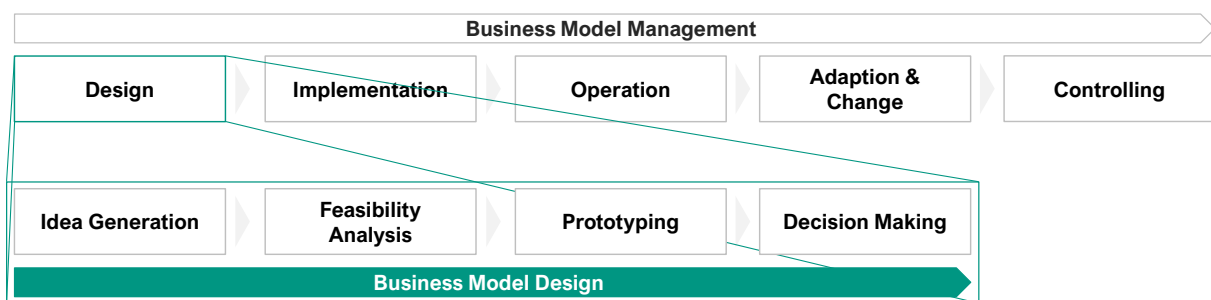


Figure 2.5: BM management and BMD process
Source: based on Wirtz (2018)

The BMD process begins with the *idea generation* phase. The task of this phase is to generate and collect as many ideas as possible. On the one hand, this includes initiative ideas that fundamentally determine the BM's concept to be developed (Zollenkop 2006). On the other hand, the ideas can be generated by imitating existing BMs of other companies in the market. These are proposed given the weaknesses of other companies to avoid potential disadvantages of the industry as far as possible and to develop new BMs (Markides 2013). Various creativity techniques can be used to generate ideas. These can be combined and carried out, e.g., in a workshop.

Based on the basic concept gained from the first phase, the *feasibility analysis* focuses on analyzing the external environment and the industrial environment (Afuah 2004), allowing the ideas to be tested for their feasibility in the BM's design. The industry and market structure, the conditions of the environment, and the competitive situation are considered external factors that can influence each other in the analysis (Wirtz 2006). (1) In the environment analysis, the technological, regulatory, economic, and social factors that reflect the general environmental conditions must be considered. (2) The elements of market potential and market volume are estimated for the existing and potential new market and examined to see whether certain ideas from the idea generation phase could affect the market situation. (3) According to the

competition model of Porter (2004), the competition in the industry and the relationships with suppliers and consumers are presented.

In the prototyping phase, different design alternatives for the configuration of the BM are elaborated. Based on the generated frame from the previous two steps, prototyping shows possible design paths for the BM. The best selection is to be made from these paths, which can avoid possible weaknesses and further refine the already designed rough BM concepts. The different prototypes should define which necessary activities, processes, and resources in the company need to be designed and built. The different BM prototypes should then enable a comparison of alternative configurations of the value-added components.

During the *decision-making* phase, the detailed concepts obtained are finally compared and evaluated. With the help of a checklist with questions to the individual BM components, which are to be answered by the entrepreneur, the prototypes are further differentiated by objective observations (Debelak 2006). The economic efficiency of each prototype is to be evaluated with the calculation of business cases. Based on the profitability analysis, the entrepreneur can make a final decision, whereby the alternative with the best fit to the defined BM goals, e.g., the highest economic advantageousness, is to be selected. By executing these four BMD phases, a complete mapping of the abstract BM can be realized.

Even if the proposed processes of Osterwalder und Pigneur (2010), Gassmann et al. (2014), and Wirtz (2018) initially appear as sequential concepts, the iterative procedure between the individual process steps is always emphasized in the description of the concepts. According to Frankenberger et al. (2013), multiple iterations within the design phase are particularly necessary to guarantee a systematic approach in their process. If relevant information is missing in the idea generation phase or further analysis is required to develop alternative solutions, a step back to the initiation phase could be important. Similarly, when developing detailed concepts in the integration phase, the solution space can be extended back to the idea generation phase. Only after the first three BMD phases have been completed will the implementation phase be initiated based on the BM concept (Gassmann et al. 2014).

Once the necessary activities, processes, and resources have been developed during the implementation phase, it is more difficult to make changes (Zott und Amit 2010). Therefore, the initial design activities' relevance increases to prevent avoidable adaptation needs after the implementation of BM concepts.

To ensure that only the BM's necessary and goal-oriented features are implemented, the Lean Startup method has been established for the transition from the design to the implementation phase. The core of Ries' (2011) lean startup methodology is validated learning through

purposeful experimentation. Validated learning aims to test and validate a set of carefully formulated assumptions through reliable empirical data from real customers. The empirical data is collected through purposeful experimentation (Ries 2011; Maurya 2012a). Accordingly, the method builds on lean manufacturing principles, i.e., avoiding waste and optimizing the use of resources, and McGrath und MacMillan's (1995) idea of discovery-driven planning, i.e., to combine planning with exploration. This idea was already developed further by Magretta (2002) concerning the design of BMs to the effect that she describes their design as "the managerial equivalent of the scientific method-you start with a hypothesis, which you then test in action and revise when necessary."

Ries (2011) evolves this idea into a cyclical process based on three recurring steps. First, entrepreneurs break down their BM alternatives into testable assumptions. For each assumption made during the BMD process, a verifiable or falsifiable hypothesis is created. In a second step, the entrepreneur develops experiments for these hypotheses, aiming to test the assumptions concerning the BM alternatives (Ries 2011). The order of these tests is determined by the relevance of the test results to continue the process. I.e., the more critical an assumption is for the successful implementation of the BM, the earlier it must be tested.

After a rigorous evaluation of the results, the invalidated assumptions are replaced by new assumptions and then tested again. This process continues until an appropriate number of tests have validated the critical assumptions. Finally, based on their interactions with potential customers, the entrepreneurs decide on the remaining assumptions (Mansoori et al. 2019). This method refines the BM alternatives' design and systematically reduces the risk of having to make major changes to the BM during the implementation phase.

Figure 2.6 shows the merging of the previous process descriptions into a common understanding of the BMD process phases. This combination forms the basis for further analysis of the BMD process in the startup practice for chapter 3.

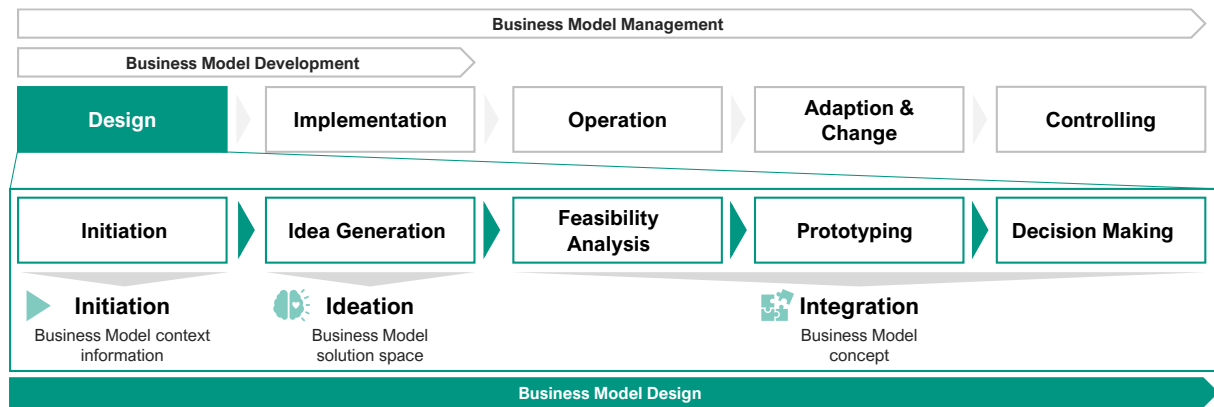


Figure 2.6: Merged view of phases and process steps for BMD

Source: own compilation inspired by Osterwalder und Pigneur (2010), Frankenberger et al. (2013) and Wirtz (2018)

In summary, BMD refers only to the design of the appropriate BM for a company, a business unit, or a product or service. The actual implementation of the BM is no longer part of the design process. On the other hand, BM development considers the entire process from the design to the actual implementation of the BM. The BMD process is, therefore, part of the BM development process and can be viewed from an entrepreneurial perspective as follows: Firstly, entrepreneurs should "actively observe, register, and make sense of the [BM's business context] before it can affect their decisions about what actions to take [to overcome] information uncertainty" (Cummings und Worley 1993). Secondly, the entrepreneurs' task is to generate BM ideas and provide an overview of possible design alternatives of the BM for the conception of the business opportunity. Thirdly, this is followed by an evaluation of the feasibility and fulfillment of the BM's goal(s). A corresponding question is here: "Do I have sufficient entrepreneurial abilities or competence for this venture?" (Mishra 2015). Fourthly, the entrepreneurs should select the most promising BM alternatives that pass the feasibility assessment simultaneously. The selected alternative should be elaborated in more detail for all relevant BM components. Finally, the design phase ends with a comprehensive BM concept, which can then be translated into practical measures for its implementation in the subsequent implementation phase.

Building on the BM understanding introduced earlier (chapter 2.1.6), the following definition of BMD can thus be concluded:

Business Model Design (BMD) is the process of systematically creating (alternative) Business Model concepts by making a set of decisions by entrepreneurs on all relevant business components, their alignment, and their interactions responding to a specific business opportunity in a concrete business context. The process result serves as the basis for the entrepreneurial decision to implement the best Business Model alternative in practice.

2.2.2 Existing Frameworks supporting BMD

In practice, the BMD process is often supported by instruments designed to guide the company or entrepreneur through the process. The design of BM components and their alignment towards a coherent BM is a complex process, as there may be several equally promising options (Massa und Tucci 2014). Therefore, these supporting tools' main task is to collect and structure the essential information and findings along the BMD process. Just as the BM itself has the function to reduce the complexity of the description of a company or business unit, these tools' task is to reduce the BMD process's complexity. Thus, they facilitate the communication of the BM and promote the understanding of the BM.

The most common way to support the BMD process is by visualizing the BM components. Using verbal and graphical elements, these BM visualizations provide simplified representations of reality and can support BM tasks beyond the capabilities of working memory. According to Henike et al. (2019), such visualizations reduce the cognitive load during a BM's design. However, they can also have a decisive influence on the creative thinking and decisions of the users.

By a BM visualization, Henike et al. (2019) understand the recorded expression of an empirical BM example or an abstract concept consisting of a meaningfully arranged graphical and verbal representation of BM components within a limited scheme (Tversky 2005; Berinato 2016). To distinguish more clearly between the types of BM visualizations, Henike et al. (2019) refer to those with empirical data as BM maps (Fiol und Huff 1992) and those with abstract concepts as BM frameworks. The latter are mainly used in the design of abstract BM and are therefore particularly relevant for the present work.

In recent years, numerous BM Frameworks have been developed. For example, there are now many tools in the literature, some of which are generic tools for all industries and sectors; others are designed for very specific industries. Table 2.4 shows a selection of these generic tools as well as some industry-specific tools.

Table 2.4: List of exemplary BM frameworks aggregated in categories

Exemplary Business Model frameworks	
Category	Tool / Author
Generic Tool	Business Model Canvas - Osterwalder and Pigneur (2010)
	Integrated Business Model - Wirtz (2010)
	RCOV Framework - Demil and Lecocq (2010)
	Lean Canvas - Maurya (2012a)
	Business Model Cube - Lindgren and Rasmussen (2013)
	Innovation Readiness Levels (IRLs) Framework - Evans and Johnson (2013)
	Business Model Navigator - Gassmann et al. (2014)
Process Model of Change for Sustainability - Roome and Louche (2016)	
Energy and Environment	Ecopreneurial Business Model Framework - Jolink and Niesten (2015)
	Framework for Business Models for renewable energies - Engelken et al. (2016)
E-business	The triple-layered Business Model canvas - Joyce and Paquin (2016)
	Business Model Gaming (Business ModelG) - Laurischkat and Viertelhausen (2017)
	Dynamic Business Model Framework - Reuver et al. (2009)
	E-Business-Model-Generator - Kollmann and Hensellek (2016)

The Business Model Canvas (BM Canvas) by Osterwalder und Pigneur (2010) is one of the most widely used instruments in practice. It has established itself as a standard tool for designing BM in theoretical and practical terms, especially in entrepreneurship education.

This approach is particularly recommended for entrepreneurs who want to develop a structured overview of the newly planned business at a very early stage (MaRS 2012). In this context, the BM Canvas can be used to visualize an existing or potential BMD opportunity on a single page (França et al. 2017). Due to the very high level of abstraction of the tool and its generic nature, the BM Canvas is perceived as a flexible and general framework and is applicable to the study of companies in all industries (Slávik und Bednár 2014). The model consists of nine BM components, called building blocks, as shown in Figure 2.7.










<p>Key Partner </p> <p>Key Partners denotes a network of suppliers and cooperation partners of a company, who, for example, provide key resources.</p>	<p>Key Activities </p> <p>The key activities are those activities through which the formulated value proposition is created and delivered.</p>	<p>Value Proposition </p> <p>The value proposition describes the benefits that a customer can derive from the company's offering. It describes which customer wishes are fulfilled or which customer problems are solved and thus represents the reason why a customer decides in favor of the company's offer.</p>	<p>Customer Relationships </p> <p>Customer relationships describe the type of relationship to be established, the degree of intensity and the costs of establishing and maintaining the relationship.</p>	<p>Customer Segments </p> <p>The customer segments define the individual customer groups to be addressed by the product. The potential customers are segmented by a market analysis in order to be able to optimally satisfy the different needs.</p>
<p>Key Resources </p> <p>Key resources are those resources that are fundamental to the implementation of key activities.</p>		<p>Channels </p> <p>Channels are used to determine how communication with customer groups should proceed. Communication channels as well as distribution and sales channels are defined.</p>		
<p>Cost Structure </p> <p>The cost structure reflects the essential costs that arise in the realization of a BM. To determine this structure, the selected key activities, resources and partnerships of the BM must be used.</p>			<p>Revenue Streams </p> <p>The revenue streams show how a company generates revenues. For this purpose, the willingness to pay of the selected customer segments must be determined and the appropriate means of pricing must be selected.</p>	

Figure 2.7: BM Canvas with a description of its components
 Source: based on Osterwalder und Pigneur (2010)

Osterwalder und Pigneur (2010) group these nine building blocks into four main categories that cover a company's four main areas: value proposition, customer interface, infrastructure management, and financial aspects. The elements of customer segments, marketing channels, and customer relationships form the customer interface. To expand these, key resources, activities, and partners are needed to represent the BM's infrastructure. The value proposition acts as an interface between the customer and the infrastructure. It forms the core of a BM. The financial model, consisting of the revenue sources and the cost structure, is the BM's monetary perspective (Osterwalder und Pigneur 2010).

Another well-known and widely used framework is the Lean Canvas by Maurya (2012a). The work of the Lean Canvas is an extension or slight redesign of the BM Canvas. Maurya replaces the four components key partners, key activities, key resources, and customer relationships of the BM Canvas with the components problem, solution, key metrics, and unfair advantage. Thus, Maurya (2012a) focuses the framework even more on defining a problem and developing a suitable solution for the customer. The stronger focus on the problem level is intended to increase the understanding of customers and their problems so that the company does not waste time, money, and effort to build on the wrong product (Maurya 2012b). Unlike the BM Canvas, the Lean Canvas is designed specifically for startups. In line with Ries's (2011) Lean Startup method (see chapter 2.2.1), the Lean Canvas puts a strong focus on testing the key assumptions around the customer problem and possible solutions (Maurya 2012b).

The St. Gallen BM Navigator from Gassmann et al. (2014), another popular BM framework, demonstrates a more process-oriented design methodology. The four key dimensions of the customer, value proposition, revenue model, and value chain are analyzed and designed by following a sequence of steps within the introduced phases of the 4I-framework (see chapter 2.2.1). This sequence leads to a BMD solution classified into one of the recommended 55 BM patterns. Overall, the BM Navigator offers more guidance and procedural structures than the other frameworks because it outlines defined process phases (Gassmann et al. 2014).

2.2.3 Critical Assessment of the Existing Frameworks

Exemplary for almost all frameworks, these examples present a very generic description of the BM concepts content. According to Osterwalder und Pigneur (2010), such frameworks create a common language for the BMD process. Therefore, they recommend using the BM Canvas as the central tool for their BMD process described in chapter 2.2.1. Nevertheless, these frameworks offer only very limited and sometimes very superficial procedural instructions on how the individual process steps of BMD can be implemented with the frameworks' support (Spremann und Frick 2011).

In general, statements can be found that the current BMD paradigm is incomplete (Upward und Jones 2016). França et al. (2017) argue that BMs designed with currently available concepts such as the BM Canvas do not ensure global scalability because they only focus on general business aspects and static components. They see a lack of integration of sustainability principles and guidelines into the BMD process. Based on their results, both overarching strategic guidelines and sector-specific needs and instruments are becoming increasingly important in BMD. Upward und Jones (2016) noted that in existing BMD approaches, the value is "uniquely measured by financial metrics with no reference to [other] impacts", implying that the success of a BM is not evaluated concerning individual BM goals expected from profit and customer value. This restriction becomes clearer when the available BM components are considered. Customer, value proposition, and financial aspects are represented, but stakeholders' perspectives or competition are missing.

The BM Canvas limits its application since aspects of growth strategies are missing (Widmer 2016). Also, there is no guidance on how to use the BM Canvas, which means that "[a]ny elicitation technique is applicable" because its purpose is more focused on a creativity tool (Fritscher und Pigneur 2014). Due to the concept's openness, its cognitive support in designing a BM cannot be guaranteed (Henike et al. 2019). Based on the findings of Simmert et al. (2014) on the practical application of BM frameworks, there is a lack of systematic process design for the creation of BMs. Furthermore, they emphasize the need to identify influencing factors that

influence a systematic process design as a preceding step. Apart from that, no links are made between the individual BM components. If the mutual effects are not considered, this can have negative effects on the design goals and thus on the quality of the BM. After all, the true strength of a BM only becomes apparent when it enables the development of a holistic system, whereas holistic means that mutual dependencies, namely the "BM mechanisms", must also be considered (Fritscher und Pigneur 2014).

Compared to other frameworks, the BM Navigator offers more guidance and procedural structures because it outlines defined process phases (Gassmann et al. 2014). Nevertheless, this approach also focuses mainly on describing different BM structures and general BMD phases but does not explain clear and holistically related process steps. It remains unclear how the individual processes are meaningfully linked and when the methods should be applied appropriately. Moreover, the approach is rather complex, so that the time required for preparation and implementation is higher than other methods (Gassmann et al. 2014).

Although the degree of abstraction varies, the authors of all three of these frameworks focus on an overview of what they consider to be the most relevant business aspects. While the BM Canvas with nine dimensions has a very high level of abstraction, the BM Navigator provides a more detailed abstraction level based on the predefined BM patterns.

Also, most frameworks consider multi-level perspectives by integrating building blocks such as product and service offerings, activities, and governance representing the internal structure, and the network architecture and partners that represent the external links. Despite the high degree of abstraction of the BM Canvas, the multi-level principle is considered through the dimensions product, key activities, key resources, and key partners. The BM Navigator covers these criteria with the dimension *Value Chain*.

The consideration of BM dynamics is not explicitly mentioned in any framework or actively included in the design result. The level of detail varies between the individual frameworks but is usually at the level of the general description of BM components. As mentioned above, a major criticism of current BMD frameworks is the lack of connection between the frameworks' individual elements. For this reason, the coherence of the resulting BM concepts is not guaranteed.

Furthermore, it can be noted that the frameworks do not explicitly offer alternative design processes and are not geared to different BMD purposes. Although different purposes are generally spoken of, no process is described that explains how a framework can be applied according to individual BMD needs. As already analyzed, the BM Canvas, e.g., is better suited to generate a general overview. More comprehensive concepts, such as the BM Navigator, on

the other hand, are better suited to obtain a detailed view of the individual components or to question an already existing BM by comparing it with the 55 patterns. An approach that gives different instructions for the specific BMD requirements is not available. Therefore, it is necessary to examine what requirements are associated with the specific design necessity to select a framework that best reflects the particular needs of the startup.

According to Wagner et al. (2015), the selection of BMD methodologies and structures are aside from these critics on BMD approaches, in most cases, more indirect results and random effects than planned and standardized actions. Another indication of unsatisfactory BMD methods can be seen in the initiatives of some experts who define and follow their individual procedures instead of using existing methods (Wagner et al. 2015).

Ultimately, this high-level analysis provides initial indications of why existing BMD approaches do not meet the user-specific requirements and expectations in BMD. At the same time, it sees the potential for developing guidelines and methods to enable a more effective BMD process. The generic character of the frameworks in conjunction with their content and their use in existing BMD processes often leads to a very superficial elaboration of the individual components and thus an insufficient understanding of the design and possible implementation of BMs. Besides, these frameworks lack complementary tools and management practices that help to design the individual components of the BM in detail and thus align the designed BM, the corporate strategy and processes, the value chain, and the corporate ecosystem (Nielsen et al. 2018)

Consequently, these insights underline the need to better understand how the framework's users can be supported as best as possible to design their BM. This understanding includes finding a suitable BMD process for them that corresponds to a selected BMD purpose and a clear BMD process. BMD users can often only guess which framework is best suited for their specific needs and follow it. In practice, frameworks such as the BM Canvas, Lean Canvas, or BM Navigator are often used in guided training, expert workshops, or startups, especially in accelerator programs.

2.2.4 Use of Frameworks within Accelerator Programs

A uniform definition of the term accelerator has not yet been established in science, but the definitions of Cohen und Hochberg (2014) and Cohen et al. (2019) are more frequently used. Accordingly, an accelerator is "a fixed-term, cohort-based program for startups, including mentorship and/or educational components, that culminates in a graduation event" (Cohen et al. 2019).

Such programs can be divided into private-sector accelerators and university accelerators depending on the executing organization. Depending on the programs' objectives, they also differ in terms of the level of maturity of the participating teams. The private sector accelerators are aimed primarily at startups which have already shown initial market interaction, i.e., are in the *Startup-Phase* or *Growth-Phase* (see chapter 2.1.6). On the other hand, university accelerators usually address teams in the phase before the company's actual foundation, i.e., the *Pre-Seed-Phase* or *Seed-Phase* (Startup Commons 2020).

This differentiation of target groups also results in differences in the content of the programs. While the private sector programs focus on intensive and targeted mentoring of the teams by industry experts, the university programs are characterized by more intensive basic instruction (Metcalf et al. 2020). Although the latter also generally provide intensive mentoring, this is less about market contacts or insights into sales and marketing but rather about mentoring in BMD and laying the foundation for the startup's organizational design. Table 2.5 shows the differences and similarities between the two types of accelerators.

Table 2.5: Comparison of Private Sector and University Accelerators
Source: based on Metcalf et al. (2020)

Private Sector and University Accelerators		
	University Accelerators	Private-Sector Accelerators
Term	Fixed: 2-6- months	Fixed: 2-4 months
Cohort based	Yes	Yes
Programming	Scheduled and ad hoc programming, covering a range of startup and specialized topics.	Seminars
Mentorship	Intense	Intense
Culmination	Public Pitch Event or Demo Day	Public Pitch Event or Demo Day
Funding to participants	Most provide financial support (grants, stipends, etc.) without receiving equity.	Most provide investment in exchange for equity.

Metcalf et al. (2020) show in their study of various university accelerators that frameworks such as the BM Canvas or the Lean Canvas essential, especially in programs with a strong focus on basic knowledge and learning (see Table 2.6). This analysis also shows that such programs take two to six months on average. Since the BMD process in these programs is only part of the content, the process must not take up the program's entire duration but must leave time and space for other content. In terms of the time and resources required, it can be deduced that the BMD process must be completed within a maximum of two months.

Table 2.6: Program focus of University Accelerator programs
Source: based on Metcalf et al. (2020)

Program focus of University Accelerator Programs			
Outcome cluster	Focused on education-related outcomes	Focused on funding, persistence, and growth	Mixed focus
Program focus	1. Customer discovery	1. Funding models	1. Pitch practice
	2. Business model or lean canvas	2. Pitch practice	2. Market and Industry research
	3. Pitch practice	3. Company formation, equity and partnership issues	3. Sales
	4. Prototyping/Minimum viable product	4. Sales	4. Mixed including lean startup methods, equity and partnership issues, company formation, or funding models
	5. Market and industry research	5. Lean startup methods	

This observation supports a strong focus on the BMD of these frameworks. Accordingly, they are primarily used in the early development phase of the startup. They play only a minor role in implementing the BM and entry into the growth phase or scaling. The target group for such BM frameworks in the startup area is primarily teams in the early phase of idea generation and idea testing, i.e., those primarily assigned to the *Pre-Seed* and *Seed-Phase*.

For the further development of the framework in the present thesis, these findings conclude that this framework should also be developed primarily for and in cooperation with startups in the *Pre-Seed-* and *Seed-Phase*. To benefit best from the startups' practical experience, the quantitative study on the status quo of the BMD process in practice should focus on startups in the transition from the *Startup-Phase* to the *Growth-Phase*. This focus ensures that the participating startups have already gained enough experience in designing their own BM and can answer the questions asked based on experience. To support the most effective BMD process for startups, the framework to be developed in the further course of the study should also be applicable without experts' or coaches' guided training. Therefore, the framework must be designed so that the BM designers do not require any special background knowledge or, where necessary, can learn this knowledge during the BMD process.

2.2.5 Goals and Motivations for BMD

However, the effectiveness of a process is not only defined by its simple applicability and the necessary prior knowledge. Rather, there are many requirements for the process itself and the tools used during the process so that this process can be considered effective.

The term "being effective" describes "the ability to be successful and produce the intended results" (Cambridge University Press 2014). Effectiveness¹⁰ is thus defined by a successful action. In the present case, this successful action is defined by whether a company succeeds in designing a BM in certain situations, e.g., in the course of founding a startup. It is essential to note that the design does not necessarily demand the success of the BM. The key implication is that the effectiveness of BMD is not defined by the quality and effectiveness of the resulting

¹⁰ Please note that the terms effectiveness and efficiency are used synonymously in this work.

BM, but only by whether the company achieves a result in the design process. Although the framework must enable the user to take the right steps to achieve its goals, a framework for effective BMD means that the framework's user is supported in the best possible way on the path to designing its BM. Thus, to validate in practice whether the framework enables effective BMD, it is not the outcome of the process, i.e., the BM, that needs to be evaluated, but rather the designer's guidance to that outcome, i.e., the framework itself. The terms framework for effective BMD and effective BMD framework are used interchangeably throughout the work for better readability.

Referring to Stachowiak's (1973) definition of the model again, it is clear from the pragmatic feature that models are not just models of something. They are also models for someone, thereby fulfilling their functions within a time interval, and they are models for a certain purpose. Hence, designing a model means considering what something is a model of and for whom, when, and for what purpose the model will be created.

Therefore, to develop the most effective instructions for designing a particular result, it is necessary to know and understand both the result itself and the designer's motivation. Based on the developed understanding of the terms BM and BMD, this chapter will first summarize the intended BM goals of a designer, in this case, the entrepreneur, and what their motivation is to initiate the BMD process, i.e., the BMD purpose. The analysis focuses on three levels. Firstly, the level of BM-related goals, secondly, the structure of the result, and thirdly, the BMD-related purposes, i.e., the motivation to conduct and implement a BMD process.

For the derivation of BM related goals, the BM functions from chapter 2.1.3 form the basis. Originally, goals in the business world were strongly linked to profit measurements and represented only shareholders' interests. Today, the understanding of success has evolved and increasingly takes other stakeholder needs into account. As a result, BM goals can be different for each company or scenario. For example, in terms of financial targets, startups may strive to find the BM that offers the opportunity to achieve the highest gross profit margins. In terms of customer value creation goals, startups could focus on finding the BM that creates the highest value for their target group(s). In terms of environmental goals, startups could focus on finding the business unit that has the least negative impact on the environment. For startups, in particular, a risk-reducing BM's goal may also be very likely (Ries 2011). Even though the goals are set individually for each startup, some BM success factors in the literature can provide orientation for general BM goals. As a relevant reference, Morris et al. (2006) cite six criteria associated with BM success, including (1) the uniqueness or novelty of the BM concept, (2) the future probability of making profits, (3) completeness, (4) inimitability, (5) robustness, and (6) sustainability. Similarly, some studies in the field of entrepreneurship evaluate the most

important success factors of startup concepts. Transferred to BM goals, BM concepts should ideally (1) have clear market advantages in the sense of a novel, additional customer benefit, (2) enable attractive margins, (3) offer opportunities for long-term protection against imitators and larger competitors, and (4) enable a start with as little capital as possible (Faltin und Ripsas 2011).

As companies no longer focus exclusively on profit-oriented shareholder goals but increasingly on different stakeholder needs, it can be concluded that there is a combination of different BM goals (Upward und Jones 2016). In this case, the relative relationship between the BM goals must also be determined. This view is also underlined by Boland und Collopy (2004), who believe that “[a] good design solution always reflects a balance of competing demands among user needs, the environment, future generations, resource capacities, real costs, and the unique historical tensions of the situation”. From these considerations, it can be concluded that a framework for effective BMD must include the definition of individual BM goals that serve as a starting point for determining the direction of the BMD process.

In addition to these BM-related goals, general structural requirements are also placed on the result of the BMD process. The modeling principles of Al-Debei und Avison (2010) provide a starting point for defining structural effectiveness. In this respect, BM concepts should fulfill five structural criteria. First, the BM concept should be at one (1) conceptual level, which means that the design solution is an abstraction from the planned business's full complexity. Simultaneously, a (2) multi-level perspective should be established by including different dimensions such as offerings, internal organization, and networks. Third, the (3) dynamic feature should ensure that possible future variations of the BM are both considered and enabled. Besides, the (4) design solution should be granular so that individual units of the overall concept can be easily managed and controlled. Furthermore, the design concept (5) should be coherent and therefore link all aspects together so that the result demonstrates the complete core logic of the business.

A further variable that influences the BMD process's effectiveness is the BMD-related purpose, i.e., the BMD's motivation. As already defined in chapter 2.2.1, the overall goal of an entrepreneur's BMD process is to systematically create (alternative) BM concepts by making a set of decisions on all relevant business components, their alignment, and their interactions responding to a specific business opportunity in a concrete business context. This process serves the entrepreneurial decision to implement the best BM alternative in practice. However, since BMs can serve different goals, the BMD process can also serve several purposes from a designer's perspective. These purposes are derived from the BM functions already introduced in chapter 2.1.3. Therefore, the result of the BMD process can be used to (1) get an overview of the most

important business components or (2) validate business ideas (Osterwalder et al. 2005; Spieth und Schneider 2016). It can also be used to (3) define all relevant BM components in detail. Furthermore, BMs are used to (4) present business ideas to stakeholders such as potential investors (Burkhart et al. 2011). Other goals found in the literature relate to (5) identifying opportunities and risks (Zott und Amit 2010) and (6) reducing complexity (Eriksson und Penker 2000; Aarntzen 2016). It should be noted that identifying opportunities and risks at this point does not refer to the discovery of an initial idea. Rather, it is assumed that the entrepreneurs have already recognized an opportunity for entrepreneurial action, for example, in changing needs, regulations, technical possibilities, or trends. From this first idea, the initial spark, the motivation to pursue the idea entrepreneurially arises. Therefore, identifying opportunities and risks listed here refers to opportunities that can arise along with this further entrepreneurial action. For example, a certain customer group enables better opportunities for rapid market penetration than others, but still concerning the entrepreneur's initially recognized opportunity.

BM goal-related criteria	BM structural criteria	BMD purpose-related criteria
Individual BM Goals	Conceptual	Getting a general overview
+	Systemic	Define components in detail
Sustainable business	Dynamic	Present business ideas
Clear market advantages	Granular	Validate business ideas
Attractive profit margins	Coherent	Identify opportunities and risks
Permanent competitiveness		Reduce complexity
Little capital needs		

Figure 2.8: BM-related goals, structural characteristics of BMs and motivation for BMD

In summary, both the specific BM goal(s) and its structure and the BMD purpose(s) together must form the starting point for developing a framework for effective BMD. Figure 2.8 summarizes these three categories.

2.2.6 Requirements for effective BMD Frameworks

Based on this, the requirements for the framework itself in terms of the artifact, i.e., the DSR process result, are derived. They provide the basis for a requirement catalog, which will be refined and, if necessary, expanded by the empirical study results. This expansion will then serve as the requirement catalog for the design cycle of the BMD framework.

In DSR, requirements are generally equated with evaluation criteria. According to the Institute of Electrical and Electronics Engineers (IEEE) 610.12-1990 (IEEE Standard Glossary of Software Engineering Terminology 1990), a requirement, in general, is defined as “[a] condition or capability needed by a user to solve a problem or achieve an objective.”

As already introduced in chapter 1.3, for DSR, Johannesson und Perjons (2014) define requirements as "a property of an artefact that is deemed as desirable by stakeholders in a practice and that is to be used for guiding the design and development of the artefact. [...], a requirement can concern the functions, structure, or environment of an artefact as well as the effects of using the artefact.”

Therefore, it is important to develop the general BMD framework based on strict DSR requirements to ensure that the user can make the best use of the framework and get the most out of the application.

The definition of these DSR requirements is knowledge-based and adapted to the specific use of the artifact, as there is no uniform standard in the field of DSR evaluation (Stockmann und Meyer 2014). The context of use is based on analyzing the problems that the artifact is supposed to solve, given by the previous chapter. From this, requirements for the artifact can be derived, based on which the artifact is later evaluated (Däuble et al. 2014).

The requirements are derived directly from the knowledge of the BMD process. Specifically, a distinction is made between *functional*, *structural*, and *environmental* requirements for the artifact (see chapter 1.3). A *functional* requirement concerns the functions of an artifact. A *structural* requirement concerns the structural properties of an artifact, such as coherence and modularity. An *environmental* requirement concerns the artifact's framing properties, such as usability or comprehensibility in a specific context (Johannesson und Perjons 2014).

To define the requirements, the *user*, the *concrete task*, the *motives for the application*, the *tools used*, and the *general conditions* must be considered (Däuble et al. 2014).

The *users* are looking for support in designing a BM. In this case, they want to pursue entrepreneurial activities either alone or as a team. The users' group is very heterogeneous and cannot be further restricted in terms of age and skills. In principle, an affinity for entrepreneurial activities can be concluded.

The *concrete task* that the artifact is supposed to fulfill is to support the users in designing their BM. In doing so, the artifact is based on the users' goals and motivations defined in the previous chapter. The artifact should serve as a guideline along the entire design process and suggest methods and procedures for individual sub-steps. It also assists in the search for information.

With the help of the framework, it also provides visual support and an overview of the designed BM alternatives and the finally selected BM.

Support in the BMD process is the *motive for the application* of the artifact. By making the methods and information sources available, the users will find it easier to search for information and thus create the BM. The complexity of the topic is reduced to essential points for the users. They receive a complete overview of the BMD process. They can understand which questions are relevant and which design options they have for the BM components. The artifact helps them validate their idea, identify opportunities and risks, and make decisions and arguments.

The *tools* a user can use are also very heterogeneous. For example, the user can run through the process in analog form or use digital platforms, strongly depending on the user's preferences and the respective application's general conditions.

The general conditions concern the location and the users themselves. The application can be in digital or analog form. Here, too, a distinction must be made between application during a targeted program, similar to an accelerator program, and application without externally guided support. In the guided variant, the environment can be influenced by other users, while the application without external guidance depends solely on self-selected influences. In the externally guided variant, the instructor can also serve the user in an expert's role to support information exchange and decision-making.

The following requirements can be derived from this usage context and are divided into the presented main categories *functional*, *structural*, and *environmental* requirements. The *functional* requirements are developed from the explicit motives of the application and transformed into requirements. The starting point for the analysis of the *structural* requirements is the results of the previous investigations of effectiveness criteria for BMD frameworks by Lucassen et al. (2012), Hoffmann (2013), and Henike et al. (2019). These results are compared and supplemented by the structural DSR requirements of Johannesson und Perjons (2014). The *environmental* requirements are derived entirely from Johannesson und Perjons (2014).

The derived functional requirements formulate the purposes that the framework should fulfill. The tasks and motives from the context of use can be translated directly into requirements for the framework. The most obvious purpose of the framework and, therefore, the basic functional requirement is to enable users to design at least one BM. Since this BM is bound again to a purpose, additional fine granular functional requirements are added. A BM is not necessarily designed to have a BM per se, but because a purpose is to be fulfilled again with this BM, e.g., better clarity of the company's structure or the convincing presentation of an idea before an investor. The artifact should, therefore, not only help to design a BM per se. Rather, the

additional functional requirements are linked to, for example, whether a team has gained more clarity about the company's structure after applying the framework or has been enabled to elaborate the most convincing arguments of an idea for an investor meeting.

Therefore, the artifact should contribute to achieving the purposes from chapter 2.2.5 and cover the motives and tasks of the users. Table 2.7 lists the functional requirements derived from the goals and motives mentioned in the previous chapter.

As shown in chapter 2.2.2, numerous BM frameworks already exist, some of which are used by startups at a very early stage, e.g., to generate ideas. Therefore, it can be assumed that many startups have already come into contact with such frameworks.

Furthermore, it can be assumed that many startups have already started to think about their possible BM without having used a specific tool or have even made the first attempts to design this BM. Therefore, another functional requirement is introduced, namely the improvement over the status quo, whereas the artifact must have advantages and improvements over the current approach used by startups to design their BM.

Table 2.7: Listing of the functional requirements

Functional requirements	
Requirements	Goal and motive
The artifact must enable the user to design at least one Business Model.	Users perform the Business Model Design process to have designed a Business Model at the end of the process.
The artifact must reduce complexity by implementing a structured business model design.	Users seek assistance in the complex process of designing the business model.
The artifact must help users to find and process the relevant information about the aspects of the business model.	Users want to understand and define the aspects/components of the BM in detail.
The artifact must help to identify opportunities and risks and help to react to them.	Users want to understand internal and external potentials and risks.
The artifact must help to validate the current business ideas and contribute to decision making.	Users need to validate the business model alternatives and need support to make decisions.
The artifact must help to present the business idea respectively communicate the chosen business model.	Users need to present the result of the business model design process to stakeholders.
The artifact must offer advantages and improvements over the current Business Model Design approach.	Users need to improve their status quo of designing a business model with the use of the artifact.

As already mentioned, the starting point for the definition of the *structural* requirements for the artifact is the results of the investigations of Lucassen et al. (2012), Hoffmann (2013), and Henike et al. (2019). These studies consider which structural criteria the BMD process itself and the supporting instruments must fulfill to enable effective BMD.

The study by Lucassen et al. (2012) formulates the effectiveness of BMD frameworks as the extent to which the framework's application is successfully communicated, and the totality of the BM is captured. According to Lucassen et al. (2012), communication effectiveness consists of three factors: (1) Acceptance: the techniques used in the framework must be accepted in

business and academia, (2) Internal Cohesion: the elements of the BM are related to one another and (3) Number Concreteness: concrete numbers are shown in the model.

The other type of effectiveness described by Lucassen et al. (2012) is the capturing effectiveness, which also consists of three elements: (1) Explicit Modelling Method: The framework provides instructions explicitly defining the approach, (2) Method Efficacy: instructions are easily translated into practice and (3) Absence of Redundancy: the resulting models contain no redundant information. If a framework for the design of a BM meets these requirements positively, Lucassen et al. (2012) consider the framework effective.

In her research, Hoffmann (2013) defines three comprehensive requirements that effective methods for the design of a BM must meet: (1) the promotion of knowledge generation and understanding, (2) the support of creativity, and (3) the inclusion of a form of visualization and tangibility.

Henike et al. (2019) extend this list of requirements by the element of cognitive effectiveness, i.e., the extent to which a BMD framework can reduce the user's cognitive load when designing a BM. The cognitive load is the strain on working memory during the execution of a cognitive task such as evaluating information or making decisions (Sweller 1988). Cognitively effective frameworks are therefore helpful and easy to apply if they consist of clear, comprehensive, but content-based, easily grasped, and rigid elements (Huang et al. 2009; Moody et al. 2010) and if they easily and helpfully relieve the tasks that otherwise take place in memory (Larkin und Simon 1987). Based on the theory of cognitive load and framing theory, Henike et al. (2019) qualitatively analyze 103 BM visualizations and derive structural features that influence BMD frameworks' cognitive effectiveness.

Open frameworks, i.e., frameworks that do not define a clear process and are kept generic, such as the BM Canvas of Osterwalder und Pigneur (2010), allow a quick and easy filling of the individual components but do not necessarily stimulate the creation of creative BMs (Henike et al. 2019; Snihur und Zott 2020). Closed frameworks, i.e., those that already provide different design options for the BM components, e.g., the BM patterns of the BM Navigator of Gassmann et al. (2014), can simplify BM's evaluation alternatives and thus accelerate the decision-making process.

Henike et al. (2019) show that BM visualizations have low cognitive effectiveness if the frameworks' operationalization is not well formulated. If this operationalization is not given and if the frameworks are not already known or resemble graphically known visualizations, their cognitive effectiveness, helpfulness, and ease of use are minimal. From this, it can be deduced that although the framework can be designed openly, clear methodologies and operationalizations

must be specified for the design of the individual BM components. This requirement for clear operationalization includes the two previously mentioned requirements of the explicit modeling method and the method efficacy. Therefore, these three requirements are combined under the criterion of clear operationalization and guidance.

These criteria were then compared with the structural requirements of Johannesson and Perjons (2014). They define coherence, modularity, and conciseness as the three essential structural criteria. Coherence is defined as "the degree to which the parts of an artefact are logically, orderly, and consistently related." This definition is in line with the internal coherence demanded by Lucassen et al. (2012) and therefore already stated. Conciseness is defined as "the absence of redundant components in an artefact", which is also in line with Lucassen et al.'s (2012) absence of redundancy and is therefore also not included again. However, Johannesson und Perjons (2014) also demand modularity, i.e., "the degree to which an artefact is divided into components that may be separated and recombined." This requirement will be added, resulting in the final list of the structural requirements listed in Table 2.8.

Table 2.8: Listing of literature-based requirements for BMD process effectiveness

Source: compiled from Lucassen et al. (2012), Hoffmann (2013), Johannesson und Perjons (2014), and Henike et al. (2019)

Structural requirement	
Requirements	Description
Acceptance of methods	The techniques used in the artifact must be accepted in business and academics.
Internal cohesion	The elements of the artefact are logically, orderly, and consistently related to one another.
Number concreteness	Concrete numbers are determined during the application of the artifact.
Absence of redundancy	The resulting components contain no redundant information.
Clear operationalization and guidance	The artifact is an openly designed process with clear methodologies and operationalizations for the design of the individual business model components.
Modularity	The artefact is divided into components that may be separated and recombined.

The *environmental* requirements for the artifact's framing are derived from Johannesson und Perjons (2014) only and are listed in Table 2.9.

Table 2.9: Listing of the environmental requirements

Source: Johannesson und Perjons (2014)

Environmental requirement	
Requirements	Description
Usability	The ease with which a user can use an artifact to achieve a particular goal.
Comprehensibility	The ease with which an artifact can be understood or comprehended by a user (also called understandability).
Customizability	The degree to which an artifact can be adapted to the specific needs of local practice or user.
Suitability	The degree to which an artifact is tailored to a specific practice, focusing only on its essential aspects (also called inherence or precision).
Completeness	The degree to which an artifact includes all components required for addressing the problem for which it has been created.
Efficiency	The degree to which an artifact is effective without wasting time, effort, or expense.

Concerning the overall research question, "How can an effective BMD procedure be realized?" these requirements represent the criteria by which the artifact is to be evaluated. Conversely,

this means that the artifact must meet these functional, structural, environmental, and general criteria to support users in effectively designing their BM. Figure 2.9 summarizes these criteria for the sake of clarity.

Functional Requirements	Structural Requirements	Environmental Requirements
Design a Business Model	Acceptance of methods	Usability
Reduce complexity	Internal cohesion	Comprehensibility
Define components in detail	Number concreteness	Customizability
Present business ideas	Absence of redundancy	Suitability
Validate business ideas	Clear operationalization and guidance	Completeness
Identify opportunities and risks	Modularity	Efficiency
Improve status quo		

Figure 2.9: Summary of the requirements for an artifact for effective BMD

However, it should be noted that these criteria are based purely on the current status of the literature. Although some of this literature is based on empirical findings, as a DSR approach, the present work needs to interact with the practice itself. The following two chapters, therefore, deal in detail with the status quo of BMD in startups. The knowledge gained from this analysis is then incorporated into the existing catalog of requirements. The thus readjusted catalog then serves as a design guideline and later evaluation basis of the effective BMD framework to be developed.

3 Quantitative Pre-Study on BMD Practice

3.1 Empirical Research Model

From the in-depth literature analysis on the state of the art, some findings could be derived that support the present work's main hypothesis. This hypothesis states that the current frameworks for BMD do not support startups effectively enough. The literature analysis also shows that quantitative analyses are underrepresented in the BM research field and therefore have great potential to provide further insights for effective BMD.

Therefore, the present empirical study aims to collect and analyze information on the BMD practice of startups. The research focus is still on entrepreneurship, so the target group consists primarily of startup companies. In this work, a startup is understood to be an entrepreneurially acting person or team actively working on a company's foundation, even if no legal entity has been found yet.

To date, very little is known about how startups perform the BMD process and whether and how satisfied they are with this process. Although some qualitative, mostly case study based studies have already followed the approach of various companies in designing their BM, these studies focus more on using existing frameworks rather than on the process itself. Thus, little attempt is made to analyze what is to be considered from the founders' point of view. Information is missing about which components are particularly relevant from their perspective and which process step requires how much time and resources. Also, it not clear whether a concrete process is followed at all.

The basic goal of the empirical research presented in this section is to validate the thesis that the existing process frameworks and tools do not yet ideally support the startups in their BMD, i.e., they are not yet effective. To this end, the study must provide, among other things, insights into why BMD is conducted, how the BMD process takes place, which steps of the process are in focus, and which tools are used along the process. The following three guiding questions can describe these information requirements:

- How and why is BMD applied?
- What is included in the BMD process, and how is it structured?
- What is the individual background of the startup company?

Based on these questions, the structure of the research model is built and specified by the three main sections (1) BMD application context, (2) BM components & BMD process, and (3) startup background. Each section aims to collect information to answer one of the main questions formulated above.

Building on these three research dimensions, the study needs to identify connections between the individual research subjects and uncover patterns that allow conclusions to be drawn about the process's effectiveness, the relevance of the individual process phases, and their contents.

Therefore, appropriate questions and metrics are defined for each section to operationalize the empirical research model. The metrics are mainly based on qualitative characteristics and compiled from the concepts and findings presented in chapter 2. For some research items, additional concepts are added. Figure 3.1 shows an overview of these items. The related questions and their respective metrics are described in the following.

Business Model Design Application Context	Business Model components and Design process	Startup background
1. Business Model definition	7. Business Model Design responsibility	16. Startup country origin
2. Business Model Design frequency	8. Business Model Design process efficacy	17. Startup age
3. Business Model Design purpose	9. Business Model Design frameworks	18. Startup size by employees
4. Business Model goals	10. Business Model Design tools efficacy	19. Startup phase
5. Business Model classification	11. Design order of Business Model components	20. Startup support program
6. Business Model markets	12. Importance of Business Model components	21. Startup country reach
	13. Time spent on Business Model Design phases	22. Startup branch of industry
	14. Importance of information/analysis	
	15. Activity level of analysis	

Figure 3.1: Overview of 22 research topics for the empirical BMD study

Starting from the **BMD application context**, a first impression of the *BM definition* of entrepreneurs is gained. In the associated question, participants can choose one of three BM definitions, while the two extremes of the BM understanding - profit logic and value logic - are complemented by another definition based on a series of decisions for a business opportunity. Thus, the financial perspective known from chapter 2.1.2 and the formative and resultative aspects of the BM concept defined in the same chapter, respectively, in chapter 2.1.5 are queried. The next question is to determine whether the *BMD frequency* is a one-time action, a continuous task, or an event-based activity. The *BMD purpose* is used to identify the reason for the design of BMs. For this purpose, the main reasons from chapter 2.2.5 are defined in detail through communication, validation, creation of an overview, and definition of business ideas. For the *BM goal*, tendencies toward profit maximization, value creation, or sustainability of the BM solution are queried. The *BM classification* divides the BM into different product and service categories. These are consumer products, industrial products, digital products, personal services, and online services. This division should enable conclusions to be drawn

between the BM's market offerings and appropriate decisions on BM components. Accordingly, *BM markets* are divided into the general target markets B2C, B2B, or both.

In the next section, the relevant ***BM components and the BMD process*** are queried. The *BMD responsibility* can be seen as a founding task, but it could also be assigned to a business development unit or delegated to a specific role. The questions asked so far promise insights into whether why and by whom BMD is conducted. Followed by questions on perceived *BMD process efficacy*, it will be assessed whether the BMD purposes have been achieved and whether the effort required in the current BMD process is appropriate. Since efficiency is defined as a framework's requirement, the time and resources spent during BMD are also queried. Therefore, this research topic is divided into seven sub-elements and includes questions on the overall effectiveness, time expenditure, resource expenditure, satisfactory level, and efficacy of the three main BMD phases of initiation, idea generation, and integration (see chapter 2.2.1). Since the term effective is not explained in detail in the questionnaire and may not be understandable for all participants, the successful action is queried concerning the process phases instead of the term effectiveness. The question about the overall process's effectiveness is asked directly using the effective term, but it is specified again in an additional question about satisfaction with the final result.

A Likert scale is recommended for measuring perceptions, feelings, opinions, or alike (Porst 2009). For this reason, perceived effectiveness and efficiency are measured on a bipolar Likert scale, which is divided into five categories ranging from "fully agree" to "fully disagree". A neutral option can be selected for participants without a clear tendency to ensure that participants do not interrupt the survey because they are forced to choose a side (Table 3.1).

Table 3.1: Five-category Likert scale for evaluating the BMD efficacy and efficiency

Measurement of Business Model Design Efficacy and Efficiency					
	2	1	0	-1	-2
	I fully agree	I mostly agree	neutral	I mostly disagree	I fully disagree
The results of the Business Model Design are very satisfactory.					
The overall Business Model Design process is very effective.					
The time effort for the Business Model Design is very high.					
...					

It is also evaluated whether startups use well-known *BM frameworks* such as the BM Canvas, the St. Gallen BM Navigator, the Lean Canvas, or others. In this context, the *tools' effectiveness* is asked based on five sub-questions about the helpfulness of BMD tools and guided workshops, the satisfaction with the use of existing BMD tools, and the degree of fulfillment of individual requirements and information needs in BMD. Also, *the components' design order*

provides information on the process structure and priorities in the BMD of startups. As a metric for this, reference is made to the BM components defined in chapter 2.1.4. For reasons of clarity, these are initially grouped into six main categories for the BMD process structure. The categories *Product & Service*; *Customer & Market*; *Organizational Structures & Processes*; *Financial Aspects*; *Partner & Networks* and *Resources & Competencies* result from this abstraction. Accordingly, the BMD categories are arranged in a priority design sequence of one to six.

To increase the granularity on this, the *importance of the BMD components research topic observes the component level's design requirements*. This analysis includes an assessment of the importance of the 14 BM components identified previously. As research in questionnaire design and scale development shows, verbal rating scales have proven to be the most suitable for measuring opinions (Walter und Derksen 2019). For this reason, the importance level is measured with a categorical rating scale consisting of five categories between "very important" and "not important" (Table 3.2). The components are queried in alphabetical order to avoid bias.

Table 3.2: Five-category rating scale for evaluating the importance of BM components

Measurement of Relevance of the Business Model Components					
	2	1	0	-1	-2
	very important	important	neutral	less important	not important
Activities & Processes					
Competencies					
Cost Factors					
...					

The *time spent on the BMD phases* is investigated to gain insights into the process-related BMD element. The three BMD phases initiation, idea generation, and integration from chapter 2.2.1 are used as evaluation metrics. In total, 100 % BMD time must be distributed among the three BMD phases.

The last two research topics aim to determine both the *importance of the analysis* and the *level of activity* of the analysis of certain components within BMD. The measurement of importance should show which information gains and analyses are considered (most) relevant. On the other hand, the analysis's activity level focuses on startups' actual design behavior and is measured on a categorical rating scale, which verbally expresses how detailed a certain analysis is performed (Table 3.3). The scale categories range from "very detailed", "detailed", "less detailed" and "not executed". Additionally, the option "I don't know" is added here if the actual behavior cannot be answered, again to avoid being forced to answer although they do not

know the answer. This scaling protects against research bias and prevents the survey from being aborted due to missing answer alternatives. For both research topics, the following predominant analyses from the theory and practice of strategic management are considered: Competitor/benchmark analysis (Porter 2008), customer analysis, financial analysis, internal organization analysis, market analysis, network analysis, scenario and strategic foresight analysis, stakeholder analysis and trend analysis (Fleisher und Bensoussan 2015). Based on the two measurements, it can be distinguished how important the analysis is perceived (opinion) and how intensively the analysis is carried out (behavior).

Table 3.3: Five-category rating scale for evaluating the analyses detail

Measurement of Detail Level for Analysis					
	2	1	0	-1	-2
	very detailed	detailed	less detailed	not executed	I don't know
Competitor/Benchmark Analysis					
Customer Analysis					
Stakeholder Analysis					
...					

The last section, the **startup background**, aims to collect basic data of the startup companies. The *startup country of origin* makes it possible to map regional influences in the BMD. With the *startup age*, a time factor can be added to the data analysis. A distinction is made between the following four startup age groups: younger than one year, more than one to three years, more than three and up to five years, and older than five years. As already mentioned, being a startup is seen in the active participation in the entrepreneurial activity, even if no legal entity has been established. The *startup size* brings a dimensional view of the startup companies and is measured by the number of employees. The categories are divided into four groups: less than ten employees, eleven to 50 employees, 51 to 100 employees, and more than 100 employees.

With the knowledge of the current *startup phase*, more conclusions can be drawn about applying the BMD process in practice. The phases are divided into the *Seed-Phase*, *Startup-Phase*, and *Growth-Phase* (see chapter 2.1.6). Also, a distinction is made as to whether the startup is or was part of a startup support program, e.g., a startup accelerator, to identify possible differences in BMD approaches due to influences present in such startup programs. Another background criterion is the *startup reach*, which indicates whether the market activities occur on a local, national, international, or global level. Finally, the *startup branch of industry* reflects a potential grouping criterion for the BMD's requirements for startups. For this purpose, the metrics are formed by two official industry lists (bmwi 2020). Finally, Table 3.4 gives a comprehensive overview of all research subjects and their metrics.

Table 3.4: Overview of research subjects and their metrics for the questionnaire

Research Subjects and Metrics		
Section	Research Item	Metrics
Business Model Design Application Context	1. Business Model definition	Profit-mindset, value-mindset, set of decisions
	2. Business Model Design purpose	Communication, validation, overview, detailed definition
	3. Business Model goals	Profit-oriented, value-oriented, sustainable solution
	4. Business Model Design frequency	One-time action, continuous task
	5. Business Model Design responsibility	Founders, Business Development Department, specific roles
	6. Business Model classification	Product and Service categories
	7. Business Model markets	B2C, B2B, B2C & B2B
Business Model components and Design process	8. Business Model Design process efficacy	Overall, time, resources, quality, three phases
	9. Business Model Design frameworks	Business Model Canvas, Business Model Navigator, Lean Canvas, others
	10. Business Model Design tools efficacy	Helpfulness of BMD tools, helpfulness of BMD workshops, satisfaction of BMD tools, requirements, information
	11. Design order of Business Model components	Main component categories: Product & Service; Customer & Market; Organizational Structures & Processes; Financial Aspects; Partner & Networks; Resources & Competencies
	12. Importance of Business Model components	14 Business Model components based on component synthesis
	13. Time spend on Business Model Design phases	Three BMD phased (Initiation, Ideation, Integration)
	14. Importance of information/analysis	Competitor/Benchmark, Customer, Financial, Internal Organizational, Market, Network, Scenario- & Strategic Foresight, Stakeholder, Trends
	15. Activity level of analysis	Competitor/Benchmark, Customer, Financial, Internal Organizational, Market, Network, Scenario- & Strategic Foresight, Stakeholder, Trends
Startup background	16.Startup country origin	Country name
	17.Startup age	one year or less, more than one year until two years, more than two years until three years, more than three years
	18.Startup size by employees	<= 10 employees, 11 to 50 employees, 51 to 100 employees, >100 employees
	19.Startup phase	Three main phases: pre-startup (ideation, concepting) start-up (commitment, validation), growth (scaling, establishing)
	20.Startup support program	Incubator or accelerator: yes/no
	21.Startup country reach	Local, national, international, global
	22.Startup branch of industry	Official branch classification clusters

Summarizing the research model, the items relating to the BM's application context provide information about the perception of BM and BMD in the founding practice. The section BM components and BMD process collect the most relevant information to identify BMD standards and individual requirements. In this context, this study's main variables can be described by the application and level of satisfaction of current BM frameworks and the importance rating of BM components in the actual BMD process. Besides, the items from the section startup background serve primarily as a basis for descriptive statistics. In general, the study focuses on observing facts, circumstances, and behaviors of founders and opinions of founders regarding BMD. Finally, the research model serves as the basis for creating an online questionnaire to be used.

3.2 Questionnaire Design and Study Pretests

A questionnaire is designed by translating each research object and metric into a single research question (Appendix B.1). When designing the questionnaire, special attention is paid to ensuring objectivity, reliability, and validity, thus improving the study's quality. Objectivity in this

respect is achieved when the implementation, evaluation, and interpretation of the results are free of any influence from the person conducting the study. Reliability also means that repeated independent measurements of a research object lead to the same results. A prerequisite for reliable results is that the research objects must be independent of each other. Additionally, validity is described as "measurement accuracy" and is given when the research methods measure what was intended to be measured (Rowley 2014). The precise definition of the independent research subjects, the general questionnaire structure, the question and scale development, and the survey's appearance are key factors that influence the questionnaire's quality. While the definition of research objects is already part of the previous chapter, the questionnaire's further design criteria are evaluated in the following. Based on the questionnaire's general structure, the study can be divided into three main parts: introduction, data collection, and conclusion. The introduction has the goals of presenting the BMD topic, motivating startups to exchange experiences, and at the same time reflecting on their BMD process for themselves. It is also intended to anticipate and eliminate any possible doubts about participation. Rather, a brief overview of the research background, including the study goal, target group, and content of the survey, is provided. Participants gain transparency about their time expenditure by stating the number of 22 questions and a time estimate of about 15 to 20 minutes. It is also emphasized that the survey is anonymized, and the data is collected, stored, and used only for intended research.

After the introduction, the participants are guided through the questions in the step of data collection. This main section opens with an icebreaker question by asking the founders' understanding of a BM and is designed to stimulate the founders' minds to think in terms of BMD experiences. Overall, more general questions about the current BMD process of startups will be asked, which will be continued with more detailed questions about the founders' behavior and opinions in the various BMD steps and their application context. Within this process, the founders are slowly guided from more general to more detailed questions. The founders' background data is collected in the last section since less cognitive effort is required, and the participants are more likely to answer the comparatively fewer exciting questions if they have already completed the more intensive questions beforehand. The survey closes with the appreciation of participation and the contribution to the research.

In the next evaluation step, the question and scale design are considered. The questionnaire consists mainly of closed questions to ensure comparability and a rational application of statistical methods for the quantitative results (Hollenberg 2016). All questions are short, clear, and formulated in a similar structure to achieve a simple and common understanding. No additional information or descriptions are added to the answer alternatives in the first version to reduce

complexity. The questions vary between multiple-choice, single choice, and predefined scales, depending on each question's specific purpose. However, some questions are still open for additional answers, which serves two purposes: First, prevent the survey from being aborted if the participant does not find the right choice in the predefined answer alternatives. Secondly, it can be determined whether the chosen answer set covers all aspects and points of view relevant from a practical point of view or whether additional answers are available.

The following findings are considered for scale development to ensure the objectivity and reliability of data collection. As introduced above, a categorical rating scale is chosen in most cases. Each rating scale shows five verbalized categories, which increases the participants' comprehensibility compared to the numerical scale. Rating scales in unipolar direction are preferred, as they are recognized as the most objective scales. However, bipolar Likert scales are used in a few cases if this ensures a more precise formulation. Also, the neutral middle category on the rating scales helps avoid distortions in data collection, as participants are not forced to choose sides if they do not have a particular opinion. Furthermore, extremes such as "the most important" or "never important" are avoided, as participants tend not to choose such extreme options. Instead, a proportional scaling with a continuum of evaluation distances between categories is considered.

A simple and consistent design is used to visualize the survey. Besides, a maximum of seven questions on each page will ensure that the page is not overloaded and that participants can easily return to previous questions if necessary. Furthermore, the scales are visualized in a horizontal direction to limit possible primacy effects concerning answer alternatives that could negatively influence the evaluation's objectivity. The online tool *survio*¹¹ is used as the tool for designing the questionnaire and conducting the survey online.

The consideration of these questionnaire design standards ensures objectivity, reliability, and validity. To further optimize the questionnaire design, pre-tests are conducted with a small group of startups. The pretests aim to validate questionnaire elements and to identify potential for improvement. For this purpose, the first version of the survey will be tested with five startups in the form of "Think-Aloud" sessions: First, the survey background and the instructions for the pretest are explained. Secondly, participants are asked to conduct the survey and express all their thoughts and feelings aloud, including questions, interests, difficulties, frustrations, and the like. Thirdly, a subsequent conversation with the pre-test respondents is designed to clarify possible adjustment needs, including specific questions for each session and a set of pre-defined questions about the survey's general perception. It includes evaluation criteria such as

¹¹ <https://www.survio.com/de/>

redundancy and linguistic understanding of the questions, the ability to give the intended answers, the scale design, the motivation to complete the questionnaire, and possible reasons for cancellation of the questionnaire.

After evaluating the pre-test results, some answer options are less intuitive, and further information is required to ensure the same understanding for participants with different backgrounds. During this, clarifications of various terms were required for each participant in the pre-test. Therefore, additional information was added for all terms, not implicit in the survey. E.g., terms such as "complementary system" were described by a short example (other market offerings that add value to your offering, i.e., the paper manufacturer is complementary to printer manufacturer). Other main adjustments to the survey concern reshaping or additional response options such as expanding the options for industry classifications. Scaling and single or multiple answer options were also discussed, as respondents would have chosen multiple answers, but only one was allowed.

Nevertheless, most items such as BM goal or BMD purpose were retained as single answers since these questions aim to examine the main preference criteria of startups rather than the collection of all alternatives. This aim was emphasized more strongly in the questions by highlighting "main" (i.e., BM-main goal, BMD-main purpose). After implementing the defined adaptations, the new version was tested in a short second pretest, from which the final study version was derived.

After completion of the study design process, the survey was activated for data collection. For this purpose, the link to the online survey within the entrepreneurial target group was released. The dissemination strategy included startups from personal connections, contacts from startup events, startup forums, and social media channels such as LinkedIn, Xing and Slack, university startup companies, and other international startup platforms. The data collected from the participants serve as a basis for the empirical analysis in the following chapters. The data collection was conducted in the period between October 2019 and March 2020 as part of the master thesis of Caroline Götz¹².

3.3 Data Basis and Descriptive Analysis

After having collected data from startups via the online survey, this chapter is dedicated to describing the data basis. In the survey, a group of 45 startups provided complete information about their entrepreneurial BMD experiences. In the first step, the data is consolidated in the

¹² This master thesis can be viewed on request at the Secretariat of the Institute of Entrepreneurship, Technology Management and Innovation (EnTechnon) at the KIT.

application "MS Excel" and transferred to the statistical tool "SPSS" for further analysis. Since each data sample is complete and thus valid for analysis, all analyses in this chapter and subsequent results in chapter 3.4 and chapter 3.6 refer to a sample size of $N = 45$. The data analysis begins with applying descriptive statistics, which are intended to provide a general overview of the participating startups. This description mainly refers to data from the survey part startup background. More than half of the survey participants are German startups (56 %). The other 44 % mainly reflect startups from Europe (36 %), and 8 % are represented by US or Canadian startups (Table 3.5).

Table 3.5: Distribution of startups' countries of origin in the data sample

Startup country of origin	Frequency [#]	Percent [%]	Cumulative Percent [%]
Germany	25	55.6%	55.6%
France	4	8.9%	64.4%
Netherlands	3	6.7%	71.1%
Sweden	3	6.7%	77.8%
Poland	2	4.4%	82.2%
USA	2	4.4%	86.7%
Austria	1	2.2%	88.9%
Canada	1	2.2%	91.1%
Croatia	1	2.2%	93.3%
Hungary	1	2.2%	95.6%
UK	1	2.2%	97.8%
United States	1	2.2%	100.0%

Besides, half of the startups (47 %) have been in existence for more than three years, while startups between one and two years and startups between two and three years account for 22 % each. As a result, startups less than one year old are barely represented at 9 %, which is accompanied by a similar distribution in the startup phase: most participants are in the growth phase (65 %), a third are in the actual startup phase (33 %), while only 2 % are in the pre-startup phase. Therefore, this distribution fits the criterion defined in chapter 2.2.4 to analyze the BMD process of startups in the transition to the growth phase, ensuring that the sample's startups have already gained sufficient experience in BMD.

Nevertheless, most startups are small and have less than ten employees (60 %). More than a third (36 %) employ between eleven and 50 people. A rather insignificant residual share of 2 % has grown to more than 50 employees. In terms of market reach, the data show an almost even distribution between local (24 %), national (27 %), and international (33 %) presence, while 11 % operate on a global basis. In summary, 51 % of startups offer products or services and restrict market activities within their country of origin, while 44 % cross national borders. Also, 89 % of all participating startups are or have been part of a startup support program. Figure 3.2 provides a visual overview of the most important startup characteristics in the data sample.

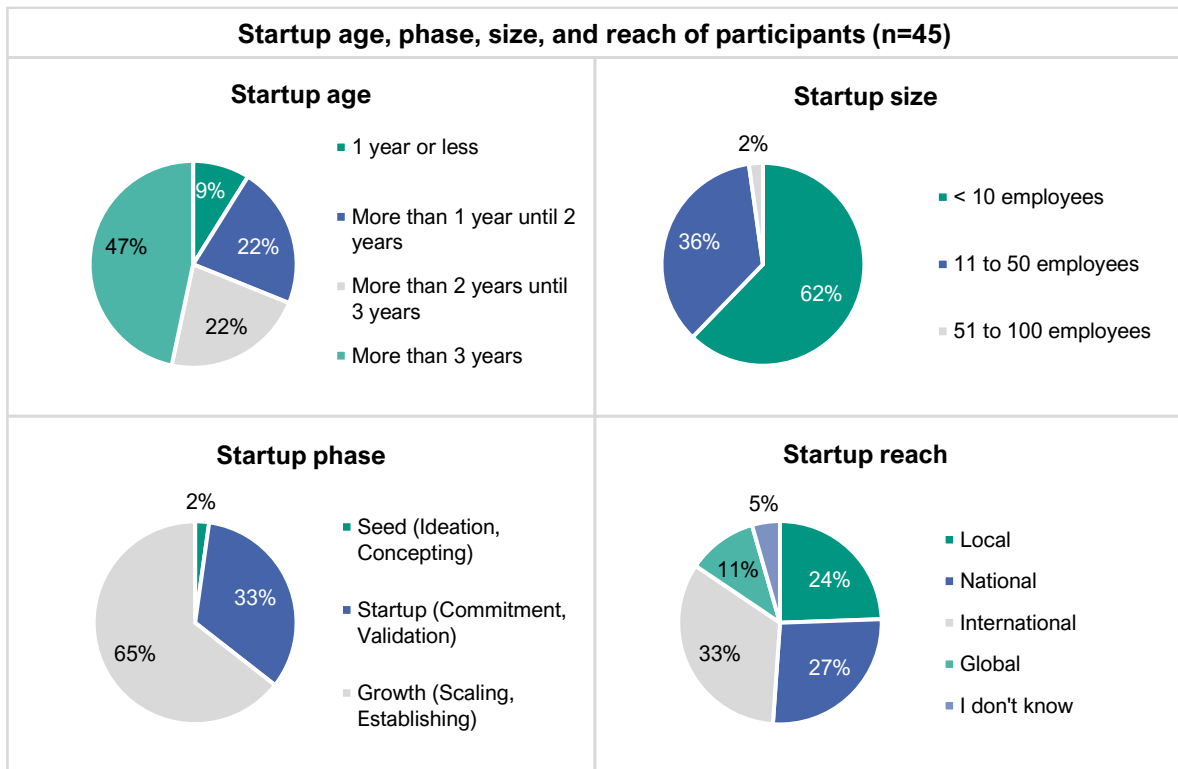


Figure 3.2: Data distribution regarding startup age, phase, size, and reach of participants

The startups mainly originate from the two sectors IT & Technology (31 %) and Energy & Power Supply (22 %). Other sectors are represented by only one to three startups each.

Table 3.6: Data distribution of startup branch of industry

Startup branch of industry	Frequency [#]	Percent [%]	Cumulative Percent [%]
IT & Technology	14	31.1%	31.1%
Energy & Power Supply	10	22.2%	53.3%
Health	3	6.7%	60.0%
Real Estate & Housing	3	6.7%	66.7%
Agriculture & Forestry	1	2.2%	68.9%
Art, Entertainment & Recreation	1	2.2%	71.1%
Artificial Intelligence & Data Analytics	1	2.2%	73.3%
Bio Technology	1	2.2%	75.6%
Construction	1	2.2%	77.8%
Consulting	1	2.2%	80.0%
Education	1	2.2%	82.2%
Hotel, Gastronomy & Tourism	1	2.2%	84.4%
Industrial	1	2.2%	86.7%
Liquor and Spirits	1	2.2%	88.9%
Media & Marketing	1	2.2%	91.1%
Pharma	1	2.2%	93.3%
Service Industry	1	2.2%	95.6%
Waste management	1	2.2%	97.8%
Water, Sewage & Disposal	1	2.2%	100.0%

As the classification of the startups' main product and service portfolios shows, the available BMs in the survey are predominantly in the digital sector (44 %) and consumer markets (42 %). Also, 31 % assign their main offering to the industrial sector, 27 % to online business, and 18 % to personal services. The most frequent additional offerings are found in the personal, digital, and online segments, by 20 %, 22 %, and 24 %, respectively (Table 3.7). Furthermore, startups are particularly present in B2B markets (67 %) and less so in B2C markets (13 %) or both markets (20 %).

Table 3.7: Total frequencies of startups' BM categories by main and additional offerings

Startup Business Model classification (multiple answers possible)	Main offerings	Additional offerings
Consumer	42%	7%
Industrial	31%	18%
Digital	44%	20%
Personal	18%	22%
Online	27%	24%

From the indicated background information of the startups can be derived, for which groups of founders and for which startup characteristics the study can make statements in the further analysis and for which not. In summary, a distinction can be made between startups from Germany and startups from abroad. Furthermore, the survey results represent startups that have been in existence for at least one year, employ less than 50 employees, and are either in the

startup or growth phase. Furthermore, the sample represents startups with local, national, international, and global reach. Furthermore, the survey focuses on BMs from the consumer goods, digital and industrial sectors, primarily in B2B markets, and is closely related to startups with experience from support programs such as accelerators.

Based on the data sample's descriptive analysis, the potentials and limitations for further analysis become clear. It should be noted that the data sample only reflects the startup characteristics outlined above. Furthermore, the limited sample size of $N = 45$ does not allow for fully valid statements for the diverse founders' community. Nevertheless, the data basis is sufficient to provide the first insights and conclusions for BMD practice and specify further empirical BMD research steps. Under these conditions, the next chapter will continue with an explorative statistical analysis of the data.

3.4 Determining the Quality of the Questionnaire

In the following chapter, the questionnaire's collected data are analyzed regarding their quality and the quality of the evaluation possibility. First, the three important quality criteria, *objectivity*, *reliability*, and *validity*, are examined to determine the questionnaire's quality. This form of checking the questionnaire design is of central importance for assessing the quality (Rammstedt 2004). In the following three steps, examining the quality of scales is run through according to the guidelines developed by Rammstedt (2004).

Objectivity is evaluated regarding the three dimensions of objectivity of implementation, evaluation, and interpretation.

For scales with more than two items, *reliability* is determined by default in the form of internal consistency via Cronbach's alpha.

To determine the *validity* and thus the degree of accuracy of the scales, three types are important: contextual validity, criterion validity, and construct validity. Factor analysis is also performed in this context.

Determination of Objectivity

The objectivity of measurement is taken for granted if the result of the examination is independent of external influences and is therefore only influenced by the person examined (Rost 2004).

The *objectivity of implementation* can be considered assured by using the standardized questionnaire. The questionnaire provides clear instructions in the introductory text on how to conduct the survey.

The *objectivity of the evaluation* can also be regarded as assured largely due to the closed answer formats in the form of the five-level Likert scale or predefined answer options, which are used exclusively with four exceptions. Besides, clear guidelines for filling out the questionnaire were also provided for the four exceptions. Furthermore, clear guidelines for data input and transformation were developed, which allow for standardization and comparability of the scales.

The *objectivity of interpretation*, which refers to the "extent to which the conclusions drawn from the numerical survey results are comparable across different interpreters", is ensured since several interpreters conclude this present work at different points in time (Rost 2004). Thus, the first interpretation of the data is performed within the master thesis of Caroline Götz. Several examiners discussed this during a presentation of results. Subsequently, the data were again analyzed in detail by the author of this work.

Determination of Reliability

The reliability provides the proportion of the true test value variance and the proportion of the total variance without the random measurement error (Moosbrugger und Kelava 2012). As one of the three most important quality criteria, it thus provides an important indication of the survey's quality. The quality criterion can be tested in different ways. In this study, the scales with more than two items are tested for reliability mathematically using Cronbach's alpha, which shows the internal consistency. According to Streiner (2003), Cronbach's alpha value should be at least higher than 0.6. A good value is above 0.7, and a very good value is higher than 0.8.

It is also important to consider the *item difficulty pi* since this allows statements to be made about the probability of solving the task. A value close to $pi = 0.00$ shows that the task cannot be solved. Moosbrugger und Kelava (2012) see at least values between $pi = 0.10$ and $pi = 0.90$, respectively, values between $pi = 0.20$ and $pi = 0.80$ desirable. Conversely, a value of $pi = 1.00$ is a sign for a task, which can be solved by everybody. Transferred to the Likert scales presented here, the *difficulty index pi* stands for the tendency to agree to a statement.

The *item selectivity rit-i* provides the correlation of the individual item with the full scale calculated from the other items and shows how an item reflects the full scale. The value of rit-i should not fall below $rit-I = 0.20$ or preferably $rit-I = 0.30$ (Bortz und Döring 2006). The so-called marker items have the highest discriminatory power and reflect this construct best in terms of construct and content validity and provide a particularly meaningful characterization (Moosbrugger und Kelava 2012).

The categorical Likert Scale was transformed into the values from 1 to 5 (see chapter 3.5) for the item analysis. The Cronbach's alpha, the item difficulty p_i , and the item selectivity rit_i will be discussed in the following chapter to analyze the data at the appropriate place.

Determination of Validity

The purpose of validity is to determine whether a procedure measures what it is intended to measure (Rammstedt 2004). A distinction is made here between the three classic dimensions of content validity, criterion validity, and construct validity.

Concerning content validity, it is checked whether a survey's items represent the distinct area to be measured with sufficient accuracy (Rammstedt 2004). The creator of the questionnaire created the items after extensive research. For this purpose, questionnaires used to evaluate artifacts were evaluated and combined. The questionnaire was created in several iterations after discussion with experts who, among others, evaluated the items. Although the sample size is relatively small, and a larger sample could relate the findings more clearly to the population, content validity can still be considered as sufficiently given.

Criterion validity is when a criterion can be successfully inferred from the test subject's behavior within a test situation (Moosbrugger und Kelava 2012). It is considered to be given if the obtained results of the survey correspond to the results of an external criterion (Rammstedt 2004). However, the use of this type of criterion is not necessarily useful in evaluations to determine validity since no concrete external valid criteria exist (Paulitsch 2017), and it is therefore fundamentally difficult to validate instruments such as this questionnaire since there are no standard criteria for good processes or good BMs (Marsh 1984). However, questionnaires with already tested items such as the German Startup Monitor questionnaire (Kollmann et al. 2018) were used to construct this questionnaire. Therefore, criterion validity can be considered as primarily given in this work.

Construct validity indicates whether a test measures what it is supposed to measure (Moosbrugger und Kelava 2012). A classic way to determine the construct validity is the conduction of factor analysis (Cronbach und Meehl 1955). Therefore, to test the categories defined in a theory-based manner, the questionnaire will be subjected to factor analysis. However, due to the sample size, only limited results can be obtained. As described in the item analysis in chapter 3.5, there are few regroupings of the items. For example, the BMD Process Effectiveness scale is split into two components. Component 1 is BMD Process Effectiveness, and component 2 is further defined as BMD Process Efficiency.

Due to the otherwise low validity of factor analysis, construct validity cannot be considered entirely satisfactory. However, as a measure of content validity, face validity can be considered since the questionnaire was structured and described clearly and understandably.

3.5 Data Analysis

In the following chapter, the collected data are analyzed based on the frequency distribution of the respective answers on the one hand. On the other hand, correlations are analyzed where appropriate to reveal correlations between the answers. The complete data analysis refers to the data basis described in chapter 3.3 with N = 45 returns.

At the beginning of the data analysis, the research part related to the **BM application context** is evaluated regarding how and why BMD is applied in business startups. Based on the three given definitions, most founders believe that a BM is an economic model of a company that defines the method of making money in a specific business environment (51 %). In contrast, one-third (31 %) of founders are more convinced that a BM is an architectural configuration that defines structures and processes for creating value. The remaining 16 % support the perspective that a BM is a set of decisions on most relevant business aspects, including decisions on internal and external arrangements (Table 3.8). Accordingly, most entrepreneurs associate a BM primarily with financial logic and less with value creation or decision making.

Table 3.8: Main BM understanding by entrepreneurs based on three definitions

Business Model Definition	Frequency [#]	Percent [%]
A Business Model is the economic model of a company. It defines the method for making money in a concrete business environment.	23	51%
A Business Model is an architectural configuration that defines the structures and processes to create value.	14	31%
A Business Model is a set of decisions on most relevant business aspects. This includes decision making on internal and external arrangements.	7	16%
I don't know	1	2%

The next variable is related to the most important BMD purposes for startups (Table 3.9). The three most important purposes are a *general overview of the configuration of key business components* (31 %), *validation of business ideas* (22 %), and *presentation of business ideas to stakeholders - for example, potential investors* (20 %). Compared to these purposes, *identifying opportunities and risks* is perceived as less relevant (13 %). The results also show that *reducing complexity* and *defining all business components in detail* are not the main purposes of the BMD for founders. When looking at the correlations, no influence of startup background criteria such as startup age or startup phase on BMD purposes can be found.

Table 3.9: Main BMD purposes in startups' practice based on six purposes

Business Model Design Purpose	Frequency [#]	Percent [%]
Getting a general overview of the configuration of the most important business components.	14	31%
Validating business idea(s).	10	22%
Presenting business ideas to stakeholders - for example potential investors.	9	20%
Identify opportunities and risks.	6	13%
Reduction of complexity.	3	7%
Defining all business components in detail.	2	4%
I don't know	1	2%

Regardless of which BM definition is given, there is a clear trend for the BM goal (Table 3.10). A large majority of 69 % strive for a *solution to realize sustainable business and growth*. For 18 %, BM's main goal is to *create the highest possible value for potential customers and other stakeholders*. Only 11 % of the entrepreneurs are looking to *achieve the highest possible profit margins*, with the financial goal being pursued exclusively by startups that also prefer the financial BM perspective.

Table 3.10: Main BM goals in startup practice based on four BM goals

Business Model Goal	Frequency [#]	Percent [%]
Finding a solution to realize a sustainable business and growth.	31	69%
Creating the highest possible value for potential customers and other stakeholders.	8	18%
Identifying the option for the highest possible profit margin.	5	11%
There is no specific design goal for the Business Model.	1	2%

The founders' opinions are divided on the BMD frequency: Half of the startups integrate BMD as a *continuous process* (44 %), while the other half carry out BMD *irregularly and only when a need to adapt the current BMD is identified* (42 %). For a minority of 11 %, BMD was a *one-time action and should not be repeated*. The general importance and connection of BMD and entrepreneurship are underlined by the fact that (except for one study participant) BMD is an active part of the entrepreneurial process (except for one study participant). Besides, 78 % of the *founders themselves are responsible for BMD*, while in 11 %, the responsibility is *assigned to a business development department*. Furthermore, it is shown that the BMD's responsibility is neither seen in this study as a shared responsibility between founders and shareholders nor is it delegated to a management team consisting partly of founders and partly of employed managers.

As the analysis of the BM application context shows, general trends can be identified for some criteria such as the entrepreneurs' BMD responsibility and the BM's overall goal. Differences are also identified, especially for the BMD purpose, leading to a first impression of who is currently conducting the BMD process for startups and in which context.

Next, data analysis of the **BM components and the BMD process** provides insights into the elements and structures of the BMD process in startups.

Table 3.11 shows the results of the item analysis for the *BMD process efficacy* component. The items *time effort* and *resource effort* were reversed for this purpose. The *item difficulties pi* are all within the acceptable range between $pi = 0.10$ and $pi = 0.90$, showing that the items tend to be easy to answer. However, Cronbach's alpha of 0.557 is below the acceptable threshold value. Likewise, the corrected *item selectivities rit-i* do not all reach the threshold value of 0.3, which indicates an unsatisfactory homogeneity of the scale.

Table 3.11: Item analysis of perceived BMD process effectiveness

Startups' perceived Business Model Design Efficacy				
	M	SD	pi	rit-i
The time effort for the Business Model Design is very high.	3.40	1.195	0.400	0.230
The resource effort for the Business Model Design is very high.	3.18	1.134	0.455	0.188
The results of the Business Model Design are very satisfactory.	2.36	0.570	0.660	0.271
The information collection and analysis of business context is very successful.	2.71	0.944	0.573	0.367
The idea creation and design of solution alternatives is very successful.	2.82	0.960	0.545	0.331
The prioritization of solution alternatives and the design of detailed business model concepts is very successful.	2.73	0.915	0.568	0.293
The overall Business Model Design process is very efficient.	2.64	0.743	0.590	0.397

Remarks: N = 45. coding: 1 (I fully agree), 2, 3, 4, 5 (I fully disagree). M = mean value; SD = Std. Deviation; pi = item difficulty; rit-i = corrected item selectivity. Cronbach's Alpha = 0.557.

Since an item should be grouped, sorted out, or reformulated into other scales by factor analysis if the item selectivities are below 0.20, factor analysis was carried out for this scale. The result shows that the scale should be divided into two components. Component 1 can be described as the BMD process's effectiveness (see Table 3.12), component 2 as the efficiency of the BMD process (see Table 3.13). Efficiency here means a satisfactory overall result with the least possible expenditure of time and resources.

After this division, the item analyses for both components show satisfactory results for Cronbach's alpha and item selectivity and difficulty. The components can, therefore, be evaluated in terms of content in the further course.

Table 3.12: Item analysis of perceived BMD process effectiveness (after factor analysis)

Startups' perceived Business Model Design Efficacy				
	M	SD	pi	rit-i
The information collection and analysis of business context is very successful.	2.71	0.944	0.573	0.573
The idea creation and design of solution alternatives is very successful.	2.82	0.960	0.545	0.672
The prioritization of solution alternatives and the design of detailed business model concepts is very successful.	2.73	0.915	0.568	0.611
The overall Business Model Design process is very efficient.	2.64	0.743	0.590	0.407

Remarks: N = 45. coding: 1 (I fully agree), 2, 3, 4, 5 (I fully disagree). M = mean value; SD = Std. Deviation; pi = item difficulty; rit-i = corrected item selectivity. Cronbach's Alpha = 0.763.

The BMD process effectiveness calculated from the items provides the following characteristic values for N = 45 subjects' sample size. The mean value is 2.73, with a standard deviation of 0.891. The participants thus indicate a rather neutral attitude toward the effectiveness of their BMD process.

Table 3.13: Item analysis of perceived BMD process efficiency (after factor analysis)

Startups' perceived Business Model Design Efficiency				
	M	SD	pi	rit-i
The time effort for the Business Model Design is very high.	3.40	1.195	0.400	0.662
The resource effort for the Business Model Design is very high.	3.18	1.134	0.455	0.643
The results of the Business Model Design are very satisfactory.	2.36	0.570	0.660	0.295

Remarks: N = 45. coding: 1 (I fully agree), 2, 3, 4, 5 (I fully disagree). M = mean value; SD = Std. Deviation; pi = item difficulty; rit-i = corrected item selectivity. Cronbach's Alpha = 0.681.

Regarding BMD process efficiency, the mean value of 2.98 and a standard deviation of 0.966 also shows a rather neutral picture.

The detailed results in terms of BMD effectiveness are shown in Figure 3.3. At first glance, it is noticeable that the question of the process's basic effectiveness is answered with a neutral opinion in 40 % of cases, according to which startups agree with neither a particularly effective nor an ineffective assessment of their actual BMD process, also explaining the mean value mentioned above. It is also striking that none of the participants rated their entire BMD process as very effective. Similar results are achieved for the individual BMD phases regarding information collection, idea generation, and prioritization of solutions.

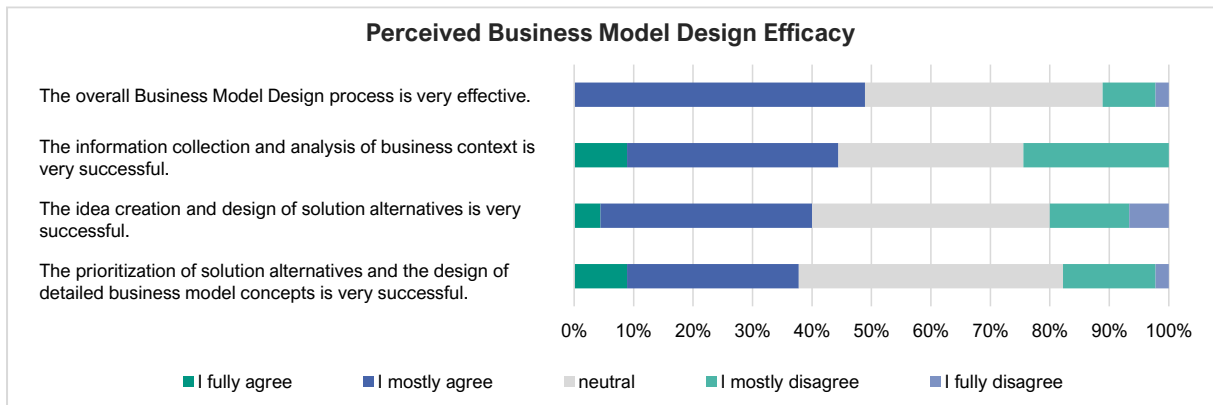


Figure 3.3: The levels of perceived BMD efficacy in startups' opinion

However, in terms of BMD process efficiency, 64 % are satisfied with the BMD results, but only 2 % of them are completely satisfied with the BMD result (see Figure 3.4). At the same time, none of the participants is completely dissatisfied with it. On the other hand, more than half of the entrepreneurs (51 %) fully or mostly agree that the time required for the BMD process is very high, and 36 % fully or mostly agree that the resources required for their BMD process are very high. Overall, this indicates that while their current BMD process leads the startups to a result, almost none of the startups are fully satisfied with this result. The high expenditure of time and resources required for this shows that there is still room for improvement in the BMD process's effectiveness and efficiency.

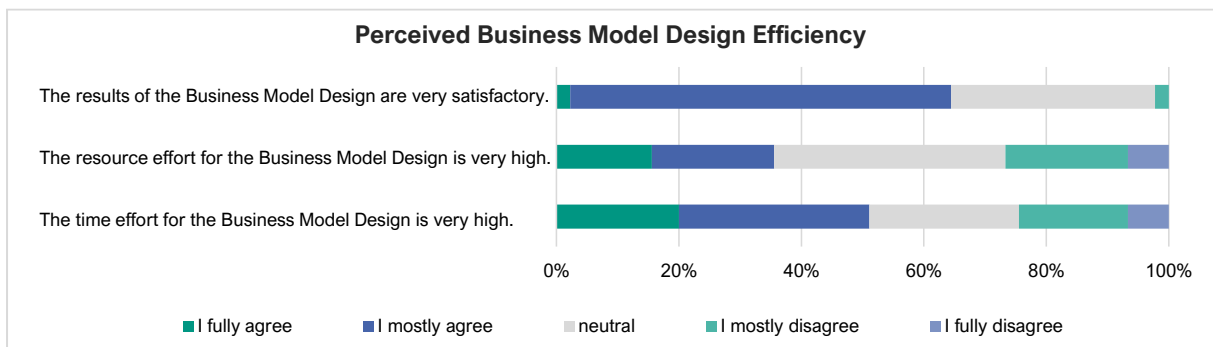


Figure 3.4: The levels of perceived BMD efficiency in startups' opinion

For BM frameworks, the BM Canvas is the most widely used in the BMD practice of startups. Overall, 60 % of startups use this framework for the design of their BM. Other startups use the Lean Canvas (36 %) and the jobs-to-done approach (22 %), while 22 % of founders admit that they either do not use frameworks in BMD practice or are unaware of them (Table 3.14). From the multiple naming of frameworks, it can be deduced that the teams use on average 1.5 different frameworks. The most common combination is using the BM Canvas with the Lean Canvas in 27 % of cases. However, the available data does not show whether these tools are used simultaneously, sequentially, or at different times.

Table 3.14: Application of BM frameworks in the entrepreneurial BMD practice

Business Model Frameworks in the Startup Practice		
	Frequency [#]	Percent [%]
Business Model Canvas	27	60%
Lean Canvas	16	36%
Jobs-to-be-Done	10	22%
Blue Ocean Strategy	7	16%
Platform Business Mode Canvas	2	4%
St. Gallen Business Model Navigator	0	0%
No frameworks	6	13%
I don't know	4	9%

In addition to the frameworks' actual use, the startups also shared their experiences with the BM tools. The item analysis shows that all criteria necessary for reliability are fulfilled for this scale (see Table 3.15). With a mean value of 2.66 and a standard deviation of 0.932, these results show a rather neutral, slightly positive picture of existing BM tools.

Table 3.15: Item analysis of helpfulness of BMD methods and tools in practice

Helpfulness of Business Model Design Methods and Tools in Practice				
	M	SD	pi	rit-i
The tools for Business Model Design used are very helpful and supportive.	2.38	0.777	0.345	0.480
Guided workshops related to Business Model Design are very helpful.	2.58	0.965	0.395	0.365
The tools for Business Model Design used are very satisfactory.	2.73	0.780	0.433	0.651
The existing Business Model Design tools meet the individual requirements for creating a business model concept.	2.80	0.944	0.450	0.597
The existing Business Model Design tools cover all information needed to design a complete Business Model.	2.82	1.193	0.455	0.624

Remarks: N = 45. coding: 1 (I fully agree), 2, 3, 4, 5 (I fully disagree). M = mean value; SD = Std. Deviation; pi = item difficulty; rit-i = corrected item selectivity. Cronbach's Alpha = 0.761.

The detailed results are shown in Figure 3.5. A majority of 62 % of the startups fully or mostly agree that the BMD tools they use are very helpful and supportive. Besides, 52 % of the founders fully or mostly agree that guided workshops help the BMD process. In contrast, only 37 % fully or mostly agree that the existing BMD instruments are very satisfactory, 17 % even disagree to a large extent, and 47 % have a neutral opinion. 22 % do not agree at all or mostly do not agree that the existing BMD instruments meet the individual requirements for the creation of a BM concept. Also, 29 % do not agree that the existing BMD instruments cover all the information required to create a complete BM concept.

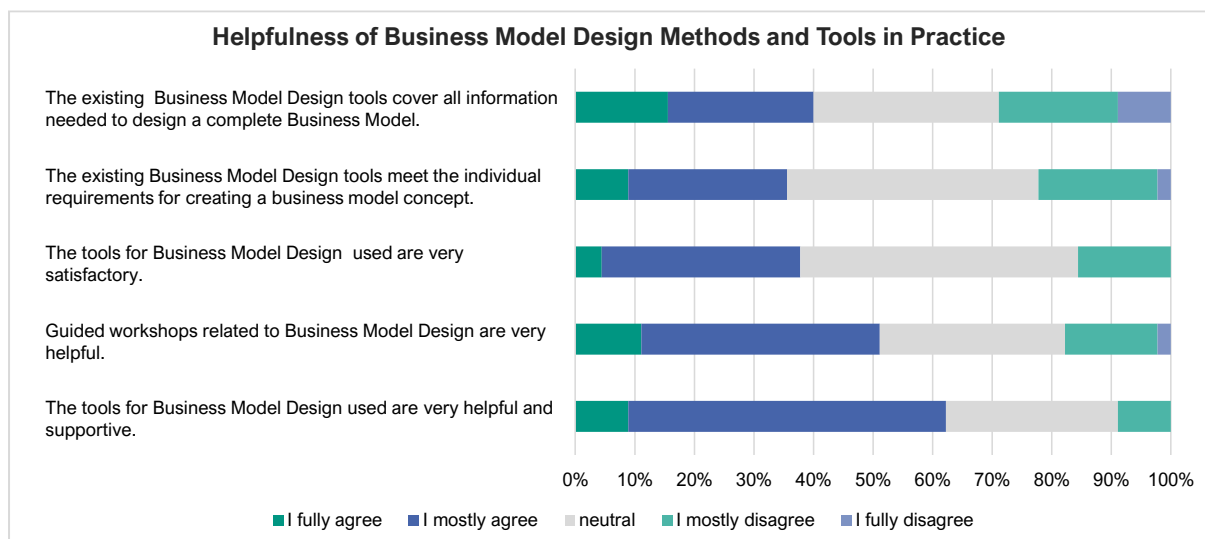


Figure 3.5: Evaluation of BMD tools in the BMD process by entrepreneurs

However, the results show that startups usually use structured BMD procedures and apply existing BM frameworks and BMD methods. The data also show that the startups generally associate a benefit with these instruments. Simultaneously, however, the BMD instruments do not fully meet the individual requirements or users' information needs, serving as a further indication that there are a need and potential for the development of more effective BMD instruments for entrepreneurs.

In addition to the selected support, the current BMD structure of startups is analyzed based on the sequence of the six main BMD categories introduced in chapter 3.1. Based on the overall average of all samples, the process sequence is shown in Table 3.16, according to which startups initially concentrate on *Customer & Market*, closely followed by the category *Product & Service*. The design of *Organizational Structures & Processes*, as well as *Financial Aspects*, follow at some distance. Overall, the BMD categories *Partner & Networks* and *Resources & Competencies* are given greater consideration in later BMD steps. While the priority for the first two design steps is very clear for all startups, the other BMD elements' order differs significantly in some cases. This heterogeneity shows that the same aspects are given priority at the beginning of each BMD process, while the later design steps depend more on the individual BMD requirements.

Table 3.16: Order priority of main BMD dimensions in startups' BMD process

Business Model Design Process Order in Startups		
	Mean [#]	Order
Customer & Market	1.8	1
Products & Services	2	2
Organizational Processes & Structures	3.6	3
Financial Aspects	3.8	4
Partner & Networks	4.6	5
Resources & Competencies	5.2	6

In addition to the process structure, the time that startups spend in each BMD phase is also analyzed. On average, startups spend about the same amount of time in each BMD phase, with a slight focus on ideation and initiation. However, the individual time distributions of the startups vary greatly. The standard deviation also indicates a wide dispersion in the data set, as visualized in Figure 3.6. Here the minimum values range from 0 % for the integration phase and 7 % for the initiation phase up to the maximum values from 69 % for the integration phase to 80 % for the ideation phase. Overall, the results show large differences between the startups in terms of time expectation and the distribution of BMD steps. Therefore, no general trend or standard can be identified, but rather a tendency towards particular time requirements. The large deviation also indicates a lack of structure and guidance for appropriate time management in BMD.

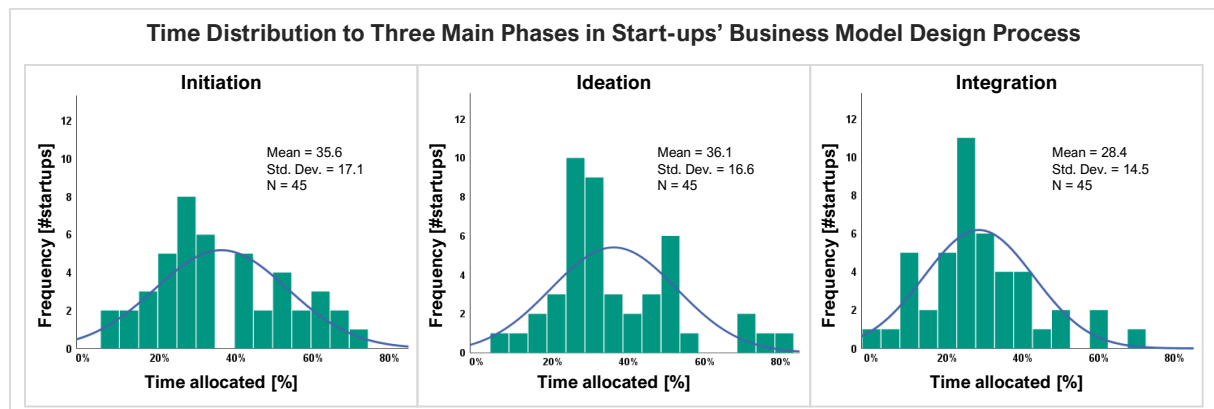


Figure 3.6: Histograms showing startups' time distribution in the BMD process

Regarding the actual content of the phases, the BMD process's strategic analyses are evaluated in terms of their importance and level of activity. The item analysis initially shows for both scales that the reliability metrics are all within the desirable range. Only in the case of item selectivity, the *Customer and Market Analysis* (see Table 3.17) for importance and the values of the *Competitor/Benchmark Analysis* and *Financial Analysis* (see Table 3.18) for activity level are at the lower end of the proposed value interval. More detailed factor analysis is not included here due to the good values for the respective Cronbach's alpha ($\alpha = 0.750$).

Table 3.17: Item analysis of the importance level of strategic analysis

Importance Level of Strategic Analysis in Startups' Business Model Design Process				
	M	SD	pi	rit-i
Customer Analysis	1.64	0.743	0.840	0.215
Market Analysis	1.67	0.769	0.833	0.273
Financial Analysis	2.27	0.963	0.683	0.503
Trend Analysis	2.27	1.031	0.683	0.465
Competitor/Benchmark Analysis	2.33	1.044	0.668	0.362
Scenario & Strategic Foresight Analysis	2.40	0.837	0.650	0.551
Internal Organizational Analysis	2.60	1.156	0.600	0.456
Stakeholder Analysis	2.62	0.860	0.595	0.447
Network Analysis	2.78	0.974	0.555	0.581

Remarks: N = 45. coding: 1 (highly important), 2, 3, 4, 5 (not important). M = mean value; SD = Std. Deviation; pi = item difficulty; rit-i = corrected item selectivity. Cronbach's Alpha = 0.750.

Table 3.18: Item analysis of the activity level of strategic analysis

Activity Level of Strategic Analysis in Startups' Business Model Design Process				
	M	SD	pi	rit-i
Customer Analysis	1.82	1.051	0.795	0.336
Market Analysis	2.24	1.209	0.690	0.483
Competitor/Benchmark Analysis	2.27	1.136	0.683	0.280
Financial Analysis	2.62	1.248	0.595	0.227
Scenario & Strategic Foresight Analysis	2.89	1.402	0.528	0.477
Trend Analysis	2.96	1.429	0.510	0.645
Network Analysis	3.27	1.338	0.433	0.488
Internal Organizational Analysis	3.38	1.284	0.405	0.481
Stakeholder Analysis	3.60	1.116	0.350	0.532

Remarks: N = 45. coding: 1 (very detailed), 2, 3, 4, 5 (not executed). M = mean value; SD = Std. Deviation; pi = item difficulty; rit-i = corrected item selectivity. Cronbach's Alpha = 0.760.

In terms of importance and activity, the mean values of 2.29 and 2.78 show that all analyses are considered relevant in principle and are also largely carried out in practice. However, the standard deviations of 0.931 and 1.246 already indicate that the startups' perception varies considerably.

The detailed analysis shows that almost all startups agree with a (high) importance of the *Customer Analysis* (85 %) and the *Market Analysis* (82 %). It should be emphasized that none of the founders rated less or not important for both the *Customer* and *Market Analysis*. Although 22 % regard the *Trend Analysis* as a (very) important element, they only perform a less detailed analysis. Regarding the not or less important evaluations, the *Network Analysis* (22 %), the *Internal Organization Analysis* (22 %), and the *Stakeholder Analysis* (15 %) are the least important analyses in the BMD of the startups. Nevertheless, most of the startups still think that these analyses are important. Besides, the *Stakeholder Analysis* is the only analysis that is not rated as very important at all. Although one-third of the startups consider *Stakeholder Analysis* important, they only carry out less detailed analysis or do not carry it out at all. A detailed presentation of the percentage responses is given in Appendix B.2.

Figure 3.7 graphically compares the two analyses of importance and activity level. For this purpose, an importance score and an activity score were calculated for each strategic analysis based on the original categorical evaluation scales. In general, there are two ways to transfer categorical scales into a numerical scale. In the five-category scale, the scale could range from 1 to 5 or from -2 to +2, with 0 for the neutral middle option (Reinders et al. 2011). In both scenarios, each rating category's frequencies are weighted according to the corresponding number and added up to an overall score. In this case, option two with the numerical scale +2, +1, 0, -1, -2 is chosen, as this better represents the verbal scales, and neutral answers are calculated from the score, as they neither positively nor negatively influence the result. This scaling means that on the importance side, "very important" is weighted with factor 2, "important" with factor 1, "neutral" with factor 0, "less important" with factor -1, and "not important" with factor -2. On the activity level side, the scales "very detailed" are weighted with factor 2, "detailed" with factor 1, "I don't know" with factor 0, "less detailed" with factor -1, and "not executed" with factor -2. The sums of the weighted frequencies result in the score values, which can be compared. Therefore, possible score values range from -2 to 2 and represent the average importance or activity of an analysis. These two score values were plotted on a two-dimensional matrix with the importance score on the X-axis and the activity score on the Y-axis. The size of the points represents the deviation between the two score values. The larger the point, the greater the divergence between perceived importance and practical execution of the analysis.

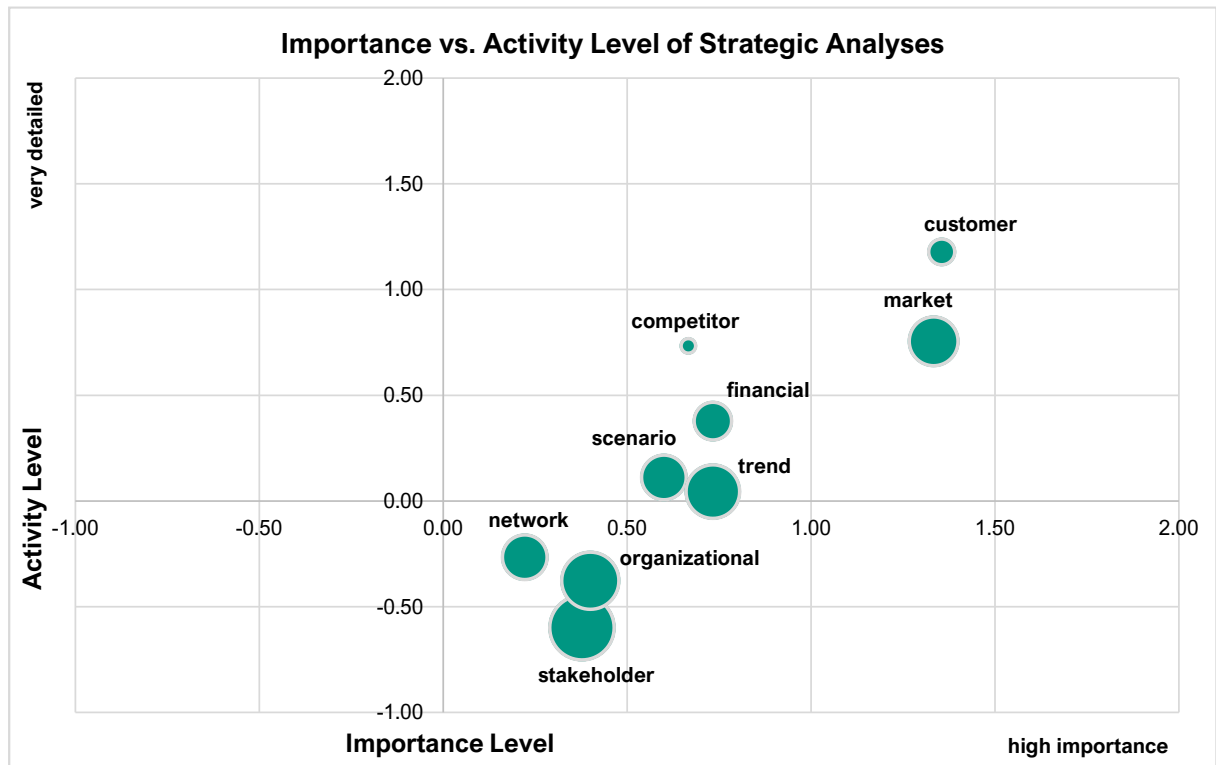


Figure 3.7: Importance vs. activity level of strategic analysis in startups' BMD process

This analysis shows that in the *Competition & Benchmark Analysis* and the *Customer Analysis*, the importance and level of activity are largely the same. In all other analyses, there are differences between importance and analysis activities. For example, the *Market Analysis* is almost equivalent to the *Customer Analysis* in terms of importance, but it is less detailed in practice. Especially for the *Stakeholder Analysis*, the *Trend Analysis*, the *Internal Organization Analysis*, and the *Network Analysis*, hardly any detailed analysis is done in practice, although they are all considered relevant. This result can be interpreted as an indication that suitable methods lack the analysis with greater divergence, which would allow more detailed processing within the BMD process.

After initial insights into the BMD structure of startups, the BM components are evaluated below. A mean importance rating is calculated for the 14 BM components that were queried. The calculation is based on the original numerical Likert scale with values from 1 to 5. Based on the mean values, it is possible to distinguish between relevant BM components by mean values lower than 3 and non-relevant BM components by mean values higher than 3. A threshold value of 3 is estimated since a higher value indicates that most startups have classified the factor as less or not important on average. Conversely, it can be argued that averages lower than a value of 2 indicates that 100 % of the startups rated the factor as (highly) important (100 % of the participants chose the categories "highly important" or "important"). In summary,

it can be said that factors with mean values lower than 2 indicate a high probability of being considered in BMD.

Based on this transformation of the scale, an item analysis was again performed. As Table 3.19 shows, all metrics are in the good range, except for Activities & Processes' item selectivity, which may indicate that the startups understood the component as too unspecific or ambiguous. For the further course of the work, this may be an indication to separate this component or describe it more specifically.

Table 3.19: Item analysis of importance level of BM components

Importance Level of Business Model Components				
	M	SD	pi	rit-i
Customer Segments	1.33	0.603	0.918	0.366
Value Proposition	1.56	0.624	0.860	0.311
Customer Relationships	1.62	0.650	0.845	0.283
Revenue Streams	1.69	0.633	0.828	0.446
Market & Competitors	2.09	0.996	0.728	0.493
Strategy & Vision	2.09	0.733	0.728	0.558
Cost Factors	2.11	0.910	0.723	0.259
Activities & Processes	2.18	0.886	0.705	0.066
Funding	2.18	1.173	0.705	0.628
Competencies	2.29	0.869	0.678	0.311
Value Network	2.33	0.879	0.668	0.659
Distribution Channels	2.42	1.138	0.645	0.557
Partnerships	2.51	0.991	0.623	0.394
Resources & Assets	3.00	1.000	0.500	0.450

Remarks: N = 45. coding: 1 (highly important), 2, 3, 4, 5 (not important). M = mean value; SD = Std. Deviation; pi = item difficulty; rit-i = corrected item selectivity. Cronbach's Alpha = 0.792.

Nevertheless, to examine whether there are abnormalities with the components' connections, factor analysis was accomplished. As Table 3.20 follows, after this analysis, a rearrangement of the components within their prior defined categories would be possible. For example, the original categories *Financial Aspects*, *Organizational Structure & Processes*, and *Resources & Competencies* could be recategorized based on the factor load. The new categories could then be *Financial Aspects & Sales*, *Organizational Structure & Resources*, and *Activities, Processes & Competencies*. However, the relatively low Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) of 0.586 must be considered in this factor analysis. Although there are authors who suggest a minimum value between 0.5 and 0.6 for the KMO (e.g., Tabachnick et al. 2007; Cleff 2015), the factor analysis results should be considered with caution. Therefore, the work will be continued with the previous categories from chapter 3.1. Nevertheless, the results show the close interaction between some BM components, which must also be considered when designing the new BMD framework. In this context, it may make sense to combine these closely interlinked components or at least link them together.

Table 3.20: Factor analysis of the importance of the BM components

Classification of Components after Factor Analysis							Component
	Customer & Market	Partner and Networks	Financial Aspects & Sales	Organizational Structure & Resources	Product & Service	Activities, Processes & Competencies	
Customer Relationships	0.908						1
Customer Segments	0.814				0.337		1
Market & Competitors	0.569	0.426	0.421				1
Partnerships		0.864					2
Value Network		0.758		0.45			2
Cost Factors			0.873				3
Distribution Channels		0.51	0.669				3
Funding		0.459	0.528	0.43			3
Revenue Streams			0.577		0.435	0.369	3
Resources & Assets				0.886			4
Strategy & Vision	0.347			0.677	0.384		4
Value Proposition	0.265				0.837		5
Activities & Processes						0.882	6
Competencies	0.324			0.531		0.524	6

Remarks : Rotation Method: Varimax with Kaiser Normalization. Rotation converged in 12 iterations. Extraction Method: Principal Component Analysis. Kaiser-Meyer-Olkin Measure of Sampling Adequacy = 0.586; Bartlett's Test of Sphericity: Chi-square = 241.252, sig = 0.000

As shown in Table 3.21, the resulting BM scores range from 3.00 to 1.33. The most important components with values lower than 2.0 are *Customer Segment*, *Value Proposition*, *Customer Relationship*, and *Revenue Streams*. The categories less or not important, were not selected for these components, which underlines their overall high relevance in the BMD process. On the contrary, the least important components with values of higher than 2.5 are *Partnerships* and *Resources & Assets*.

Overall, all BM components have achieved a positive score and are possibly relevant to startups' BMD. Only the *Resources & Assets* component receives a score of exactly 3.00. Therefore, it is considered to be possibly less relevant overall, even though it is (very) important for 31 % of the participating startups. Based on the values and the threshold value of 2.0, a distinction will be made between standard and flexible components in the following. Accordingly, the quantitative results separate four standard and ten flexible BM components.

So far, the relationship between founders and BMs, the motives, goals, and components and structures of the BMD process have been examined from a quantitative perspective. These data-based results will be further deepened and interpreted in the following discussion of the empirical study.

Table 3.21: Relevance of BM components in entrepreneurial perspective

Business Model Component Analysis					
		Frequency [#]	Percentage [%]	Weight Factor	Score
Customer Segments	highly important	33	73%	1	1.33
	important	9	20%	2	
	neutral	3	7%	3	
Value Proposition	highly important	23	51%	1	1.56
	important	19	42%	2	
	neutral	3	7%	3	
Customer Relationships	highly important	21	47%	1	1.62
	important	20	44%	2	
	neutral	4	9%	3	
Revenue Streams	highly important	18	40%	1	1.69
	important	23	51%	2	
	neutral	4	9%	3	
Market & Competitors	highly important	14	31%	1	2.09
	important	19	42%	2	
	neutral	6	13%	3	
	less important	6	13%	4	
Strategy & Vision	highly important	6	13%	1	2.09
	important	33	73%	2	
	neutral	2	4%	3	
	less important	4	9%	4	
Cost Factors	highly important	11	24%	1	2.11
	important	22	49%	2	
	neutral	9	20%	3	
	less important	2	4%	4	
	not important	1	2%	5	
Activities & Processes	highly important	8	18%	1	2.18
	important	26	58%	2	
	neutral	7	16%	3	
	less important	3	7%	4	
	not important	1	2%	5	
Funding	highly important	15	33%	1	2.18
	important	17	38%	2	
	neutral	5	11%	3	
	less important	6	13%	4	
	not important	2	4%	5	
Competencies	highly important	7	16%	1	2.29
	important	23	51%	2	
	neutral	10	22%	3	
	less important	5	11%	4	
Value Network	highly important	6	13%	1	2.33
	important	23	51%	2	
	neutral	12	27%	3	
	less important	3	7%	4	
	not important	1	2%	5	
Distribution Channels	highly important	9	20%	1	2.42
	important	18	40%	2	
	neutral	12	27%	3	
	less important	2	4%	4	
	not important	4	9%	5	
Partnerships	highly important	6	13%	1	2.51
	important	18	40%	2	
	neutral	15	33%	3	
	less important	4	9%	4	
	not important	2	4%	5	
Resources & Assets	highly important	3	7%	1	3.00
	important	11	24%	2	
	neutral	16	36%	3	
	less important	13	29%	4	
	not important	2	4%	5	

3.6 Discussion of Empirical Results

The discussion focuses on the main conclusions regarding the approach of founders in the BMD. Besides, general BMD trends, BMD standards, and individual BMD requirements, as well as the associated potential for improvement of BMD effectiveness, will be examined.

Regarding the BM definition, most founders primarily see an economic connection with BM. Due to the limited response options in the survey, it is impossible to derive a complete view of the entrepreneurs' understanding of BM. Nevertheless, the BM concept currently has a strong economic connection and different interpretations in the case of startups.

As a general tendency, it can be noted that startups follow the BM's main goal of finding a solution to realize sustainable business and growth. Also, the three observed main purposes of the BMD for startups are (1) to provide a general overview, (2) to validate business ideas, and (3) to present business opportunities to stakeholders. Simultaneously, the data show that the goals and purposes can vary between different startups, which indicates both the existence and the need for dynamically adaptable BMD processes. For the further development of the new BMD framework, this means that it must support users in performing detailed analyses of BM components where necessary, in including the evaluation of ideas and their potential, in enabling the development of several possible alternative configurations of a BM, and in communicating the result of the BMD process in a clear and easy-to-understand way.

Furthermore, the results show that BMD is an active process in most startups, for which the founders take responsibility. As most study participants confirm, BMD is helpful, and BM frameworks, tools, and guided workshops are supportive, which underlines the importance of using BMD concepts throughout the entire startup process. From the combination of these statements, it can be concluded that founders accept structured approaches and guidance in their business development process and at the same time see advantages in using BMD methods. For the present work, this means that the artifact to be developed must be easily usable and accessible, preferably not just once at the beginning of the founding process but continuously over a longer period. This insight can be transferred to the requirement that the framework must be applicable without external expert guidance.

Besides, the results show that the teams along their BMD process rely largely on the support of the BM Canvas, often in combination with the Lean Canvas or the jobs-to-be-done method (for more information on this method, see chapter 4.3.3). According to the results presented by Henike et al. (2019), the cognitive effectiveness, helpfulness, and ease of use of tools for BMD are highest when the used elements are either known or resemble graphically familiar visualizations. Therefore, the artifact's overall design to be developed in the following should

be based on well-known tools such as the BM Canvas, Lean Canvas, and the JTBD method. Also, the survey results show that supporting workshop formats are considered helpful by the teams. Therefore, it can be assumed that the framework can embed the known tools in a higher-level workshop format.

Nevertheless, the requirement defined above that the framework must also be applicable without external expert guidance must be considered. Therefore, the workshop must be designed so that it guides the user through the BMD process in a comprehensible manner, even without external workshop guidance. It is, therefore, more appropriate to speak of a process guideline than a workshop.

Despite the already widespread use of different BM frameworks and methods in the BMD process, more than one-third of startups state that the effort required for BMD is currently high and that the methods and tools do not meet all the requirements startups place on the creation of a complete BM. More precisely, it is shown that the existing BMD tools do not sufficiently help to find and create all the necessary information for the design of a complete BM. Consequently, there is potential for improvement in the BMD procedures of startups, which creates an incentive to develop the BMD framework further. Potential for improvement is also seen for each BMD phase and related activities such as information collection, creating alternative solutions, and designing detailed BMD concepts. A closer look at the time spent in the individual BMD phases reveals no clear systematic relationship between the teams. The large deviations in time distribution can indicate a lack of structure and guidance for appropriate time management in BMD.

This lack of a uniform structure is also reflected in the processing of the individual BM components. For example, although the study shows that startups tend to start their BMD process either with the *Customer & Market* category or with the *Product & Service* category, the other elements vary. However, the *Physical & Human Resources* category and the *Network, Partners & Infrastructure* category are done in the later BMD steps.

These differences are also consistent with the divergences between the perceived importance and the actual activity level in most strategic analyses. In particular, *Trend Analysis*, *Stakeholder Analysis*, and *Network Analysis* are underrepresented in current BMD processes. Although all startups agree that *Customer and Market Analysis* should be part of the BMD process, further analysis depends on the individual requirements of the startups. Nevertheless, there is no clear indication of how much time startups need for the various BMD activities. One reason for the time variations could be due to individual BMD requirements. For this reason,

guidelines on the prioritization, allocation, and management of time throughout the BMD process could also be helpful here.

The fundamental priority of customer and market aspects in the BMD of startups is also evident in analyzing the individual BM components. In careful consideration of the empirical research results, customer and market design aspects in BMD are the top priority. The *Customer Segment*, *Value Proposition*, *Customer Relationship*, and *Revenue Streams* are the most important BM components. As with the divergence of the strategic analyses, there are also differences in connection with the BM components. Nevertheless, all 14 components are relevant. Due to the nevertheless significant higher weighting of the four components mentioned, the 14 components were divided into four standard and ten flexible components (see Table 3.22).

Table 3.22: Classification of standard and flexible components in startups' BMD process

Business Model Component Analysis				
BM Questions	Standard Components		Flexible Components	
Who?	Customer Segment	1.33	Market & Competitors	2.09
	Customer Relationship	1.62	Distribution Channel	2.42
What?	Value Proposition	1.56	Strategy & Vision	2.09
How much?	Revenue Streams	1.69	Cost Factors	2.11
			Funding	2.18
How?			Activities & Processes	2.18
With whom?			Value Network	2.33
			Partnerships	2.51
With what?			Competencies	2.29
			Resources & Assets	3.00

However, it can be assumed that the artifact must still provide information about all relevant components, but each team can flexibly decide which components are of particular importance. It is also clear that the framework to be developed must contain or at least suggest methods for the functional analysis of all these components. Thus, methods and instruments must be provided for each component to guide the teams through their analysis. However, no clear path through practice is defined after that. Therefore, when designing the artifact, a combination of existing approaches and experiences from the artifact's practical application can and must be used.

Overall, the empirical study provides the first quantitative insights into the BMD practice of startups. Based on the statistical analysis, both the existence of BMD standards and the significant differences in entrepreneurial BMD practice are demonstrated. The findings and requirements for effective BMD derived from this are used to refine the requirements derived from the literature in chapter 2.2.6 for the artifact to be developed.

4 Design of the Artifact

4.1 Design Requirements for the BMD Framework

The following chapter deals with the first step of the actual design cycle of the DSR project, the final definition of the artifact requirements. For this purpose, the requirements derived from the literature and presented in chapter 2.2.6 are compared with the empirical study findings presented in chapter 3.6. Then, the basic criteria for the function, structure, general applicability, and physical design of the artifact are defined. Furthermore, the findings from theory and practice are used to define overarching design principles that must be adhered to by the artifact to ensure effective BMD. The defined requirements are the essence of the knowledge base built up by analyzing the existing literature and empirical findings. On this basis, the content and structure of the developed BMD framework will be presented. It is important to note that the artifact's actual conception and development will take place in a total of two iterations. These iterations are performed one after the other, with the second building on the feedback from the first iteration. The actual adaptations of the artifact made necessary by the evaluation results are described in detail in the evaluation chapters.

This chapter highlights similarities and differences between the theoretical and the practical BMD world and determines whether the results agree, complement, or exclude each other. From this, it is deduced whether the new findings influence the requirements already defined for the artifact and how these requirements should be adapted. As a basis for comparison, the results are evaluated regarding BM definition, BM concept, BMD process, and BMD effectiveness.

The theoretical and practical investigation first focuses on the BM definition concerning the questions: *What is understood by a BM? What are the essential characteristics of a BM?* As is generally observed, different interpretations coexist, mostly related to financial or value logic. Nonetheless, the BM has evolved in the literature from an originally purely financial concept to one increasingly associated with the creation, delivery, and capture of value. This shift in emphasis is not yet visible in practice. Here, the view of the BM as an economic model for generating profit continues to dominate.

In addition to the BM definition, both analyses further examined the BM concept in terms of relevant BM components - intending to answer the question: *What are relevant components of a BM?* Derived from the three BM dimensions of *Value Creation*, *Value Delivery*, and *Value Capture*, a total of 14 potential BM components were identified from a wide range of studies. Utilizing these components, these three dimensions of the BM are further specified. Thus, if

these components are defined in the BMD, the dimensions themselves are also elaborated. If all components are defined, then thereby a BM was designed.

Both in theory and from practical realizations, these components can be divided into standard and flexible BM components. The *Customer Segment* and *Value Proposition* components are, both in theory and practice, the most important BM concept elements. Besides, the empirical results extend the list of standard components to include *Customer Relationship* and *Revenue Streams*. The existence of both standard and flexible BM components makes it clear that there is no single solution for defining all relevant BM components. Nevertheless, the 14 components cover all major sub-areas relevant for startups in the BMD context. For the later process around the framework, some startups may focus more on individual components, while other startups may work on each component with the same depth, depending, for example, on the startup's current level of knowledge, previous experience, or prior work.

Further theoretical findings underline the importance of creating a holistic BM concept by linking all BM components. The literature also recognizes a general direction for extending the BM to a systemic level by considering interconnected ecosystems and networks. The empirical study shows that startups see the *Value Network* as a relevant BM component and several startups agree with the importance of the *Network Analysis* in BMD. However, only a few startups actively perform a *Network Analysis*, and the design of network structures is less prioritized in the BMD process. Although awareness of BM network aspects is obvious in practice, there is still a reluctance to integrate them. A possible reason for this could be the lack of guidance on BM frameworks and how the ecosystem and network aspects can be successfully integrated into the BMD process. Therefore, for the framework to be developed, integrating *Network Analysis* into the BMD process is explicitly introduced.

Continuing to compare results on the BMD process, the discussion focuses on the questions "*How do startups conduct their business model design?*" and "*What are the appropriate process steps for an effective business model design framework?*" The theoretical analysis outlines that BMD is a sub-element of BM development and thus part of any entrepreneurial process that results in a BM concept. The empirical study also confirms BMD as a proactive task in most startups. It seems that the theory refers only to the general structure and results of the three main phases of initiation, ideation, and integration, while there are very few details about when and how individual design steps should be carried out and how partial results can be combined to form a holistic BM picture. Furthermore, there are no explanations of how a BMD process can be adapted to individual BMD requirements or how relevant business context influences can be discovered and integrated.

In this context, the empirical study shows that startups' time required varies greatly in the three BMD phases, although they use the same few BM frameworks. Neither BMD theory nor the available BM frameworks adequately account for the diversity of practical BMD procedures. Theoretically, it remains unclear how the structuring and timing should be designed to meet individual BMD requirements. On the other hand, a similarity for the BMD structure is that startups first prioritize the design of the BMD category *Customer & Market* together with *Product & Service*. Similarly, *Customer Segment* and *Value Proposition* appear as the most important BM components in the literature.

With respect to the initiation phase, the theory states that the collection and analysis of relevant information is an important basis for further BMD steps. The empirical study also shows that startups rely on and perform several strategic analyses during their BMD process. In detail, all startups actively conduct *Market & Customer Analyses* and, if required, add elements from the areas of *Competitors & Benchmark*, *Finance*, *Network*, *Scenario & Strategic Foresight*, *Stakeholder*, *Trend*, and *Internal Organizational Analysis*. In contrast, BM tools such as the BM Canvas do not provide guidelines for defining and generating a relevant information base and do not consider individual information needs. Overall, the studies show potential for further guidance on how relevant information can be collected and used to derive successful BM decisions from entrepreneurs.

In terms of BM frameworks and instruments, the BM Canvas by Osterwalder und Pigneur (2010) achieves the highest reference rate in both theoretical and practical studies. There is a contradiction between the requirements of BMD and the applied BM frameworks in terms of new findings. More recent BMD concepts recommend moving to integrated systems thinking, linking various BM components and actors in the corporate environment, and incorporating internal and external influences into BMD. Although the importance of business context influences is obvious in the BMD practice of startups, the tools are limited to standard BM tools, particularly the BM Canvas, the Lean Canvas, and the Jobs-to-Be-Done method. It can be concluded that there is a discrepancy between BMD needs, the status quo of BM frameworks in theory, and actual entrepreneurial BMD practices.

This conclusion is followed by an outline of the findings regarding the effectiveness of BMD. The literature points out that more effective and efficient BMD approaches are needed to provide entrepreneurs with more guidance in making sustainably successful BMD decisions. Such entrepreneurs recognize that their current BMD process is not very efficient, nor are their BM results satisfactory. As a main result of the theory study, a new understanding of BMD effectiveness and the associated effectiveness requirements is presented. A BMD process is effective if the framework to be developed supports a company in certain situations in designing a

BM for their case. The BMD process must be geared to individual BM goals, to a specific BMD purpose, and at the same time, meet the usual structural and environmental design criteria to achieve a high-quality result. The empirical results confirm that BM goals can vary and that there are different BMD purposes. However, startups are generally looking to find a solution to achieve sustainable business and growth and pursue the main objectives to gain an overview of the key BM components, validate business ideas or communicate business ideas to their stakeholders.

Furthermore, the most common BM frameworks' analysis clarifies that existing BM frameworks cannot fully meet the imposed BMD effectiveness criteria, meaning that existing BM frameworks cannot provide the best possible support towards a satisfactory result. In this context, entrepreneurs find that existing BMD tools are not very satisfactory and do not meet all individual BMD requirements.

Ultimately, neither the current procedures nor the instruments used in entrepreneurial practice fully meet the founders' requirements for the BMD. Conversely, potential resulting from new developments in BMD theory remains unused in BMD practice when it comes to structured design steps in the overall BMD process, the inclusion of entrepreneurial contextual influences, the selection of relevant BM components, and the creation of an information base for dedicated BM decisions. Building on current BM frameworks from theory can lead to incomplete and ineffective BMD practice, meaning that BMD processes are not consistent with the goals and purposes of BMD, and high quality of support cannot be guaranteed. Besides, efficient time management is unlikely due to a lack of guidance through the BMD process steps.

With these new findings, the requirements for the artifact as defined in chapter 2.2.6 can be supplemented. These additional requirements refer specifically to the physical design and handling of the artifact and the accompanying process of the artifact application, i.e., the actual requirements of the users. Figure 4.1 adds these new criteria to the requirements known from chapter 2.2.6. For a better overview and delimitation of the requirements, they are assigned unique codes for the work's further course. The two letters in the code describe the type of requirement. For example, the letter sequence ER stands for an environmental requirement.

Environmental Requirements	Functional Requirements	Structural Requirements	User Requirements
ER_1 Usability	FR_1 Design a Business Model	SR_1 Acceptance of methods	UR_1 Comprehensive process and method description
ER_2 Comprehensibility	FR_2 Reduce complexity	SR_2 Internal cohesion	UR_2 Guiding poster (Canvas-like structure)
ER_3 Customizability	FR_3 Define components in detail	SR_3 Number concreteness	UR_3 Include supporting methods for each component
ER_4 Suitability	FR_4 Present business ideas	SR_4 Absence of redundancy	UR_4 Prioritization of components possible
ER_5 Completeness	FR_5 Validate business ideas	SR_5 Clear operationalization and guidance	UR_5 Usable without external expert guidance
ER_6 Efficiency	FR_6 Identify opportunities and risks	SR_6 Modularity	
	FR_7 Improve status quo		

Figure 4.1: Refined requirements for effective BMD

As already defined in chapter 2.2.6, the artifact must enable new companies to design a BM while supporting several individual BMD purposes and BM goals and ensure that this BM meets the structural criteria of being coherent, conceptual, systemic yet granular where necessary and allows for a dynamic update.

Furthermore, the artifact must be usable and dynamically adjustable not only once but over a longer period. The artifact should therefore be applicable without external expert guidance offering a comprehensive process guideline. Furthermore, the artifact should be visually oriented on a structure like the BM Canvas, the Lean Canvas, and the Jobs-to-Be-Done method. The artifact must contain supporting methods for all relevant BM components, provide a clear process structure, and still allow flexible prioritization of the level of detail and time required to analyze each component. All this serves to build an appropriate information base for decision making.

From these aspects, the first rough structure of the artifact can be derived. First, the artifact must have an instrument that can be easily modified at any time. On the other hand, the artifact must provide a detailed guideline through the BMD process, and within this guideline, it introduces the supporting methods and understandably describes them. Therefore, the basic structure of the artifact is two-part. On the one hand, it consists of a kind of poster or canvas, similar to the already known approaches. On the other hand, the artifact should contain a description of the methods, including examples and exercise instructions, in the form of a self-explanatory workshop format. Here, a detailed presentation in supporting slides for MS PowerPoint or similar digital programs could be useful.

In the end, a consolidated picture of the two research streams results from the key findings for the BM definition, the BM concept, the BMD process, and BMD effectiveness. As the discussion

of theory and practice shows, many findings from theory and BMD practice coincide. Some key findings from theory can be quantitatively validated. Furthermore, the empirical study adds new insights into the relevance of different BM components and specifies the BMD process requirements. All these findings are incorporated into the design of the actual artifact in the following chapters.

4.2 Initial Design of the BMD Poster

As derived from the requirements in chapter 4.1, the basic structure of the artifact has two parts. First, it consists of a kind of poster or canvas, similar to the already known approaches. This poster visualizes the BM components to be worked on and visually supports the BMD of the founders. Second, the artifact should include a description of the methods with examples and practice instructions in the form of a self-explanatory workshop format to support the founders in working on the components. In the following chapter, the design of the BMD poster is defined first. To do this, the BM building blocks it contains, and the associated terminology must first be defined. From the theoretical and practical preliminary investigations, 14 components were derived that are considered relevant for BMD (see Table 3.22). Since the poster's design is an essential basis for the final design of the artifact, the poster will be designed with the help of a panel of experts.

4.2.1 Planning and Conducting of Expert Discussions

Therefore, during the initial development of the canvas with its 14 components, several discussions were held with experienced experts to find the most appropriate generic terms and guiding questions for the 14 components. The main criteria were the comprehensibility and unambiguity of the terms. Besides, these discussions determined the design of the poster and developed initial principles for the design of the accompanying workshop or process guide.

Participants for the discussions were selected based on the following selection criteria:

- Significant experience working with startups (> 5 years, e.g., as a startup coach or startup mentor).
- Own experience in the design and development of BMs
- Deep insights into the theoretical and practical status quo in BMD
- Willing and able to share expertise in a group and openly discuss relevant topics

The goal was to assemble a diverse sample of experts from different business areas or different areas of expertise. This approach was intended to ensure that a comprehensive understanding was achieved across business units.

For a discussion to be successful, it is important to create an informal environment for discussion that encourages participants to respond to a question (Krueger und Casey 2015). Therefore, initially and as a gentle introduction to the topic, the research project was briefly introduced. Initial questions were then asked about previous experience with the research area. These questions were informal and in a conversational tone to encourage conversation with the participants. Discussions were conducted according to a predetermined structure to ensure that relevant topics were covered and that there was sufficient time for participants to understand the topics and engage in a more in-depth discussion. This structure consists of five guiding chapters that cover the most important aspects of the study.

The first guiding chapter addresses the content of each component. In preparation for the discussion, each of the components is defined in two to three sentences. From this, it is determined if the definitions provided were understandable to the participants and fit the component's current name. The basis for the definitions is given from the theoretical considerations in chapter 2.1.4.

The second guideline chapter deals with the possible renaming of the components. It is asked how understandable the terms are and how these must be adapted if necessary. For this purpose, concrete anchor examples from existing BM frameworks are used, e.g., the term Key Resources from the BM Canvas by Osterwalder und Pigneur (2010) instead of the term Resources & Assets defined in chapter 2.1.4.

The third chapter directly follows the content or description of the components using guiding questions for the founders. For this purpose, guiding questions are defined in advance partly from the literature and partly from existing BM frameworks by the moderator and assigned to the individual components. Basic templates for this are the works of Osterwalder und Pigneur (2010) and Wirtz (2018). This sub-discussion aims to define three to five guiding questions for each component to be recorded on the component poster.

The fourth chapter addresses the initial design of the canvas-like poster provided to participants as an essential working tool during their BMD. The chapter aims to find the best possible layout of the poster's components to provide a visual aid to the founders along the BMD process and while working with the poster. Therefore, the facilitator created several different design prototypes in preparation for the discussions.

In the fifth chapter, participants are asked to create an initial rough sketch of the process by logically organizing the 14 components. This part of the discussion is to determine which components should be worked on first and which components can build on each other. For this

purpose, the 14 components were transferred to Post-Its and randomly distributed on the whiteboard beforehand. In the discussion, they are then prioritized by the participants.

The discussion ends with closing questions and an acknowledgment. The closing questions are designed to help participants reflect on the previous discussions. Following the discussion, participants will be sent a summary of the key findings and the poster with the developed layout, components, and associated guiding questions. Participants will be asked to review this summary for missing aspects and ensure that no critical elements have been overlooked.

The discussions took place in the period between February and May 2018. A total of five discussions were held, each with one expert from entrepreneurship research or practice. All experts showed deep theoretical and practical insight into startup BMD from different professional perspectives. These experts were the directors of two startup accelerator programs, an independent startup coach with his own startup experience and almost ten years of experience coaching startups, a professor of entrepreneurship at a technical university, and a serial founder and active mentor of several technology-oriented startups. The discussions conducted lasted on average about 55 minutes, including a warm-up period of about 5 minutes. This warm-up period was important to create a relaxed and comfortable atmosphere. However, since some of the participants already knew the moderator, this warm-up phase could be kept short. Due to the rather informal and workshop-like nature of the discussions, they were not audiotaped. Instead, the actual content was recorded on whiteboards or flipcharts during the discussion and then archived with photo logs. The advantage of actively taking notes on the whiteboard or flipchart was that the discussions could focus on specific phrases. The essence of the discussions could be reproduced. The photo log made it possible to return to the data several times and record information in a structured manner.

4.2.2 Findings and Derivation of the Poster

The discussion results showed that the BM components are correctly defined from the experts' point of view. Although there are different opinions about the definitions' level of detail, the descriptions known from chapter 2.1.4 are sufficient to introduce the components in the BMD design.

However, some differing opinions arose regarding the names of the components. For example, some participants suggested that the terminology should be as close as possible to the formats already known, such as the BM Canvas, not to confuse teams that may have already worked with such tools. On the other hand, other participants suggested using terms that sound different from the already known ones to distinguish the new framework more clearly from the already existing tools. In the end, a compromise was found that was based on the component

names of the already existing tools. It was nevertheless introduced a uniform naming of the components for the new Framework. However, the most significant change was made to a generally not addressed component in the previous frameworks. The component, initially called *Strategy & Vision*, was renamed *Purpose & Team* following discussions. This change echoes the discussion already alluded to in chapter 2.1.4 regarding the assignment of the *Strategy & Vision* component. The experts argued almost unanimously that startups are less concerned with strategy development per se and that the vision and mission and thus the corporate goals are derived more from the founders' motivation. Even though the component still has the same goals in terms of content, renaming the component considers this motivation and the strong focus on the founding team in aligning the company. However, since this renaming has not yet been tested with the user group, further evaluations will need to closely examine whether this wording meets user approval.

Concerning the respective guiding questions for the components, there was predominantly a consensus that the pre-formulated questions based on the existing tools were also sufficient for the new design. Ultimately, between three and five guiding questions were defined for each component.

The previous component designations, the new designations, and the associated guiding questions are summarized in Table 4.1. The table also shows the order that was determined by the discussions. During the process of creating this order, discussions arose about the nature and maturity of the startups' ideas and background. For example, one participant noted that the order of components could change depending on whether the approach is more market- or technology-focused. In the first case, the problem is derived from an existing market or customer group, e.g., through intensive market observation or customer surveys. In the second case, the idea for a new product tends to arise from research or the development of new technology or product, for which a specific use case is then sought. Therefore, in the case of a market-pull approach, it may make more sense to start with analyzing customer segments. In contrast, with a technology-push approach, the initial focus may be on core activities or resources to develop the new technology.

In contradiction, other participants argued that the technology-push approach could only be successful if defined as early as possible by whom the technology will be used and what problem it will solve. As a compromise between these two views, it was therefore decided that the problem definition and the derived definition of the solution space must occur as early as possible in the process. This sequence is also in line with the empirical study results in chapter 3.6, according to which the BM categories *Customer & Market* and *Product & Service* are processed first by almost all startups.

However, the *Purpose & Team* component (originally *Strategy & Vision*) was chosen by all experts as the starting point of the entire process. Here it was argued that the team is the most critical resource for success at such an early stage and therefore, it is important first to clarify what motivates the team and who on the team brings what competencies to the table.

Additionally, there is also a natural sequencing between components in that the information or decisions of one component must be gathered or made first before another component can be defined. For example, until a decision is made about which customer segment to target, it is impossible to define how sales channels or customer relationships must operate. Based on these considerations, the idealized sequence of components listed in Table 4.1 was determined.

Table 4.1: BM components, their sequence, and associated guiding questions

Business Model Components and their Guiding Questions			
Prior Name	Adapted Name	Order	Guiding Questions
Strategy & Vision	Purpose & Team	1	<ul style="list-style-type: none"> • What is our common vision for the company? • Is there a sufficient alignment between our personal goals and the company's strategy? • What are the core aspects of our mission?
Customer Segments	Customer Segments	2	<ul style="list-style-type: none"> • Which customer groups / market segments have been identified? • What are the most important customer needs regarding the value proposition? • How can parts of the value proposition be customized for customers?
Value Proposition	Value Proposition	3	<ul style="list-style-type: none"> • What value do we offer to the customer? • Which of our customers problems do we solve? • How can we articulate this value as simple and precise as possible?
Activities & Processes	Core Activities & Processes	4	<ul style="list-style-type: none"> • What are the critical processes? • What are the processes that distinguish us from others? • Which processes are relevant to building the most efficient and effective added value? • How dependent / independent is the internal value creation of network partners? • Are there any process patterns that can be standardized?
Competencies	Core People	5	<ul style="list-style-type: none"> • Who do we need to get the work done? • What are the success-critical competences? • Can competences be built and protected against imitation? • Which competencies ensure the competitiveness and sustainability of the business model?
Resources & Assets	Core Assets	6	<ul style="list-style-type: none"> • What do we need to get the work done? • What are the success-critical assets? • How can we obtain and keep our critical resources? • Can resources be built and protected against imitation? • Which resources ensure the competitiveness and sustainability of the business model?
Value Network	Value Network	7	<ul style="list-style-type: none"> • Which potential network partners can be identified? • What role does your own company play in this network? • Which services make your own company valuable for the partners? • Could a particular task be extended or outsourced to other roles?
Market & Competitors	Market & Competitors	8	<ul style="list-style-type: none"> • What characterizes the market? • Are there any market barriers? • Which (cross-industry) competitors have been identified? • How big is the market potential?
Customer Relationships	Customer Relationships	9	<ul style="list-style-type: none"> • What type of relationship does each of the customer segment expect? • How can these relations be established? • How can the customers be tied to our product/service? • Which marketing strategy do we follow?
Distribution Channels	Distribution Channels	10	<ul style="list-style-type: none"> • Through which channels do our customer segments want to be reached? • Are their already channels in place? • What customer touchpoints are in place?
Partnerships	Strategic Partnerships	11	<ul style="list-style-type: none"> • Which tasks do we perform ourselves and which do our partners perform? • What exactly do the individual partners have to do and what is important in the cooperation? • Which partners are able to bring in their capabilities reliably and on a long-term basis?
Revenue Streams	Revenue Streams	12	<ul style="list-style-type: none"> • Which revenue strategies do we follow? (Direct vs. Indirect, transactional, etc.) • Which forms of revenue are used? (Basic charge, pay-per-use, etc.) • How is the pricing structured for the respective customer group? • Is pricing adjusted to both the value proposition and customer demand?
Cost Factors	Cost Factors	13	<ul style="list-style-type: none"> • What are the main cost drivers and are these perceived as added value by the customer? • How does the cost structure look like? • What is the ratio of fixed costs to variable costs? • When do the costs occur and how often?
Funding	Capital & Funding	14	<ul style="list-style-type: none"> • How can we close the gap between costs and revenue? • What is the underlying capital structure? (Share of debt / equity) • Which forms of financing are used? (Investments, loans, etc.)

Regarding the initial layout of the poster, most experts choose a layout visually following the existing frameworks of the BM Canvas or Lean Canvas, i.e., the poster's components should be presented in boxes. Regarding their arrangement, it was also said that the poster should guide the user from left to right through the dimensions *Value Creation* and *Value Delivery*. Framing these two areas are the visually superior *Purpose & Team* component and the subordinate *Value Capture* dimension. The interaction of the *Core Activities & Processes* and the *Value Proposition* is centrally located in the middle of the poster.

The poster directs the user's view from the outside via the *Strategic Partnerships* and the *Value Network* first inwards to the *Core Assets*, *Core People*, and the *Core Activities & Processes*. Then the view is guided via the *Value Proposition*, the *Distribution Channels*, and the *Customer Relationships* in the direction of the *Customer Segments* and the *Market & Competitor*, i.e.,

back out of the organization into the market environment. The view is embedded in the overall goals and values of the founders and the financial aspects. The latter shows the *Cost Factors* below the organization's primary cost sources and the *Revenue Streams* below its primary revenue sources. To visually close the gap between revenues and expenses, *Capital & Funding*, which deals with the company's long-term financial and liquidity planning, is shown between the *Revenue Streams* and *Cost Factors* boxes.

Figure 4.2 shows the first draft of the first part of the artifact, the BMD poster.

en>techn>on>>>The BMD Poster_v1

Company _____ Team _____ Iteration _____		Purpose & Team <ul style="list-style-type: none"> • What is our common vision for the company? • Is there a sufficient alignment between our personal goals and the company's strategy? • What are the core aspects of our mission? 	Company Logo
Strategic Partnerships <ul style="list-style-type: none"> • Which tasks do we perform ourselves and which do our partners perform? • What exactly do the individual partners have to do and what is important in the cooperation? • Which partners can bring in their capabilities reliably and on a long-term basis? 	Core Assets <ul style="list-style-type: none"> • What do we need to get the work done? • How can we obtain and keep our critical resources? • Can resources be built and protected against imitation? • Which resources ensure the competitiveness and sustainability? 	Core Activities & Processes <ul style="list-style-type: none"> • What are the critical processes? • What are the processes that distinguish us from others? • Which processes are relevant to building the most efficient and effective added value? • How dependent / Independent is the internal value creation of network partners? • Are there any process patterns that can be standardized? 	Value Proposition <ul style="list-style-type: none"> • What value do we offer to the customer? • Which of our customers problems do we solve? • How can we articulate this value as simple and precise as possible?
Value Network <ul style="list-style-type: none"> • Which potential network partners can be identified? • What role does your own company play in this network? • Which services make your own company valuable for the partners? • Could a particular task be extended or outsourced? 	Core People <ul style="list-style-type: none"> • Who do we need to get the work done? • What are the success-critical competences? • Can competences be built and protected against imitation? • Which competencies ensure the competitiveness and sustainability? 	Distribution Channels <ul style="list-style-type: none"> • Through which channels do our customer segments want to be reached? • Are their already channels in place? • What customer touchpoints are in place? 	Customer Segments <ul style="list-style-type: none"> • Which customer groups / market segments have been identified? • What are the most important customer needs regarding the value proposition? • How can parts of the value proposition be customized for customers?
Cost Factors <ul style="list-style-type: none"> • What are the main cost drivers and are these perceived as added value by the customer? • How does the cost structure look like? What is the ratio of fixed costs to variable costs? • When do the costs occur and how often? 	Capital and Funding <ul style="list-style-type: none"> • How can we close the gap between costs and revenue? • What is the underlying capital structure? (Share of debt / equity) • Which forms of financing are used? (Investments, loans, etc.) 	Customer Relationships <ul style="list-style-type: none"> • What type of relationship do our customer segment expect? • How can these relations be established? • How can the customers be tied to our product/service? • Which marketing strategy do we follow? 	Market & Competitors <ul style="list-style-type: none"> • What characterizes the market? • Are there any market barriers? • Which (cross-industry) competitors have been identified? • How big is the market potential?
Revenue Streams <ul style="list-style-type: none"> • Which revenue strategies do we follow? • Which forms of revenue are used? • How is the pricing structured for the respective customer group? • Is pricing adjusted to both the value proposition and customer demand? 			

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Figure 4.2: Initial draft of the BMD poster

Since only five individual discussions were conducted, it could be argued that theoretical saturation was not achieved. Besides, there may have been limitations to the generalizability of the results when considering the individual discussions. Due to the limited number of experts, it could be argued that the results may not reflect the full perspective. However, based on previous research activities, the identified components were well developed and validated, so theoretical saturation was already achieved. Nonetheless, the results of the discussions may not be sufficient in themselves to generalize the findings. Therefore, these discussions serve only as a first step in a series of research, design, and evaluation activities.

4.3 Initial Design of the BMD Slide deck

The expert discussions and the associated preliminary work thus lay the foundation for the further design cycles. In the next step, further literature research is used to determine which accompanying methods should be selected for the individual components. All these methods aim to help the framework users work on the components as effectively and efficiently as possible. Therefore, assistance in finding the right information for the components and, where appropriate, assistance in redeveloping information must be included. These methods and their sequence lay the foundation for the slide set that surrounds the poster.

On the one hand, this serves the trainer as a guide for applying the framework in startup programs such as accelerators. On the other hand, it serves the teams as a reference book after the workshop. Alternatively, if they want to apply the framework without an accompanying program, it is also a guide for implementing the individual methods. The slide set must, therefore, describe the methods it contains as intuitively as possible. At the appropriate point, it may nevertheless be useful to provide the founders with further, more in-depth, or background information by referring to other sources.

From the theoretical and practical considerations, initial insights have already been derived from which analyses are considered essential in the BM components' context. As Figure 3.7 in chapter 3.5 shows, these are primarily in-depth analyses of customers, the market, competition, and financial aspects. These findings serve as a starting point for the subsequent search for suitable methods that the teams can use to find the right information on the individual components as part of their BMD process and decide on their BM's design based on this information.

In addition to introducing and describing these methods, the slide deck must also act as a process guideline and provide an explicit process sequence. In doing so, the slide deck is oriented to the phases of the BMD process elaborated in chapter 2.2.1.

Therefore, the 14 defined components are first assigned to the BMD phases, thus creating an initial rough process guideline, followed by a description of how the individual components' methods were selected. Based on this selection, the BMD framework's initial guideline is developed by sequencing the process phases' methods. Attention is paid to the methods' logical composition, thereby ensuring that the methods build upon each other in a meaningful way. This approach creates a process that should enable the founders to gather step-by-step information on their BMD poster's respective boxes and then fill these with the most relevant findings from applying the accompanying methods.

4.3.1 Phases and Associated Components

The assignment of the components to the individual phases preliminary based, on the one hand, on the preliminary work on the phases of BMD from chapter 2.2.1. On the other hand, the experts idealized sequence plays an essential role in the assignment of the components to the phases and the sequence of the components within the phases.

The goal of the first phase, *Initiation*, is to strategically frame the BMD process's implementation and define the purposes of the BMD process. This framing is done by identifying the team's core values and core competencies and deriving a vision and mission for the organization. Therefore, the *Purpose & Team* component is the only component in this phase and sets the starting point for the BMD process.

In the second phase, *Idea Generation*, the components *Customer Segments*, *Value Proposition*, and *Core Activities & Processes* are developed. This phase aims to create a value proposition that fits the needs of the customers and the company's capabilities. To ensure that a solution to a relevant problem is derived, the problem space must be explored by discovering and defining customer problems. This exploration includes identifying the customers' core tasks and desired outcomes. The solution space can then be outlined, and solution concepts designed from which one or more value propositions are derived. Likewise, initial ideas are developed as to how this value proposition can be implemented. In other words, whether products or services are involved and what activities and processes would be necessary for the company to develop them.

The *Feasibility Study* aims to check whether the necessary resources and competencies are available to implement the activities and processes described above. This phase also analyzes how the company must position itself in the market with the previously defined solution. For this purpose, it is examined which role the company must or can assume in the value network. The feasibility study analyzes whether the market potential to be developed is attractive enough and whether the competitive situation permits market entry, or how the market entry barriers are designed. Therefore, the associated components are the *Core People* and *Core Assets*, the *Value Network*, and *Market & Competitors*.

The fourth phase, *Prototyping*, pursue designing possible alternative implementation variants of the previously considered solution, involving, for example, defining different market entry strategies or revenue opportunities. Furthermore, make or buy decisions are played out based on the previous findings on the company's required resources and capabilities, and positioning in the market. For this purpose, possible strategic partnerships with suppliers, complementary companies, or other stakeholders are analyzed, and the resulting cost advantages or

disadvantages. Likewise, possible financing scenarios for the implementation are played out. Therefore, prototyping includes *Distribution Channels*, *Customer Relationships*, *Strategic Partnerships*, *Revenue Streams*, *Cost Factors*, and *Capital & Funding*.

The final phase of the design process is *Decision Making*. In this phase, all BM components are again included to refine or harmonize them if necessary. The components' contents are checked for coherence, and a final decision is made to implement a BM. Thus, this phase represents the conclusion of the BMD process. Figure 4.3 assigns the individual components to the BMD phases.

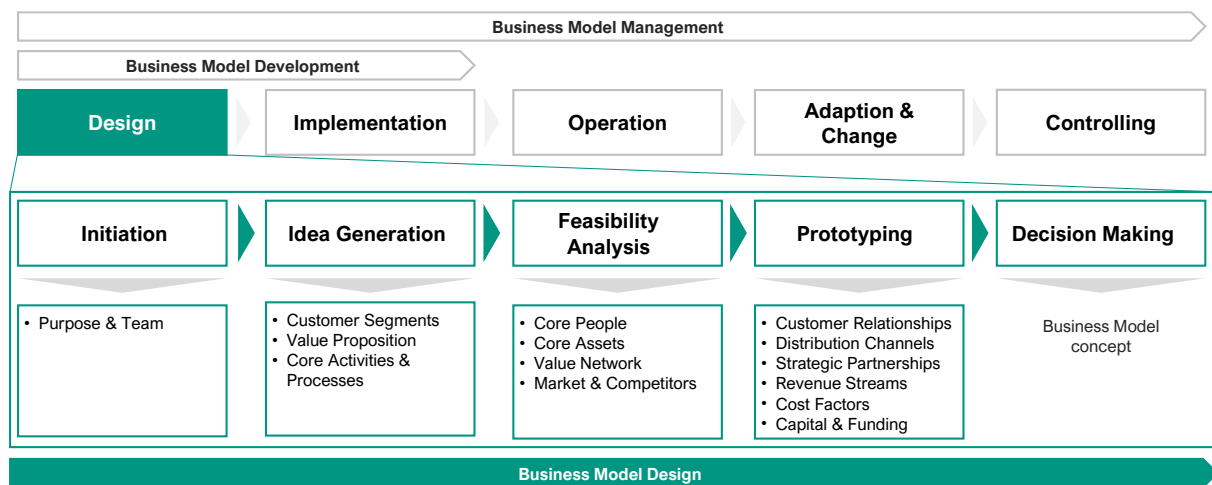


Figure 4.3: BMD phases and the associated components

4.3.2 Selection of Accompanying Methods

According to the artifact's structural requirements (see chapter 4.1), it must be based on accepted methods in theory and practice. For the slide set, this means that methods should be introduced that are already used in practice whenever possible. If this is not possible for specific methods, approaches must be found that can be derived conclusively from theoretical considerations.

Furthermore, the requirement of internal cohesion requests that the methods, if possible, build on each other and take up the findings from previous methods. While the entire framework's coherence is to be increased, it must be ensured that the requirement of the absence of redundancy is maintained. That is that several methods do not produce redundant results. In addition to the precise process structure, this also serves the efficiency of the entire process.

Another structural requirement is number concreteness. Here, the goal is to use methods that make the user work towards concrete numbers that allow comparisons between different alternative designs. In the BMD context, these are preliminary numbers that relate to the market's economic attractiveness, the customer group, or the revenue opportunities.

The requirement for modularity states that the artifact's parts, i.e., the methods in the slide deck, can be applied separately if necessary and then reassembled at another time. For the slide set, it can be derived from this requirement that the methods must be described in a modular way. Therefore, they must have a clear beginning and a clear end to carry them out separately if necessary. Overall, a compromise must be found between the internal cohesion of the entire process, the avoidance of redundancy, and the possibility of modular application of the individual methods.

The toolbox metaphor is introduced at this point to explain the slide deck structure in a tangible manner. A toolbox contains different tools for different purposes, for example, a hammer to hammer a nail into the wall or a screwdriver to screw down a lamp housing. Each tool has its purpose. However, for specific tasks, several tools can and must be combined to achieve the goal. The design of a BM falls into the latter category. Here, in terms of methods, multiple tools must be applied to design a finished BM concept. If, however, a team wants to determine the market potential of a product or carry out a new price calculation at a later or earlier point in time, for example, individual methods from the toolbox can be used for this purpose without having to go through the entire BMD process again.

The process is described by which the respective methods were selected, and the toolbox was filled step by step. The consolidation of all methods, their actual description, and their classification in the individual phases of BMD then determines the slide deck's initial structure. This structure is described in detail in chapter 4.3.4.

4.3.2.1 Search Strategy

The finding and selection of those methods with which the above requirements can be met, and the individual components' questions can be answered needs more in-depth research of the existing methods from theory and practice. In the present case, two types of research were conducted. The first is a literature search that focuses on scientific studies and books on the topic. This search aims to identify recognized or at least more widely accepted methods in the scientific world. Nielsen et al. (2019) state that the BMD research field's proactive driver is the practitioner community. Therefore, it can be assumed that not all relevant contributions to the field of BMD will be published as scientific literature but will be available on the Internet in website articles. Therefore, a web search was conducted as a second type of research. The web search focuses more on practical literature, such as blog entries or workshop descriptions of business incubators, consultancies, or similar offerings. The web search aims to identify methods that come mainly from the practical world and were developed more from users' experience than from scientific considerations.

A web search is based on the basic principle of information retrieval. According to this principle, a user requires information based on a task and verbally formulates this need (Broder 2002). The search engine then translates the formulation into a query and returns the documents that match the search criteria. If the return does not meet the user's needs, a process must be performed to refine the query. This process includes generating new queries or refining the results (Broder 2002).

Web searches can be divided into different categories depending on their intent. One of these types is the informational query, whose purpose is to find information believed to exist in static form on the Internet. The static form emphasizes that the user's query does not generate the document (Broder 2002). Since the web search of this thesis was conducted to collect information about methods and tools related to enterprise modeling that were assumed to be available on the Internet, it can be categorized under the informational query type.

The two research avenues' goal is to gather as many potential methods as possible and then examine and select them for their suitability for use in the BMD framework. Therefore, a clear strategy for conducting the research was defined, ensuring the traceability of the method search. This strategy includes the keywords to be used and the databases to be searched. Four databases were used for the literature search to reduce the influence of variation in search results. These databases were EBSCOhost, Google Scholar, Research Gate, and ScienceDirect, as they allow for a comprehensive and in-depth analysis of the topic. The search engine used to perform the web search was Google.

The search terms used to create the queries were chosen to describe best the design of a BM as a whole and its components. The given search terms were used equally for both the literature search and the web search. The search results found were evaluated, and the methods and tools they contained were extracted. An overview of the keywords used for the literature search and the web search is shown in Table 4.2.

Table 4.2: Overview of the keywords used for this research

Search String			
„Business Model“ OR “Business Model Design”	and	Method OR Tool OR Process OR Concept OR Framework OR Asses* OR Analys*	and respective name of Business Model Component

The search strategy also includes the extraction and synthesis of information about the methods and tools found in the search results. The criteria for extracting these techniques were derived from the descriptions of the 14 components and the corresponding phase objectives

presented in chapter 2.2.1. Consequently, the extracted methods and tools had to be assigned to one of the BM components. This mapping was the first step of data synthesis.

After the data were clustered, they were evaluated by the researcher and finally synthesized logically. The evaluation of the methods was based on the criteria of estimated time and resources required for the method, required information content, and industry- or technology-independent applicability. Besides, the artifact's structural requirements, more precisely the acceptance of methods, the internal cohesion, the number concreteness, and the absence of redundancy, were included in the evaluation. If, for example, two methods lead to similar results, the method selected for the BMD framework is the one that has a higher acceptance, requires less time and resources, or ties in more seamlessly with other selected methods.

In terms of time and resource requirements, the decisive factor was that the method could be explained in a comprehensible manner within a few minutes and that initial insights could be gained by the teams through its application within one to two hours. The knowledge gained does not have to be final but serves primarily as the first sense of achievement for the users and should encourage them to work on the methodology in greater depth.

Concerning the required information content, the essential assumption is that the method users still have very little information about possible customers, their offers, the market, or any economic numbers. Therefore, the methodology must also be feasible based on plausible, but not necessarily tested, assumptions. The primary objective here is to show the users which assumptions significantly influence the methodology's results and must therefore be replaced by tested findings at the earliest possible stage.

The openness of the method to different industries and technologies is relevant so that teams from different areas can apply the method equally. This selection criterion also serves to ensure the customizability of the framework. Thus, only methods are selected which contain generic instructions, which the teams then customize by themselves to their respective environment.

To ensure that such methods also find their way into the analysis that were developed and published in the course of the creation period of the present work, these two searches and thus the creation of the pool of methods to be examined were carried out several times starting in May 2018, most recently in June 2020 as part of Marc Hittel's master's thesis¹³. During the development period of this thesis, some originally selected methods were refined and further developed by the scientific and practical community. The following descriptions of the methods therefore refer to the most current status of the analysis in June 2020.

¹³ The master's thesis is available upon request at the secretary of the EnTechnon.

4.3.2.2 Assignment and Selection of Methods

Through the literature review and internet search according to the previously defined search strategy for collecting data on methods or tools, a total of 175 techniques were found and extracted that could potentially be incorporated into the BMD framework approach.

Individual guiding questions were formulated for each BM component in the expert discussions from chapter 4.2.1. From these questions, component goals were derived against which the identified methods were matched and finally assigned to one or more appropriate components. In total, 347 initial assignments of methods and tools to BM components with matching criteria could thus be made.

Most of the identified methods could be assigned to the *Value Proposition* component, followed by the *Purpose & Team*, *Customer Segments*, and *Market & Competitor* components, to which 40 or more initial assignments could be made. This distribution again highlights the importance of these components in the context of BM design.

In a second assignment step, the original 175 methods were checked for redundancies and further narrowed down based on the above criteria. Besides, when considering startup companies, it can be assumed that these companies initially only plan to launch a single product in most cases. Since the BMD framework is intended to focus on startups, all techniques targeting a portfolio with multiple products were likewise excluded. These filtering steps reduced the original 347 assignments to 141 assignments (see Figure 4.4). These 141 assignments are listed in Appendix C.1.

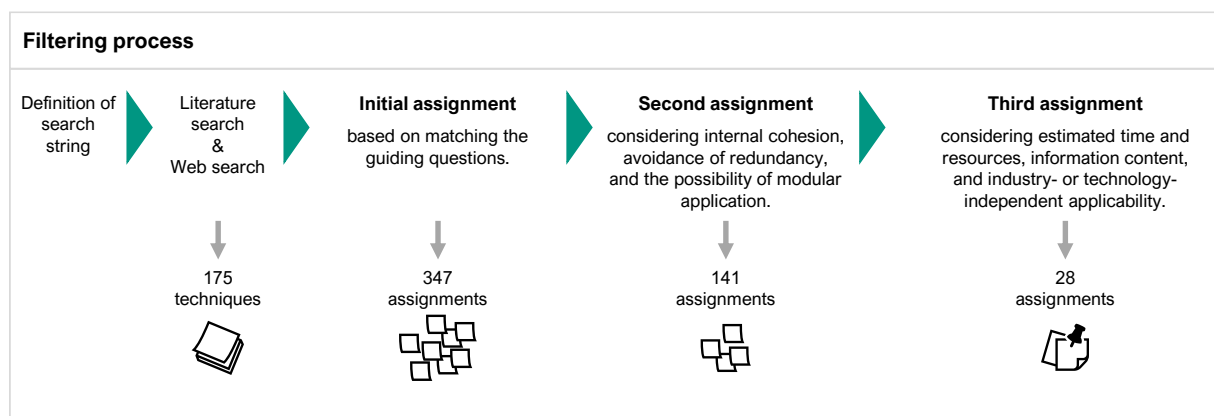


Figure 4.4: Filtering process for the method assignment

After this second allocation round, the remaining methods were again examined in detail, finally selected, and allocated to the respective components. Finally, a total of 28 methods were assigned to the 14 components.

A summarized overview of all components with the method and tool assignments can be seen in Figure 4.5.

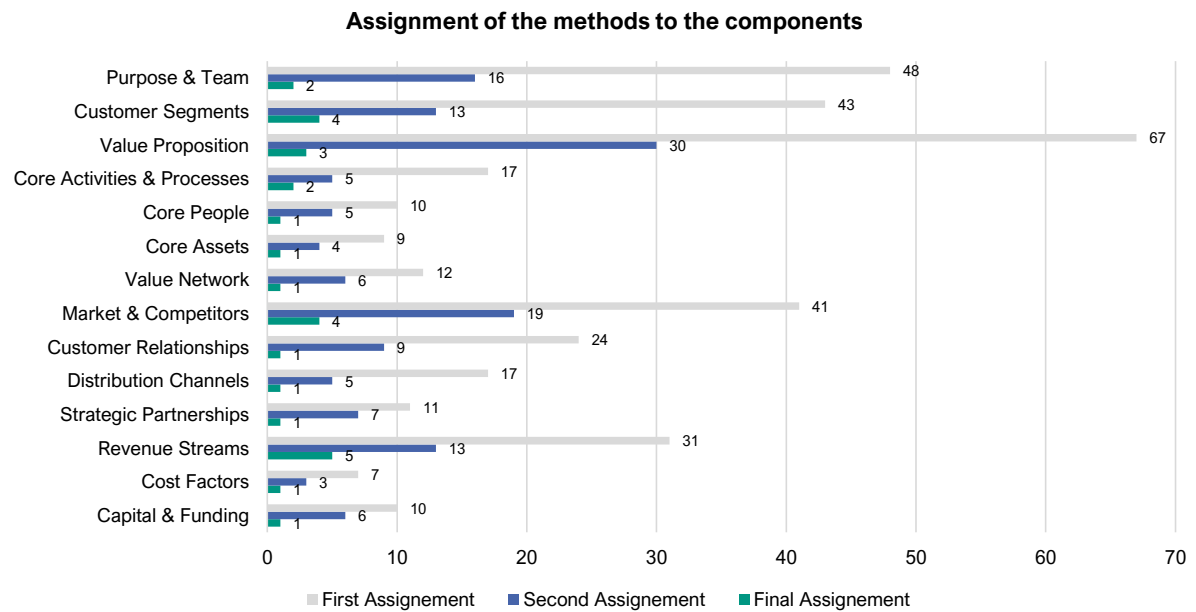


Figure 4.5: Assignment of potential methods to the BM components

4.3.3 Description of the Selected Methods

In the following, the final selected methods for the individual components are briefly presented. For some components, a single method is sufficient. Others need a combination of methods to achieve a better result. The following presentation of the methods does not aim at enabling the reader to accomplish the appropriate methods without further information. It merely serves a better understanding of the BMD framework and the respective tasks within the phases.

Purpose & Team

The Purpose & Team component includes methods and tools to help define and achieve consistency among team members' values, vision, mission, and strategic goals. The following two methods were finally selected, the *Team Core Values* approach and the *Team Canvas*.

Team Core Values

The goal of the Team Core Values Workshop is to explore the personal and team values with the aspiring or practicing entrepreneurs based on which to define a company mission and vision. The workshop lasts two to three hours.

The workshop begins with a self-reflection phase in which each participant explores their top-most five personal values. This process is supported by a psychological personality test, the

ValuesFinder¹⁴, which involves describing and visualizing personal value tendencies based on quantitative questions. This test will be sent digitally to the participants before the start of the workshop. Based on the top five personal values defined in this way, the team agrees on the company's top five core values. These company values build the foundation for defining a corporate mission and outlining a vivid picture of the company's future, i.e., a corporate vision.

Empirical studies, particularly from the field of motivational and organizational psychology, suggest that an intrinsically motivated corporate mission leads to effectiveness in terms of the team and company goal progress (Sheldon und Elliot 1999; Collins und Porras 2005) as well as better health for individuals (Sheldon und Elliot 1999; Ryan et al. 2008).

Team Canvas

The Team Canvas serves to sharpen the insights gained from the Team Core Values method and process them in a way that potential new team members can easily understand them. Using this tool can harmonize teams, promote cohesion, improve performance, and establish a positive team culture (Ivanov 2020). The Team Canvas can be used when starting a new team, introducing new team members, clarifying roles, common goals, and performance objectives, or generally to review the team's direction. Some Canvas fields can be completed individually, but there are required fields on which all team members must agree. These are people and roles, goals, purpose, values, rules, and action items (Ivanov 2020). In the team canvas, therefore, an initial task allocation of the founding team is also made in which it is recorded which team member brings which skills and special interests and is, therefore, best suited for specific tasks.

Customer Segments

For the Customer Segments component, methods and tools have been identified to define the organization's target customer segments to which the company's value proposition should be directed. Accordingly, this component is closely related to the Value Proposition component. The criteria for assigning methods to the component are presented below:

- Identifying, defining, and segmenting the relevant customer segments according to common attributes and needs, requiring different value propositions.
- Defining the customer tasks to be completed and the desired outcomes
- Deciding which customer segments to serve and which to ignore

¹⁴ Accessible via www.findyourvalues.com. The quantitative questions are based on the PVQ-RR, see Schwartz et al. 2012; Cieciuch et al. 2014.

The final selected methods for this component are the *Persona*, the *Jobs-to-be-done method*, and *Mom-test* and *Storytelling* to gather information about the potential customer groups' wants and needs.

Persona

The persona's goal is to characterize the stereotype of a customer to capture the customer's perspective. The description should include a fictitious name, photo, profession, and demographic aspects. It should also explore the customer's characteristics, goals, and obstacles. Generally, there are no restrictions on the attributes used. Mapping promotes understanding of the customer's preferences and thus better prioritization of needs. Besides, the identification of potential customers ensures effective, targeted communication (Hague 2019). In addition to attributes, external factors such as trends, opportunities, and risks can be included to represent the persona's environmental influences.

Jobs-to-be-done

Based on an initial engagement with potential customers and the derivation of possible needs, ideal customers' jobs-to-be-done are defined, determining the solution space's basis. Since customers buy products and services to make progress in a particular context, companies need to develop a deep understanding of these core functional tasks to offer appropriate customer value. The jobs-to-be-done method is a recognized approach to gather this understanding. A job-to-be-done has the characteristics of being stable over time, not limited by geographic boundaries, and being solution independent. The functional core job is the center of value creation, as additional jobs can only be done in conjunction with it. These can be related jobs that are other functional jobs, emotional jobs that provide a certain feeling, or social jobs that determine how others perceive the customer (Ulwick 2016). The following semantics determines the formulation of a job statement (Ulwick 2016):

"Job statement = verb + object of verb (noun) + contextual clarifier"

While a job statement defines the task a customer is trying to complete, the desired outcome statement defines the customer's success and value in completing the core functional job. The desired outcome is thus the metric that describes how a task can be completed faster, more efficiently, more predictably, and without waste. Accordingly, identifying the customer's desired outcome is the key to successful innovation (Ulwick 2016). The following semantics determines the formulation of a desired outcome statement (Ulwick 2016):

"Outcome statement = direction of improvement + performance metric + object of control + contextual clarifier"

The BMD framework initially encourages teams to start the jobs-to-be-done method even without existing in-depth knowledge about potential customers. The method is then carried out assumption-based, meaning that teams must identify the critical assumptions and validate them with customers at the earliest possible stage. A possibility to validate is to conduct customer interviews.

Mom-test

One way to validate the established hypotheses through research and observation in the field and gain new insights about the customers is the so-called mom test, a specific way of talking to customers and gaining valuable information. The interviewer needs to be careful not to mention any of their ideas to avoid statements biased by politeness (Fitzpatrick 2013). The method is based on the following three rules mentioned by Fitzpatrick (2013):

1. talk about their life instead of the tested idea
2. ask about specifics in the past instead of generics or opinions about the future
3. talk less and listen more

Storytelling

Another way to explore the problem space and, thus, the customer's hypotheses is to tell a story. Storytelling is a practice used in knowledge management that enables the vivid communication of knowledge, experiences, and emotions about specific topics. The audience can re-enact certain situations, which can also be futuristic if reality and fiction are mixed in the story (Hornung-Prähauser et al. 2015). Using storytelling can promote a shared understanding of the customer needs, outlined in the persona, by generating empathy.

Value Proposition

The Value Proposition component includes possible methods and tools that support the creation of the company's value proposition to meet target customer segments' needs. The criteria for assigning methods to components are given as follows:

- Illustration of the solution space with core jobs and desired outcomes addressed.
- Definition of the products and services bundle offered to each customer segment
- Fit between the selected bundle of products and services and requirements of a specific customer segment
- Definition of the value proposition statement

Most of the identified methods are creative techniques to develop new ideas for the solution space. In selecting the appropriate methods for the value proposition, the assumption is made

that most teams starting a BMD process already have an initial idea for a product or service. Thus, the BMD framework deliberately avoids initiating a new ideation process. Instead, the idea is that the teams sharpen and adapt their initial idea based on their customers' knowledge. Therefore, the starting point for developing the value proposition is the insights into the problem space. The final selected methods are arranged to be low cost and fast in the idea generation phase and increase their evidential value in the solution's development phase to reduce uncertainty.

Value Proposition Explorer

The Value Proposition Explorer is a specially developed variation of the well-known Value Proposition Canvas by Osterwalder et al. (2014). As with the Value Proposition Canvas, the method's goal is to ensure that the solution space matches the problem space. The Value Proposition Explorer was merely adapted more closely to the wording already used in the problem space analysis. This problem space is defined by the customer's core functional jobs to be completed with their associated emotional and social jobs and the customer's desired outcomes. As a reminder, the core functional job is the primary task the customer is trying to complete, and the desired outcome is the metric the customer uses to evaluate the success of completing that task. Therefore, the solution space is used to design products and services that create value for the customer by addressing these jobs and desired outcomes. The Value Proposition Explorer structures the solution space as the value of product and service concepts into must-haves, differentiators, and enjoyment factors.

Value Proposition Statement

The results from the Value Proposition Explorer must be tested and, if necessary, refined based on the insights gained by carrying out the appropriate validation methods, e.g., customer surveys (see Mom Test). For the definition of the refined value proposition, the Value Proposition Statement tool is used. This tool is based on the statement developed by Hatzijordanou (2019) for defining a company's unique selling proposition and, like the explorer, has been adapted to the language used in the BMD framework. The teams' task is to formulate different value propositions precisely and understandably for the customers' respective jobs. Therefore, the following semantics are introduced for the teams to follow:

"For (customer segment) who must (job statement) and want/need to (desired outcome), we offer (product/services), which is a (product category/market category/technology) that provides (key benefits/features)."

Minimal Viable Product

After the initial value propositions have been formulated, the Minimal Viable Product (MVP) method is introduced. The MVP is a concept introduced by Eric Ries as part of his Lean Startup work (Ries 2011). The MVP aims to emphasize the influence of learning in the development of new products. Ries (2011) defines an MVP as "a version of a new product which allows a team to collect the maximum amount of validated learning about customers with the least effort."

An essential premise behind the MVP is that the team produces a basic version of the product or service they can offer to their customers to observe their actual behavior with the product or service. An MVP's key benefit is that the team can understand their customers' interest in their product without fully developing it (Ries 2011).

To operationalize this concept in BMD, teams first list all the features they want to include in their product before building the MVP. These are derived from, for example, customer interviews, core tasks, and desired outcomes. Once the list of features is in place, they then need to be prioritized. As a prioritization tool, teams use the Eisenhower Matrix, also known as the "urgent-important matrix" (Jyothi und Parkavi 2016). This matrix includes four quadrants (1) Important/Urgent, (2) Important/Not Urgent, (3) Unimportant/Urgent, and (4) Unimportant/Not Urgent.

Quadrant (1) places the MVP features that should be mandatorily integrated into the MVP. The product features in quadrant (2) should be integrated later in the development phase. In quadrant (3), features are placed that should be delegated to third parties for processing, for example. The elements in quadrant (4) can be postponed to a later point in time or removed entirely from the MVP features. Once all features have been prioritized, the first version of the product can be defined, and the MVP creation can begin. The MVP's actual creation then runs parallel with the rest of the BMD and does not necessarily have to be completed before the BM is fully designed.

Core Activities & Processes

The Core Activities & Processes component includes methods and tools to support the description of the essential activities that the company must perform to establish a functioning BM. Criteria for assigning the methods and tools are:

- Identification and definition of the company's core activities to create value and implement the BM
- Identification of the factors influencing value creation
- Determination of the processes that differentiate the company from the competition

- Standardization of business processes

As supporting methods for the teams to identify and standardize its core processes and activities, a *Process Modeling* method and *Porter's Value Chain* are selected.

Value Chain

Each organization's activities to design, produce, market, distribute, and support its solution can achieve a competitive advantage, i.e., when certain activities are performed cheaper or better than the competition. Therefore, a company needs to analyze its activities, which is achieved by using Porter's Value Chain tool (Porter 1985). It divides an organization into primary activities and supporting activities. Primary activities include inbound logistics for receiving, storing, and distributing inputs for the product, operations for converting inputs into the product, outbound logistics for picking up, storing, and distributing the product to customers, marketing and sales for selling the product, and service for providing after-sales services to customers. Supporting activities include procurement for obtaining needed inputs, technology development for providing needed technologies, human resource management for managing the firm's human capital, and firm infrastructure for general management (Porter 1985).

Process Modeling

To standardize the organization's processes, modeling languages such as Business Process Model and Notation (BPMN) can be used for documentation and communication purposes. BPMN aims to provide a standardized notation that enables precise communication between all organization stakeholders (Object Management Group 2013). BPMN enables the modeling of end-to-end business processes, including the mapping of internal processes, public processes, and collaboration between two or more business units. The modeling elements can be flow objects, data, connection objects, swim lanes, and artifacts (Object Management Group 2013). Here, BPMN is introduced only as a professional way to model processes. Teams in the BMD process do not necessarily need to use a modeling language. At this early stage, it may already be sufficient to write down or visualize the processes so that all team members can understand the essential process steps. The introduction of BPMN merely serves as a point of orientation for the teams.

Core People

The Core People component includes methods and tools that support identifying and defining the company's core people and competencies. These are all skills that are critical for the sustainable, successful operation of business activities. The purpose of the assigned methods and tools is:

- Identify and define all relevant core people and competencies
- Defining the competencies that generate a competitive advantage and ensure the sustainability of the BM
- Definition of the forms of competence acquisition
- Definition of how competencies critical to success can be built and protected from imitation

The *VRIO framework* is selected to determine the core people and the associated core competencies. It is used for the Core People component and simultaneously for the Core Assets component.

VRIO Framework

Based on the information already collected at the beginning of the framework in the Team Canvas, the VRIO framework (valuable, rare, inimitable, organized) can be applied to identify the company's existing core competencies. Besides, the previous definition of the core processes can derive which competencies need to be built in the future. The VRIO framework is a tool for determining and evaluating the company's resources and competencies to achieve sustainable competitive advantage. It is based on four questions to be asked in connection with each resource and capability under consideration. The value question assesses whether a resource or capability is valuable in exploiting strategic opportunities, avoiding risks, or creating internal or external value. The rarity question assesses the scarcity of the resource or competency, as valuable but widely available resources and competencies do not provide a competitive advantage. The inimitability question assesses the difficulty of imitation. A resource or competency that is valuable, rare, and difficult to imitate provides a competitive advantage if the company can integrate it into its business. Accordingly, the organizational question assesses whether the company can incorporate the resource or competency into its BM (Barney und Hesterly 2010).

Core Assets

The Core Assets component includes methods and tools that support identifying and defining the company's core assets. These are all tangible and intangible assets critical to the sustainable, successful operation of business activities. The purpose of the assigned methods and tools is:

- Identify and define all relevant core assets and resources
- Determine the resources that generate a competitive advantage and ensure the sustainability of the BM

- Definition of the forms of resource acquisition
- Definition of how resources critical to success can be built up and protected from imitation

As mentioned in connection with the Core People component, the *VRIO framework* is also used for the Core Assets component and is not explained again.

Value Network

For the Value Network component, methods and tools were identified that support the company's investigation of the value network. However, upon closer examination, none of these methods were implemented within the BMD framework. The methods' implementation effort was considered too high, or the possible results of the methods were not considered to meet the objectives. However, since understanding the market mechanisms is considered essential for the teams, it was necessary to develop a different method to meet the BMD framework's requirements and methods. The method to be developed must serve the following purposes:

- Definition of the network scope and purpose
- Mapping of the BM network and identification of actors, roles, and transactions
- Definition of the own position in the network
- Identification of potential network partners and critical roles
- Determination of the value creation areas and the distribution of the joint value creation

The newly developed method for the capture and subsequent analysis of the value network is briefly described below.

Network Mining

The newly developed method is presented in the following under the term Network Mining. The method pursues the goals of first modeling and visualizing the value network uniformly and then analyzing it using specific metrics. It is based on earlier approaches to analyzing value networks, for example, by Allee (2008) or Metzger (2017). Also, for modeling the value network, there are first approaches for notations for modeling value networks on which the method builds. The most detailed notation is the Value Delivery Modeling Language (VDML), an object-oriented notation based on the "Unified Modeling Language" (UML). Like UML, it was developed by the Object Management Group (2018) and provides various approaches and methods for modeling and visualizing value streams and value transactions in enterprise networks. The language's three main goals are to model tangible and intangible value streams within an enterprise robustly and across enterprise boundaries, model collaborations between market

actors, and model business activities in a dynamic and unstable business environment (Object Management Group 2018).

Critical elements of VDML are roles, values and value propositions, capabilities and activities, collaborations, and resources. Roles describe the individual actors in the network at a generic level (e.g., auto supplier or auto manufacturer). Values and value propositions represent all measurable products or services that an actor provides to a recipient. The Object Management Group (2018) defines value as a measurable benefit provided by a sender to a receiver connected with a product or service. A value proposition represents a combination of different values and deliverables into a joint, holistic value proposition that satisfies the recipient to some degree. Capabilities and activities are required to deliver the products or services, while activities' performance is the basis for value creation. Products and services can only be created from specific capabilities and activities. Collaboration describes the type of interaction between actors, e.g., a partnership or a customer-supplier relationship. Different actors participate in different interactions. Resources are used and consumed in the execution of activities. The network mining method presented here follows this already defined modeling language.

Once the network map is created, the network must be analyzed to understand value creation and distribution. First, the general patterns of value exchange in the network are analyzed, including determining the dependencies between roles by analyzing the number, type, and frequency of interactions. Besides, it is possible to analyze whether benefits trigger responses, whether they are role-specific, what values each role receives and contributes, and which value exchanges dominate the network. Furthermore, it is possible to determine the most critical interactions and roles in the network. The second step is to analyze the flow of values in the network to optimize the flows when more than one path is possible. This analysis can be achieved by running different scenarios and adding information to transactions such as frequency and transport speed. The third step of the network analysis evaluates the ability to realize value from inputs, which can be achieved by efficiently transforming inputs and building tangible and intangible assets. Accordingly, the costs that impact financial and non-financial resources and intangible assets must be analyzed to determine the total costs, risks, and benefits that result from handling and receiving inputs. In the final step, value creation within the network is analyzed by role. Therefore, the efficiency of using assets to produce a particular value output, the benefits provided by that output, and the company's benefits from providing that output are examined. As a result, external costs, risks, and benefits to the industry, society, and the environment can be determined.

Also, it is possible to measure the network with various metrics. These metrics are not explained in detail here, as this would go beyond the chapter's scope. Therefore, reference is made to further literature on the network mining method (Lau et al. 2020 i.E.).

Market & Competitors

The Market & Competitors component includes methods and tools that aim to investigate the structure of the target market and its potential to make demand forecasts, and a good product-market fit can be achieved. Furthermore, these methods aim to investigate the competitive landscape to achieve competitive advantages. The purpose of the component gives the criterion for assigning the methods to the component:

- Definition and analysis of the target market structure
- Identification of new markets
- Determination of market potential
- Fit between market potential and value proposition
- Identification of competitors and the definition of competitive strategy

Four methods are selected to elaborate on the above purposes. These are the *Market Segmentation*, the *Top-Down Approach*, the *Bottom-Up Approach*, and the *Competitor Analysis Framework*.

Market Segmentation

When considering the relevant market, it can be divided into mostly homogeneous segments according to specific criteria. It is important to select suitable segmentation criteria to divide current and potential customers into customer target groups based on common characteristics. This process is referred to as market segmentation (Smith 1956). According to Homburg (2017), attention should be paid to the following points:

- Behavioral relevance: segments should be distinguishable in terms of customer behavior
- Reachability/responsiveness: customers in a segment should be reachable and responsive to advertising
- Clear differentiation: segments should be distinguishable from each other
- Measurability: segmentation criteria should be measurable
- Stability: Segments should be stable over time
- Economic feasibility: it should be possible to develop segments at a reasonable economic cost, excluding segments with low demand

The segmentation criteria can be used on their own or in combination and can be categorized under the following approaches (Homburg 2017):

- sociodemographic market segmentation
- geographic market segmentation
- psychographic market segmentation
- behavioral market segmentation
- benefit-oriented market segmentation

Segment-specific marketing strategies can thus be derived based on the defined market segments (Homburg 2017).

Top-down approach

Estimating the size of a market is usually done using three variables, Total Addressable Market (TAM), Serviceable Available Market (SAM), and Serviceable Obtainable Market (SOM), each representing a different subset of the market (York 2018).

The TAM is the total market demand and accordingly represents the total revenue opportunity within a market for a given solution. It can be calculated, for example, by using a top-down approach or a bottom-up approach, which are described in the following sections. Using different factors, the TAM can be divided into several submarkets to determine the SAM. These factors can include geographic, cultural, legal, and product cannibalization aspects in addition to quality, price, and functionality. The SOM represents the amount of SAM that can be achieved by the organization in the short and medium-term. The achievable market share is determined by a combination of competitive forces in the market and the organization's resources. Timely penetration of the SOM provides the basis for an organization to penetrate the SAM further and increase its market share (York 2018).

The top-down approach is a widely used technique for estimating market size based on specific information. It is based on the chain ratio principle, an arithmetic technique that uses ratios to reduce a population to derive a realistic demand (Waheeduzzaman 2008). Specifically, this means applying demographic, geographic, and economic factors to a population and ultimately eliminating irrelevant market segments (Wolters 2017).

Bottom-up approach

Another method for estimating market size is the bottom-up approach, based on primary and secondary research. In this method, data obtained at a granular level, such as local markets, are extrapolated to the broader population to estimate the total TAM (Wolters 2017). The underlying principle is cross-sectional and time-shift analogies. Thus, the size of a market for a

product or service with a given economic indicator can be calculated based on another market for which data on the size and the given economic indicator are available. Cross-sector analogies look at the relationships between markets in different regions or sectors. Since it is assumed that economic development generates demand, in temporal analogies, different markets' economic development stages are considered (Waheeduzzaman 2008). Combining the top-down and bottom-up approaches allow teams to approximate and more accurately quantify their actual market potential.

Competitor Analysis Framework

After analyzing the market for the solution and determining the appropriate market sizes, a company needs to identify potential competitors and develop a competitive strategy. This analysis will determine whether the solution's market launch will be successful and how much market share of the SOM can be gained by the company. For this task, the Competitor Analysis Framework (CAF) by Hatzijordanou (2019) is integrated into the BMD framework. This tool provides a structured process for identifying and analyzing competitors for early-stage startups and supporting informed decision-making. Using the CAF, the teams can understand the company's competitive environment by gathering information about competitors and identifying relevant differentiators to position the company in the competitive landscape. The CAF process consists of five sequential steps, each containing one or more tasks that must be performed. The first step is to define the company's value proposition. This task should be performed using the value proposition statement already introduced. Next, historical, current, and potential competitors are identified and evaluated according to their similarity to the startup under consideration. The fourth step is a structured and guided collection of the required information about the competitors' BM characteristics. The fifth step is to present the obtained information to compare the competitors with the considered company. The sixth step can be divided into six subsections, whereas subsections one through four deal with understanding the competitive environment, the startup's differentiators, its positioning relative to its competitors, and an evaluation of the same. Subsections five and six conclude the analysis by reformulating the value proposition with additional information on competitors and differentiators and defining further actions (Hatzijordanou 2019).

Customer Relationships

The Customer Relationships component includes methods and tools to describe the channels through which relationships with the various customer segments are established and maintained. The criteria for assigning the methods are:

- Identification and description of the relationships expected by the customer segments

- Defining how customer relationships are built and integrated into the BM
- Definition of how the customers can be tied to a product or service

The creation of the *Customer Journey* is selected as the primary method for this purpose.

Customer Journey

As customers start as prospects and go through an exploratory journey where they build awareness, knowledge, and interest, then evaluate and finally make the purchase, there are multiple touchpoints, i.e., contact points or interactions between the company and the customers. They can be either pleasant or painful (Hague 2019). These touchpoints can be mapped, their importance assessed, and it can be determined whether they are positive or negative experiences so that the company can derive actions from meeting customer needs along the customer journey and improving the overall customer experience (Hague 2019). Knowing the potential touchpoints with customer segments helps an organization establish the appropriate distribution channels.

Distribution Channels

The Distribution Channels component assigns methods and tools to help describe the channels through which value is communicated, sold, and distributed to target customer segments. The criteria for method assignment are:

- Representation of existing and potential communication, distribution, and sales channels between the company and its customers
- Definition of channel functions
- Representation of the customer experience through the touchpoints between company and customer
- Identification of channel costs and their cost-effectiveness

The only method used is the design of the *Marketing and Sales Funnel* based on different distribution phases. The method thus ties in seamlessly with the previously elaborated customer journey.

Marketing and Sales Funnel

When designing and setting up a company's distribution channels to reach customer segments and sell and deliver the product or service, it helps be aware of the different distribution phases. The first phase is awareness, in which the company reaches out to customers to inform them of the existence of the product or service. Then, in evaluation, the customer assesses whether the product or service is worth buying. If the evaluation is positive, the customer carries out the purchase. Then, in the delivery phase, the company must deliver the goods. Moreover,

after the purchase, the last phase, the after-sales, involves taking care of the product or service (Weitz und Jap 1995).

Strategic Partnerships

The Strategic Partnerships component includes methods and tools to establish strategic alliances between organizations and buyer-supplier relationships with the corresponding procurement methods to operate the BM. The criteria for the method assignment are:

- Identifying and defining the essential partners and resources to be procured
- Determination of the tasks of the individual partners and their role in the cooperation
- Identifying which partners can bring in their capabilities reliably and on a long-term basis

In the context of building strategic partnerships, there are numerous recognized methods to help companies identify the right sourcing or distribution partners, such as Carter's 10Cs of Supplier Appraisal (Cordell und Thompson 2019). However, these approaches usually require already established processes and clearly defined requirements, e.g., regarding the goods to be procured. However, at the early stage in which the BMD framework is used, such information is often unknown. For this reason, only a *Stakeholder Analysis* is performed in the framework for the Strategic Partnership component.

Stakeholder Analysis

Stakeholder identification and analysis enable a company to identify the people affected by the project and evaluate them regarding their importance and influence on the project's course. Accordingly, stakeholders can be categorized based on their influence, relevance to the BM, their attitude towards the project, and their role in the project. The insights gained from the analysis can derive measures for dealing with and communicating with the respective stakeholders. The focus should be on stakeholders critical to the project's success and with whom conflicts of interest may arise (Hornung-Prähauser et al. 2015). In the BMD process environment, a particular focus is placed on external stakeholders on whom the own company is dependent. This analysis is supported by analyzing the value network and the previously analyzed core people and core assets.

Revenue Streams

The Revenue Streams component includes methods and tools that support identifying financial sources and processes through which the startup can generate revenue. Besides, pricing models for the products and services offered are explored to determine the appropriate unit prices. The criteria for assigning the methods to the components are given as follows:

- Identification and definition of revenue streams from each customer segment
- Definition of the pricing model per revenue stream
- Determination of the market entry strategy
- Determination of the contribution of each revenue stream to total revenues
- Determination of critical revenue streams

The methods used to develop this component are the 55 patterns of the already familiar *BM Navigator*, the *Price-Service-Positioning Matrix*, and the three methods of *Cost-based*, *Competitor-based*, and *Value-based pricing*.

Revenue Patterns of the BM Navigator

The BM Navigator, already known from chapter 2.2.2, offers 55 BM patterns to define potential revenue strategies. Each of these 55 patterns describes a possible revenue type and thus serves as an anchor for the teams to select their revenue strategy (Gassmann et al. 2014).

Price-Service Positioning Matrix.

When choosing the price level for products and services offered, a company must consider its desired positioning relative to its competitors and the characteristics of the value proposition itself. Accordingly, the price-service positioning matrix outlines how a company can define special pricing based on product or service superiority (Hague 2019). Product superiority means that a company offers a reliable, high-quality product with innovative features that is durable and has a good reputation. Service superiority means that a company has a responsive service team with extensive technical skills and knowledge to resolve problems in the shortest possible time. Consequently, a company can occupy one of four possible positions (Hague 2019). In the (1) premium positioning, the company acts as a market leader and offers high product superiority combined with high service superiority. With (2) technical leadership, the company offers high product superiority along with only poor service. (3) Service leadership requires the company to offer a product comparable to the market average combined with excellent service qualities. With the (4) low-cost leadership, the company offers lower quality products and little or no service.

Cost-based

Once the pricing strategy and the target price level have been defined, the prices for the individual products and services offered to the corresponding customer segments must be determined. There are various methods for this, all of which should be used for comparison purposes. Depending on the company's strategy, the final price can finally be chosen within the resulting interval. The first method is the cost-based pricing approach, which sets a price based

on the costs incurred for the item and determines the lower limit of possible prices. The lower bound can be divided into short-term and long-term boundaries. The short-term price limit is based on variable unit costs and may be appropriate for suppliers in difficult market situations where only partial cost recovery is acceptable. Long-term profits can compensate for these losses (Homburg 2017).

On the other hand, long-term price limits are calculated based on full costs since a company can only exist in the long term if both variable and fixed costs are covered. Cost-based prices are determined by adding a specific markup rate to unit costs, which can be industry- or company-specific (Homburg 2017).

Competitor-based

Another method of determining prices for individual products and services is the competitor-based pricing approach, in which the prices and related behavior of competitors strongly influence a company's pricing. For example, the market leader's price can serve as a benchmark price according to which the company sets its price. Depending on the company's strategy and attitude towards competition, the price may vary upwards or downwards (Homburg 2017).

Value-based

The last of the recommended pricing methods is the value-based pricing approach, which determines the price based on the customer's perceived value of the solution. Thus, the solution's price reflects the maximum price the customer is willing to pay to obtain the solution's individual benefits. A recognized method for value-based pricing is the Van Westendorp pricing approach, which identifies a price range acceptable to a large proportion of customers (van Westendorp 1976). This approach includes asking a set of open-ended questions in which participants are not given answer categories. The set consists of four questions that ask participants to name a reasonable price that is still affordable, a high price that is still reasonable, an amount above which the price is considered too high, and an amount below which the price is so low that doubts about quality, service, or safety may arise. The upper and lower limits of the acceptable price interval can be derived by cumulating the questions' answers. The upper limit is at the intersection of the curves "reasonable and still affordable" and "too high," and the lower limit is at the intersection of "too low" and "high, but still reasonable" (Homburg 2017).

Cost Factors

The Cost Factors component comprises methods and tools that support the BM's cost planning, allowing a company to identify its cost structure, including the allocation of costs incurred to the associated business processes of value creation and delivery. Besides, an analysis of

these costs enables a company to discover opportunities for cost reduction. The criteria for assigning methods to the component are given as follows:

- Identification and definition of the company's cost structure
- Estimation and analysis of different cost development scenarios
- Identification of cost reduction opportunities

Cost Planning is used as the primary method of this component. This planning is already very labor-intensive as a method. Since cost planning for startups in an early phase is associated with a great deal of uncertainty, this method does not create a detailed cost plan but merely shows how it is to be determined later and fitted into the *Cash Flow Planning* that follows.

Cost Planning

The purpose of cost planning is to support a company's management in monitoring its performance and making future-oriented decisions. Accordingly, cost planning focuses not only on historical and current data but also on forecasted data to assess the cost impact of decisions, cost trends and expected cost levels at specific planned performance levels. Costs refer to the number of valuable resources used for business activities in a given period. Similarly, planned costs refer to a future period. Therefore, the most critical factor influencing cost planning is the planned output level, which determines the various business departments' output levels (Taschner und Charifzadeh 2016).

It should be noted that both products that are stored after production and products for internal use are included in the total output. Therefore, the total output does not always equal sales. All cost drivers and the quantities required for the planned output must be identified to determine each department's output quantities. This data can then be used to estimate each department's planned costs (Taschner und Charifzadeh 2016).

In general, the cost structure of a BM can be categorized as cost-driven or value-driven. Furthermore, cost structures can be characterized by the ratio of variable and fixed costs. Other characteristics of cost structures can be economies of scale and economies of scope (Osterwalder und Pigneur 2010).

Capital & Funding

The Capital & Funding component includes methods and tools that support the company's financial planning and financing activities based on information from the Revenue Streams and Cost Factors components. The criteria for assigning the techniques to the component are indicated as follows:

- Presentation of a cash flow plan
- Determination of capital requirements
- Identification and definition of the forms of financing
- Determination of the debt-equity ratio and the cost of capital

The primary method of this component is *Cash Flow Planning*.

Cash Flow Planning

A cash flow statement's function is to present and explain the company's cash inflows and outflows during a given period, which result in changes in the company's cash and cash equivalents (Nothhelfer 2017). Accordingly, the cash flow statement neglects income and expenses and considers only cash flows. A cash flow schedule is characterized by three different cash flows: operating activities, investing activities, and financing activities. A company can report cash flows in the statement using the direct or indirect method. Under the direct method, individual business transactions are analyzed for their impact on cash and then presented in categorized cash flows. Under the indirect method, the more common cash flows are calculated based on the income statement by eliminating non-cash transactions, such as depreciation and amortization. Unlike operating cash flows, the direct method is prescribed for investing and financing cash flows (Nothhelfer 2017).

4.3.4 Structure of the Slide Deck

The consolidation of all methods and their classification in the individual phases of BMD determines the slide deck's initial structure. To this end, the 14 components were first placed in a process sequence and assigned to the respective BMD phases. Subsequently, the supporting methods for the individual components were selected and synthesized within the components in a logical combination with each other. Thus, based on the five phases of BMD, the associated 14 BM components, and their supporting methods, a sequential process model approach to designing a BM emerges.

The slide deck's actual operationalization results from the questions to be answered about the components and the requirements of the methods in terms of the time and resources to be expended. The structure, therefore, also includes initial assumptions about time expenditures. The essential purpose of the slide deck must be kept in mind, namely, to describe the methods so that the teams can perform the resulting tasks themselves. The methods should allow for initial feelings of success that can be achieved quickly to motivate the teams to think deeply about and implement the resulting tasks. Therefore, the methods' results are a quick, first draft of a component's design, on the other hand, clear recommendations for action regarding how these first drafts should be enriched with insights from practice and adapted if necessary.

If the BMD framework is used, for example, in the context of an accelerator, an initial result is developed within a few hours or minutes in the presence workshop, and then specific homework is derived from it, in the processing of which the teams independently apply the method knowledge they have learned.

For example, if a team makes assumptions about a possible customer segment in the face-to-face workshop, the homework can consist of conducting customer interviews to verify or falsify the assumptions. The teams can use methods such as the *Mom-test* or *Storytelling* to do this. These methods can already be used in the face-to-face workshop to work out possible interview questions or prioritize the assumptions to prepare the homework in a targeted manner. As soon as the first results are derived from a method, the teams should ask themselves whether this result contains certain assumptions that still need to be examined, what effects the result has on the findings that have already been worked out, and whether these may require adjustments.

The duration of completing the homework depends strongly on the respective teams, their previous knowledge, and their resources and can only be predefined to a limited extent by the BMD framework. Therefore, the framework's structure specifies an initial and concrete time window for each method in which it should be possible to develop initial results. However, only the next steps are shown concerning the homework, without recommending time and resource requirements. Wherever possible, the effort for the individual methods was derived from information from literature and web searches. If there was no such information, the efforts were estimated based on the method's tasks, including the processing of the method itself and transferring the knowledge gained to the BMD poster. Table 4.3 summarizes the initial time required, possible initial results, the recommendation for homework, or the next steps exemplified for the persona method.

Table 4.3: Estimation of time and resources for the Persona method

Estimation of Time and Resources (Persona)			
Method	Initial Time and Resources	Initial Results	Next Steps
Persona	<ul style="list-style-type: none"> • ~ 30 minutes • 2-5 people 	Initial draft of at least one persona with name, age, profession, concrete life circumstances (single, married, etc.), interests and hobbies, how she feels, thinks and what attitudes and values she represents.	<ul style="list-style-type: none"> • Check the persona for assumptions and prioritize them. • Talk to (potential) customers (at least 5-10 customer interviews). • Adapt the persona based on new insights from interviews. • Use the persona as the basis of the jobs-to-be-done. • Use the persona as the basis of the value proposition explorer. • Use the persona as the basis of the customer journey.

This compilation was conducted for all 28 methods and integrated into the structure of the slide deck. In total, 1,100 minutes or 18.5 hours of processing time were allocated for the initial processing of all slide deck methods, which corresponds to a pure workload of about three days. Figure 4.6 summarizes the process as well as the initial time spent on the methods.

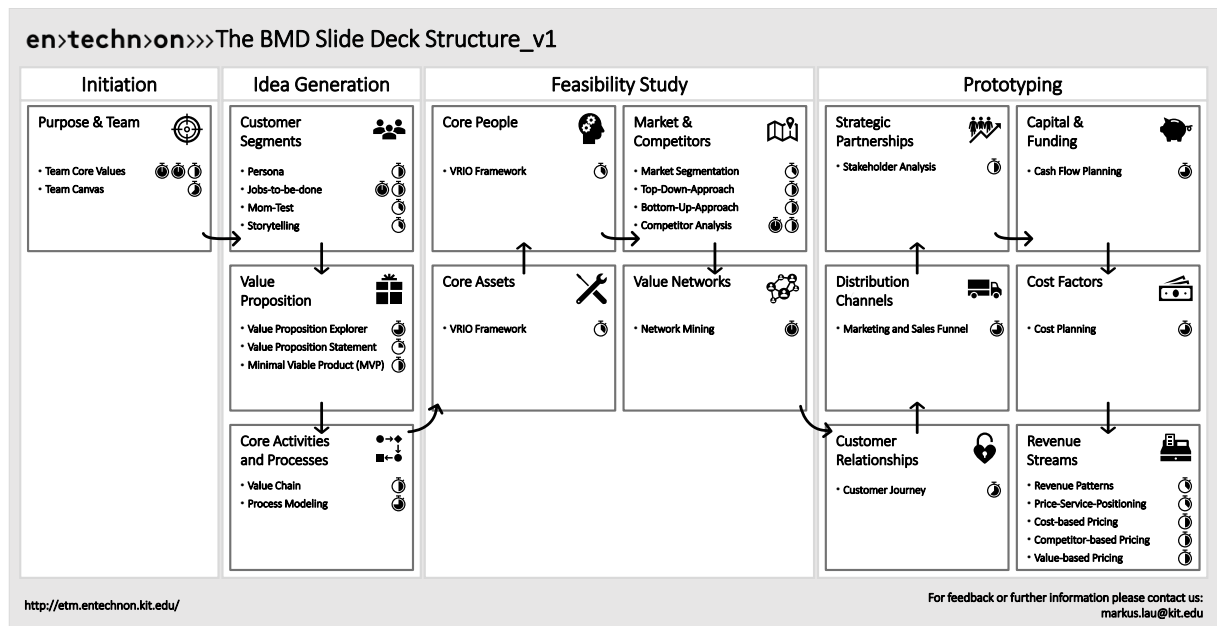


Figure 4.6: Initial design of the slide deck

This process approach, consisting of the BMD Poster and the BMD Slide Deck, will be referred to as the BMD Framework (BMDF) in the further course.

Thus, Version One of the BMDF was developed from the theoretical and practical insights into the BMD process of startups and transformed into a usable framework. This initial design must now be checked for its effectiveness in several iteration cycles and adapted accordingly if specific requirements are not satisfactory. For this purpose, the BMDF is used practically in different formats and thus demonstrated to the target group in workshops. The overarching evaluation strategy, the individual demonstrations, and the associated evaluations and adjustments to the initial design are described in the following chapters.

4.4 Definition of the Evaluation Strategy

To carry out the evaluation successfully, it is necessary first to present the research design. In general, an evaluation design is not characterized by a specific approach but by the objective (Häder 2015). The empirical research methods used to evaluate a concept and build an evaluation strategy must be applied systematically (Patton et al. 1981).

The evaluation's concept developments are based on the four phases of qualitative research design, the *basic phase*, the *planning phase*, the *implementation phase*, and the *analysis phase* (Reinders 2016) (see Figure 4.7).

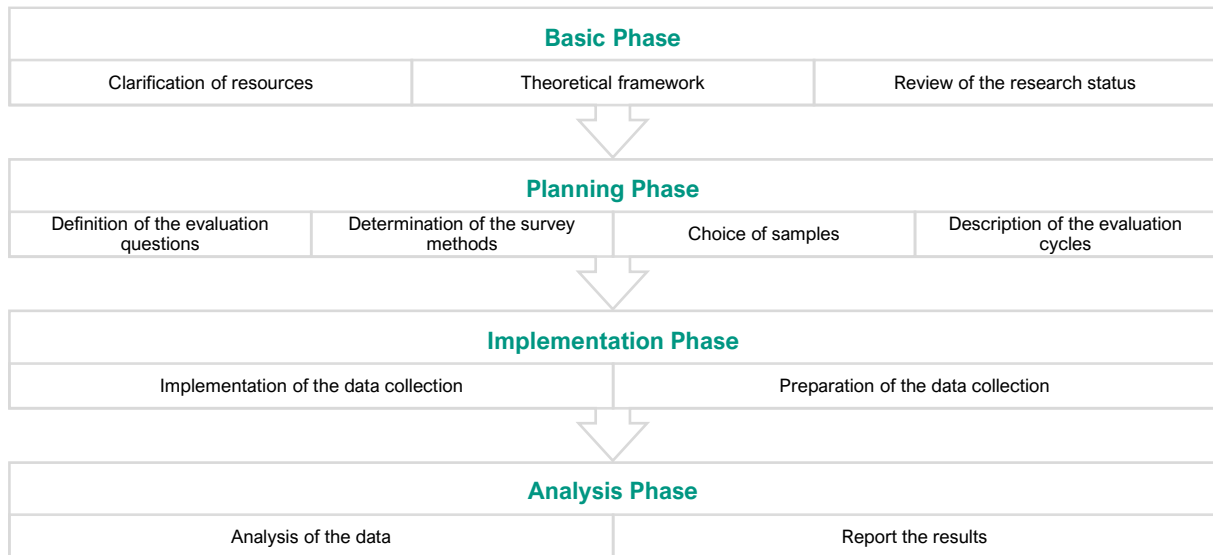


Figure 4.7: Description of the qualitative research process
 Source: own description based on Reinders (2016)

In the *basic phase*, the first steps are to clarify which resources are available, clarify the research state, and how the theoretical framework is defined. The *planning phase* is generally determined by the evaluation questions, which groups of people can provide answers, and how these should be collected. Therefore, it consists of the question, the survey methods, samples' choice, and the evaluation cycles' description.

The two subsequent phases are described in the chapters of the particular evaluation methods. In the *implementation phase*, the data are collected and, if necessary, processed, and finally analyzed and evaluated in the *analysis phase* (Reinders 2016).

In general, an evaluation's participants or resources can be divided into the three categories *sponsor*, *user*, and *evaluator* (Stockmann 2002). The *sponsor* is interested in the benefit of the artifact he or she has created. It should be noted here that evaluations, in contrast to other forms of studies, provide concrete recommendations for the sponsor. *Users* are the people that will be evaluated, i.e., the users of the artifact. The task of the *evaluator* is to present and assess the evaluation process and results objectively. In this study, the evaluator, who is supposed to determine the artifact's effect, is the author of the work itself. Since the sponsor and the evaluator would thus be the same person, students' input will be used at the appropriate point. They perform specific evaluation steps, which could otherwise lead to a possible bias of both the user and the evaluator, e.g., in the execution and initial interpretation of interviews or the systematic observation. In this way, the objectivity of the evaluation should be maintained.

Another essential step to ensure objectivity is the definition of a transparent procedure. Using the FEDS (Framework for Evaluation in Design Science Research) framework by Venable et al.

(2016), an evaluation strategy for the artifact at hand is developed. The process of evaluation strategy development is divided into four steps (Venable et al. 2016):

1. explanation of the objectives of the evaluation,
2. selection of the evaluation strategies,
3. determination of the properties to be evaluated, and
4. design of the individual evaluation episodes

First, the evaluation's various objectives are described concerning the accuracy, risk reduction and uncertainty, ethics, and efficiency (Venable et al. 2016). Ensuring accuracy in the sense of efficiency and effectiveness shows that the artifact causes the result and that the artifact works. In the case of artifacts used in practice, there is a risk that the artifact does not fit into the use or social situation and, therefore, does not work or causes further problems (Venable et al. 2016). Reducing this risk by identifying improvement and potential difficulties is another goal. From an ethical point of view, it must be ensured that none of the study participants will suffer any disadvantage from using the artifact. An efficient evaluation finds a balance between the stated objectives and the available resources. The limited time frame within the scope of the present work must be considered here. In this case, the evaluation's overall goal is to evaluate whether the developed framework enables its users to design a BM. For this purpose, requirements were defined, which need to be fulfilled by the artifact. Hence, the artifact needs to be evaluated against the list of these requirements. When all the requirements are met, the artifact successfully achieved its objectives.

In the second step, the overall evaluation strategy needs to be selected. For the socio-technical artifact at hand, the "Human Risk & Effectiveness" strategy is recommended. This strategy evaluates long-term effectiveness in real-world use since use by real people strongly influences the artifact. Moreover, it is easy to conduct a naturalistic evaluation with users in a real-world context (Venable et al. 2016). The temporal focus of this evaluation strategy is primarily formative. Formative means that, based on the evaluation's findings, interventions or corrections are made to the artifact to increase the probability of achieving the goal, i.e., in the case of an artifact, its fulfillment of the defined requirements.

Step three of the FEDS process is to determine the properties to be evaluated. The evaluation objects are individually adapted to the evaluation's purpose and situation (Venable et al. 2016). In this case, the properties to be evaluated include the functional, structural, environmental, and user-oriented requirements placed on the artifact, which were elaborated and presented in detail in chapter 4.1.

The fourth step is the design of the individual evaluation episodes. First, the framework conditions are identified, analyzed, and prioritized, which leads to the definition of the individual evaluation episodes and results in a multi-stage evaluation design.

As the chosen type of evaluation strategy, the "Human Risk & Effectiveness" strategy mainly includes naturalistic methods. One such method is a field experiment, i.e., a type of experiment in a natural environment. Thus, it is distinguished from the laboratory experiment, where the experiment is conducted under artificial conditions. In the present work, field experiments represent the mainstay of the evaluation.

The degree of naturalness of a design can be systematized along the *utos* (units, treatments, observations, settings) dimensions of Cronbach (1982):

- Units: The participants of the study are representative of the group to be inferred.
- Treatments: The intervention during the experiment is implemented in a form as it would naturally occur in the field without the researcher's intervention.
- Observations: The respective measurements represent the underlying constructs sufficiently and at the time of interest. In this context, the risk of reactivity has to be taken into account, i.e., the act of measurement must not change the subjects' behavior.
- Settings: to ensure the highest possible degree of naturalness, the study's environment must represent real-world conditions sufficiently well. Interference with the environment by the researcher should therefore be kept to a minimum.

Based on prior knowledge of the use of frameworks in BMD from chapter 2.2.4, it is known that such frameworks are primarily used in accelerator programs. Thus, such a program is also chosen as the natural environment for the experiment. As a rule, workshops take place in such programs in which several teams are trained simultaneously on certain topics and then immediately apply what they have learned to their project in teams. For this purpose, the teams are in a room simultaneously and interact with each other to some extent.

Thus, the participants in the experiments consist of startups working on the design of their BM, among other things, as part of an accelerator. The more detailed criteria for the recruited participants are described in chapter 4.4.2. The researcher will expose the startups to the framework in the usual accelerator environment. In this case, the teams will also be in a room together, working on their projects simultaneously. Interactions between the teams are still possible. The intervention, i.e., the new framework instead of the approaches previously used in accelerators, takes place in the most natural way possible. The measurements mainly occur after the workshops are over, not to change the accelerator's flow and the natural environment, also preventing the risk of reactivity. Both qualitative and quantitative instruments in the form

of systematic observation, questionnaires, and interviews are the main tools for measurement. The respective instruments and their use are described in chapter 4.4.5. Figure 4.8 summarizes the evaluation strategy graphically.

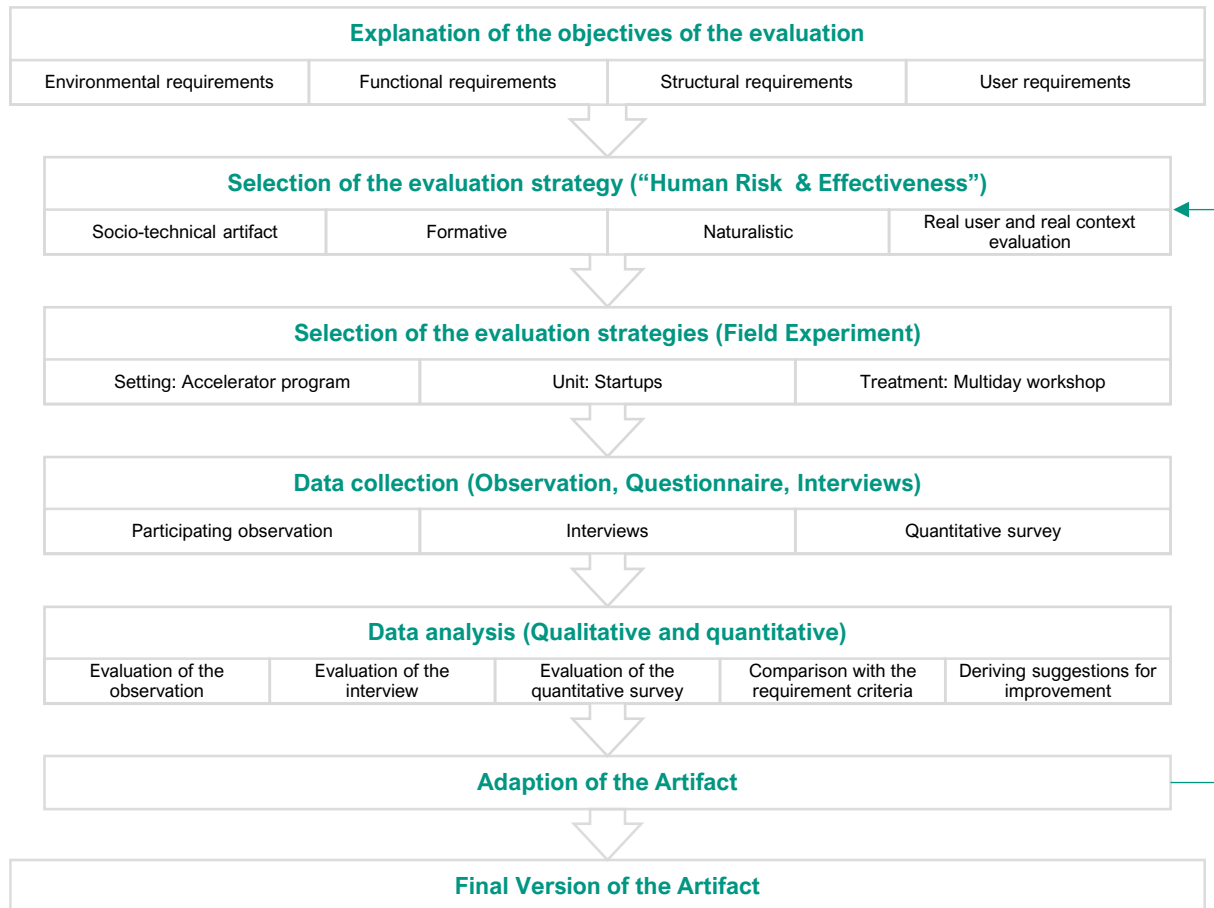


Figure 4.8: Developed evaluation strategy
Source: derived from Venable et al.'s (2016) FEDS Framework

4.4.1 Evaluation Design

The evaluation concept is based on a multi-part, iterative research design that evaluates the BMDF's impact concerning the requirements stated in chapter 4.1. The evaluation uses a combination of systematic observation, a questionnaire, and semi-structural interviews, all with real users in a real environment. The evaluation instruments are conducted at different times and with different participants in the data collection. The evaluation runs in cycles, and each cycle provides valuable feedback for the redesign of the next evaluation cycle.

On the other hand, the potential for improvement of the artifact should be identified. Therefore, after each evaluation cycle, it is analyzed whether improvements for the artifact can be derived from the evaluation results. As described in chapter 4.1, it should be noted that the evaluation is performed following the design iterations, so that an iterative procedure consisting of several evaluation cycles is also presented in the sequential form in this chapter.

The evaluation cycles are consistent with the demonstration of the artifact described at 4.1 the beginning of each evaluation cycle (see chapters 4.5 and 4.7), which also occurred at different times. After each evaluation cycle, the new findings were used to improve and verify the artifact. The individual results of the data collection and analysis, obtained through a mixed-methods approach, were also incorporated into a summary evaluation of the artifact. Combining quantitative and qualitative data collection and analysis serves as triangulation to expand the potential gain of knowledge and mutually validate the results (Flick 2011). Assignment to requirements is made after the interventions. Participants and scientific staff were aware of the evaluation taking place due to the evaluation methods.

Thus, this iterative approach to design and evaluation can be summarized as follows. Starting with the initial design, i.e., Version One, of the BMDF from chapters 4.2 and 4.3, the first evaluation cycle is conducted in chapter 4.5. This cycle's results are incorporated back into the draft of the BMDF in the form of adjustments, resulting in Version Two. This version is then examined in the second evaluation cycle (see chapter 4.7). The newly gained insights and opportunities for improvement are again integrated into Version Three of the BMDF, representing its final state. The recurring steps of this process are shown in Figure 4.9.

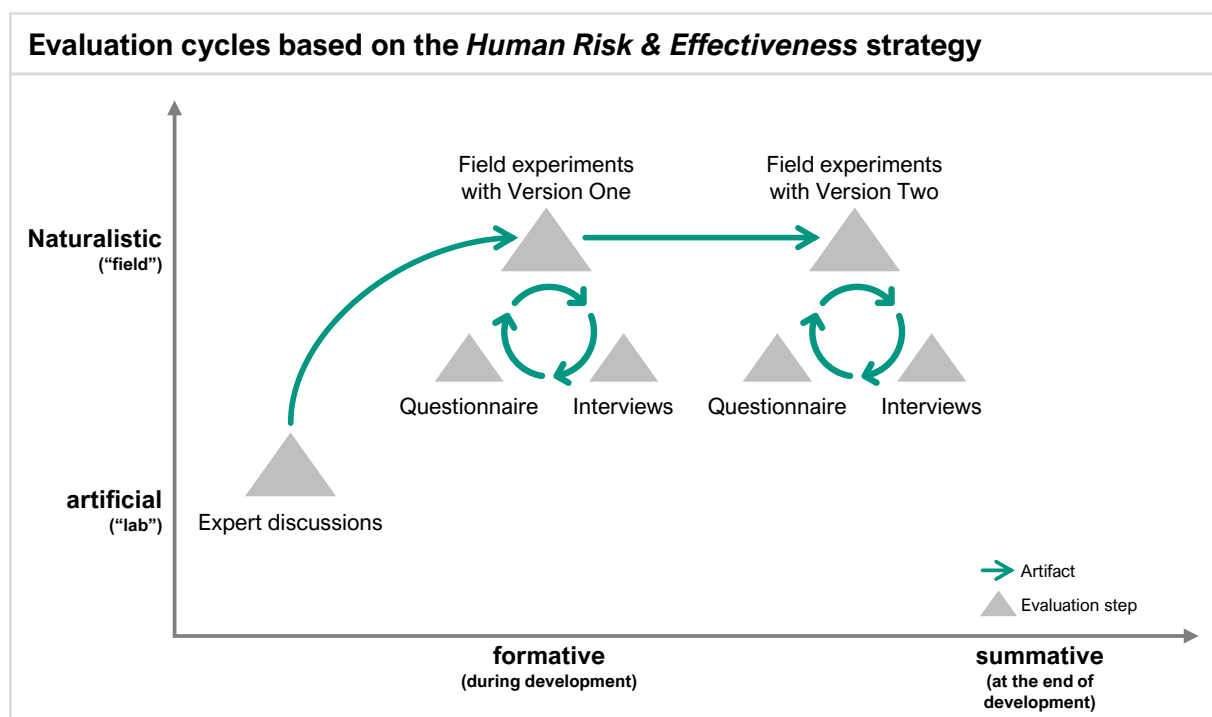


Figure 4.9: Evaluation concept for the BMDF
Source: adopted from Venable et al.'s (2016) FEDS Framework

4.4.2 Participants and their Recruitment

Participants in the study must meet the following inclusion criteria:

- Age from 18 to 65
- Sufficient knowledge of German and English
- Participants of the demonstration workshops described in chapters 4.5 and 4.7

These criteria were defined following the research questions of the underlying work and the subsequent analysis requirements.

The selected participants for the interviews and the quantitative survey each took part in one of the workshops described in chapters 4.5 and 4.7. Due to the study design's nature, all participants in the workshops were initially potential participants in the study, and questionnaires were handed out to all participants after the demonstrations. The participants were recruited for the interviews either in person or via e-mail after the respective workshop. Recruitment information included details on the evaluation procedure's course to be carried out and different ways of contacting the research team. After a positive response from the participant, an appointment was made to conduct an interview. The evaluation interviews were conducted by telephone. Participation in the study was voluntary and had no influence on the programs' further measures after the workshop.

The studies were conducted from June 2018 to April 2020. Recruitment and implementation of the evaluation concept took place continuously during the workshops. The participants received introductory information on the study via e-mail at least one week before the start of the workshop. The research staff continuously evaluated the individual persons' feedback on the respective evaluation measures and sent out reminders, if necessary, to achieve the planned sample size as far as possible.

Table 4.4 gives an overview of the recruited participants. In total, 42 startups took part in the evaluation in one way or another. In detail, evaluation questionnaires were distributed to the workshop participants, and evaluation interviews were conducted on the workshop contents and the work with the artifact afterward.

Table 4.4: List of participants of the evaluation studies

Participants of the evaluation studies						
Evaluation Cycle	Workshop	Date	Number of Teams	Questionnaire (n)	Interview (n)	
1	AXEL	Jun-18	4	-	4	
1	GROW	Nov-18	6	-	3	
1	AXEL	Feb-19	7	-	3	
1	UPCAT	Apr-19	4	9	-	
2	AXEL	Oct-19	7	7	4	
2	GROW	Nov-19	9	19	9	
2	UPCAT	May-20	5	6	-	

As shown in Figure 4.10, most startups are in the information and communications technology and energy and environment industries. Also represented are the metal and electronics industry, sports and health, consumer goods, lifestyle, chemical industry, food and beverages, construction, and biotechnology. The sample thus covers a broad spectrum of technologies, products, and services.

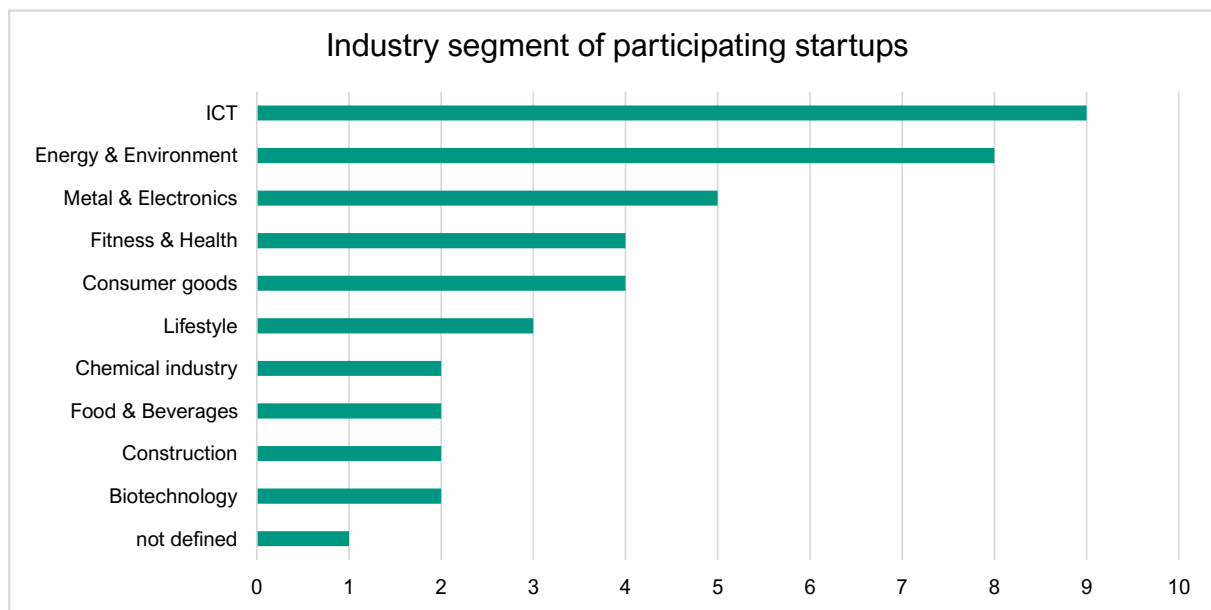


Figure 4.10: Industry segments of the participating startups

4.4.3 Overall Strategy for Data Analysis

As already known from the description of the research strategy in chapter 1.3, evaluating the artifact is an essential step of a DSR project (see Figure 1.2). This evaluation is performed based on the previously defined requirements, in which the core question must be answered as to whether the artifact fulfills these previously described requirements. Additionally, the data analysis also aims to derive findings that provide information about where and how the artifact may need to be improved. The data analysis is carried out in different ways regarding the

mixed-method approach, considering the quantitative and qualitative data obtained. The data is collected individually for each sub-area and digitally processed.

The observation data are transferred into an observation protocol for a better overview and analyzability. The result of this process is set out in Appendix C.2.

The completed questionnaires' analog data are first digitized for the selected analysis and the evaluation programs SPSS and Excel. Regarding the examinations of the questionnaire's quality criteria, the techniques already introduced in chapter 3.4 were used.

The qualitative data from the interviews were collected as part of two master's theses. The first evaluation cycle interviews were collected by Magnus Doll, the interviews of the second evaluation cycle by Lea Schäfer¹⁵. In this context, the students transcribed the interviews according to the transcription rules of Dresing und Pehl (2015). These transcriptions were used as such for further analysis. The qualitative analysis of all transcriptions follows the guidelines for qualitative content analysis, according to Mayring (2015), whereby this systematic approach ensures comprehensibility and verifiability (Mayring und Gläser-Zikuda 2008). MAXQDA analysis software is used to support this process.

All qualitative data were subjected to an initial qualitative content analysis by the students as part of their work. For this purpose, both students developed code systems according to the procedure in chapter 4.4.5.3, which were discussed and refined together with the author of this thesis. The interviews were coded by both the students and the author of this thesis using the resulting code systems. The results of this independent coding were then discussed and merged. This merging serves as the basis for the interpretation of the interviews. Independent coding using the same code system allows for a more comprehensive analysis of the interviews. According to Müller-Benedict (1997), if both researchers code everything and discuss and agree on the disputed cases by way of content discussion, this is the best way to achieve reliability, and further calculations of coefficients are not necessary. However, to increase the reliability of the results, the intercoder reliability, i.e., the agreement between different researchers' coding (Früh 2009; Mayring 2015), was calculated. The detailed calculation and evaluation of intercoder reliability are described in Appendix C.3.

4.4.4 Ethical Considerations

All procedures involved in this study were following generally accepted standards of ethical practice. The participants were informed both orally and in writing that the studies' participation was voluntary and could be terminated at any time. All data collected was based on individual

¹⁵ Both master theses can be viewed on request in the EnTechnon secretariat.

pseudonymized name codes, which were treated confidentially. During the intake interview, oral consent was obtained from all participants for participation, data collection, and sound recording.

4.4.5 Evaluation Instruments in Detail

Based on the requirements of this explorative and inductive research approach, appropriate and comprehensive data collection methods were implemented. These are described in detail in the following sub-chapters on observation, interviews, and quantitative survey. In doing so, each instrument pursues the goal for itself of testing specific requirements for the artifact. The multiple testing of individual requirements using different instruments is an essential part of the evaluation strategy. Table 4.5 lists the known requirements for the artifact from chapter 4.1 summarizes which requirements are tested with which instrument. As described in chapter 4.1, the requirements were given unique codes for better assignment in the further course of the evaluation.

In addition to the empirical instruments, a logical validation was performed to evaluate the structural requirements. In this case, the artifact's internal structure is used to justify why a requirement was met or not met. This logical validation already underlies chapters 4.2 and 4.3, in which the structure of Version One of the artifact was developed. It will, therefore, not be revisited in the remainder of the evaluation.

Table 4.5: Assignment of the instruments to the design requirements of the artifact

Evaluation Instruments					
Code	Requirement	Observation	Questionnaire	Interviews	Logical
ER Environmental Requirements					
ER_1	Usability	x	x	x	
ER_2	Comprehensibility	x	x	x	
ER_3	Customizability		x	x	
ER_4	Suitability	x	x	x	
ER_5	Completeness	x	x	x	
ER_6	Efficiency	x	x	x	
FR Functional Requirements					
FR_1	Design a Business Model		x	x	
FR_2	Reduce complexity		x	x	
FR_3	Define components in detail		x	x	
FR_4	Present business ideas		x	x	
FR_5	Validate business ideas		x	x	
FR_6	Identify opportunities and risks		x	x	
FR_7	Improve status quo		x	x	
SR Structural Requirements					
SR_1	Acceptance of methods				x
SR_2	Internal cohesion				x
SR_3	Number concreteness				x
SR_4	Absence of redundancy				x
SR_5	Clear operationalization and guidance				x
SR_6	Modularity				x
UR User Requirements					
UR_1	Comprehensive process and method description			x	
UR_2	Guiding poster (Canvas-like structure)			x	
UR_3	Include supporting methods for each component			x	
UR_4	Prioritization of components possible			x	
UR_5	Usable without external expert guidance			x	

4.4.5.1 Systematic Observation

The systematic observation serves to systematically record and document human behavior, statements, non-verbal reactions, and social characteristics at the time they occur. Furthermore, conclusions are drawn by acting and interacting with the artifact at hand (Baur und Hering 2017). In this case, the observer's role is a so-called complete observer (Brüsemeister 2008). This evaluation step is an open form of observation, as the subjects were informed in advance about the researcher's activity. The survey is not random but systematically planned (Flick 2019). The detailed observation protocol, which is compiled during and after the observation, forms the final evaluation basis (Mayring 2016). The following Figure 4.11 shows the schedule of the observation:

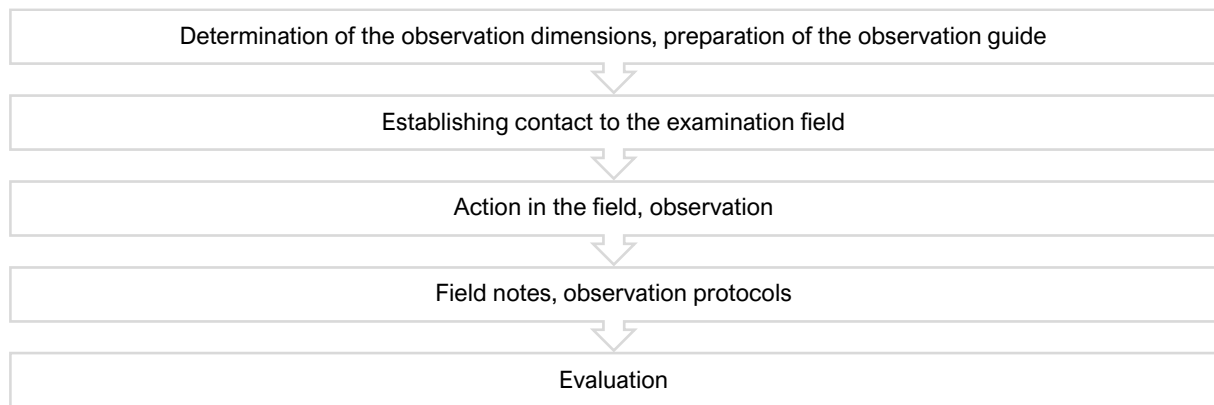


Figure 4.11: Flow chart of the observation process
 Source: own representation based on Mayring (2016)

In the observation protocol, relevant events are recorded concerning the research question. This written form of the observation data can subsequently be evaluated qualitatively with the help of content analysis, according to Mayring (2016). More information on the use of content analysis in this work can be found in chapter 4.4.5.3. In addition to unbiased observation notes created to record observations for later evaluation, theoretical and methodological notes are collected. Theoretical notes provide approaches to elaborate theoretical hypotheses relevant to answering the research question. Methodological notes answer the questions of what, when, how, and by whom something was observed and help to think through the methodological procedure to state the observation's appropriateness and quality (Brüsemeister 2008). The following table 14 shows an excerpt from the prepared protocol.

Table 4.6: Excerpt from the detailed protocol notes

Protocol notes		
Observation notes	Theoretical notes	Methodical notes
		Participants were informed about the observation project by the workshop leader
Test persons sit in pairs - constellations distributed in the room at tables together	Possibility of cooperation, sparring	Observation from a table in the right front corner from the perspective of the workshop leader
Test persons are presented with the Business Model Design Poster in DIN in A0	Thematic overview for better understanding, possibility to fill in analogous	

general conditions: Location Business Model Design Workshop in the context of the upCAT-Accelerator, April 2019

The following key questions established by Flick (2019) were of central importance in the preparation:

- Space: what is it like?
- Objects: Which ones are in the space?
- Actor: who is involved in the situation?

- Action: what does an actor do?
- Goal: what is he trying to achieve?
- Postures: How does someone move or position themselves in space?
- Emotions: What reactions are apparent?
- Constellations: How do actions intertwine?

The author of this thesis conducts the workshops himself. The observations are therefore carried out separately by students, each as part of their master's thesis.

The observation field access is made possible by the workshop leader, who also mediates the contact to the individual participants and introduces the research project and the observer. The events observed relate to both the theory and practice phases of the workshop. Interactions between participants are also relevant. The observation protocols were written by the observers, i.e., the students.

In the observation approach, typical difficulties should be noted. According to Seidel et al. (2006), these are the observation situation (reactivity), low scientific distance due to strong identification with the field ("going native"), and theoretical knowledge (perspectivity).

However, these problems will have little influence on the quality of the present observations. The reactivity decreases after a short settling-in period, and the subjects no longer perceive the observer. The observer recedes entirely into the background, as the focus is on the workshop leader and the contents. Through permanent note-taking, a reflection of one's role in and to the field, and a corresponding observer competence, the problem of losing scientific distance through participation is defused. Also, perspectivity will play only a minor role, as the observed insights will be reflected upon and thus will also be included in the interpretation (Seidel et al. 2006; Breidenstein et al. 2020).

Based on the guiding questions, the observation notes' analysis can provide initial insights in a wide range of areas regarding the evaluation of the BMDF.

4.4.5.2 Questionnaire

During data collection, a survey was conducted with the user group. The associated questionnaire will be distributed to the participants in an analog form immediately after the workshops.

This survey aims not only to evaluate the BMDF but also its operationalization in the workshop format. For this purpose, the questionnaire analyzes the effectiveness of the BMDF from the workshop participants' perspective. On the other hand, the questionnaire analyzes the workshop itself to conclude its user's perception and possible improvement suggestions. The questionnaire is therefore structured based on two central evaluation instruments.

The questionnaire uses the standardized measuring instrument to evaluate the teaching quality index (LQI) at KIT to evaluate the workshop itself. The LQI is calculated from the mean values of several interval-scaled core questions. Students use the LQI to evaluate the fulfillment of their individual learning needs by a single course. The more a course succeeds in meeting students' naturally diverse learning needs, the higher the course's overall quality from all participating students' perspectives. Therefore, the teaching quality index is a measure that places the learning needs of students at the heart of the quality assessment of teaching and learning. For the calculation, all questions must be interval-scaled, and the direction of the characteristic expression and the number of scale points must be the same. At KIT, a 5-point interval scale was defined for all questions. The positive characteristic expression is 1 for all questions, and the negative characteristic expression is 5.

In the present case, the questions of the LQI do not explicitly aim to measure the fulfillment of the requirements by the artifact but rather serve to measure the workshop's perception as such. The goal here is to evaluate whether a guided workshop is a suitable format for using the BMDF in practice. Likewise, the LQI questions are intended to provide a framing for the evaluation of the BMDF to potentially show connections between the workshop itself, its workshop facilitation, or other external influences and the evaluation of the BMDF.

For the actual evaluation of the effectiveness of the BMDF, the questionnaire uses Hatzijordanou's preliminary work, who developed a questionnaire for evaluating the effectiveness of a DSR artifact in a startup environment in the context of workshop format applications (Hatzijordanou 2019). Her questionnaire includes 25 interval-scaled questions (5-Likert scale) that address different requirements of a DSR artifact. Some of the questions are specific to the artifact developed by Hatzijordanou (2019). Therefore, the artifact-specific questions for evaluating the BMDF's effectiveness were explicitly adapted to the requirements from chapter 4.1.

A questionnaire with ten scales and 45 items was compiled for the present evaluation to capture users' impressions and feelings from these two questionnaires. Nine scales use closed questions with a five-point Likert scale. The last block includes three open-ended questions.

Each item that specifically targets the requirements of the BMDF was also assigned one of the requirements known from chapter 4.1. The questionnaire focuses on functional and environmental (see Table 4.5). A specific question is assigned to each requirement, except for FR_1 (Design a Business Model) and ER_3 (Customizability).

The functional requirement of enabling the user to design a BM (FR_1) is tested via the questions of whether users can define all BM components in detail and whether the framework provides all the necessary information to do so. According to the argumentations from

chapters 2.1.6 and 4.1, the 14 designated BM components cover all relevant aspects of the BM. Hence, by defining all these components, a BM is designed.

Since all teams use the BMDF within the workshop according to the same scheme and the same boundary conditions, the environmental requirement of customizability (ER_3) can only be tested to a limited extent in this scenario. Nevertheless, the requirement is indirectly co-assessed by the questions that specifically target the teams' own BMD and not the framework as a whole. Some questions are therefore assigned several codes.

The items were validated and selected by the author of the questionnaire through an expert exchange with KIT employees. Table 4.7 lists the individual scales, the associated items, and their assignment to the requirements.

The questionnaire is introduced with demographic information about the startup background and aims to collect the startup companies' basic data. First, the respondent's age and position in the company are requested. The respondent can then describe the startup's current stage of development and maturity via several response options. At this point, the participants' prior knowledge is also queried. The participants can choose one of the following five options: no previous knowledge, some previous knowledge, already used similar methods, already developed a first BM, already participated in a startup support program (e.g., Accelerator). These five options are converted into a numerical scale of 5 at the given point, ranging from 1 = no previous knowledge to 5 = already participated in a startup support program (e.g., Accelerator). The detailed questionnaire is listed in Appendix C4.

Table 4.7: Questionnaire's scales, items, and their assignment to the requirements

Research Subjects and Items		
Introduction		
Respondant's Demographics	Age: 20-30 years, 31-40 years, 41-50 years, >50 Position in the company: Founding Team, CxO, Employee Startup Development stage: Ideation phase, First Customer Feedback, MVP developed, First Pilot customers, Already market traction, Already founded, External funding raised Prior knowledge: no previous knowledge, some previous knowledge, already used similar methods, already developed a first Business Model, already participated in a startup support program (e.g., Accelerator)	
Main questionnaire		
Scale	Item (5er-Likert Scale: 1= I fully agree, 5= I fully disagree)	Requirements
1. Workshop Management	1.1 The workshop management appeared to be technically competent.	
	1.2 The workshop management was sufficiently focused on the needs of the participants (e.g., questions).	
	1.3 The workshop leader was open for suggestions and criticism.	
2. Working atmosphere	2.1 The learning atmosphere among the participants was good.	
	2.2 The behavior of the participants in the discussion was appropriate.	
	2.3 I actively participated in the discussions in the workshop.	
3. Content of the Workshop	3.1 All subject areas were sufficiently addressed.	
	3.2 It was possible for me to clearly understand the topics presented.	
	3.3 My expectations with regard to the workshop have been fully met	
4. Organization	4.1 In the workshop there was a lot of room for discussions.	
	4.2 The theme plan was dynamic and flexible.	
	4.3 There was enough time for breaks and recreation.	
	4.4 The duration of the workshop was appropriate.	
	4.5 The information in the run-up to the workshop was sufficient and comprehensible.	
5. Learning success	5.1 I think I learned a lot in this workshop.	
	5.2 The workshop has provided enough knowledge.	
	5.3 The workshop was valuable for me because my knowledge or abilities have significantly improved.	
	5.4 Please rate each of the following topics of the workshop regarding their importance to you: (Listing of all 14 Components)	
6. Practical relevance and applicability	6.1 The workshop provided a lot of practical knowledge.	
	6.2 I consider the acquired knowledge to be well applicable.	
	6.3 What I have learnt I will definitely apply in my job.	
	6.4 I will continue using techniques that were developed in the workshop.	
7. Durability of the learned	7.1 The knowledge gained in the workshop will facilitate my future activities.	
	7.2 The contents of the workshop are conveyed in a sustainable way.	
	7.3 I think that the workshop will have a positive impact on my behavior.	
8. Evaluation of the Framework	8.1 The framework contained all necessary information to design our Business Model.	ER_5 FR_1
	8.2 The framework helped us finding and processing the relevant information about the aspects of the business model.	FR_3 FR_1 ER_3
	8.3 The framework helped us presenting the business idea and the chosen Business Model.	FR_4 ER_3
	8.4 The framework helped us to identify opportunities and risks.	FR_6 ER_3
	8.5 The framework provided clear guidance on the process of Business Model Design.	ER_6
	8.6 The framework helped us to validate the current business ideas and contributed to decision making.	FR_5 ER_3
	8.7 The framework reduced complexity by implementing a structured business model design.	FR_2
	8.8 The framework itself is easy to understand.	ER_2
	8.9 The framework itself is easy to use.	ER_1
	8.10 The framework supported all our relevant purposes for Business Model Design.	ER_4
	8.11 Using the framework enhanced the effectiveness (quality of goal achievement) of our Business Model Design.	FR_7
9. General Judgment	9.1 I was interested in the topics.	
	9.2 I liked the workshop.	
	9.3 I am satisfied with the workshop.	
	9.4 I would recommend the workshop to others.	
Open questions at the end of the questionnaire		
Suggestions and comments	In your opinion, what were the most important weaknesses of the workshop? In your opinion, what were the most important strengths of the workshop? What improvements would you suggest for the next workshop? Do you have other general comments about the framework and its application?	

The approaches to objectivity, reliability, and validity already known from the preliminary study are used to evaluate the questionnaire's quality criteria.

Since two already tested questionnaires were used to create the questionnaire, the implementation objectivity and the evaluation objectivity can be considered as assured. At the end of the questionnaire, the open questions only serve to ask for possible suggestions for improvement and are not included in the scales' actual interpretation.

The objectivity of interpretation can also be regarded as given since the questionnaires' results were carried out and compared with each other both within the framework of two master's

theses and separately for the present work. Thus, the conclusions were drawn by several interpreters.

The structure of the questionnaire can also justify the requirements for validity. Since the questionnaire's composition is based on the two already tested and established test instruments of KIT and Hatzijordanou (2019), respectively, the content validity and criterion validity can be considered as given. A factor analysis will be conducted at the appropriate point after collecting the data to check for construct validity.

Reliability is determined after the respective data collection, using the known parameters *Cronbach's alpha*, *item difficulty p_i* , and *item selectivity $rit-i$* .

The developed questionnaire is used to analyze Version One of the artifact and its further development, Version Two. Thus, in addition to evaluating the individual versions, it is also possible to examine how the requirements' fulfillment has changed between the two versions.

4.4.5.3 Interviews

In data collection, additional semi-structural interviews will be conducted with the user group following the workshops. This sub-study aims to evaluate the BMDF and the explorative identification of fulfilled requirements, the purpose of use, and possible user types. For this purpose, it is first necessary to disregard the theoretical pre-understanding formed from the technical literature and prior personal experience (Mayring 2016).

The guideline used in this survey for the workshop participants is based on Witzel's problem-centered interview methodology and can be found in Table 4.8 (Witzel 2000). The problem-centered interview can be understood as a combination of narrative and guideline-based interview. There is an alternation between inductive and deductive procedures, as the researcher's prior knowledge is used to formulate the questions. Also, the principle of openness is preserved by the open questioning since the guiding questions are not pre-formulated in the exact wording but merely a guideline, which makes it possible to adapt them to the respective participant and his specific situation. However, the core of the questions is retained to ensure comparability of the interviews. The goal of the problem-centered interviews is defined by Witzel (2000) as the identification of ways of acting, individual perceptions, and ways of processing of the interviewee.

Table 4.8: Interview guide of the questions asked, including the addressed requirements

Interview Guideline			
Topic	Interview questions	Requirements	approx. Duration
Introduction, Current challenges	How have you been doing over the past few weeks?	Improvement of the status quo	4 minutes
	Have there been any new developments regarding your business idea?		
	How are you currently working on your business model?		
	What challenges are you currently facing?		
What is the prior knowledge of the participants?	Have you already carried out business model design activities in advance? If yes, which ones?	Functional requirements	2 minutes
	Why did you carry them out?		
	How much time did you invest in carrying out the business model design?		
Expectation, motive of application	What was your expectation in advance of the workshop?	Functional requirements	2 minutes
What actions did participants take as a result?	In particular, did you use the framework after the workshop? If yes, how often?	Functional requirements, Environmental requirements	4 minutes
	Why did you use the framework?		
	Which topics were particularly relevant for you?		
	Which methods did you use afterwards?		
What are the implications among users?	What were the effects of applying the framework?	Environmental requirements	5 minutes
	What new insights did you gain?		
	Did you change anything about your BM because of these insights?		
	Did you come to a decision based on your insights?		
Is the motive of the application fulfilled?	What was easy for you?	Functional requirements, Environmental requirements, User requirements	5 minutes
	Which methods of the framework worked particularly well or were particularly relevant?		
	Did you have any problems in carrying out the business model design using the framework?		
	What was difficult for you?		
Ideal process	Specifically, in what sub-areas did you have problems or were sub-areas of the framework incomprehensible?	Functional requirements, User requirements	2 minutes
	What does the ideal business model design process look like to you?		
Concluding remarks	Finally, do you have any additional comments on the Business Model Design framework?	All requirements	open

The interview begins with an introduction to the topic of the interview and an explanation of anonymization. The interviewer explains that the interviewee's personal views and perceptions are central to the interview, to reveal the interviewee's interest in knowledge (Witzel 2000). Then, following the guideline, the interviewees are asked open-ended questions that, on the one hand, inquire about the interviewee's prior knowledge, the general attitude towards the BMDF and the workshop, and specifically, the strengths and weaknesses of the BMDF. The order and the selection or wording of the questions asked can vary following the principle of

openness and the process orientation of the problem-centered interview (Witzel 2000; Helfferich 2011). The first question serves as an introduction to the startup's current situation to stimulate the interviewee's speech flow. The other questions focus on the goals and requirements of the evaluation for the artifact. These questions' general wording serves to stimulate speech flow and the intended open approach to the research field.

The guide was evaluated and revised by another expert. The interviews will be digitally recorded. Besides, a short protocol will be prepared, including any special features and critical terms. Since participation was voluntary and there was an assurance that both the data would be anonymized and the statements would not influence the evaluation of participation's success, the statements were most likely formulated independently and free of social desirability.

After the interviews are conducted, they are subsequently transcribed according to the transcription rule system of Dresing und Pehl (2015) and provided with a transcription header. MAXQDA analysis software is used to support the transcription process. The transcription header, adapted from Selting et al. (1998), contains the origin, the name of the interviewee, the recording day, place, interview duration, the name of the interviewer, the name of the transcriber, the interview situation, characterization of the interviewee and the course of the conversation. The interview transcript contains line numbering and time information for a more straightforward classification of which statements were made when and for easier comprehension for later analysis. With one exception, all interviews were conducted in German. The interview was written in standard orthography and, thus, according to German or American spelling rules. If specific statements from these interviews are quoted in the evaluations' further course, they are translated verbatim into English for better comprehensibility.

Table 4.9 lists the rules that were applied. The transcripts, short protocols, and audio files can be viewed in the EnTechnon institute archive on request.

Table 4.9: Transcription rules
 Source: adapted from Dresing und Pehl (2015)

Transcription Rules	
Characters	Meaning
(xx Sek.)	Pause in seconds
(lachen)	Characterization of nonverbal utterances that support the utterance
SICHER	Special emphasis
Schrecklich?	Presumed wording
(...)	Incomprehensible passage
[Begrüßung]	Description of action
Befragter xx (hh:mm:ss): Ich habe dort	Each speaker has their own paragraphs with timing that interrupts the other's flow of speech.
Interviewer (hh:mm:ss): Wo genau?	
Befragter xx (hh:mm:ss): eingekauft.	

Figure 4.12 shows an example of an excerpt from a transcription protocol, including the transcription header.

Finally, according to the guidelines for qualitative content analysis, the qualitative evaluation of the results is carried out based on Mayring (2015). He divides the process of qualitative content analysis into the following steps:

- (1) Definition of the material
- (2) Analysis of the development situation
- (3) Formal characteristics of the material
- (4) Direction of the analysis
- (5) Theoretical differentiation of the research question
- (6) Determination of the analysis techniques and the process model
- (7) Definition of the analysis units
- (8) Analysis steps using the code system
- (9) Re-examination of the code system in terms of theories and material
- (10) Interpretation of the results towards the main question
- (11) Application of the content analytical quality criteria

Steps (1) to (3) are concerned with the determination of the source material, deciding what can be interpreted from the material (Mayring 2015). In step (1), the so-called corpus, the material on which the analysis is based, is defined. Here, in addition to the definition, the selected sample size and sampling choice must be recorded. In step (2), the basic conditions' description is relevant, like the author, the target group, the concrete emergence situation, and the material emergence's socio-cultural background. Step (3) is concerned with the formal description of the material (Mayring 2015).

Herkunft:	Workshop 2
Aufnahmecode:	Befragter 43 (B043)
Aufnahmetag und -ort:	17.11.2019 in Ludwigshafen am Rhein
Dauer der gesamten Aufnahme:	00:21:12
Name des Aufnehmenden:	Lea Schäfer
Name des Transkribierenden:	Lea Schäfer
Gesprächssituation:	Telefoninterview
Charakterisierung:	männlich, Mitte 20, Mechatronik Student,
Gesprächsverlauf:	entspannt, keine Vorerfahrung, Details über Schwierigkeiten im Canvas, Danksagung am Ende

1 [Begrüßung des Teilnehmers und einleitende Worte]
2
3 INTERVIEWER (00:01:15): Magst du trotzdem nochmal erzählen, was so passiert ist die letzten
4 Wochen bei euch?
5
6 BEFRAGTER 11 (00:01:19): Ja. Also, angefangen beim Workshop, haben wir uns dann eigentlich mehr
7 Gedanken gemacht zu den Personas, die wir ansprechen wollen. Weil anfangs dachten wir ja halt, wir
8 sprechen die-. Oder wir machen unsere App ja für jeden, der abnehmen will und jeden der im Fitness-
9 Studio ist. Und das konnten wir dann ein bisschen weiter eingrenzen und haben dann so zwei
10 Personas einfach entwickelt. Und haben ja so unsere Zielgruppe dahingehend verkleinert und
11 spezifiziert. Value Proposition haben wir, also überhaupt mal, geschrieben. Die haben wir dann auch
12 im Vortrag vorgestellt, glaube ich, im Midterm. Wir haben eine Marktpotenzial-Analyse gemacht. Also
13 zum einen bei den Mitbewerbern geschaut wie deren Umsätze so aussehen. Und vor allem wie die ihr
14 Geld machen. Also, was deren Preisstrategie ist. Und haben dann geschaut, ob wir es vielleicht ein
15 bisschen besser machen können. Vor allem ist uns dann halt aufgefallen, dass wenn wir jetzt die
16 Zahlen nehmen oder die Statistiken, was wir heraus gefunden haben bezüglich Kalorienzähler-App-
17 Nutzer in Deutschland und so weiter, und Leute interessiert sind. Dann bekommen wir eigentlich viel
18 mehr raus als die anderen einnehmen. Und dann haben wir uns halt Gedanken gemacht, was die halt
19 vielleicht falsch machen oder was wir besser machen wollen. Um da vielleicht mehr Umsatz zu
20 erzielen. Oder unser Marktpotenzial war ja auch schon deutlich höher als jetzt die anderen irgendwie
21 jährlich einnehmen. Ja, dann hatten wir (...) dastehen können.

Figure 4.12: Excerpt from a transcription protocol including transcription header

In step (4) and (5), the analysis's goal is determined by defining a specific question and the analysis direction. Since a text can be interpreted in different ways, this must be determined in step four. Subsequently, in step five, the concrete question for the analysis is formulated in a theory-guided manner based on the theoretical knowledge already gained (Mayring 2015).

Steps 6 to 11 are dedicated to the concrete course of the analysis, whereby the formation of codes represents the center of the analysis. This formation aims to ensure comprehensibility,

verifiability, and transferability to other fields of application by which qualitative content analysis distinguishes itself as a scientific method. The general process model for code formation proposed by Mayring (2015) is adapted to the respective material and circumstances. Since the existing material is to be summarized in terms of content and relevant aspects are to be extracted for specific content areas, a content-based structuring according to the following process model is applied for the concrete flow of the analysis.

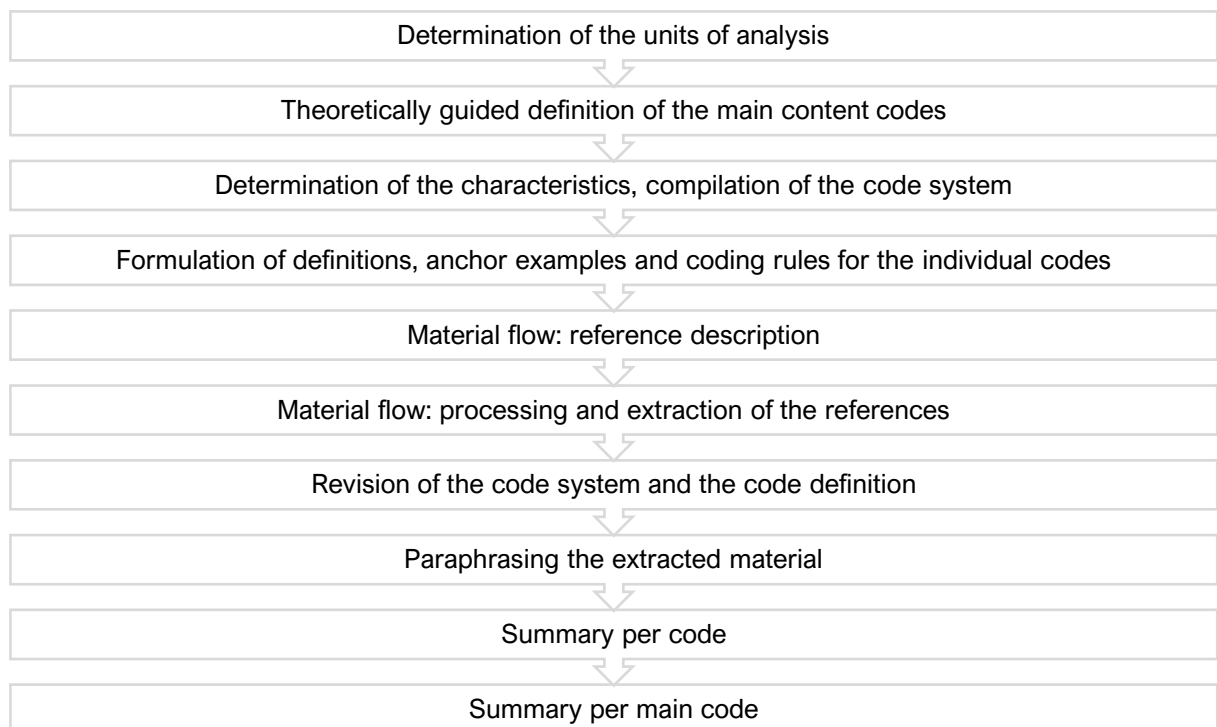


Figure 4.13: Structure of the content of the data analysis

Source: own representation based on Mayring (2015)

Following this structure, the so-called analysis units are defined in step (7), divided into the coding unit, the context unit, and the evaluation unit. Since the text material consists partly of sight points, one word is selected as the coding unit. The context units form a person's statements or observations, consisting of several sentences or keywords. The evaluation units are the interview transcripts and the observation protocol in the case of systematic observation.

In step (8), the respective code system can then be developed, derived from the concrete material, and always reviewed. Code formation is done inductively using the principle of open coding, which has its origin in the *Grounded Theory Methodology*, applied to develop codes directly from the material (Strauss und Corbin 2010). By shortening the text passages to relevant aspects and merging similar text passages, the codes are worked out and merged into a final code system in step (9).

In step (10), the results are then interpreted based on the research question, and in a final step (11), the analysis is evaluated according to quality criteria (Strauss und Corbin 2010).

4.5 First Evaluation Cycle (Version One)

The two-part artifact with the initial design from chapter 4.3, Version One, is applied in several end-users' workshops. The demonstration of Version One will take place in a total of four workshops, each lasting several days. These were conducted in the context of three different Accelerator programs. The programs are accelerators with different target groups but with a fundamentally similar program flow. Specifically, they are the AXEL Energie Accelerator of fokus.energie e.V., the GROW Accelerator of the university group Pioniergarage at KIT, and KIT's Accelerator upCAT.

Since 2017, AXEL has been the only German-wide accelerator focusing exclusively on the energy sector and startup teams in their startup project's early stages. AXEL offers two free startup programs, Team Training and Team Development. The demonstration of Version One of the artifact was conducted as part of Team Training, a compact intensive program of 4-6 weeks for teams that are just starting and do not yet have a mature BM. Specifically, the program helps teams design their BM, develop an initial prototype, and build public speaking and presentation skills. In total, Version One was used in two rounds of team training, first in June 2018 and then again in February 2019.

GROW is the annual student startup competition of PionierGarage e.V., Germany's largest student club on entrepreneurship and based at KIT, held since 2013. The GROW competition addresses student teams in the pre-seed phase. The competition lasts eleven weeks in total. During the competition, the participating teams get relevant knowledge in several workshops. Version One of the artifact was used in the GROW competition in November 2018.

The upCAT program is KIT's twelve-week accelerator program. Since 2013, the upCAT program has targeted scientists and researchers from the KIT environment with a content focus on Deep Tech applications, i.e., technology solutions based on significant scientific or technical challenges. The upCAT takes place annually. Version One of the artifact was deployed during the program in April 2019.

As indicated by the Version One structure, three days were set to implement the entire BMDF. Therefore, each of the workshops took place on three consecutive days. Table 4.10 lists the dates of the demonstrations. In total, Version One was thus piloted with 21 startup teams. During this trial, the artifact was evaluated using the previously defined evaluation strategy and associated instruments.

Table 4.10: Demonstrations of Version One, evaluation instruments and returns

Data set for the first evaluation study (Version One)						
Evaluation Cycle	Workshop	Date	Number of Teams	Observation (n)	Questionnaire (n)	Interview (n)
1	AXEL	Jun-18	4	-	-	4
1	GROW	Nov-18	6	-	-	3
1	AXEL	Feb-19	7	-	-	3
1	UPCAT	Apr-19	4	1	9	-

Due to the particular workshop situation and local conditions, it was impossible to use all three instruments for each workshop. Therefore, the most appropriate instruments were selected depending on the situation. The systematic observation took place as part of the outreach in the upCAT program. The AXEL and GROW teams were interviewed afterward, while the upCAT teams participated in the survey via questionnaire. Thus, the Version One demonstration resulted in a data set of one observation protocol, ten interviews, and nine completed questionnaires for the first evaluation cycle (see Table 4.10).

Since this is the user group's first involvement with the artifact, evaluating the results was primarily on the topics of comprehensibility of the individual parts of the artifact. To what extent the phases and components are understandable, and how well the methods can be edited. Besides, the artifact's overall structure, i.e., both the structure of the poster and the slide deck, was examined. The findings from the respective evaluation instruments and the resulting adaptations of Version One are presented in the following.

4.5.1 Findings from the Systematic Observation

Version One was presented and used, among other things, during a three-day workshop with potential founders in the upCAT program. Here, the facilitator provided a theoretical introduction to the framework's components and the methods used to gather the necessary information to design the BM. After each theoretical introduction to a single topic area of the framework, the teams work together in practice phases to gather the necessary information for a method and consolidate the results. The theoretical introductions for each method are intentionally kept short to allow more space for the practice phases. The key messages identified in the practical exercises are then transferred to the BMD poster. For this purpose, each team was provided with a BMD poster in DIN A0 format. The poster's crucial terms and boxes were presented in detail in the workshop, and their meaning was explained.

The observation's focus was on the reaction, interaction, and practice of the workshop participants to the presented content and tasks by the workshop leader. In the course of the workshop, an observation protocol was created by an observer. The observed events recorded in it refer to both the theory and practice phases of the workshop. Interactions between participants are also relevant. As specified in chapter 4.4.5, a particular focus of the systematic

observation is on evaluating the artifact's environmental requirements, more specifically its usability, comprehensibility, suitability, completeness, and efficiency.

During the evaluation of the observation protocol, the code system is formed inductively, as described in chapter 4.4.5.3. After evaluating the protocol, the codes listed in Table 4.11 resulted, including an anchor example for a better overview. In case of uncertainty regarding the code assignment, the corresponding passage was compared with possible already clearly coded protocol passages and then assigned to a code. As can be seen from the table, the codes were formed more concerning the workshop's course. The requirements were thus indirectly co-evaluated.

Table 4.11: Overview of the inductively formed codes of the observation protocol

Inductively formed codes of the observation protocol	
Code	Anchor example
Presentation by workshop leader	"Presentation of Persona"
Practice phase	"Practice part persona"
Questions from the participants	"Question back on the distinction between mission, vision and goals"
Strength of the Framework	"Subjects want to fill this out immediately and take photos of it"
Weakness of the Framework	"much explanations necessary"
(Methodical) action of the participants	"Participants take notes"

Figure 4.14 presents the frequency distribution of the identified codes and shows the frequency of certain occurrences. The code *Presentation by the workshop leader* lists the presentation parts noted in each case. Equally, the code *Practice phase* lists the practical phases the teams go through. Thus, these code can be neglected for the analysis.

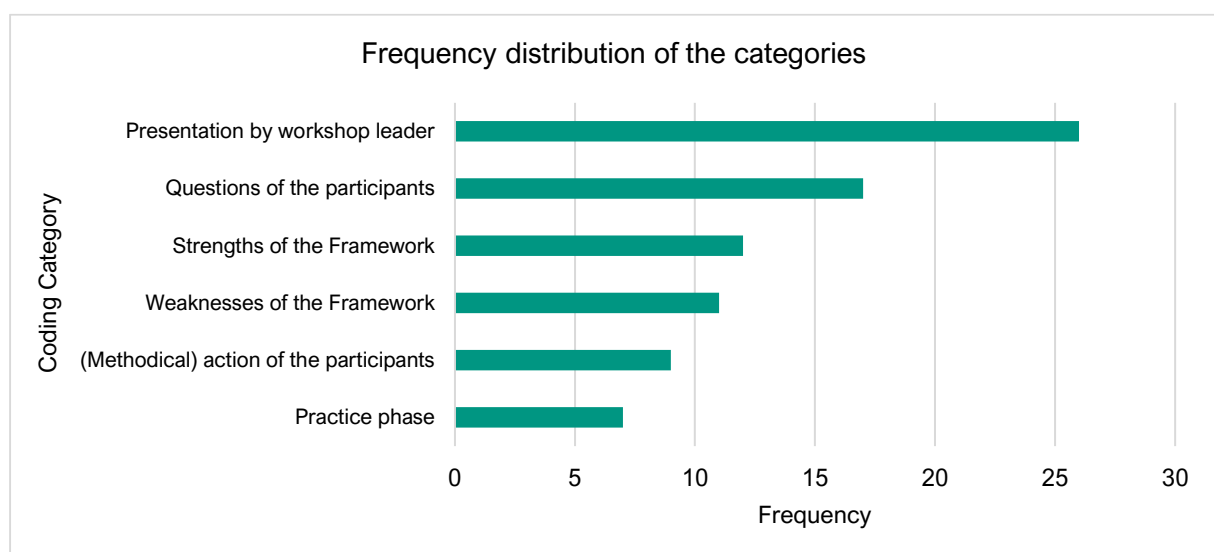


Figure 4.14: Frequency distribution of the identified codes

More relevant is the code *Questions from the participants*, which contains the workshop participants' noted questions. Table 4.12 lists these in excerpts. It is clear here that the participants would like more information on certain topics, such as practical examples. Besides, some terms are not self-explanatory for all participants, resulting in the potential for improvement of the framework concerning comprehensibility and usability.

Table 4.12: Coding of the code *Questions from the participants*

Coding *Questions from the participants*

- 1 Definition of the "Business Model", one person asks questions regarding the level of detail.
 - 2 What is done in the workshop: explicit demand for stakeholder analysis and network analysis, Value Exchange and Transaction
 - 3 Presentation of the Vision: query on the distinction between Mission, Vision and Goals
 - 4 Practical part of the Team Core Values Session: Inquiry about the demarcation between personal and company values.
 - 5 Presentation of an example of Team Core Values: questions on the change of values
 - 6 Practice part Persona: they ask questions about the degree of detail and sensing
 - 7 Presentation Value Proposition Explorer: a lively discussion starts about the definitions of Excitement and Differentiator.
 - 8 Presentation BPMN: Participants have questions about how exactly to model which processes,
 - 9 Presentation Value Network: Participants ask questions about the exact process and how to get started
 - 10 Presentation Value Network: Participant asks about the terms tangible and intangible
 - 11 Practice part Assets/People: Questions about patent, limitable time and taxes,
 - 12 Presentation Competitor Analysis: Competitor Analysis Framework and Value Profile, questions about parameters
 - 13 Presentation Distribution Channels: Questions about legal forms, after-sales and difference to disposal
 - 14 Presentation Revenue Streams: Questions about prioritization, presentation of the Business Navigator
-

The *framework's strengths and weaknesses* were also noted and are shown in Table 4.13 and Table 4.14, respectively.

Table 4.13: Coding of the *Strengths of the framework code*

Coding *Strength of the Framework*

- 1 Introduction: Thematic overview for better understanding
 - 2 Why is the Business Model necessary, aspects in workshop: Attention of participants increases
 - 3 Core Assets and People: with example great interaction, interesting for participants
 - 4 Poster in general: thematic overview for better understanding,
 - 5 Poster in general: very big interest in it
 - 6 Poster in general: subjects want to fill it in immediately and take photos of it
 - 7 First practice phase: some teams finish quickly
 - 8 Timing planned in advance makes sense, earlier end not necessary
 - 9 Presentation and practice Value Proposition: participants listen attentively
-

Of particular note here was the strong interest in the BMD poster. The format as such seems to be suitable for the user group. In terms of the suitability requirement, the framework is heading in the right direction. The individual presentation phases for introducing the framework, particularly *Core Assets*, *Core People*, *Value Proposition*, and *Value Network*, are followed with concentration and attention by the participants. The practical phases around the topics *Value*

Proposition, *Core Assets*, and *Core People* are also carried out with workshop participants' significant commitment. In general, the participants' interest and participation increased in those phases in which overview topics for better understanding or concrete examples were covered. Feedback on the planned schedule shows that the schedule is reasonable, and an earlier end of the workshop days is not desired. On the contrary, several feedbacks are asking for more time to work on each method. Concerning the efficiency requirement, this finding shows a need for improvement. The scope of the tasks must be reduced, or the workshop's total duration must be increased.

Weaknesses of the framework are mainly the aspect of the length of the practical phases. The participants often need more time than given by the workshop leader to complete the practical exercises. In the workshop's feedback round, the participants also state that they would like to discuss the team results within the individual teams and all other participants. In some phases like the theoretical introduction to BMs in general, the introduction of BPMN, or the VRIO framework, the participants are inattentive and uninvolved. In other phases, such as the practical parts on jobs-to-be-done and value proposition statement, participants have difficulty applying what is presented and need further support from the workshop leader. Here, too, there is a need for improvement in terms of comprehensibility. The practice phases are only conducted in a seated position and are therefore very quiet and undynamic.

Table 4.14: Coding of the code *Weakness of the framework*

Coding *Weakness of the Framework*

- | | |
|---|--|
| 1 | Theoretical Introduction to Business Models: Participants seem uninvolved, topic is rather uninteresting |
| 2 | Core Assets and People: interest decreases again at first |
| 3 | Practical phase: others need more time |
| 4 | Value Proposition practice session: practice phase very undynamic and quiet |
| 5 | Value Proposition Statement: Participants express difficulties in formulation |
| 6 | BPMN: Participants digress |
| 7 | Practice part Value Network: Teams need longer time |
| 8 | Practical Phases in general: Lecturer talks to teams individually, participants would need more time, long discussions |
| 9 | Presentation VRIO: Participants are partly uninvolved |
-

Besides, some *participants' (methodical) actions* are listed, giving insight into the workshop's evaluation. These insights are listed in Table 4.15.

Table 4.15: Coding of the code (Methodical) action of the participants

Coding (Methodical) action of the participants

1	Test persons sit together in constellations of two at tables distributed around the room, possibility of cooperation, sparring
2	Introduction of the participants including their own business idea
4	Participants receive a Poster in A0 format, which can be taken away after the workshop, possibility to fill it in analogously
5	Participants start in practical part, quiet work in teams of two with exchange among each other
6	Practice part Value Proposition, participants use Post-Its, remain seated in their chairs, remain relatively quiet, workshop leader gives feedback to individual teams
7	Practice part Persona, participants start working directly, use Post-Its and one team uses a book they brought with them
8	Practice part Value Proposition Statements, participants work in teams to formulate,
9	Presentation of VRIO framework, participants are partially uninvolved, others take notes

The analysis of the observation initially reveals an overall positive picture of the workshop days and the BMDF. Nevertheless, some difficulties among the participants and suggestions for improvement regarding the contents and the implementation can be identified.

The distinction between mission, vision, and goals should be elaborated more precisely in the initiation phase. The *Value Proposition's* practical part seems sensible to encourage the teams to exchange more through the workshop leader. It also seems necessary to define the terms used, such as must-haves or excitement attributes, more clearly. An example of excitement could provide more clarity. An example is also necessary for presenting the *Core Activities & Processes*, especially for process diagrams. The practical part on the *Value Network* should be extended, although promising approaches can already be seen in the given time. However, the feedback also shows that the participants are basically not missing any topic or explicitly missing content. In terms of the requirement for completeness, these are good results.

In summary, the systematic observation shows potential for improvement in the requirements of comprehensibility, usability, and efficiency. However, the first investigation using observation shows positive aspects regarding the requirements of suitability and completeness.

4.5.2 Findings from the Quantitative Survey

True to the formative nature of the evaluation design, the questionnaire aims to validate Version One of the BMDF against the defined requirements and, if possible, to identify potential improvements that can increase the degree to which the requirements are met. To better classify these improvements, the environment of the artifact's use, i.e., the workshop as a whole, is also evaluated.

The scales 1 to 7 and scale 9 of the questionnaire evaluate the artifact's application's environment without explicitly assessing the fulfillment of the requirements. They thus evaluate under which conditions the artifact itself is evaluated. The goal here is to show possible correlations

between the workshop itself, its workshop facilitation, or other external influences and the evaluation of the BMDF (see chapter 4.4.5.2).

Scale 8 is then used to validate the framework itself against the list of requirements, verifying whether and, if so, to what extent the framework meets the previously defined requirements.

First, however, a brief description of the sample is given. A total of 10 participants received the questionnaire, with $n = 9$ participants completing it, corresponding to a response rate of 90 %. Here, all completed questionnaires are accounted for by the workshop conducted as part of the upCAT in April 2019, the same workshop in which the observation from the previous chapter took place. Concerning the demographic data, their age, their position in the company, and the startup's status were recorded. The survey included seven participants in the age group of 20 to 30 years old (78 %) and two between 31 to 40 years old (22 %). All respondents state to hold a position in the founding team.

As a development stage, eight participants indicated that they had already developed an initial prototype. Two participants had already received initial customer feedback, and four had already obtained external funding.

Regarding prior knowledge, one participant stated to have no prior knowledge. Two participants have some prior knowledge, two others have already worked with similar methods, and three participants have already participated in another accelerator.

The statistical results refer only to scales 1-9. The four open-ended questions at the end of the questionnaire are qualitatively analyzed separately.

Table 4.16 shows the results of the item analysis for the scale *Workshop management*. The item difficulties are all above the acceptable range, showing that the items tend to be formulated too easily or that the participants tend to agree on the questions easily. The item selectivities rit_i all reach a value above 0.30, which indicates a satisfactory homogeneity of the overall scale. Cronbach's alpha is in a good range with a value of $\alpha = 0.770$.

Table 4.16: Item analysis of scale 1 Workshop management (Version One)

1. Workshop management (Version One)				
	M	SD	pi	rit-i
1.1 The workshop management appeared to be technically competent.	1.11	0.333	0.973	0.803
1.2 The workshop management was sufficiently focused on the needs of the participants (e.g. queries).	1.22	0.441	0.945	0.535
1.3 The workshop leader was open for suggestions and criticism.	1.22	0.441	0.945	0.535

Remarks: N = 9. coding: 1 (I fully agree), 2, 3, 4, 5 (I fully disagree). M = mean value; SD = Std. Deviation; pi = item difficulty; rit-i = corrected item selectivity. Cronbach's Alpha = 0.770.

The mean value of the scale *Workshop management* is 1.19, with a standard deviation of 0.388. Accordingly, the participants indicate a very positive attitude towards the evaluation of the workshop management. They see the workshop management as technically competent and sufficiently focused on the needs of the participants. Most importantly, the workshop management seems open to suggestions and criticism.

Table 4.17 shows the results of the item analysis for scale 2 *Working atmosphere*. The item difficulties, with values ranging from pi = 0.860 to pi = 0.918, are all at the upper end of the acceptable range. The item selectivities with values ranging from rit-I = 0.359 to rit-I = 0.746 are all acceptable and indicate a mostly existing homogeneity of the overall scale. Cronbach's alpha is also suitable for this scale.

Table 4.17: Item analysis for scale 2 Working atmosphere (Version One)

2. Working atmosphere (Version One)				
	M	SD	pi	rit-i
2.1 The learning atmosphere among the participants was good.	1.33	0.500	0.918	0.359
2.2 The behaviour of the participants in the discussion was appropriate.	1.33	0.500	0.918	0.746
2.3 I actively participated in the discussions in the workshop.	1.56	0.527	0.860	0.456

Remarks: N = 9. coding: 1 (I fully agree), 2, 3, 4, 5 (I fully disagree). M = mean value; SD = Std. Deviation; pi = item difficulty; rit-i = corrected item selectivity. Cronbach's Alpha = 0.692.

The scale 2 *Working atmosphere* has an overall mean value of 1.41. The item dispersion here is 0.491. Accordingly, the participants give a very positive evaluation of the working atmosphere of the workshop. They especially like the learning atmosphere and the discussions among the participants. Whether they actively participated in the workshop discussions is also indicated as very active with a mean value of M = 1.56.

Table 4.18 shows the results of the item analysis of scale 3 *Content of the workshop*. The item difficulties are all in the desirable range. The item selectivities also indicate a good homogeneity of the overall scale.

Table 4.18: Item analysis of scale 3 Content of the workshop (Version One)

3. Content of the workshop (Version One)				
	M	SD	pi	rit-i
3.1 All subject areas were sufficiently addressed.	1.67	0.707	0.833	0.539
3.2 It was possible for me to clearly understand the topics presented.	1.78	0.667	0.805	0.357
3.3 My expectations with regard to the workshop have been fully met	2.00	0.707	0.750	0.469

Remarks: N = 9. coding: 1 (I fully agree), 2, 3, 4, 5 (I fully disagree). M = mean value; SD = Std. Deviation; pi = item difficulty; rit-i = corrected item selectivity. Cronbach's Alpha = 0.643.

The mean value of the scale is 1.81, with a standard deviation of 0.669. The participants, therefore, give a very positive evaluation of the content of the workshop. Cronbach's alpha, with a value of 0.643, is also acceptable. Overall, the respondents indicate that they were very interested in the topics covered and that they were able to understand them well. Participants' expectations of the workshop were also rated as acceptable.

Table 4.19 shows the results of the item analysis for scale 4 *Organization*. The item difficulties are all in the desirable range except for item 4.3 with $p = 0.918$. The item selectivities also reach the desirable values here. Cronbach's alpha of 0.765 is in an excellent range.

Table 4.19: Item analysis for scale 4 Organization (Version One)

4. Organization (Version One)				
	M	SD	pi	rit-i
4.1 In the workshop there was a lot of room for discussions.	2.11	0.928	0.723	0.351
4.2 The theme plan was dynamic and flexible.	1.67	0.707	0.833	0.343
4.3 There was enough time for breaks and recreation.	1.33	0.707	0.918	0.668
4.4 The duration of the workshop was appropriate.	1.44	0.726	0.890	0.610
4.5 The information in the run-up to the workshop was sufficient and comprehensible.	1.67	0.707	0.833	0.803

Remarks: N = 9. coding: 1 (I fully agree), 2, 3, 4, 5 (I fully disagree). M = mean value; SD = Std. Deviation; pi = item difficulty; rit-i = corrected item selectivity. Cronbach's Alpha = 0.765.

Scale 4 *Organization* is rated overall with a mean of 1.64 and a standard deviation of 0.765. Accordingly, the participants reflect a positive evaluation of the organization of the workshop.

Nevertheless, the results show that some participants would like to have more time for discussions, even if the workshop's overall duration is perceived as suitable. The participants rate the time for breaks and recreation as very good with $M = 1.46$. Combined with the findings derived from the observation, it can be concluded that the theory sections in the workshop may need to be reduced further. The information provided before the workshop was sufficient and understandable, with a value of $M = 1.67$.

Table 4.20 shows the results of the scale 5 *Learning success*. The item difficulties provide very good values. The item selectivities are with values from $\text{rit-I} = 0.348$ to $\text{rit-I} = 0.667$ also in the desirable range.

Table 4.20: Item analysis of the scale 5 *Learning success* (Version One)

5. Learning success (Version One)				
	M	SD	pi	rit-i
5.1 I think I learned a lot in this workshop.	2.00	0.707	0.750	0.667
5.2 The workshop has provided enough knowledge.	1.89	0.928	0.778	0.582
5.3 The workshop was valuable for me because my knowledge or abilities have significantly improved.	1.89	0.601	0.778	0.348

Remarks: N = 9. coding: 1 (I fully agree), 2, 3, 4, 5 (I fully disagree). M = mean value; SD = Std. Deviation; pi = item difficulty; rit-i = corrected item selectivity. Cronbach's Alpha = 0.801.

Scale 5 *Learning success* has a mean value of 1.93. The standard deviation here is 0.716. Accordingly, the participants give a good evaluation of the learning success of the workshop. An analysis of these items' correlation with the participants' previous knowledge shows a significant positive correlation between the previous knowledge level and items 5.1 and 5.2. Due to the scaling of the knowledge level from 1 = no previous knowledge to 5 = already participated in a startup support program (e.g., accelerator), this significance means that the learning success increases, the less previous knowledge the participant has. Since the BMDF primarily addresses startups at a very early stage, this is a desirable result.

Figure 4.15 shows the results for item 5.6, which is treated separately due to its special coding. Here, participants were able to rate the addressed components individually. As the figure shows, all components were considered important. As was also known from the previous study in chapter 3, the *Value Proposition* and *Customer Segments* components were also the most relevant in this survey. Also noteworthy is the very high relevance of the *Value Network* component (M = 1.89), for which a particular method was developed for the BMDF. The *Purpose & Team* component, which was further developed for Version One, also meets a very good response with an average value of 1.89.

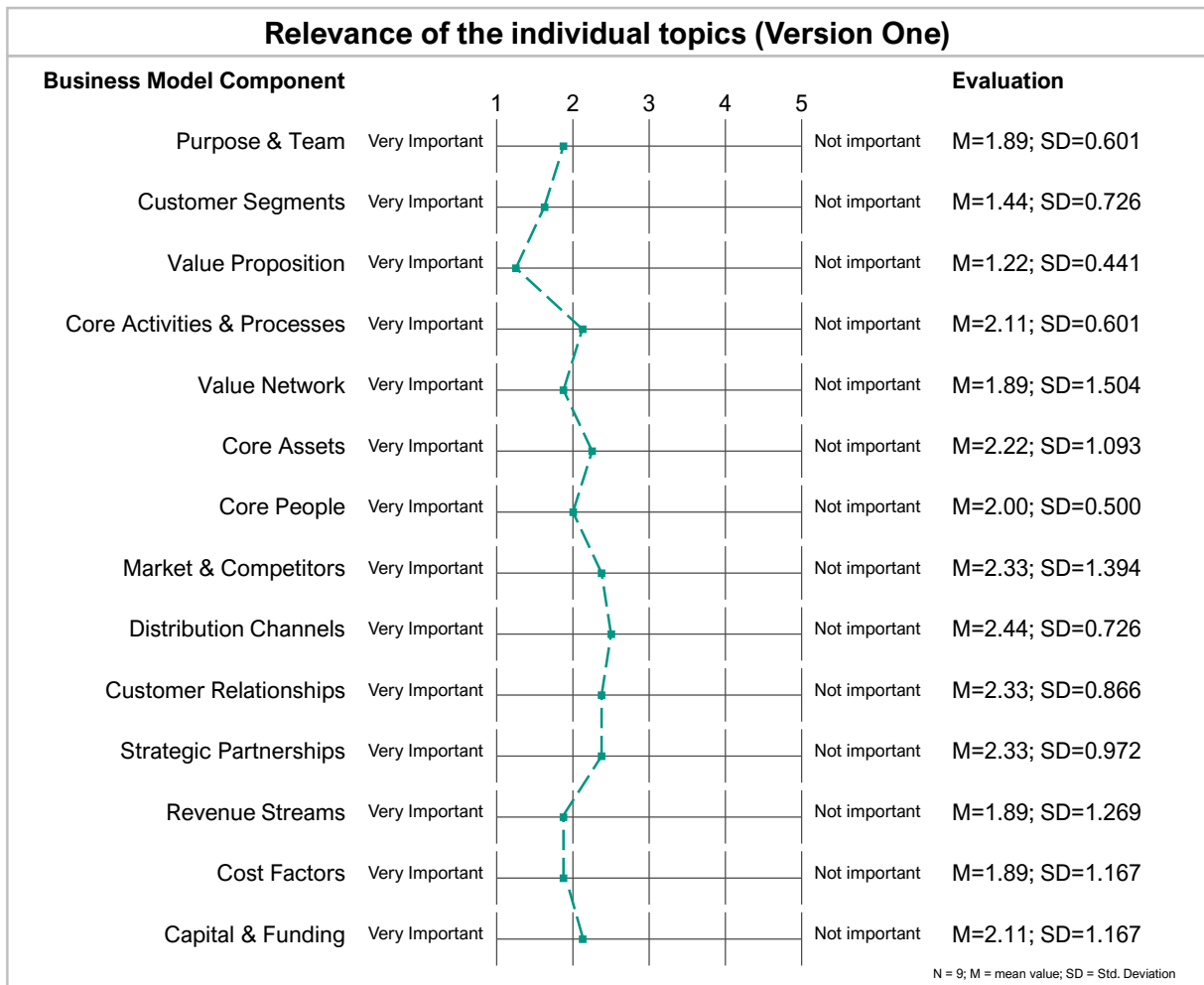


Figure 4.15: Relevance of the individual topics of the BMDf (Version One)

Table 4.21 shows the results of scale 6 *Practical relevance and applicability*. The item difficulties are all in the desirable range with values from $\pi_i = 0.750$ to $\pi_i = 0.860$. The item selectivities provide good values except for item 6.3. The low item selectivity of item 6.3 may be due to the very generic formulation of the question itself. Therefore, a factor-analytical consideration of item 6.4 is omitted. Cronbach's alpha provides a good result with a value of 0.679.

Table 4.21: Item analysis of scale 6 Practical relevance and applicability (Version One)

6. Practical relevance and applicability (Version One)				
	M	SD	pi	rit-i
6.1 The workshop provided a lot of practical knowledge.	2.00	0.866	0.750	0.596
6.2 I consider the acquired knowledge to be well applicable.	1.67	0.707	0.833	0.339
6.3 What I have learnt I will definitely apply in my job.	1.56	0.527	0.860	0.281
6.4 I will continue using techniques that were developed in the workshop.	1.89	0.782	0.778	0.672

Remarks: N = 9. coding: 1 (I fully agree), 2, 3, 4, 5 (I fully disagree). M = mean value; SD = Std. Deviation; pi = item difficulty; rit-i = corrected item selectivity. Cronbach's Alpha = 0.679.

Scale 6 *Practical relevance and applicability* has an overall mean of 1.78 (SD = 0.711). The participants thus give a positive assessment of the practical relevance and concrete applicability of the workshop content. There is also broad agreement that techniques introduced in the workshop will continue to be used in the future.

Table 4.22 presents the results of the item analysis of scale 7 *Durability of the learned*. The item difficulties, as well as the item selectivities, are all in the desirable range. Cronbach's alpha of 0.881 is also excellent.

Table 4.22: Item analysis of the scale 7 Durability of the learned (Version One)

7. Durability of the learned (Version One)				
	M	SD	pi	rit-i
7.1 The knowledge gained in the workshop will facilitate my future activities.	1.56	0.527	0.860	0.747
7.2 The contents of the workshop are conveyed in a sustainable way.	1.78	0.441	0.805	0.713
7.3 I think that the workshop will have a positive impact on my behaviour.	1.67	0.500	0.833	0.866

Remarks: N = 9. coding: 1 (I fully agree), 2, 3, 4, 5 (I fully disagree). M = mean value; SD = Std. Deviation; pi = item difficulty; rit-i = corrected item selectivity. Cronbach's Alpha = 0.881.

Scale 7 *Durability of he learned* has a mean of 1.67. The standard deviation here is 0.471. Accordingly, the participants give a very confident rating towards the durability of what has been learned. The participants think that the workshop will have a positive influence on their behavior. Also, on average, they expect that the workshop's knowledge will facilitate their future activities for the most part.

Table 4.23 shows the results of scale 8 *Evaluation of the framework*. The item difficulties are in the desirable range. Only items 8.2 and 8.4 are slightly above the desirable range with values of $p = 0.945$. The item selectivities are also in the acceptable range, except item 8.9. Therefore, the content formulation of the item could be discussed. It might make more sense to specify the question about usability and not ask it too generically. However, since the items of Scale 8

are also to be used to query the specific requirements for the artifact directly, a rewording of item 8.9 is omitted. Cronbach's alpha provides an excellent value of $\alpha = 0.784$.

Table 4.23: Item analysis of the scale 8 Evaluation of the framework (Version One)

8. Evaluation of the framework (Version One)				
	M	SD	pi	rit-i
8.1 The framework contained all necessary information to design our Business Model.	1.89	0.782	0.778	0.763
8.2 The framework helped us finding and processing the relevant information about the aspects of the business model.	1.22	0.441	0.945	0.330
8.3 The framework helped us presenting the business idea and the chosen Business Model.	1.67	0.707	0.833	0.472
8.4 The framework helped us to identify opportunities and risks.	1.22	0.441	0.945	0.330
8.5 The framework provided clear guidance on the process of Business Model Design.	1.44	0.527	0.890	0.800
8.6 The framework helped us to validate the current business ideas and contributed to decision making.	1.89	0.928	0.778	0.724
8.7 The framework reduced complexity by implementing a structured business model design.	1.56	0.882	0.860	0.538
8.8 The framework itself is easy to understand.	3.00	0.866	0.500	0.400
8.9 The framework itself is easy to use.	2.44	0.882	0.640	0.017
8.10 The framework supported all our relevant purposes for Business Model Design.	2.56	0.882	0.610	0.358
8.11 Using the framework enhanced the effectiveness (quality of goal achievement) of our Business Model Design.	1.67	0.866	0.833	0.352

Remarks: N = 9. coding: 1 (I fully agree), 2, 3, 4, 5 (I fully disagree). M = mean value; SD = Std. Deviation; pi = item difficulty; rit-i = corrected item selectivity. Cronbach's Alpha = 0.784.

The scale 8 *Evaluation of the framework* provides an overall mean value of 1.87. The standard deviation here is 0.906. Accordingly, the participants give a positive evaluation of the framework.

For the most part, according to the respondents, the workshop contained all the necessary information for designing a BM. Also, the BMDF was able to support the teams in the essential functions of the BMD process. However, the values of ease of understanding, ease of use, and support for the individual purposes of the BMD are notable. Although all three values are still considered acceptable, they still stand out compared to the generally very positive responses. From this, the concrete potential for improvement can be derived concerning usability and comprehensibility. The further development of Version One must, therefore, place a particular focus on these requirements. The question regarding the effectiveness of the BMDF was rated as very positive with a mean value of 1.67.

Table 4.24 shows the translation of the items into the respective environmental and structural requirements for the artifact. The functional requirement FR_1 (Design a Business Model) is not answered by a single question but by the two questions 8.1 and 8.2. Question 8.2 checks whether the user can define all BM components in detail, and question 8.1 whether the

framework provides all the necessary information. However, combining the two questions into a two-item construct is difficult due to the low reliability of this new construct. For constructs with two items, the Spearman-Brown coefficient generally proves to be a better indicator of reliability than Cronbach's alpha (Eisinga et al. 2013). In the present case, however, the value of 0.489 is a rather low coefficient. Question 8.2 is mainly aimed at the empowerment by the framework, question 8.1 at its content. Due to this different focus, the low value can be partly justified. Nevertheless, both items are considered valid in themselves. For better comparability between the different BMDf versions, the requirement is therefore assigned the mean value of both questions 8.1 and 8.2. With a mean value of 1.56, this requirement is fulfilled.

Regarding the other functional requirements, Version One also provides excellent results. Thus, all functional requirements can be considered fulfilled. Concerning the environmental requirements, however, improvements must be made. This potential for improvement will be considered with the development of Version Two.

Table 4.24: Assessment of the environmental and functional requirements (Version One)

Fulfillment of environmental and functional requirements (Version One)			
	Mean	Fulfillment	related Item
ER_1 Usability	2.44	-	8.9
ER_2 Comprehensibility	3.00	-	8.8
ER_4 Suitability	2.56	-	8.10
ER_5 Completeness	1.89	+	8.1
ER_6 Efficiency	1.44	+	8.5
FR_1 Design a Business Model	1.56	+	8.1, 8.2
FR_2 Reduce complexity	1.56	+	8.7
FR_3 Define components in detail	1.22	+	8.2
FR_4 Present business ideas	1.67	+	8.3
FR_5 Validate business ideas	1.89	+	8.6
FR_6 Identify opportunities and risks	1.22	+	8.4
FR_7 Improve status quo	1.67	+	8.11

Table 4.25 shows the results of the indirect query about the customizability of the BMDf. Items 8.2, 8.3, 8.4, and 8.6 were combined for this purpose.

Table 4.25: Assessment of the requirement customizability (Version One)

ER_3 Customizability (Version One)				
	M	SD	pi	rit-i
8.2 The framework helped us finding and processing the relevant information about the aspects of the business model.	1.22	0.441	0.945	0.595
8.3 The framework helped us presenting the business idea and the chosen Business Model.	1.67	0.707	0.833	0.625
8.4 The framework helped us to identify opportunities and risks.	1.22	0.441	0.945	0.595
8.6 The framework helped us to validate the current business ideas and contributed to decision making.	1.89	0.928	0.778	0.406

Remarks: N = 9. coding: 1 (I fully agree), 2, 3, 4, 5 (I fully disagree). M = mean value; SD = Std. Deviation; pi = item difficulty; rit-i = corrected item selectivity. Cronbach's Alpha = 0.711.

The values of Cronbach's alpha, item selectivity, and item difficulty are all in suitable ranges, showing that the four items' rescaling is possible. Thus, the requirement of customizability overall can also be considered as well met with a mean value of 1.50.

Table 4.26 lists the results for scale 9 *General judgment*. The item difficulties are all in a very high range and indicate a very high affirmative tendency for the questions. The item selectivities with values of rit-I = 0.327 to rit-I = 0.945 provide good values, indicating a good homogeneity of the overall scale. Cronbach's alpha with the value 0.842 is in the excellent range.

Table 4.26: Item analysis of scale 9 General judgment (Version One)

9. General judgment (Version One)				
	M	SD	pi	rit-i
9.1 I was interested in the topics.	1.22	0.441	0.945	0.327
9.2 I liked the workshop.	1.22	0.441	0.945	0.945
9.3 I am satisfied with the workshop.	1.56	0.882	0.860	0.845
9.4 I would recommend the workshop to others.	1.22	0.441	0.945	0.945

Remarks: N = 9. coding: 1 (I fully agree), 2, 3, 4, 5 (I fully disagree). M = mean value; SD = Std. Deviation; pi = item difficulty; rit-i = corrected item selectivity. Cronbach's Alpha = 0.842.

Scale 9 *General judgment* has a mean value of 1.31. The standard deviation here is 0.569. Accordingly, the participants give a very positive evaluation of the workshop's overall assessment and the BMDF. The participants were also very interested in the workshop topics and would recommend participation in the workshop to others.

Qualitative evaluation of the four open questions

Now follows the separate qualitative evaluation of the four questions openly asked at the end of the questionnaire. The participants' answers are first summarized, paraphrased, and generalized. A total of 14 comments were in the four questions.

Most frequently, the participants criticized the insufficient exchange among the teams. Furthermore, the framework should encourage more to work on the topics outside of the workshop and to put the learned knowledge into practice.

The clarity of the poster and the division of the process into different phases with different focuses were rated positively. However, it was noted that it was not always apparent to the participants in which phase they were while working on the methods. The approaches relating to the market environment were also described positively, i.e., above all, the method relating to the *Value Network* and the methods relating to the *Market & Competitors*.

In summary, the mean values of the individual scales paint a positive picture of the assessment. The general assessment of the workshop shows a positive correlation with different aspects. The better the participants rated the framework in general, the better their expectations were met. They also indicate that they learned a lot and significantly improved their skills and knowledge. Besides, participants also seem to believe that what they have learned will positively impact their future.

Regarding the fulfillment of the artifact requirements, a positive result can also be derived. Except for the requirements comprehensibility, usability, and suitability, all remaining structural and environmental requirements can be considered fulfilled. However, since the three requirements mentioned are fundamental properties that are of central importance for accepting the artifact, these requirements must be given special attention in the next design cycle.

4.5.3 Findings from the Interviews

The ten qualitative interviews were conducted between June 2018 and April 2019. The process described in chapter 4.4.5.3 will serve as the basis for the analysis. The interviews were conducted by telephone voluntarily by appointment, recorded, and transcribed using MAXQDA analysis software.

All interviewees had previously been participants in one of the two workshops held as part of AXEL or the workshop held as part of GROW. Depending on the interview, there were four to twelve weeks between the workshops and the interviews' conduct. Table 4.27 lists the duration and scope of the ten interviews and assigns the interviews with one of the workshops described in chapter 4.5.

Table 4.27: Overview of interviews conducted for Version One

List of interviews conducted (Version One)				
Respondent (Code)	Business context	Workshop Date	Duration	Words
Respondent 1 (R01)	Consumer & FMCG	Jun 18	00:19:59	2,168
Respondent 2 (R02)	Energy and environment	Jun 18	00:21:15	2,790
Respondent 3 (R03)	Energy and environment	Jun 18	00:18:41	2,082
Respondent 4 (R04)	ICT	Jun 18	00:25:34	2,708
Respondent 5 (R05)	ICT	Nov 18	00:28:41	2,988
Respondent 6 (R06)	ICT	Nov 18	00:21:08	2,000
Respondent 7 (R07)	Consumer & FMCG	Nov 18	00:12:56	1,032
Respondent 8 (R08)	Energy and environment	Feb 19	00:21:22	1,250
Respondent 9 (R09)	Metal & Electronics	Feb 19	00:16:28	1,588
Respondent 10 (R10)	Energy and environment	Feb 19	00:12:46	1,056

Remarks: Summed duration: 03:18:50; Average duration: 00:19:53; Summed word count: 19.662; Average word count: 1.966.

A total of 3 hours, 18 minutes, and 50 seconds of interviews was recorded. On average, the interviews lasted 19 minutes and 53 seconds, varying from 12 minutes and 46 seconds to 28 minutes and 41 seconds.

To structure the material in terms of content, the units of analysis are first determined. Since some of the text material consists of one-word sentences, one word is chosen as the coding unit. The context units are the statements of one person, which can consist of several sentences. The analysis units are individual transcripts.

The center of the analysis is the development of the code system, which is formed inductively. The methodology used is open coding, which finds its origins in grounded theory methodology, to develop codes directly from the material (Strauss und Corbin 2010). The codes are elaborated and combined into a final code system by shortening the text passages to relevant aspects and merging similar text passages. The following questions are asked of the text to identify relevant text passages and develop codes:

- (1) How do the respondents describe the artifact?
- (2) What aspect of the artifact do respondents describe?
- (3) How did the respondents feel while using the artifact?
- (4) What was the respondents' intention in using the artifact?
- (5) What were the implications for the design of the BM?
- (6) How can the artifact be improved?

The marked text passages of an interview are subsequently sorted, paraphrased, and generalized. According to Mayring (2015), the first code is formulated as a term or short sentence as close as possible to the text formulation and considers abstraction levels. The formulation happens as soon as the selection criterion is fulfilled for the first time in the material. When the next selection criterion is fulfilled, it is decided whether the text passage falls under the already formed code or whether a new code is formed. Thus, an initial inductively formed code system

is created for each interview, as described in chapter 4.4.5.3, which is then reduced to cross-interview codes to reflect all interviewees' overall picture.

The final code system formed after summarization, generalization, and code formation resulted in six main codes which were further subdivided into 18 codes of the first sublevel and 84 codes of the second sublevel. A total of 250 text passages were assigned to the codes. Table 4.28 lists the six main codes, for a detailed and complete overview of the code system, see Appendix C.5.

Following the evaluation instruments' assignments in chapter 4.4.5, the interviews' particular focus is on evaluating the artifact's environmental, functional and user requirements. As can be seen from the table, the codes were not directly linked to the requirements but came from the natural progression of topics in the interviews. This is due to the inductive coding method.

Table 4.28: Code system of the qualitative interviews from Version One

Code system of the qualitative interviews (Version One)			
Main Code	# Codes Sublevel 1	# Codes Sublevel 2	# Mentions
Introduction & Presentation	3	13	50
Prior knowledge	3	11	31
Fundamentals of business model design and the framework	3	16	35
Application of the framework	5	31	91
Strengths and weaknesses of the framework	2	9	30
Feedback from the participants on the framework	2	4	13

Prior knowledge

The founders interviewed participated in one of the workshops at an early to mid-stage of their startup development. It is concluded that the workshop took place at a good time for the interviewed startups, as the participants had only a few experiences with BMD. These observations are analyzed in more detail using the *prior knowledge* code. Of the ten respondents, there are a total of three participants who attended the workshop with no prior knowledge.

Six of the ten participants state that they have already taken part in a workshop on entrepreneurship. The workshop subcode is mentioned most frequently and contributes the most to the founders' knowledge. The university is mentioned as an additional provider of knowledge. The respondents attend lectures, seminars on entrepreneurship or are active in university groups.

One participant with previous accelerator experience also took part in the workshop. Another point mentioned concerning prior knowledge is that the founders educate themselves autodidactically. Through online courses, books, or trade journals, the founders obtain knowledge on developing a company. According to the data collection, most startups already know about entrepreneurship before attending the workshop.

Another focus in the prior knowledge code is on tools and methods, analyzing which tools the startups have already used. In total, five tools are mentioned used by the startups before the workshop. The most frequently mentioned tool for designing a BM is the BM Canvas. Some of the respondents state that they had already attended a workshop on the BM Canvas. Others state that they used it by themselves before the workshop. Furthermore, the Blue Ocean Strategy, the Value Proposition Canvas and the Jobs-to-be-done are also mentioned by the participants.

Fundamentals about the BMD and the framework

The code *Fundamentals about the BMD and the framework* deals with the statements regarding the workshop and the framework. Important aspects here are the evaluation and takeaways from the workshop.

The participants' assessment of the workshop is consistently positive, and the participants perceive the methods used in the workshop as helpful. Further, the respondents find it positive to work on the methods directly in the workshop and get help with questions or problems. Only one participant expressed a partially negative view of the workshop, as he did not find the work, which was partly based on assumptions, useful. Overall, the feedback concerning the methods for each component are very positive. The user requirement to include supporting methods for each component (UR_3) is therefore fulfilled.

The participants particularly appreciated the fact that they received a very comprehensive overview of the topic of BMD and learned many special terms that are essential in the startup context. The fundamental structure of the poster is also emphasized. However, there are also opposing opinions here, which see the poster as too complicated and, at first glance, overwhelming. Hence, the guiding poster (UR_2) may need to be revised again. Regarding comprehensibility (ER_2), the interviews therefore show that the framework still has room for improvement. The usability (ER_1) of the framework also needs to be improved. The requirement of completeness (ER_5), however, can be considered largely fulfilled.

The take-aways from the workshop are primarily characterized by the persona method. When asked what the participants remember, the persona is mentioned in half of the cases. Participants also mention the jobs-to-be-done method and the value proposition statement. While the startups remember almost all methods presented, those taught at the beginning of the workshop are better remembered by participants than the methods presented towards the workshop's end.

Two participants explicitly mention the exercises on the founders' values and their alignment with the team's vision as very helpful and insightful.

Application of the framework

The main code *Application of the framework* analyzes the tool's application after the workshop and its usefulness in practice. Additionally, the question is asked how the founders deal with changes to the BM.

The interviews confirm the preliminary study findings that the BMD is seen as a continuous process that is run through repeatedly, especially in the early phases of a startup. Six of the ten founders interviewed continue to use the tool after the workshop. There are various reasons for not using it. One of the main reasons is that the startups have gone back to intuitive working and no longer work on the BM in a structured way, meaning new topics are discussed in the team and implemented directly. Another point of conflict mentioned is the time it takes to design a BM. Depending on the startup phase, other activities are of greater importance to the founders than the BMD. The complexity of the tool also plays another role in post-workshop processing. Respondents believe that complexity influences editing. They believe that editing the BMDF takes much time, which they are limited in their ability or, in one case, unwilling to invest.

The users who continue to use the BMDF note that for innovative products, the BMD must be approached in a structured way and the BM must be continuously adapted to external influences. However, respondents also indicate that they do not necessarily go through the entire BMD process again but rather use individual methods to make changes to the BM. This finding confirms the original assumption of the modularity of the framework and its methods. After the initial processing, the BMDF serves as a toolbox, from where suitable tools, in this case, the suitable methods, are selected and used.

In terms of the individual components, the interviewees most often talk about the value proposition. At the beginning of the interview, when the interviewees introduce themselves and their company, the founders mention their value proposition. For a part of the interviewees, it is problematic to define a good value proposition. A first version is formulated with the value proposition statement's help, which is then further evaluated and revised until a meaningful value proposition is established.

In addition to the value proposition, the topic of network or value network is also mentioned. One startup particularly deals intensively with the topic of the network in addition to the personas. Participants also became more aware of the benefits that partners can bring to the startup. In general, the interviews give positive signals regarding the functional requirements to define the components in detail (FR_3), to present and to validate the business idea (FR_4, FR_5), and the identification of opportunities and risks (FR_6). Since all teams were able to

present a filled-out poster at the end of the workshop, the requirement to design a BM (FR_1) is also fulfilled.

The subcode *Benefits of the BMDF* analyzes which advantages the founders receive when they work with the model. First, it is mentioned that the listed methods in the boxes of the poster give a crucial added value to develop a BM. It is practical for the users to display the company activities in these boxes and thus understand each area's interrelationship. As a result, the entire BM can be understood at a glance. The model also helps to illustrate the corporate structure during discussions with mentors. Therefore, the requirement of suitability (ER_4) can be considered largely fulfilled.

In total, the word structure is frequently mentioned concerning benefits. Furthermore, four interviewees state that the BMDF had shown them some aspects that they had not thought about before and behind which there were partly significant risks for the BM. Besides, it is mentioned that the benefit of the tool does not arise after one-time use. The BM must be adapted repeatedly when external influences affect the company. With the help of the BMDF, these influences can be incorporated in a structured manner.

Strengths and weaknesses of the framework

The *Strengths and Weaknesses* code shows which strengths and weaknesses the participants identified during the process. Also, other potentially occurring difficulties are identified.

The purpose of the BMDF itself is clear to respondents. It supports the founders in designing their BM. As a strength, respondents indicate that they find the BMDF fundamentally useful for the future, allowing them to think about the company's overall concept and where the company should be in the future. The requirement of customizability (ER_3) is therefore matched. It is also mentioned that additional technical features that will be integrated into the product will cause changes in the BM and can be incorporated using the methods presented. According to the interviewees, substantial adjustments can arise, especially with the value proposition or the pricing model, where it makes sense to look at the complete BM again and revise parts.

Another strength cited is that the BMDF makes it possible to give outsiders a quick and comprehensible picture of one's own company. This way of presenting the BM and the business idea is advantageous for various interest groups if they are not necessarily interested in a business plan.

In a more detailed follow-up question regarding the business plan, some respondents stated that they had used the BM as a guide to write the plan. Not necessarily the complete BMDF is used to produce a business plan. However, individual boxes and methods are taken and written

down in the business plan. This shows that the prioritization of certain components is possible (UR_4).

Regarding the weaknesses, the respondents most often say that the processing is time-consuming. Before editing a method, the theory about it must be studied, costing time, which the startups would like to invest in other activities if possible. At first glance, users feel distanced because of the number of tasks and topics they need to process. According to some respondents' statements, this is also because simpler representations, such as the BM Canvas, promise a similar benefit. In the first moment, the respondents would always reach for the model that looks more appealing and easier to understand for them. Hence, the requirement of efficiency (ER_6) is not fully met with Version One.

Even during processing, participants are not always aware of the method's meaning and how it is embedded in the phases of the BMDF. Hence, concerning the reduction of complexity (FR_2), Version One needs to be improved. However, after familiarization with the framework, the added value provided becomes apparent to users.

Feedback from the participants on the framework

In the main code *Feedback on the framework*, participants were asked about possible improvements. On the one hand, these relate to the content, and on the other hand, to the presentation. Two respondents are exclusively positive about the BMDF and have no suggestions for improvement, either in terms of presentation or content.

The remaining respondents provide feedback on the visualization of the BMD poster. Three respondents argue that it is not clearly shown with which component to start. Similarly, respondents indicate they would like to see more concrete examples within the methods, possibly even a consistent example to guide users through the entire BMD process. Therefore, the requirements concerning the comprehensive process and method description (UR_1) and the usability without external experts (UR_5) cannot be fully met.

Besides, four respondents indicated that they were confronted with environmental sustainability issues more often in the aftermath of the workshop and that these in part prompted changes to the BM. It is therefore suggested that another component be included that addresses sustainability issues.

Summary of the findings

In summary, the interviewed founders believe that the BMDF is well suited for designing a BM. However, in terms of intuitive working, the participants state that they do not explicitly and consciously apply the BMDF in their startup's daily business or BMD after the workshop.

Based on the respondents' statements, it appears that most startups reinvest their time in product development after the workshop, neglecting or not prioritizing BMD highly. Especially in an early startup phase, the interviewees are interested in developing a product and making it marketable. Based on the interviews, startups invest time in competitions, pitches, and other events. Startups that deal with financing cite this point as time intensive. Customer acquisition and sales is another point that is time-consuming for startups. Thus, the use of BMDF in everyday life conflicts with other activities of startups.

However, the respondents also state that they specifically refer to the results of particular methods, such as the persona, jobs-to-be-done, or the value proposition statement, when they deal with customer acquisition or similar topics. Therefore, the BMDF is primarily used implicitly and somewhat unconsciously in the follow-up to the workshop, and that it sets structures for permanent further development and optimization of the BM.

4.6 Adapted BMD Framework (Version Two)

Table 4.29 summarizes Version One's fulfillment of the requirements defined in chapter 4.1. The degree of fulfillment depends on the consolidated results from the observation, the questionnaire, and the interviews. Concerning the questionnaire, a requirement is considered fulfilled if the associated item received a mean score of 2.0 or lower. Concerning the interviews, the fulfillment of the requirements depends on the overall assessment, determined across all interviews. These assessments of the individual requirements were explained in the previous chapter. The logical fulfillment of specific requirements results from the construction of the BMDF itself.

Table 4.29: Version One's fulfillment of the requirements

Fulfillment of requirements (Version One)				
	Questionnaire	Interviews	Logical	Overall
ER_1 Usability	(2.44)	-	-	-
ER_2 Comprehensibility	(3.00)	-	-	-
ER_3 Customizability	(1.71)	+	+	+
ER_4 Suitability	(2.56)	-	o	-
ER_5 Completeness	(1.89)	+	o	o
ER_6 Efficiency	(1.44)	+	o	o
FR_1 Design a Business Model	(1.56)	+	+	+
FR_2 Reduce complexity	(1.56)	+	o	o
FR_3 Define components in detail	(1.22)	+	+	+
FR_4 Present business ideas	(1.67)	+	+	+
FR_5 Validate business ideas	(1.89)	+	+	+
FR_6 Identify opportunities and risks	(1.22)	+	+	+
FR_7 Improve status quo	(1.67)	+	o	o
SR_1 Acceptance of methods			+	+
SR_2 Internal cohesion			+	+
SR_3 Number concreteness			+	+
SR_4 Absence of redundancy			+	+
SR_5 Clear operationalization and guidance			+	+
SR_6 Modularity			+	+
UR_1 Comprehensive process and method description		o		+
UR_2 Guiding poster (Canvas-like structure)		+		+
UR_3 Include supporting methods for each component		+		+
UR_4 Prioritization of components possible		+		+
UR_5 Usable without external expert guidance		o		o

Overall, the evaluation results of Version One already show a very positive picture of the framework. Nevertheless, some improvement possibilities can be derived based on which Version One was adapted. In the following, the resulting Version Two of the BMDF will be presented.

Regarding the workshop, different difficulties are mentioned. In general, the respondents feel that the time frame for discussions is too short. They would like more time both in practice and theory to achieve more depth in the topics. The workshop's general conditions are criticized for the room's attractiveness and the heterogeneity of the participants. During and after processing the methods in the workshop, the respondents miss a more substantial exchange with other teams and more practical examples by the workshop leader. In general, the evaluation found that the time required for individual methods is higher than initially assumed.

Version two takes this into account by expanding the workshop format to four days, two consecutive days each with two weeks between the dates. The first two days deal with phases one and two of the BMDF. After that, teams get two weeks to rehearse what they have learned. Then, the other two days occur, where teams work on phases three through five of the BMDF. The advantage of splitting the workshop is that the BMDF is integrated into the founders' everyday lives. Thus, the founders also learn to work with the tool outside of the workshop, in their

environment. Thus, Version One criticism is met that the framework should animate more strongly to applying the methods outside of the workshop.

The BMDF itself is criticized primarily for its complexity and the resulting reduced usability. Especially participants without prior knowledge are overstrained by the framework at the beginning. This result becomes apparent in the quantitative survey as well as in the interviews. Regarding the provided poster, the interviewees criticize the limited space on the poster.

Version Two is structured much more firmly based on the five phases to reduce the framework's complexity and thereby increase its ease of use. For this purpose, a separate poster is developed for each phase as a visual support and working medium. On these individual posters, work areas for the methods of the respective phase are incorporated. The work areas are numbered and arranged in a transparent process sequence. Likewise, a continuous example is introduced in each phase, intended to make the individual methods and their interrelationships easier to understand. The names of the phases are also more closely aligned with the actual tasks within the phase. Phase one will continue to be called the *Initiation Phase*. Phase two will be renamed the *Exploration Phase*, phase three will become the *Specification Phase*, phase four will be called the *Assessment Phase* in the future, and phase five will be renamed the *Implementation Setup*. Figure 4.16 provides an overview of the five posters. For better readability, these are also presented in detail in Appendix C.6.

All five posters are converted to a digital format to facilitate general editing of the posters and make the BMDF more usable outside of the workshop. A significant advantage of the digital version is the possibility of zooming into the poster and thus making ideal use of the given workspace. The teams will then have the choice in the workshop itself whether to work on their posters in analog or digital format.

Besides, each poster is visually categorized into the five phases, and the explicit goals of each phase are described. This arrangement responds to criticism that participants could not classify to which phase specific tasks belonged while working on individual methods. Against the background of the longer timeframe of Version Two, this aspect becomes even more critical.

Likewise, the teams are motivated to summarize their key findings from the individual methods of a phase at the bottom left of the poster. These key messages are then transferred to the original BMD poster in phase five. This process serves to harmonize all aspects of the BM and facilitate a common understanding of the team's BM. Likewise, this poster serves as a possible basis for short presentations to investors or similar events, as this poster focuses on the essential key statements in terms of content and thus enables a compact description of the BM.

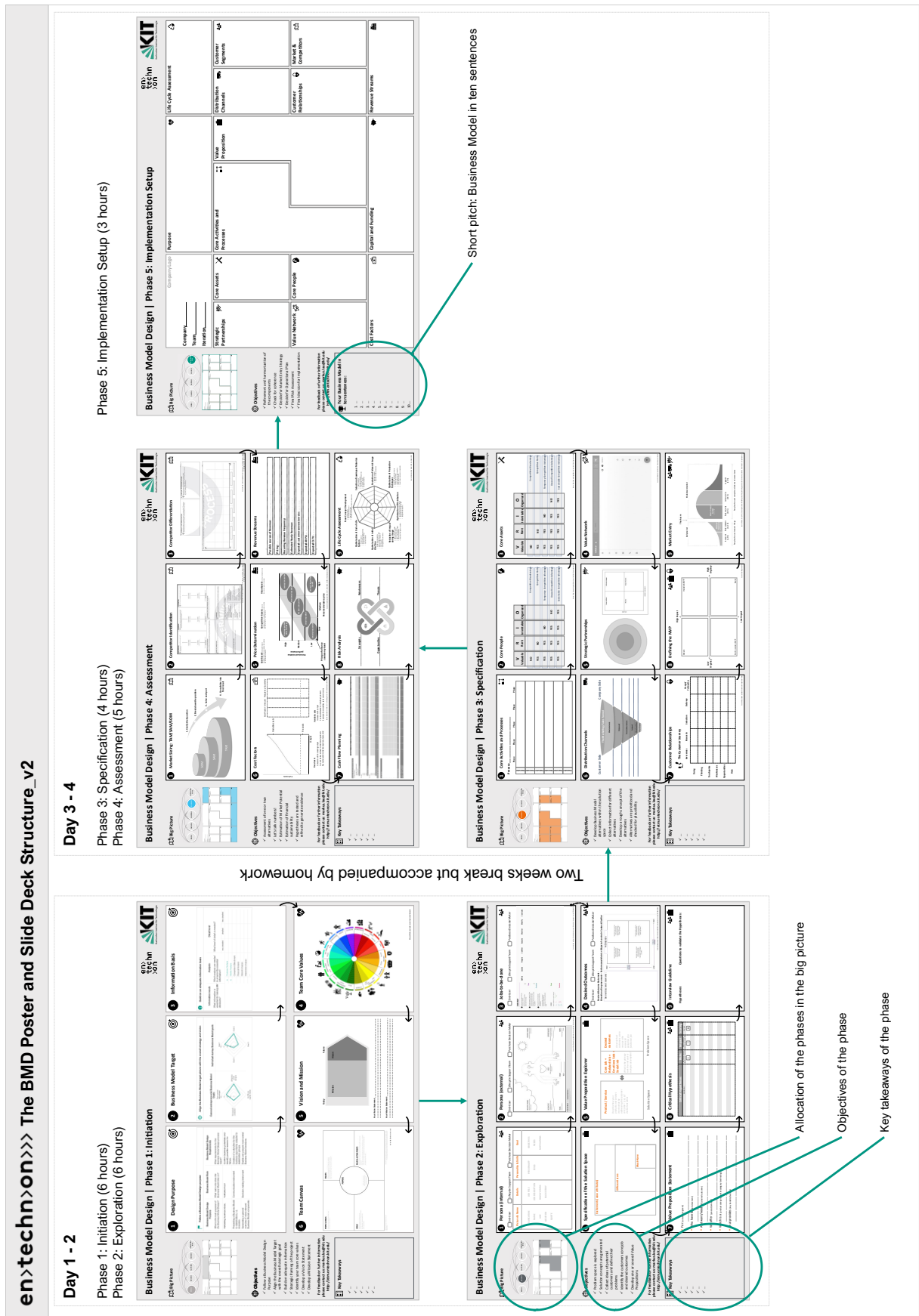


Figure 4.16: Structure of the five posters from Version Two
 Remark: All five posters are displayed in higher resolution in Appendix C.6.

In addition to pure restructuring, the content of the BMDF was also expanded. On the one hand, the *SWOT analysis* method was introduced as part of the assessment phase to examine the BM for possible weaknesses or risks finally. The abbreviation stands for Strengths, Weaknesses, Opportunities, and Threats. The method is used to assess the opportunities and risks of a BM conclusively and is usually required and critically read by capital providers as part of a business plan (Helms und Nixon 2010).

Based on the interviews' multiple feedback, the assessment phase was also supplemented by the *Life-Cycle* component related to environmental sustainability. Even though this component could also be considered part of the value proposition, it is listed separately due to the explicit mentions. The associated method introduced is a lifecycle assessment using the LiDS Wheel, also known as the Ecodesign Strategies wheel. It was developed under the United Nations Environment Program by Brezet und van Hemel (1997) to assess how well a product design reflects the application of eight eco-design strategies, particularly in comparison to alternative designs. These strategies are usually presented as an eight-axis radar chart.

No precise scales are defined for these eight expressions. Thus, it is primarily a subjective assessment of the impact. Therefore, the LiDS Wheel is not a method that can determine the actual environmental impact. Instead, it is a method designed to encourage users to question their solutions critically. The Swot Analysis (point eight) and the LiDS Wheel (point nine) in phase four are shown in Figure 4.17.

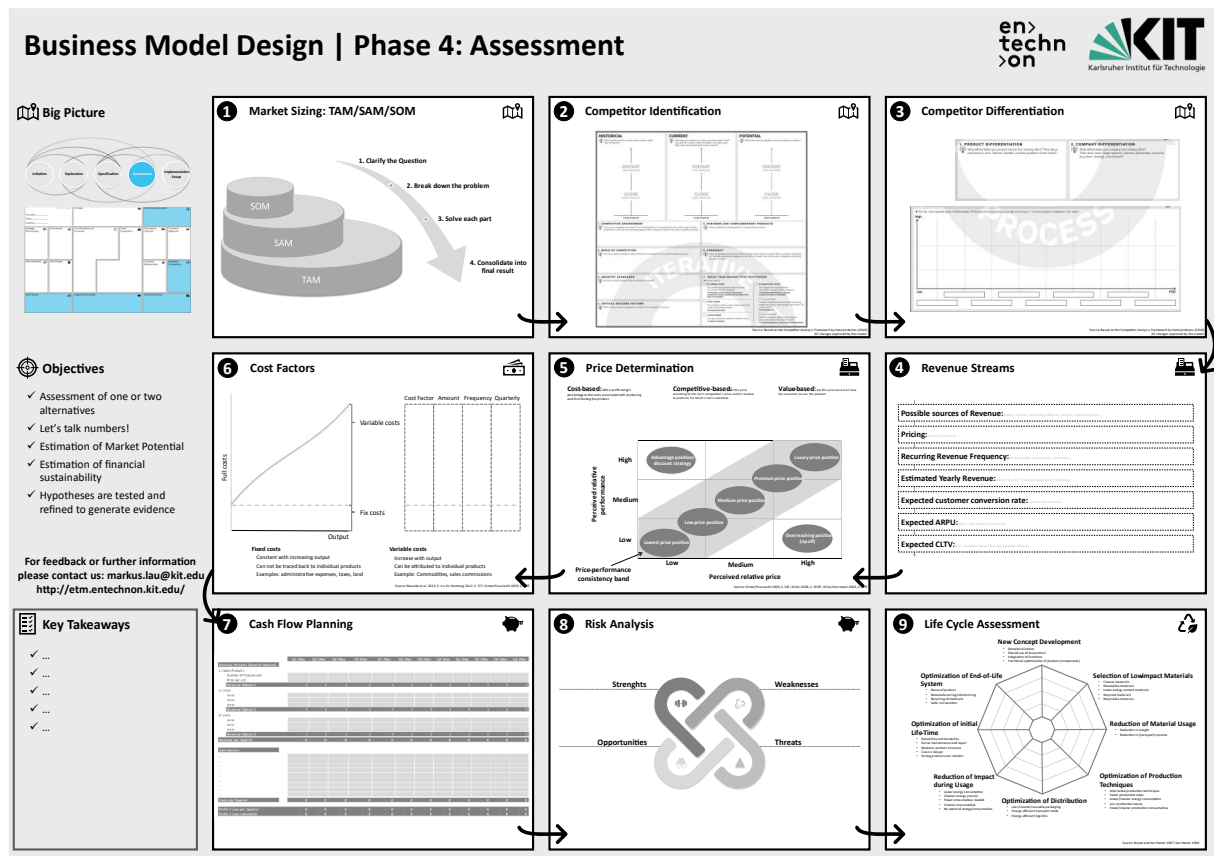


Figure 4.17: Poster for the Assessment Phase (Version Two)

However, the most significant change in content occurs right at the beginning of the BMDF. Three principles are introduced in phase one at the beginning of the framework to counteract the too low suitability of the BMDF. These are intended to align the BMD process more closely with the teams' purposes and goals. Building on the findings of theoretical and empirical research in the field of BMD, the following recommendations can be summarized from the observations made thus far.

First, BMD approaches should provide structures to guide the BMD process more according to a BMD purpose and BM goals. Second, BMD interventions should better reflect the individual BM needs of startups in terms of BM components and information collection and analysis. Third, the BMD process should be focused on those measures that have a relevant impact on a successful BM decision. These findings are translated into the following three principles of more effective BMD (Figure 4.18).

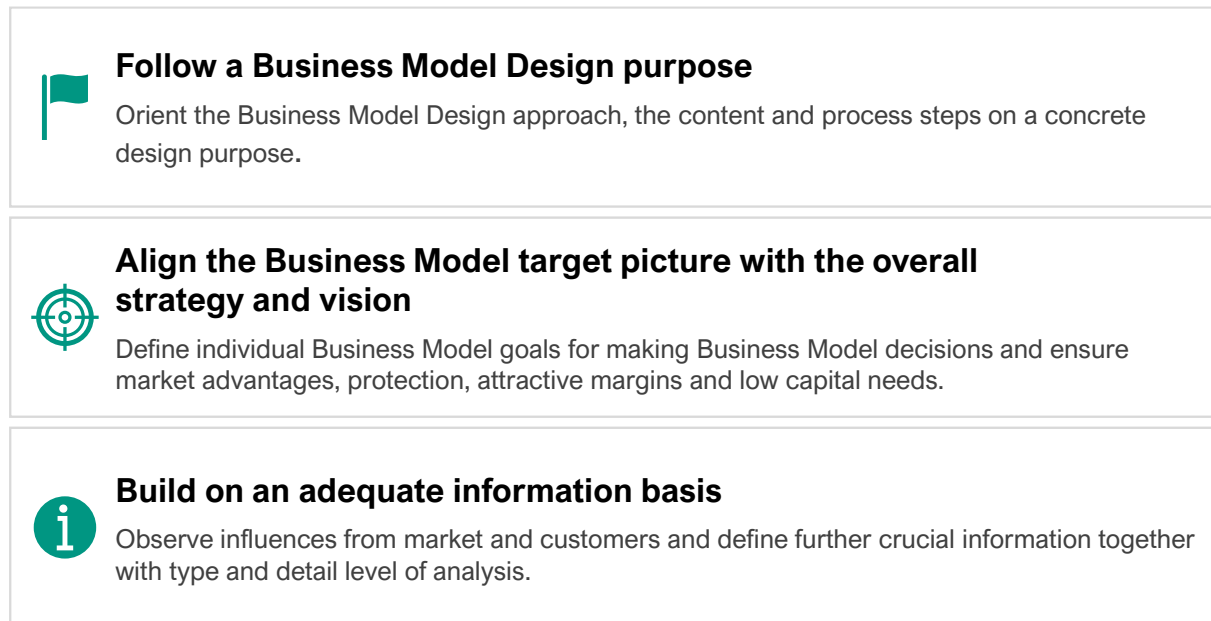


Figure 4.18: The three overarching principles for effective BMD

Principle 1 - Follow a BMD purpose

The first principle states that BMD processes must follow a specific BMD purpose, meaning that the individual BMD approach should be based on a predefined motivation - the trigger to start a BMD process actively. Similarly, there are multiple intentions for using a BM, associated with different motivations for designing a BM. Consequently, each BMD purpose places different demands on the BM outcome. For this reason, a key question must be answered: What is the primary purpose of BMD? This purpose should be clarified at the beginning of any BMD process.

For example, if the goal is to create an overall view of the most relevant BM components, the BM serves as a tool to create a simplified version of most key BM decisions. When validating business ideas, the BM serves as a tool to either confirm the potential of a business idea or to identify possible reasons against a business idea. For example, in such a case, the BM's economic aspects would need to be elaborated much more intensively. In contrast, when presenting a BM to stakeholders, the BM takes on a communication tool's role to create a success story for a target group. Here, the understanding of the problem and the uniqueness of the solution should be emphasized.

Therefore, it is vital to understand the BM goal and the resulting requirements for the BMD process. Once these aspects are clarified, it is possible to define which methods within the BMD process are best suited for each BMD requirement and which components may be particularly prioritized. Figure 4.19 shows three examples of evaluating the BMD purpose, BM role, and corresponding BMD requirements. It is possible to direct and control what is done with a

clear purpose, helping to align the BMD approach, content, and process steps with it. Therefore, an effective BMD tool must provide the ability to dynamically adjust the depth and intensity of BMD process steps to suit different BMD purposes. Principle 1 can thus be summarized as follows: To best support a high-quality BM concept, a purpose-oriented design process is critical.


 Follow a Business Model Design purpose		
Business Model Design Purpose	Business Model Role	Business Model Design Requirements
<i>What is the main purpose of the Business Model Design?</i>	<i>What main role does the Business Model take on?</i>	<i>What requirements for the Business Model Design process result?</i>
Validating business ideas.	Validation tool	Confirm business potentials and identify possible reasons for failure.
Presenting a Business Model to stakeholders, i.e. investors.	Communication instrument	Creation of a storyline for the business opportunity adapted to stakeholder groups.
Generating a general overview of most relevant Business Model components	Decision-making instrument	Enable and present most central Business Model decisions.

Figure 4.19: Assessment of BMD purpose, BM roles, and BMD requirements

Principle 2 - Align the BM goal with the overall strategy and vision

The second principle states that the BMD process should pursue a clear BM goal that supports the overall design of a sustainable business and growth. Consequently, the startup's strategy and goals must be reflected by concrete BM goals before BM decisions can be made. In terms of the overall entrepreneurial BM goal, all individual BM goals should contribute to sustainable business and growth.

In summary, goal-oriented BMs can only be realized if BM goals exist in the first place. By defining the individual BM goals at the beginning of the BMD process, guidelines are given for the corresponding decisions. When defining a business opportunity, the founders may be confronted with different design alternatives. Therefore, clear BM objectives guide the decision-making process for individual BM aspects and the overall concept's direction. For example, the question of which main objectives the BM should achieve could be answered as follows: First, the BM concept must ensure the highest possible profit margin. Second, the BM must ensure the highest possible level of environmental protection.

Because of possible conflicting goals, it is essential to align them. Prioritizing the objectives becomes especially important when the objectives would be mutually exclusive. Therefore, other important questions must be asked: Are the different goals compatible with each other? How are the various goals prioritized?

In addition to the individual BM goals, some general BM goals exist that startups need to keep in mind to create a successful BM. According to theoretical insights, a startup's BM concept should ideally ensure clear market advantages, attractive profit margins, the possibility of permanent protection from imitators and larger competitors, and the lowest possible capital requirements. The combination of company context-specific goals and company-wide standard BM goals defines the overall BM target picture, as shown in Figure 4.20.

Ultimately, the overall BM target picture provides startups with the key decision criteria to optimize the quality of their BM decisions on individual BM aspects and overall direction and shorten the time required for BM-related decisions.

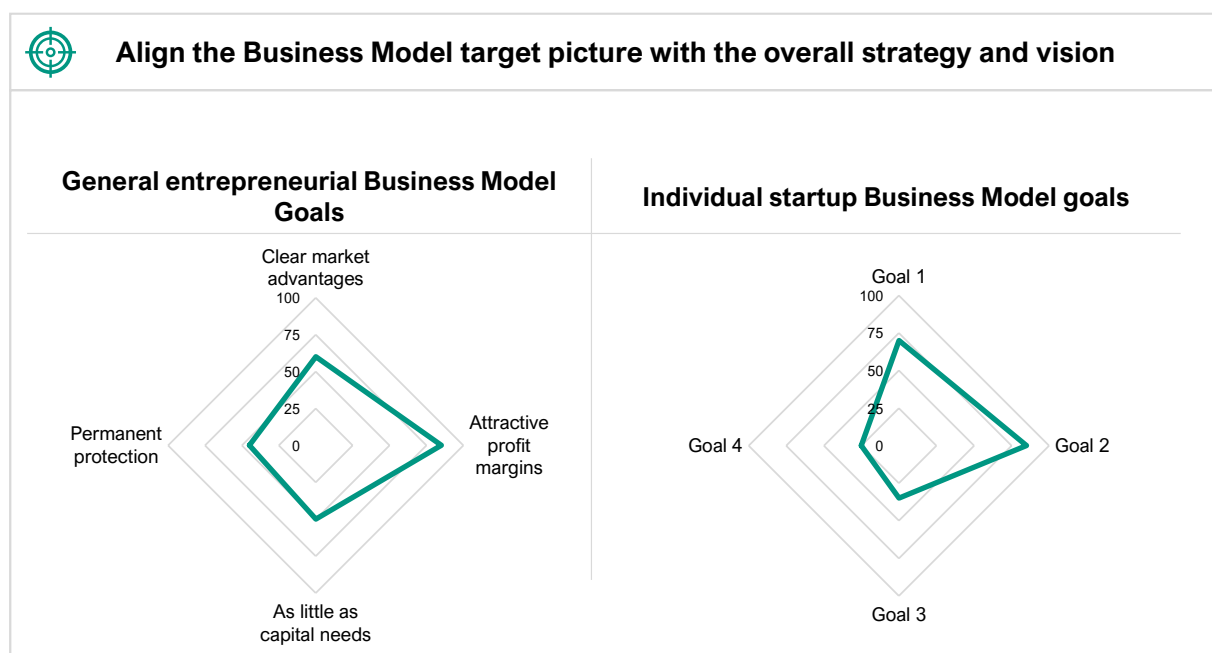


Figure 4.20: BM goal picture consisting of general corporate and individual BM goals

Principle 3 - Build on an adequate information base

The third principle states that BMs should be built on an adequate information base. Adequate in this case means that the focus should be on all information critical to the BM decision-making process. The challenge is to find the right balance between the time constraints of information gathering and analysis while capturing all information related to BM opportunities and limitations. On the one hand, all information related to BM opportunities could be relevant, but a detailed overview of all information is very time consuming and increases the BMD effort. For

this reason, it is crucial to define and focus on essential information needs. Based on this, it is necessary to assess what type and level of detail of analysis are required. However, customer analysis and market analysis are standard BMD elements and must be included in any BMD process.

A key question under this principle is: what information is essential for BMD decisions? Defining what information is essential for BMD decisions is followed by the questions: what validated information is already available? Furthermore, what analyses are needed to obtain the essential missing information? Again, the focus must be on the analyses that significantly impact the BMD decision-making process. Finally, the detail required must be estimated (What level of detail is needed for each analysis?). For example, a rough overview of the competition may be sufficient for some startups, while others need to understand their competitors' product features and competitive strategies in detail to position their BM concept in the market properly. Figure 4.21 shows a guideline for defining appropriate information needs at the beginning of the BMD process. In summary, a clear focus on individual essential information and analysis needs facilitates a targeted BM decision process. This focus is accompanied by a reduction in process complexity and savings in time and effort in developing the BMD concept.


 Build on an adequate information basis					
Information needs <i>What information is essential for making BM decisions?</i>	Analysis <i>Which analysis are needed to acquire the essential information?</i>		Detail level <i>What level of detail is needed?</i>		
			<i>very detailed</i>	<i>detailed</i>	<i>less detailed</i>
	x	Customer Analysis			
	x	Market Analysis			
		Competitor & Benchmark			
		Financial Analysis			
		Network Analysis			
		Stakeholder Analysis			
		...			

Figure 4.21: Definition of essential information and analysis needs in the BMD process

Although these new steps involve additional tasks at the beginning of the BMD process, it is believed that the overall effort can be reduced. Thus, BMD is focused on essential activities and guided by specific BMD requirements to achieve a goal-oriented BMD outcome. Thus, the

three principles serve as anchor points to which teams must return at various BMD process points to reconsider BM goals or further, more detailed analysis.

Figure 4.22 shows the poster of the *Initiation Phase* and how these principles are embedded in it. All other posters are shown in Appendix C.6.

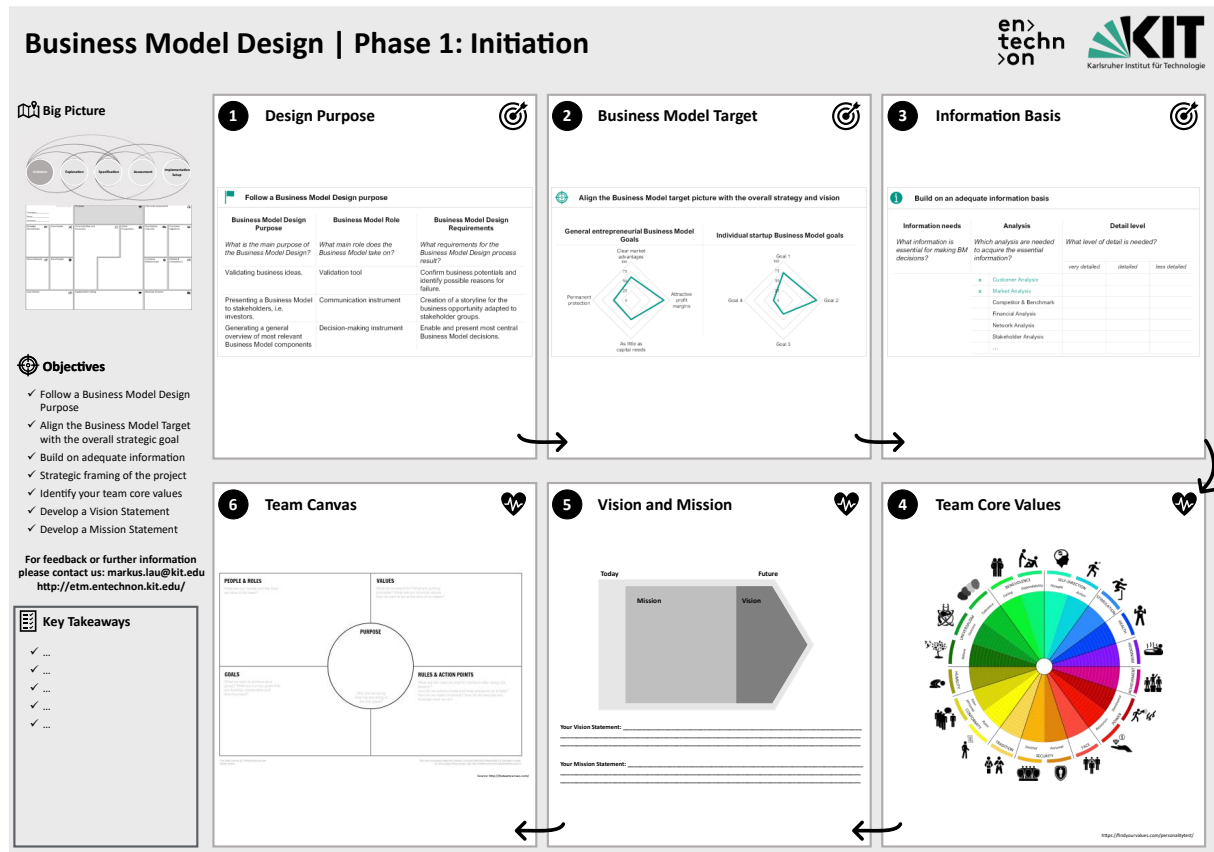


Figure 4.22: Poster for the Initiation Phase (Version Two)

This redesign of the BMD is referred to as Version Two. As with Version One, this must be evaluated against the established strategy. This second evaluation cycle is now described in the following chapters.

4.7 Second Evaluation Cycle (Version Two)

Like Version One of the BMD before, its further development, Version Two, will also be applied by the end-users in the course of several workshops. The Version Two demonstration takes place in a total of three workshops lasting several days, which are conducted again within the frame of the three known accelerator programs, AXEL, GROW, and upCAT (see chapter 4.5).

Version two was used in October 2019 in the AXEL Team Training with a total of seven teams. In November 2019, in the GROW program with nine teams, and finally in the upCAT in May 2020 with five teams.

As derived from Version Two's new structure, four days over three weeks were scheduled to implement the entire BMDF. Each workshop was held on two consecutive days, two weeks apart. In total, Version Two was tested with 21 startup teams. During this trial, the artifact was evaluated using the previously defined evaluation strategy and the associated instruments. However, due to the new structure, the workshops' systematic observation was omitted in the second evaluation cycle.

Table 4.30: Demonstrations of Version Two, evaluation instruments and returns

Data set for the second evaluation study (Version Two)						
Evaluation Cycle	Workshop	Date	Number of Teams	Observation (n)	Questionnaire (n)	Interview (n)
2	AXEL	Oct-19	7	-	7	4
2	GROW	Nov-19	9	-	19	9
2	UPCAT	May-20	5	-	6	-

The teams from the runs of AXEL and GROW were interviewed in the follow-up. All participants from the three workshops participated in the survey via a questionnaire. Thus, the Version Two demonstration resulted in a data set of thirteen interviews and 32 completed questionnaires for the second evaluation cycle (see Table 4.30).

The findings from the respective evaluation instruments and the resulting adaptations of Version Two are presented in the following.

4.7.1 Findings from the Quantitative Survey

A total of 42 participants received the questionnaire, with $n = 32$ participants completing it, which corresponds to a completion rate of about 75 %. Seven completed questionnaires were received from the AXEL workshop, 19 from the GROW workshop, and six from the upCAT workshop. In terms of demographic data, age, position in the company, and the startup's status were recorded. $N = 25$ participants in the 20 to 30 age group (78 %) and $n = 7$ in the 31 to 40 age group (22 %) took part in the survey. The position indicated by all participants was membership on the founding team.

As a development stage, $n = 22$ (69 %) participants indicated they were still in the idea generation phase. $N = 12$ (38 %) participants stated that they had already developed the first prototype. Nine participants (28 %) have already received initial customer feedback, and $n = 2$ (6 %) participants have also already won their first pilot customers. $N = 6$ (19 %) have already developed a presentable MVP.

Regarding prior knowledge, seven participants stated that they had no prior knowledge. Eight participants have some prior knowledge, and three others have already worked with similar

methods. Ten participants stated that they had already worked on their BM, and four participants had already participated in another accelerator.

Similar to the first evaluation cycle procedure, the statistical results only refer to scales 1-9. The four open questions at the end of the questionnaire are qualitatively evaluated separately. For the evaluation of the scales, the first step is the item analysis concerning the items' reliability and the scaling. If the scales meet the reliability criteria about Cronbach's alpha, item difficulty, and item selectivity, the scales can be evaluated, and their content interpreted.

Table 4.31 shows the results of the item analysis for the scale *Workshop management*. The item difficulties are all above the acceptable range between $pi = 0.10$ and $pi = 0.90$. This range shows that the items tend to be formulated too simply or that the participants easily affirm the questions. This finding was already evident in the Version One survey. If the questionnaire is used for future analyses, the three items should be adjusted accordingly. The item selectivities $rit-i$ all reach a decent value. Cronbach's alpha is also in an excellent range with a value of $\alpha = 0.904$.

Table 4.31: Item analysis of scale 1 *Workshop management* (Version Two)

1. Workshop management (Version Two)				
	M	SD	pi	rit-i
1.1 The workshop management appeared to be technically competent.	1.13	0.421	0.968	0.872
1.2 The workshop management was sufficiently focused on the needs of the participants (e.g. queries).	1.28	0.683	0.930	0.899
1.3 The workshop leader was open for suggestions and criticism.	1.16	0.448	0.960	0.803

Remarks: N = 32. coding: 1 (I fully agree), 2, 3, 4, 5 (I fully disagree). M = mean value; SD = Std. Deviation; pi = item difficulty; rit-i = corrected item selectivity. Cronbach's Alpha = 0.904.

The mean value of the scale is 1.19, with a standard deviation of 0.527. Accordingly, the participants again indicate a very positive evaluation of the workshop management.

Table 4.32 shows the results of the item analysis for scale 2 *Working atmosphere*. The item difficulties with $pi = 0.853$ to $pi = 0.938$ all lie at the upper edge or above the acceptable range. The item selectivities with values from $rit-I = 0.326$ to $rit-I = 0.735$ are all acceptable and indicate a mostly existing homogeneity of the overall scale. Cronbach's alpha is also suitable for this scale.

Table 4.32: Item analysis for scale 2 Working atmosphere (Version Two)

2. Working atmosphere (Version Two)				
	M	SD	pi	rit-i
2.1 The learning atmosphere among the participants was good.	1.25	0.508	0.938	0.735
2.2 The behaviour of the participants in the discussion was appropriate.	1.38	0.660	0.905	0.475
2.3 I actively participated in the discussions in the workshop.	1.59	0.911	0.853	0.326

Remarks: N = 32. coding: 1 (I fully agree), 2, 3, 4, 5 (I fully disagree). M = mean value; SD = Std. Deviation; pi = item difficulty; rit-i = corrected item selectivity. Cronbach's Alpha = 0.651.

The working atmosphere is evaluated with a mean value of 1.41. The item dispersion here is 0.716. Accordingly, the participants also positively evaluate the working atmosphere for the redesigned workshop format. Above all, active participation is to be emphasized as positive since Version Two's workshops involved significantly larger groups compared to Version One.

Table 4.33 shows the results of the item analysis of the scale 3 *Content of the workshop*. Both the item difficulties and the item selectivities are all in the desirable range. Cronbach's alpha with a value of $\alpha = 0.624$ is also acceptable.

Table 4.33: Item analysis of scale 3 Content of the workshop (Version Two)

3. Content of the workshop (Version Two)				
	M	SD	pi	rit-i
3.1 All subject areas were sufficiently addressed.	1.81	0.592	0.798	0.442
3.2 It was possible for me to clearly understand the topics presented.	2.38	1.157	0.655	0.494
3.3 My expectations with regard to the workshop have been fully met	1.72	0.813	0.820	0.471

Remarks: N = 32. coding: 1 (I fully agree), 2, 3, 4, 5 (I fully disagree). M = mean value; SD = Std. Deviation; pi = item difficulty; rit-i = corrected item selectivity. Cronbach's Alpha = 0.624.

The mean value of the scale is 1.97, with a standard deviation of 0.918. Accordingly, the participants give a positive evaluation of the content of the workshop. It should be noted that item 3.2 was rated slightly lower than in Version One. However, the lower score for understanding the individual topics can be attributed to the larger sample size and the significantly lower prior knowledge of many participants. Overall, the respondents indicated that they were very interested in the topics covered. The fulfillment of the participants' expectations of the workshop was also rated very highly.

Table 4.34 shows the item analysis results for scale 4 *Organization* with item difficulties all in the desirable range. The item selectivities, except for item 4.2, also reach the desired values. The generic wording of the item can explain this value. If the questionnaire is used for further evaluations, this item's content must be discussed in advance. Cronbach's alpha of 0.639 is in a reasonable range.

Table 4.34: Item analysis for scale 4 Organization (Version Two)

4. Organization (Version Two)				
	M	SD	pi	rit-i
4.1 In the workshop there was a lot of room for discussions.	2.22	0.906	0.695	0.645
4.2 The theme plan was dynamic and flexible.	2.28	2.280	0.680	0.137
4.3 There was enough time for breaks and recreation.	1.44	1.440	0.890	0.409
4.4 The duration of the workshop was appropriate.	1.81	1.810	0.798	0.386
4.5 The information in the run-up to the workshop was sufficient and comprehensible.	1.94	1.940	0.765	0.489

Remarks: N = 32. coding: 1 (I fully agree), 2, 3, 4, 5 (I fully disagree). M = mean value; SD = Std. Deviation; pi = item difficulty; rit-i = corrected item selectivity. Cronbach's Alpha = 0.639.

The scale *Organization* is rated overall with a mean of 1.94, with a standard deviation of 0.844. Accordingly, the participants give a good rating of the organization of the workshop. As with Version One, the results show that some participants would still like more time for discussion. Here again, the Version Two workshops' larger group size should be noted, which generally makes group discussions more difficult. Nevertheless, it is clear from both evaluations how important the exchange among each other is assessed to be for the founders. Therefore, when using the BMDF in a similar workshop setting, care should be taken to schedule enough time for discussions. The results for item 4.5 regarding the materials sent out in advance show that these may need to be reviewed again.

Table 4.35 shows the results of the *Learning success* scale. The item difficulties (pi) provide high but still good values. The item selectivities are also in the desirable range with values from rit-I = 0.385 to rit-I = 0.764.

Table 4.35: Item analysis of the scale 5 Learning success (Version Two)

5. Learning success (Version Two)				
	M	SD	pi	rit-i
5.1 I think I learned a lot in this workshop.	1.56	0.801	0.860	0.682
5.2 The workshop has provided enough knowledge.	1.59	0.712	0.853	0.385
5.3 The workshop was valuable for me because my knowledge or abilities have significantly improved.	1.50	0.916	0.875	0.764

Remarks: N = 32. coding: 1 (I fully agree), 2, 3, 4, 5 (I fully disagree). M = mean value; SD = Std. Deviation; pi = item difficulty; rit-i = corrected item selectivity. Cronbach's Alpha = 0.762.

The scale 5 *Learning success* shows a mean value of 1.55. The standard deviation here is 0.802. According to this, the participants give an excellent evaluation of the learning success of the workshop. An analysis of these items' correlations with the participants' prior knowledge again shows a significant positive correlation between prior knowledge and items 5.1 and 5.3, which means that learning success increases the less prior knowledge the participant has.

Figure 4.23 shows the results for item 5.6 in assessing the components dealt with in the BMDF. As the figure shows, all components were considered necessary. Nevertheless, the results show a significantly larger dispersion of the ratings, with an average standard deviation of

1.010. However, this deviation can again be explained by the larger sample. The results suggest that different components are considered more or less important, depending on the team and the time point. This hypothesis could already be derived from the preliminary quantitative study from Chapter 3. Here, possible further research arises regarding correlations between startup background, maturity level, industry and product code, and specific BM components' weighting. Should it be possible to discover any clusters here, the BMDF could be built up like a toolbox in an even more targeted manner and used more efficiently.

The good performance of the lifecycle component ($M = 2.59$) is also vital at this point. Even though this is rated as less relevant than other components, the high standard deviation of 1.160 shows that the component is much more relevant for some teams than for others. Since it can be assumed that the relevance of environmental sustainability will grow more in the future, the component will continue to be retained in the BMDF.

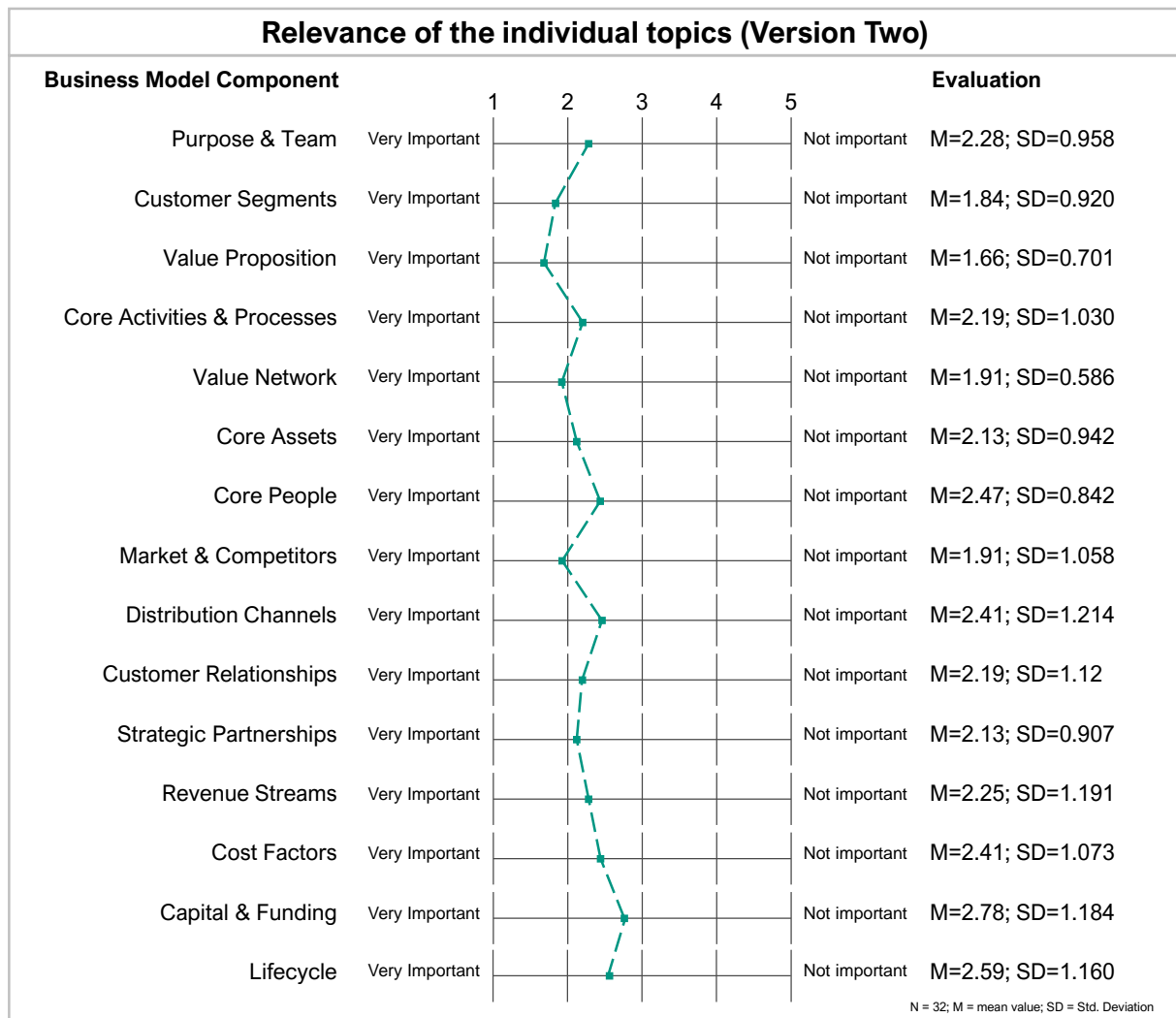


Figure 4.23: Relevance of the individual topics of the BMDF (Version Two)

Table 4.36 shows the results of scale 6 *Practical relevance and applicability*. The item difficulties fall within an acceptable range with values ranging from $\pi = 0.695$ to $\pi = 0.898$. The item selectivities provide good values. Cronbach's alpha provides an excellent result with a value of $\alpha = 0.825$.

Table 4.36: Item analysis of scale 6 *Practical relevance and applicability* (Version Two)

6. Practical relevance and applicability (Version Two)				
	M	SD	π	rit-i
6.1 The workshop provided a lot of practical knowledge.	1.81	0.896	0.798	0.701
6.2 I consider the acquired knowledge to be well applicable.	1.56	0.669	0.860	0.752
6.3 What I have learnt I will definitely apply in my job.	1.41	0.756	0.898	0.679
6.4 I will continue using techniques that were developed in the workshop.	2.22	0.941	0.695	0.529

Remarks: N = 32. coding: 1 (I fully agree), 2, 3, 4, 5 (I fully disagree). M = mean value; SD = Std. Deviation; π = item difficulty; rit-i = corrected item selectivity. Cronbach's Alpha = 0.825.

The scale 6 has an overall mean value of 1.75 (SD = 0.866). The participants thus give a positive assessment of the practical relevance and concrete applicability of the workshop content. The participants also uniformly state that they want to continue to apply what they have learned in their profession. Despite the higher sample compared to Version One, item 6.1, i.e., the practicability of the knowledge, is rated better. This improvement indicates that the restructuring of the BMDF in Version Two has had a positive impact.

Table 4.37 presents the results of the item analysis of scale 7 *Durability of the learned*. The item difficulties, as well as the item selectivities, are all in the desirable range. Cronbach's alpha of 0.884 is also excellent.

Table 4.37: Item analysis of the scale 7 *Durability of the learned* (Version Two)

7. Durability of the learned (Version Two)				
	M	SD	π	rit-i
7.1 The knowledge gained in the workshop will facilitate my future activities.	1.66	0.745	0.835	0.817
7.2 The contents of the workshop are conveyed in a sustainable way.	1.72	0.683	0.820	0.715
7.3 I think that the workshop will have a positive impact on my behaviour.	1.56	0.716	0.860	0.798

Remarks: N = 32. coding: 1 (I fully agree), 2, 3, 4, 5 (I fully disagree). M = mean value; SD = Std. Deviation; π = item difficulty; rit-i = corrected item selectivity. Cronbach's Alpha = 0.884.

The scale 7 *Durability of the learned* has a mean value of 1.65. The standard deviation here is 0.707. According to this, the participants give a very positive evaluation of the durability of what has been learned. The results of this scale are almost congruent with the results for Version One.

Table 4.38 shows the results of the scale 8 *Evaluation of the framework*. The item difficulties (π) and item selectivities (rit-i) are in acceptable ranges. Cronbach's alpha also provides an excellent value with $\alpha = 0.870$.

Table 4.38: Item analysis of the scale 8 *Evaluation of the framework (Version Two)*

8. Evaluation of the framework (Version Two)				
	M	SD	π	rit-i
8.1 The framework contained all necessary information to design our Business Model.	2.06	0.619	0.735	0.315
8.2 The framework helped us finding and processing the relevant information about the aspects of the business model.	2.03	0.695	0.743	0.495
8.3 The framework helped us presenting the business idea and the chosen Business Model.	1.50	0.622	0.875	0.441
8.4 The framework helped us to identify opportunities and risks.	1.50	0.718	0.875	0.713
8.5 The framework provided clear guidance on the process of Business Model Design.	1.78	0.751	0.805	0.695
8.6 The framework helped us to validate the current business ideas and contributed to decision making.	1.69	0.821	0.828	0.732
8.7 The framework reduced complexity by implementing a structured business model design.	1.69	0.821	0.828	0.787
8.8 The framework itself is easy to understand.	2.19	0.931	0.703	0.644
8.9 The framework itself is easy to use.	2.03	0.967	0.743	0.387
8.10 The framework supported all our relevant purposes for Business Model Design.	1.72	0.634	0.820	0.710
8.11 Using the framework enhanced the effectiveness (quality of goal achievement) of our Business Model Design.	1.84	0.723	0.790	0.438

Remarks: N = 32. coding: 1 (I fully agree), 2, 3, 4, 5 (I fully disagree). M = mean value; SD = Std. Deviation; π = item difficulty; rit-i = corrected item selectivity. Cronbach's Alpha = 0.870.

The scale 8 *Evaluation of the framework* provides an overall mean value of 1.82. The standard deviation here is 0.783. According to this, the participants give a positive evaluation of the framework again. The overall rating of the scale changes only marginally compared to Version One. Nevertheless, substantial improvements are recognizable. Above all, the comprehensibility of the BMDF, previously rated with a mean value of 3.00, could be significantly improved to 2.19. The ease of use could also be improved considerably. The adaptations of the BMDF within Version Two's scope also show an apparent effect concerning the support of the teams' respective BMD purposes. Here, the rating could be improved from previously 2.56 to 1.72.

The sample size can again explain the minor changes in the other items. The second evaluation cycle results can be regarded as more consolidated due to the increase from nine participants to 32 participants. The excellent performance of Version Two of the BMDF shows that the framework fulfills its purpose of effective BMD.

Table 4.39 shows the translation of the items into the artifacts' individual environmental and functional requirements, again stating the improvements regarding usability, comprehensibility, and suitability of Version Two. Following the same procedure, as described in chapter 4.5.2, the assessment of requirement FR_1 (Design a Business Model) comprises the mean values

of items 8.1 and 8.1. Although the Spearman-Brown coefficient is rather low with a value of 0.546, the items' combination is also argued via their validity. Hence, with a mean value of 2.05, the requirement is fulfilled for Version.

Table 4.39: Assessment of the structural and environmental requirements (Version Two)

Fulfillment of environmental and functional requirements (Version Two)			
	M	Fulfillment	related Item
ER_1 Usability	2.03	+	8.9
ER_2 Comprehensibility	2.19	+	8.8
ER_4 Suitability	1.72	+	8.10
ER_5 Completeness	2.06	+	8.1
ER_6 Efficiency	1.78	+	8.5
FR_1 Design a Business Model	2.05	+	8.1, 8.2
FR_2 Reduce complexity	1.69	+	8.7
FR_3 Define components in detail	2.03	+	8.2
FR_4 Present business ideas	1.50	+	8.3
FR_5 Validate business ideas	1.69	+	8.6
FR_6 Identify opportunities and risks	1.50	+	8.4
FR_7 Improve status quo	1.84	+	8.11

Table 4.40 shows the indirect query results about the customizability of the BMDF, which can also be considered fulfilled with a mean value of 1.68.

Table 4.40: Assessment of the requirement customizability (Version Two)

ER_3 Customizability (Version Two)				
	M	SD	pi	rit-i
8.2 The framework helped us finding and processing the relevant information about the aspects of the business model.	2.03	0.695	0.743	0.551
8.3 The framework helped us presenting the business idea and the chosen Business Model.	1.50	0.622	0.875	0.440
8.4 The framework helped us to identify opportunities and risks.	1.50	0.718	0.875	0.542
8.6 The framework helped us to validate the current business ideas and contributed to decision making.	1.69	0.821	0.828	0.674

Remarks: N = 32. coding: 1 (I fully agree), 2, 3, 4, 5 (I fully disagree). M = mean value; SD = Std. Deviation; pi = item difficulty; rit-i = corrected item selectivity. Cronbach's Alpha = 0.752.

The results from the two previous tables taken together, all environmental and functional requirements are met by Version Two.

Table 4.41 lists the results for scale 9 *General judgment*. The item difficulties are all in a very high range and indicate a very high affirmative tendency. The item selectivities with values from rit-I = 0.663 to rit-I = 0.886 provide good values. As with scale 1, future use of the questionnaire should examine whether these items' content can be adapted or possibly merged. Cronbach's alpha of 0.905 is in the excellent range.

Table 4.41: Item analysis of scale 9 General judgment (Version Two)

9. General Judgment (Version Two)				
	M	SD	pi	rit-i
9.1 I was interested in the topics.	1.34	0.602	0.915	0.663
9.2 I liked the workshop.	1.19	0.644	0.953	0.886
9.3 I am satisfied with the workshop.	1.38	0.660	0.905	0.781
9.4 I would recommend the workshop to others.	1.19	0.592	0.953	0.823

Remarks: N = 32. coding: 1 (I fully agree), 2, 3, 4, 5 (I fully disagree). M = mean value; SD = Std. Deviation; pi = item difficulty; rit-i = corrected item selectivity. Cronbach's Alpha = 0.905.

Scale 9 *General judgment* has a mean value of 1.27. The standard deviation here is 0.621. Accordingly, the participants give a very positive evaluation compared to the workshop's overall assessment. The participants were also very interested in the workshop topics and would recommend participation in the workshop to others.

Qualitative evaluation of the four open questions

The participants' answers to the four open questions at the end of the questionnaire are summarized, paraphrased, and generalized. It is noted that the different stadiums of the startups are problematic and that some teams would like the BMDF to be adapted to the beginner level of some participants. One interviewee states that he had hardly any knowledge in business management or economics beforehand and consequently had problems understanding even basic terminology.

Some participants would like to have more active presentations of the results to benefit from the whole group's feedback. Overall, however, most participants perceived the workshop as an interactive, well-supported, and pleasant learning environment.

Respondents personally value the BMDF on a variety of levels. One respondent sees it as a "good summary of complex topics in a short time." One strength is the precise structure. Another strength results from the mixture of theory and practice since the practical sessions are related to theoretical knowledge. The practical sessions contain practical exercises for the participants' ideas. Besides, the examples are particularly emphasized. They explain the different topics to learn the theory through suitable and easy to understand examples. "The many practical examples are entertaining and instructive." Two respondents see the posters themselves as strength of BMDF.

One respondent sees BMD as "clear and to the point" through the BMDF. They understand the framework and know how to use it in BMD. It provides a comprehensive overview of the topic and clear guidance on the next steps.

One respondent explicitly prefers the BMDF to Osterwalder und Pigneur's (2010) well-known BM Canvas: "The new framework is great, much better than Osterwalder."

Respondents also suggest some additional offerings around the BMDF. For example, the framework could be embedded in a year-long program to guide a startup from initial idea to first revenues. Another suggestion is to write a book covering the topic and serves as further assistance to the workshop.

4.7.2 Findings from the Interviews

The basis for the qualitative analysis of Version Two is the 13 qualitative interviews conducted between October 2019 and January 2019 following the process presented in chapter 4.4.5.3. Interviews were conducted by appointment voluntarily by telephone, recorded, and transcribed as described above. All interviewees were participants in one of the AXEL or GROW program workshops, described in chapter 4.7. Table 4.42 lists the duration and scope of the 13 interviews with each respondent. There was an average of seven weeks between the workshops and the interviews. A double interview was conducted with respondents R17 and R18.

Table 4.42: Overview of interviews conducted for Version Two

List of interviews conducted (Version Two)				
Respondent (Code)	Business context	Workshop Date	Duration	Words
Respondent 11 (R11)	Energy and environment	Okt 19	00:20:57	2,398
Respondent 12 (R12)	Energy and environment	Okt 19	00:23:39	2,776
Respondent 13 (R13)	Energy and environment	Okt 19	00:31:22	3,740
Respondent 14 (R14)	Energy and environment	Okt 19	00:19:41	1,768
Respondent 15 (R15)	not defined	Nov 19	00:28:21	2,960
Respondent 16 (R16)	Consumer & FMCG	Nov 19	00:31:00	3,750
Respondent 17 (R17)	Consumer & FMCG	Nov 19	00:27:03	4,085
Respondent 18 (R18)	Construction	Nov 19	00:24:01	2,724
Respondent 20 (R20)	Construction	Nov 19	00:22:30	2,336
Respondent 21 (R21)	Fitness & Health	Nov 19	00:21:12	2,080
Respondent 22 (R22)	Fitness & Health	Nov 19	00:24:26	2,981
Respondent 23 (R23)	Metal & Electronics	Nov 19	00:21:27	1,231

Remarks: Summed duration: 04:55:39; Average duration: 00:24:38; Summed word count: 32.829; Average word count: 2.736. A joint interview is conducted with R17 and R18.

A total of 8 hours, 14 minutes, and 29 seconds of interviews can be recorded. On average, the interview lasts 22 minutes and 29 seconds, varying from 12 minutes and 46 seconds to 31 minutes and 22 seconds.

The final code system formed after summarization, generalization, and code formation contains 9 main codes, 27 codes of the first sublevel, 85 codes on the second sublevel, and 36 codes on the third level. A total of 400 text passages were assigned to the codes. Table 4.43. lists the main codes, the complete code system is attached in Appendix C.7.

Table 4.43: Code system of the qualitative interviews from Version One

Code system of the qualitative interviews (Version Two)				
Main Code	# Codes Sublevel 1	# Codes Sublevel 2	# Codes Sublevel 3	# Mentions
Prior knowledge	2	4		17
Prior Business Model Design activities	2	6		21
Expectation of the workshop and the framework	3	7		20
Challenges in business model design	3	7	6	42
Strengths of the framework	6	37		157
Weaknesses or difficulties of the framework	3	5		20
Follow-up usage of the framework	2	6	30	90
Improvement suggestions of the participants	3	6		13
Ideal process for business model design	3	7		20

As known from the first evaluation cycle, an inductive procedure of code formation is chosen to be compared afterward with the requirements defined from theory and practice from chapter 4.1. Therefore, the already known main questions are also relevant for this evaluation: "Does the developed artifact support founders in designing their BM?" and "How can the developed artifact be further improved, if necessary?" To answer these two main questions, we first analyze the participants' expectations, activities, and knowledge before the workshop and the use of the BMDF.

Prior BMD knowledge

Respondents have varying levels of prior BMD experience. Almost half of the respondents have not gained any prior knowledge in the field of BMD. They do not know what is meant by the term BM and only start with a vague idea.

The remaining respondents have acquired their prior knowledge either through practical experience or prior theoretical knowledge. Practical experience has been gained as a founder of a startup and as a consultant for EXIST¹⁶ applications. For another interviewee, founding a startup was part of a university course. Furthermore, two interviewees have worked out the BM Canvas in advance for a competition. Further theoretical knowledge about BMD is obtained on the one hand from books, for example, by Steve Jobs or Lean Startup by Ries (2011). Two respondents obtain theoretical knowledge from a lecture on entrepreneurship. The course of study of another respondent is in entrepreneurship and innovation. Furthermore, two respondents are active in a university group that deals with the topic of entrepreneurship.

Prior BMD activities of the participants

Regarding the preparation of their BM, the respondents have already undertaken different activities in advance. Three respondents stated that they had done some preparatory work and

¹⁶ EXIST is a startup funding program of the Federal Ministry for Economic Affairs and Energy in Germany and is co-financed by the European Social Fund (ESF).

independently indicated which tools they had already used. The most frequently mentioned tool is the BM Canvas. Design Thinking, the Value Proposition Canvas, or the Lean Canvas, are also mentioned. Six respondents started with just an idea. Two respondents have already developed a product but have not dealt with BM. Another two respondents have read up on the topic.

Expectations of the workshop and the framework

In the survey, the participants name different dimensions concerning their expectations of the workshop and the framework. In general, the interviewees expect a steep learning curve in BMD, which is why they participate. Regarding the BMD, most interviewees state that no BM was developed in advance, as this should be done with the workshop and the BMDF. People want to use the potential and see what BMD looks like in this case. Six respondents explicitly state that this is because of their lack of knowledge in this topic area.

Some participants are more specific about their expectations. They hoped to learn about a systematic approach to develop their own BM. Also, one would like to gain knowledge for future activities regarding BMD. One is interested because he has developed a product but does not know how to evaluate the business side.

Other respondents refer to specific parts of the BMD. They hope to find the target group or to develop a pricing strategy.

Nine respondents explicitly state that their expectations were met or even more than exceeded. Respondent 07 (R07) says about his expectations: "We actually only had the basic expectation that hopefully, someone would finally explain to us what we are actually doing here and how it is best to continue with us and what we have to pay attention to now. That's why the expectation was exceeded a hundred times over." Two respondents had no expectations beforehand.

Challenges in BMD

In keeping with the diverse expressions of knowledge, activities, and expectations in advance, respondents cite different BMD challenges they faced before and during the process.

On the one hand, the challenges arise directly from the chosen BM. Seven respondents mention framework conditions such as laws and regulations as problematic. For three respondents, the challenge also lies in the technology push approach used, since initially, the product exists, but the target group is still unknown.

Three respondents say that they do not know how they can make money with their business idea. Also, they had not yet found the right niche for their product. Furthermore, it is noted that crystallizing the added value leads to difficulties in modeling the BM. One respondent mentions

that he does not know how to finance the production of the product. Several times, respondents mention that it is difficult to find partners. However, they say the BMDF inspired them as to how this could work. Most often, interviewees face the problem of defining the target group. Again, they would not have known how to determine this before using the model.

The difficulties are also subjective. Seven interviewees cite a lack of knowledge or experience as the reason for difficulties resulting from their technical or scientific study courses. Two interviewees explicitly state that they decided to switch back to the BM Canvas after the workshop because it was less extensive and more appropriate for their knowledge level. In six interviews, the difficulties arise from the persons' priorities, which are not on the BMD due to lack of time or other whereabouts. Also, seven interviewees see the general approach to BMD as critical. They find it difficult to make decisions about what the next sensible step is. They also said they did not know how detailed the business idea should be modeled. Concerning these problems, respondents emphasize the positive benefits of the BMDF, which helps them structure the upcoming decisions and "create more order in our minds" (R19).

Strengths of the BMDF

The interviewees name a wide variety of aspects that they remember positively or have inspired them to decide on aspects of the various sub-areas of the BMD in the long term.

Strengths of the BMDF that are not content-related refer to the workshop leader, the feedback given, and the slide deck. Furthermore, the feedback culture among the participants is also rated as pleasant. The feedback, in general, stimulates thinking and is not purely negative criticism. The provided slides are valued due to their quality and usefulness and therefore continued to be used afterward.

The participants name different parts of the BMDF as particularly helpful and relevant. Most frequently, they express themselves positively about *Market & Competitors* and *Revenue Streams*. The pricing and market potential analysis method were beneficial for them, as the approaches presented were very precise and comprehensible. They were also shown new ways and possibilities concerning revenue opportunities. The parts *Value Network* and *Purpose & Team* were found very helpful and exciting by six and five respondents. The setting up of this network or the vision, mission, and own values was necessary and useful for finding the right position in the market. The value proposition's determination was difficult before the workshop but could be described compactly and precisely with the BMDF. One also likes the formulation of the business idea in different ways since essential insights are gained. In the area of *Customer Segments*, the target group can now be determined.

The respondents also see the *Lifecycle* part as necessary. This component is a model that is not naturally thought of but is becoming increasingly important in today's world. The *Distribution Channels* section is helpful, as it allows the respondents to determine their product distribution and sales structure.

The personal assessments of the BMDF also have different dimensions. The respondents felt that the design was good. They were delighted and were able to take away a lot from the BMDF. The workshop had also been beneficial, and they had noticed an added value. The division of the workshop into practical phases and theoretical parts was varied. All relevant parts of a BM were covered. The best was made of limited time. The expectations of the interviewees were fulfilled. For one respondent, they were even exceeded. The respondents were very optimistic about this: "Yes, that's really the case. I thought that I would simply return the fact that you have helped us so much" (R13). They also explicitly express their gratitude: "That's why I can't think of anything right now except to just say thank you, because it was really great" (R18).

Regarding the comprehensibility of the BMDF, the respondents state that the workshop leader's contents and methods were comprehensible. They said that the explanations in the workshop and the contents of the BMDF were easy to understand. There were no significant challenges or problems in the application. The theory part was always supplemented with practical examples for better understanding. The explanations from the workshop contribute to the understanding of the posters and the methods. The relevant terms were also learned and understood in English.

The interviewees see the BMDF in different ways concerning BMD. It is an excellent tool for BMD. The steps were helpful to think about BMD from a different perspective. There was a perspective on how to try certain aspects. People had gone into detail with the BMDF. Respondents had been encouraged to think more deeply and in more detail, and subtleties that matter can be worked out and unique selling points defined. The very detailed description of the parts of the BM was significantly positive. The BMDF gives respondents an overview of what needs to be done, making it possible to work well and target-oriented on the BMD. Respondent 22 (R22) describes this aspect through this: "We didn't know how to start at all. That's why it really just gave us such a jump start." The respective sub-areas make sense and cover the essential topics. The interviewees also state that they have now learned to know and understand relevant areas. One can determine essential issues for the BM.

The BMDF can also be used as an aid. It helps to think in a more structured way and to classify what one does. The interviewees see it as a strategic map that shows which aspects need to be considered and where starting points can be found. It provides helpful tips on how to design

the BM. It also helps prepare for risks and thus aids in decision-making. The respondents also see the BMDF as a systematic approach to BMD. This systematic approach helps structure the large topic and guides how to proceed in a BM's respective sub-areas. It also supports the determination of goals to be achieved. Interviewee 20 (R20) comments on this assessment: "And with regard to the model, I think it's good that this approach is so systematic, that this major topic of the BM is well structured into these individual subsections, i.e., into all the individual things. That makes it clear and easy to work on."

The interviewees also explicitly and unasked distinguish the BMDF from the well-known BM Canvas by Osterwalder und Pigneur (2010). They rate the BMDF as much deeper, more specific, and more detailed than the BM Canvas. The BMDF is therefore very appealing because it addresses even more specific topics and is more all-encompassing. One does not miss any topic areas there. The connections and influencing factors between and within the sub-areas are more clearly and strongly elaborated and presented, which is very important for the BMD. The presentation of the BMDF is overall better compared to the BM Canvas. Interviewees describe the BMDF as a fortunate extension of the BM Canvas. Six interviewees list this as to why they prefer the BMDF to the BM Canvas and why they feel that it is the better framework.

Weaknesses or difficulties of the framework

To evaluate the design and subsequently derive further improvement opportunities, interviewees were explicitly asked about weaknesses or difficulties in using the BMDF.

Seven respondents explicitly stated that they had had no difficulties in understanding or using the BMDF. No possible improvements can be derived from this.

One respondent stated that *Capital & Funding's* topic could not be dealt with in the workshop because the necessary figures were not yet available at the time.

Furthermore, three respondents state that they were confused or overwhelmed at the beginning of the workshop by introducing the BMDF and its phases, which, in their view, was too long. It was suggested that the phases should only be introduced briefly initially, and the posters should only be presented once they are in use. In this way, one still has an overall view without "getting nervous when I see all the tasks coming up" (R11).

Follow-up usage of the framework

Towards the end of the interviews, respondents were also asked about their follow-up activities. In particular, they were asked how the teams proceeded after using the framework, whether they continued to use the framework, and whether certain parts of the framework were particularly relevant.

Overall, three respondents indicated that they did not continue to use the framework. The non-use is either due to lack of time, and thus no BMD activity is done in general. Alternatively, it is because of the use of other BMD methods. Two respondents mention books on specific topics or explicitly the BM Canvas, as it is less complex.

Ten respondents state that they will continue to use the BMD in whole or at least in part. Five respondents stated that they would use it in the future to develop the BM. Another four respondents explicitly use the presented slides. Also, three interviewees use the canvas analogously in paper form, for example, by having it "hanging on the wall in our office, I mean the last poster, the one with the essential statements" (R14).

The analysis of the interviews also shows that respondents find specific parts particularly relevant and therefore use them. Each of the 15 components is mentioned at least once. However, the *Market & Competitors* part to determine market potential is found most frequently, with $n = 6$. The *Value Network* part is also perceived as particularly relevant with $n = 5$. The *Value Proposition* and the target group identification in the *Customer Segments* part are frequently determined and elaborated ($n = 4$).

There are also mentions of specifically revised parts of the BM in the interviews, very often based on the exchange with experts or mentors. The interviewees had been inspired towards this exchange by the contents of the workshop. Interviews with potential customers were also encouraged. Positive feedback motivated the teams to continue working on their BM. The product was developed based on *Core Activities & Processes*. A pricing strategy was also developed through the *Revenue Streams* part, and exact positioning in the market was worked out using the methods from the *Market & Competitor* and the *Value Network* components.

Improvement suggestions of the participants

The content-analytical evaluation of the interviews conducted shows that the participants explicitly mention suggestions for improvement.

Concerning the BMD in particular, an additional subsection for development steps of the BM in the coming years is desired. Besides, three respondents miss the possibility to place their logo on the posters. The logo supports the development of the own BM since it is identity-giving for a startup. As Respondent 12 states, it "looks even more professional to brand something, so on our business model then also to put our logo" (R12).

For participants to gain more knowledge in advance of the workshop and thus be able to take away even more from the practical phases, a more detailed offer of preparation for the relevant contents of the BMD would be desirable. Here, three respondents each explicitly mentioned explanatory videos and the possibility of exchange with web sessions.

The ideal process for BMD

To obtain further insights into possible users of the BMDF, they are asked about the ideal process for BMD. Respondents have different ideas in this regard, and some would choose different perspectives on the ideal process. One part would take a market-pull approach and proceed to start from the customer and demand to ensure that they develop something needed. The other part would take a technology-push approach and develop their BM starting from product innovation.

However, most interviewees mention assistance they would use to flesh out their business idea. Nine respondents would specifically use the BMDF presented and develop their idea further based on it. Three other respondents would also use either this model or the BM Canvas for BMD. One interviewee opts directly for the BM Canvas and would like to create the BM based on this approach. Simultaneously, two interviewees would also consult other media such as books, videos, or podcasts on this topic.

In summary, it can be stated that the interviewees have different levels of knowledge in the field of BMD before using the BMDF. The respondents' BMD level also differs, resulting in respective expectations of BMDF and challenges to BMD in general.

Overall, it can be stated that despite some minor weaknesses, the proportion of positive aspects in the evaluation of the artifact is explicit. This positive impression is reinforced because most of the respondents state that they have no difficulties with the BMDF. The small number of possible suggestions for improvement shows that the framework is useful for the BMD. This impression is reinforced by the fact that 75 % ($n = 10$) of respondents will continue to consult the BMDF in whole or in part to design their BM. Besides, the BMDF is cited by the majority as the ideal approach to BMD.

4.8 Overall Evaluation of the BMD Framework

Due to the second evaluation cycle's very good results, no major adaptation of Version Two of the BMDF will be made. Only the proposal to integrate the logo will be included. The original BMD poster from chapter 4.2.2 already contained space for the logo, the team name, and the BM's number of iterations. In Version Two, these were removed due to space limitations. Adding the fields again was nevertheless easy to implement. Due to the small change, a new evaluation cycle was omitted.

In the following, the results of the two cycles are summarized, and the improvements are compared. A final evaluation of the fulfillment of the requirements for the artifact is also performed.

Figure 4.24 first shows the fulfillment of those BMDF requirements that were evaluated via the quantitative study, i.e., with the items 8.1 to 8.11 of the questionnaires. Likewise, the figure clearly shows how the BMDF has improved from Version One to Version Two at crucial points.

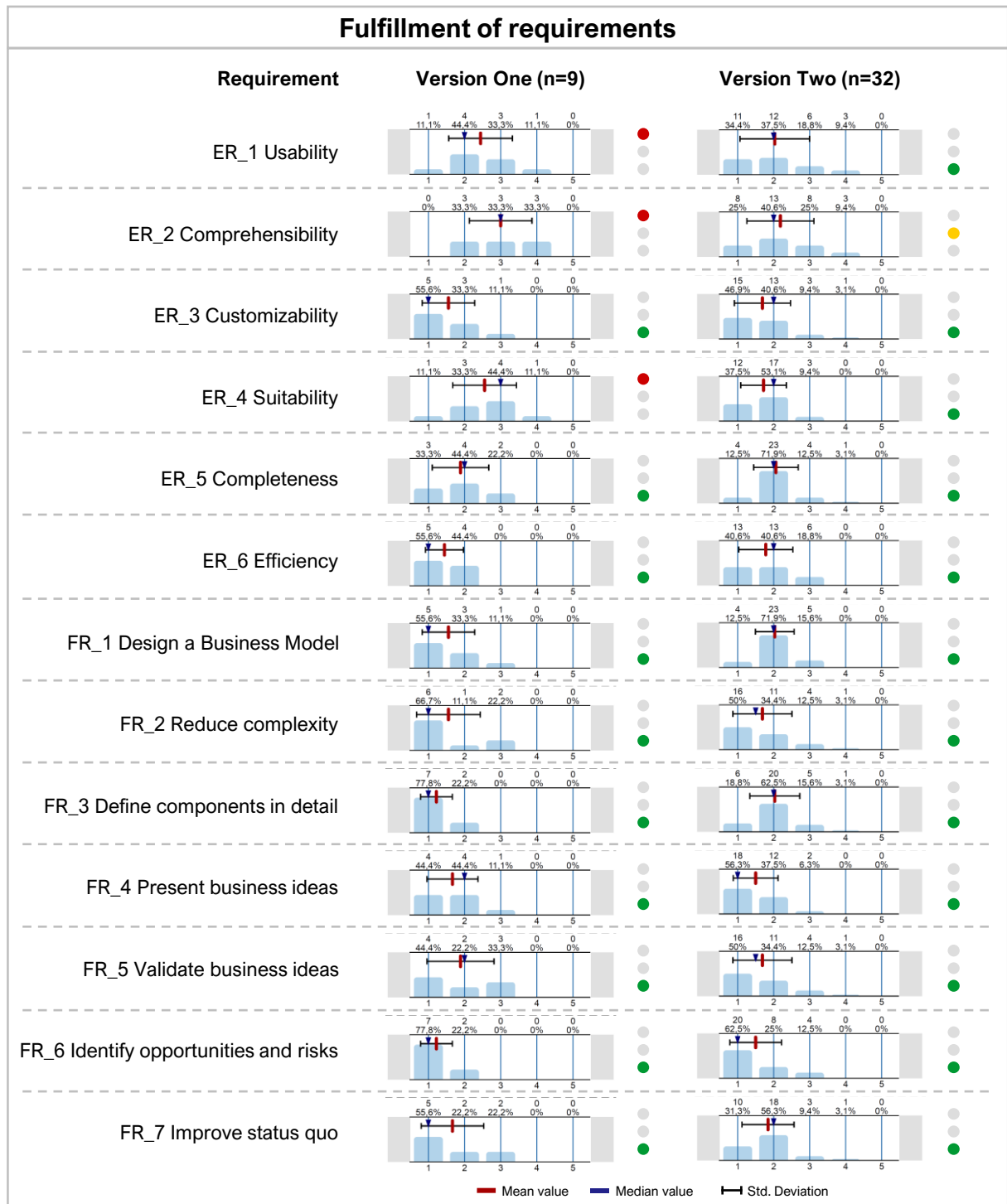


Figure 4.24: Fulfillment of requirements, Version One versus Version Two

Due to the small sample in the first evaluation cycle, the results, most of which were very good, could only be considered meaningful to a limited extent. Nevertheless, essential findings for the improvement of Version One were derived. The adapted structure and the partly content-

related extensions by Version Two show that these changes lead to significant improvements in the evaluation of the BMDF. Besides, the sample has increased by a factor of 3.5 compared to the first cycle. Although the sample is still relatively small, with now 32 participants, the results can be considered reliable and stable.

The three requirements of usability, comprehensibility, and suitability were rated as insufficient in the first cycle. In the second cycle, the evaluation of these requirements in the quantitative study increased significantly. The usability and suitability requirements can now be regarded as fulfilled. The requirement of comprehensibility is also considered fulfilled, even if the mean value of 2.19 is slightly above the selected fulfillment criterion $M \leq 2$. As could also be shown by the interviews, comprehensibility is related to the participants' prior knowledge. Users who already have prior knowledge of BMD or have already worked with similar tools rate the comprehensibility as very good. Only users without any prior knowledge of BMD or, in some cases, without any prior knowledge of business fundamentals have problems dealing with the newly learned terms and vocabulary typical of the scene. However, since this vocabulary should be part of the founders' common knowledge, the knowledge must inevitably be learned. Thus, these terms cannot be dispensed within the context of the BMDF either.

All in all, based on the quantitative analysis, Version Two of the BMDF fulfills all functional and environmental requirements defined in chapter 4.1 for an effective BMD framework.

The qualitative analysis of the interviews could confirm and underline this fulfillment. The Version One results, which were still moderate concerning usability, simplicity, completeness, and the general improvement of the status quo, were also entirely fulfilled by Version Two. The interviews cannot completely confirm only the requirement of efficiency. Whether the BMDF is efficient depends mainly on the resources, priorities, and existing information of the teams regarding their potential customers or the market. Without such information, teams sometimes have to expend a great deal of effort to work out the BMDF methods well. In these cases, the efficiency is rated as optimizable by the participants. However, it can be argued here that the teams' time and resources at such an early stage, building up knowledge about the customers and the market, must be invested at a later stage anyhow and possibly at much higher costs and risks. Therefore, a time- and resource-intensive BMD can make sense in an early phase, even if the teams often tend to prefer working on the product rather than thinking about the BM behind it.

In improving the status quo, the statement can be made that this requirement is considered met. The majority of the interviewees continue to use the artifact and explicitly state that they prefer the BMDF to other BMD models.

Utilizing the interviews, it was also possible to test the user requirements. The participants describe the process guideline and the contents of the BMDF as appropriate, engaging, and helpful. The contents' relevance could also be proven by the quantitative study, in which none of the covered components was rated worse than 2.7.

Some parts, such as *Value Network* or *Market & Competitors*, are particularly important in the questionnaire and the interviews. Besides, the vast majority of respondents state that they will continue to use the BMDF as a whole, or at least parts of it, as well as the slide deck after the workshops. This continuous usage shows that the BMDF can also be used without external experts. However, it should be noted that the BMDF was always presented to the participants by an external expert. It was not explicitly tested whether the BMDF can also be used without this introduction, i.e., entirely without external support. However, since Version Two has been used by several other startups already without attending a workshop beforehand, this type of application also seems promising.

Table 4.44 summarizes the fulfillment of all requirements by Version Two of the BMDF again.

Table 4.44: Fulfillment of all requirements by Version Two

Fulfillment of requirements (Version Two)				
	Questionnaire	Interviews	Logical	Overall
ER_1 Usability	(2.03)	+	+	+
ER_2 Comprehensibility	(2.19)	+	+	+
ER_3 Customizability	(1.68)	+	+	+
ER_4 Suitability	(1.72)	+	+	+
ER_5 Completeness	(2.06)	+	+	+
ER_6 Efficiency	(1.78)	+	+	+
FR_1 Design a Business Model	(2.05)	+	+	+
FR_2 Reduce complexity	(1.69)	+	+	+
FR_3 Define components in detail	(2.03)	+	+	+
FR_4 Present business ideas	(1.50)	+	+	+
FR_5 Validate business ideas	(1.69)	+	+	+
FR_6 Identify opportunities and risks	(1.50)	+	+	+
FR_7 Improve status quo	(1.84)	+	+	+
SR_1 Acceptance of methods			+	+
SR_2 Internal cohesion			+	+
SR_3 Number concreteness			+	+
SR_4 Absence of redundancy			+	+
SR_5 Clear operationalization and guidance			+	+
SR_6 Modularity			+	+
UR_1 Comprehensive process and method description		+		+
UR_2 Guiding poster (Canvas-like structure)		+		+
UR_3 Include supporting methods for each component		+		+
UR_4 Prioritization of components possible		+		+
UR_5 Usable without external expert guidance		+		+

These requirements were created through the theoretical and practical preliminary considerations in chapters 2 and 3 to define what an artifact must fulfill to be called an effective BMD

framework. The evaluation cycles demonstrated that Version Two of the BMDF meets the requirements and can be considered an effective BMD framework.

In addition to these analysis results, several observations can be derived from the evaluation cycles that, while not directly relevant to the BMDF, provide possible indications for further research.

For example, specific types of users of the BMDF seem to emerge from the survey. Depending on the users' prior knowledge and expertise, the BMDF provides different benefits and is further used differently after its initial use in the workshop. The goal of the BMDF is to enable effective BMD for startups, regardless of their product or industry. Nevertheless, the results from correlational analyses, the findings from the observation, and the interviewees' statements suggest that, depending on the product type or industry sector, there are differences in the teams' focuses regarding BMD.

Further insights into these contexts and user types could hold the potential to tailor the BMDF to specific user groups further. The modular design of the framework would allow the BMD to be targeted according to the user group, pre-selecting the components and methods that are most relevant to the group. The first step in this direction has already been taken with the three principles for effective BMD introduced in chapter 4.6. An analysis of user behavior concerning the BMD purposes defined in phase one of the BMDF and the focus on specific methods in the follow-up could provide insights for further development or better modularization of the BMDF. However, this requires modifying the survey forms and evaluations precisely, associated with a considerable effort. Therefore, no further analysis of possible user types and clusters will be conducted in this work.

5 Conclusion and Outlook

5.1 Reflection of the Research

This chapter reflects on the research journey to develop a framework for effective BMD undertaken in this thesis. It summarizes the key aspects and presents the major findings related to the original research objectives. It also outlines the new findings and contributions to BM research and BMD practice.

The ever-changing and increasingly complex business environment makes new successful BMs a key challenge for entrepreneurs. Accordingly, BMD is an essential task for startups to explore, define, and communicate new business opportunities. Simultaneously, there has been insufficient knowledge, either in theory or in practice, to realize an effective BMD process. Therefore, this dissertation's approach was to develop a framework that startups can use to effectively design their BM.

Chapter 1 introduced the BMD research topic, formulated the objectives, and delineated the thesis's scope. In this context, the main objective of the thesis was specified by the sub-objectives (1) improve the understanding of effective BMD, (2) provide new insights from BMD practice in startups, (3) build on a combined view of qualitative and quantitative analysis of BMD, (4) provide principles and guidelines in BMD for both practice and academia, and (5) develop comprehensive guidance in the form of a framework that startups can use for effective BMD.

Besides, chapter 1 described the underlying motivation, research structure, and research strategy. The very practical problem guided this thesis's motivation that existing approaches to BMD do not adequately support startups. Mistakes, a wrong focus, or neglecting certain aspects during BMD have far-reaching consequences for a startup, not infrequently leading to failure. A Design Science Research (DSR) approach was used in this work to answer this practical problem with a scientific approach. Design Science generates various artifacts, including constructs, models, methods, and instantiations, and origins in engineering and the sciences of the artificial. In all steps of this work, the research framework and guidelines for DSR introduced by Hevner et al. (2004) in the field of information systems, based on the principle that knowledge and new understanding are derived from the construction, application, and evaluation of an artifact, were strictly followed. The DSR project's process was based on the approach of Peffers et al. (2007). Similar to approaches from related ADR (see Sein et al. 2011), Peffers et al. (2007) call for a very iterative approach with a constant exchange between theory and practice and consistent improvement of the artifact.

At the beginning of a DSR project, it is important to identify a real problem that is relevant enough to be solved. To specify this problem, it is first necessary to build a deep knowledge base around the problem. To this end, the identified problem, i.e., the lack of support for startups during their BMD, was subjected to an intensive analysis of the related literature in chapter 2. Therefore, a literature review was conducted by reviewing the state of research related to BM definition, BM concept, BMD in entrepreneurship, the BMD process, BMD effectiveness, and BMD frameworks. This literature review builds on existing literature reviews conducted between 2005 and 2019. It was also expanded to include new publications throughout the research. To this end, forward citations of these reviews were conducted on the one hand, and search alerts were set in the literature databases of EBSCOhost, Google Scholar, and ScienceDirect on the other. From this resulting extensive literature base, it could be deduced that the BM concept is a multi-layered construct due to its ambiguity and numerous interfaces to other research areas. Nevertheless, to show that a more homogeneous understanding of the concept is emerging in the literature, the BM concept was defined from two aspects, the formative and the resultative aspects.

From these two aspects, the perspectives of the concept were captured by six main characteristics:

1. A BM describes a company's value logic, specifically value creation, value delivery, and value capture.
2. All BM functions relate to the making or representing of a set of decisions by entrepreneurs.
3. A BM can be described by a combination of different relevant business components.
4. More emphasis is placed on the alignment of individual BM aspects and interactions with the external ecosystem of a BM.
5. The BM responds to a business opportunity.
6. Each BM is embedded in and influenced by a specific business context.

Based on these commonalities, the following BM understanding was introduced as the basis of the work:

A Business Model is a simplified, idealized, and aggregated representation of a company's value logic, describing how a company creates, delivers, and captures value for itself and all relevant stakeholders, documenting a set of decisions by an entrepreneur on all relevant business components, their alignment, and interactions - altogether responding to a specific business opportunity in a concrete business context.

This new definition combines the theoretical basis of the BM with its practical implications and can be applied in both academia and the practical world. It thus makes a significant contribution to the convergence of the two fields.

In addition to providing new insights, the qualitative findings also allowed for refinement of the research gap and served as input for designing an empirical study on entrepreneurial BMD practice.

Subsequently, an empirical study was developed in chapter 3 to examine what processes are present in entrepreneurial BMD practice. The study was designed as a structured online questionnaire to ensure standardized data collection and comprehensive coverage of heterogeneous startups. Three main research areas were defined and divided into 22 research questions to elicit relevant insights. The research questions include BMD application context by startups, the importance of BM components and BMD process structures, and startup background characteristics such as startup size, reach, and industry. During the research period, a set of 45 data samples was generated, mostly representing startups from Germany and Europe, from the IT & Technology and Energy & Power sectors, offering consumer, industrial or digital products and actively working on their entrepreneurial project for more than one year. Based on the collected data, a quantitative picture of entrepreneurial BMD practices was created. After consolidating the data, insights into startup BMD practices were derived from both descriptive and analytical statistics. In practice, the BM primarily represents a logic for entrepreneurs to generate profit, while in the literature, the focus is increasingly shifting to the conceptualization of value creation, value delivery, and value capture.

Nonetheless, in response to the relevant content for effective BMD, 14 BM components have been identified and validated across theory and practice. In previous literature, a very heterogeneous understanding of the essential aspects of a BM has prevailed. By comparing literature and practice in this work, a significant contribution to a better understanding of the BM concept could be made.

In terms of the relevant process steps for effective BMD, it was found that BMD is initially used to create BM concepts or an abstract visualization of an existing BM but is not concerned with its implementation. BMD was defined as follows:

Business Model Design (BMD) is the process of systematically creating (alternative) Business Model concepts by making a set of decisions by entrepreneurs on all relevant business components, their alignment, and their interactions responding to a specific business opportunity in a concrete business context. The

process result serves as the basis for the entrepreneurial decision to implement the best Business Model alternative in practice.

Furthermore, five phases of BMD were elaborated: *Initiation*, *Exploration*, *Specification*, *Evaluation*, and *Implementation Setup*. In examining how startups conduct BMD, it was found that special attention should be paid to gathering and analyzing information. These planning steps are critical to assessing the business context and uncovering the company's key opportunities and risks. Thus, the information base significantly influences the development of alternative solutions as well as BM decisions. To best support startups in this information gathering and analysis, targeted methods were selected for each component to be incorporated into the BMD framework. For the most part, recognized methods from science and practice were used. However, in some cases, entirely new methods were developed to address specific components of the BM. Regardless of whether a method already existed or was newly developed, all methods were analyzed comprehensively and adapted specifically to startups' needs, their time and resource availability, and necessary prior knowledge. The resulting method kit is so far unique in the BMD environment.

Concerning the requirements for an effective BMD framework, functional, structural, environmental, and user-related requirements were derived from literature and practice. To do so, the founders' different motivations to design a BM and the related purposes were analyzed. From these requirements, the structure and content of the framework were defined. On the other hand, the requirements were used to analyze why current BMD approaches are not effective. Using the most popular BMD frameworks such as the BM Canvas or the BM Navigator as examples, it was shown that the status quo of BMD approaches in the literature cannot fulfill the defined requirements.

Based on the literature's theoretical findings and the study's empirical findings, the final design requirements for the effective BMD framework were derived in chapter 4. These requirements formed the basis for the design and evaluation cycles in which the actual framework for effective BMD was developed. At the beginning of these cycles, a first version of the effective BMD framework was developed in close exchange with several experts. For this purpose, the findings from the theoretical and practical investigations were cast into several design prototypes, and the most promising design was selected together with the experts.

To evaluate the resulting artifact, an evaluation strategy was developed based on the existing FEDS framework by Venable et al. (2016). Their *Human Risk & Effectiveness* approach was chosen as the basic strategy, which is characterized by a strongly formative and naturalistic character and is applied in particular when the main risk of the design is social or user-oriented

and well feasible to evaluate with real users in their real context. Likewise, this evaluation strategy's critical goal is to rigorously establish that the benefits and advantages of the artifact will persist in real-world situations and over the long term (Venable et al. 2016). Field experiments were conducted as an essential method for evaluating the artifact. The artifact was tested in accelerators with startups that participated in these programs to design a BM. Field experiments have high internal and external validity but also present difficulties associated with manipulating treatments and controlling for extraneous effects in a field setting (Bhattacharjee 2012). A standardized questionnaire and in-depth interviews supplemented the field experiments to uncover these manipulations and extraneous effects and filter them out to evaluate the artifact itself.

In two formative evaluation cycles, the artifact was tested and adjusted several times together with the user group, i.e., the startups. Figure 5.1 graphically summarizes these two evaluation cycles.

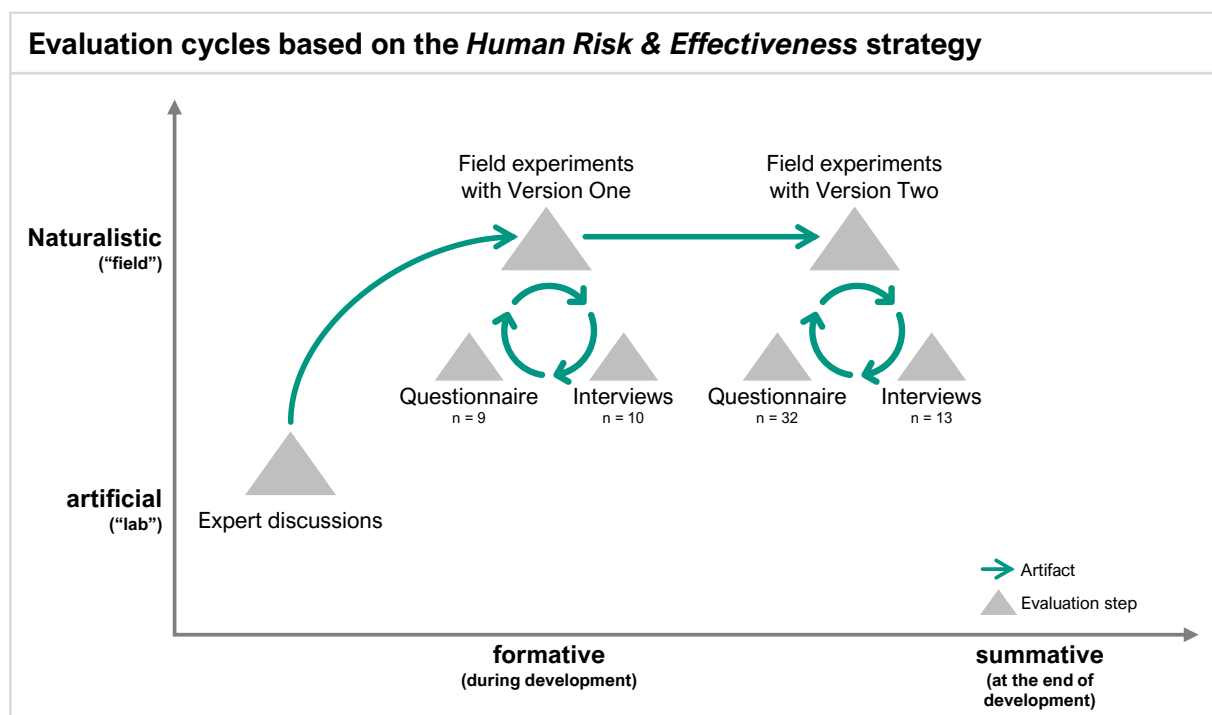


Figure 5.1: Evaluation cycles during the artifacts design
Source: adapted from Venable et al.'s (2016) FEDES Framework

In total, the framework was tested with 42 startups in seven multi-day workshops in different accelerator programs. After each application, the framework was evaluated through interviews and questionnaires and adjusted based on lessons learned. This iteration was conducted until the defined requirements for the artifact were fully met.

The final artifact features significant structural and content enhancements to existing BMD approaches. Thus, in addition to the components already well represented by existing

frameworks, such as the value proposition, other relevant components were implemented in the developed framework that are not addressed or insufficiently addressed in existing approaches to BMD. These include, for example, the *Value Network*, *Purpose & Team*, and *Lifecycle*. Furthermore, the newly developed framework provides users with a clear process structure and guides them step by step towards a BM. Validation of the artifact shows that it is also preferred by users with prior experience with other frameworks. The detailed methods and examples and the clear visualization of the process and goals via the posters support the startups to deal with the BMD's complexity and finish a BM despite many uncertainties during the process. Furthermore, it is clear that the teams continue to use the framework in whole or in part even after the initial design of their BM and specifically draw on the knowledge bundled in it when needed.

As a final result, it was thus possible to develop a framework supporting startups in effectively designing their BM, regardless of their stage of development or their economic background. This research project has thus achieved its original goal and answered all the research questions posed.

The acceptance and added value of the new framework among the user group are also evident because the framework has already been used individually by numerous other startups and in several accelerator programs since the final evaluation cycle was completed. These are the programs in which the framework was evaluated and other programs at universities in Germany and abroad. Besides, the first accelerators from the private sector are also integrating the framework into their programs for early-stage startups. With the introduction of the new framework, all these accelerators are simultaneously replacing the frameworks previously used to support the BMD of the participating startups.

5.2 Limitations and Validation of Results

On the way to answering the research questions, the study has some limitations that are common in research but should be documented. The method-specific limitations regarding the expert interviews and systematic observation have been described in the respective chapters. Nevertheless, it is useful to review the major limitations of the overall study design from an overarching perspective and provide a foundation for future research efforts.

Despite extensive research and great care in the selection, examining the status quo literature reflects only selected perspectives. The literature reviews are largely based on the systematic prior work of other researchers. No own systematic literature review was conducted. Thus, the studies are limited to a subset of available BM sources and research directions. Despite the

inclusion of also current literature, which was continuously screened, e.g., utilizing search alerts, it cannot be guaranteed that all available perspectives in the BM field were considered. Research has also focused on selected aspects of the BM, particularly the study of BM components and possible supporting methods. For the latter, the status quo analysis reveals an immense set of methods for creative work, strategic analysis, or in the context of product and market development. The selection of methods for the framework was based on previously defined criteria. The researcher thereby evaluated the fulfillment of the criteria by the individual methods. While the researcher himself could draw on many years of experience in applying and teaching such methods, it cannot be guaranteed that the ideal method or methods were selected for each component.

Further limitations arise from the research design itself as well as the associated methods. The holistic nature of the BM concept inevitably means that a BMD framework must also be holistically designed. Such a comprehensive artifact requires an evaluation strategy that is itself very broad. Depending on the evaluation strategy, it would be possible first to evaluate the artifact's sub-aspects individually and then evaluate the artifact as a whole. In the present case, with 15 individual components, this would ideally also mean 15 individual evaluations. However, the present case's primary goal was not to evaluate all the individual subcomponents' effectiveness but to determine whether the artifact as a whole enables the user to design a BM. Although the evaluation strategy was purely formative, i.e., after the minor adaptations of Version Two, the artifact's effectiveness was not tested summative, the selected evaluation design nevertheless enabled a conclusive positive answer to be given that the artifact in its current form fulfills all the requirements set.

For more specific and focused aspects, the chosen validation (per research design) is not suitable. Nevertheless, it is reasonable and necessary to analyze the artifact's individual aspects in more detail in future studies. For example, it could be shown that certain methods for individual components need to be further specified or optimized.

There are also natural limitations regarding the methods used during the evaluation, i.e., the field experiments, the questionnaires, and the interviews. In total, two questionnaires were developed, one for the preliminary study on the state of the art of BMD in startups (chapter 3.2) and one for the evaluation of BMDF (chapter 4.4.5.2). In both cases, the questionnaires' design, wording, and scales were developed following standard research guidelines. Besides, existing constructs that had already been studied for their scientific quality were used. In the preliminary study, an additional pretest was conducted to test the resulting survey instrument's performance. However, this test of content validity was qualitative, as no statistical measures could be applied. A general limitation of questionnaires is that one cannot be certain whether the

data obtained are biased, as non-respondents may differ from those who responded (Sekaran und Bougie 2016).

The preliminary study results are based on the experiences of 45 startups, which means that only part of the diversity of startups is represented. There are limitations in terms of startup region, startup sector, and startup stage. For example, the quantitative study mainly reflects startups from Germany and Europe, the IT & Technology and Energy & Power sectors, and within the growth phase. Therefore, the empirical study can only show a sample of the actual BMD procedures in startup practice. However, this study's main objective was to provide initial insights into how founders proceed in the BMD process and how satisfied they are with their process, and the available supporting frameworks. To this end, despite the small sample, clear insights could be gained, and the relevance or need for further development of new frameworks could undoubtedly be seen.

The sample size is also a limitation of the quantitative surveys in the two evaluation cycles. In the first cycle, a sample size of nine participants could be used. However, this phase's results were primarily used to identify areas for improvement (formative evaluation) and tended to identify challenges and problems in the use of the framework. Numerous requirements for the artifact were found to be satisfactory after the initial evaluation. However, due to the small sample size, all requirements were retested in the second cycle. Here, a sample size of 32 participants was generated. Compared to quantitative surveys that measure statistical correlations, this sample seems rather small. However, it must be emphasized that 42 prospective companies were involved in the evaluation and thus indirectly in the design of the artifact. The user group's direct interaction with the artifact during the workshops, i.e., the time during which the user group interacted with the artifact directly under guidance, comprised 24 full working days over the entire evaluation period. Therefore, given the depth of interaction with the teams, the time and effort required to apply the artifact, and the scale and complexity of the intervention and observation, this sample can still be considered a respectable number.

Moreover, correlations regarding participants' prior knowledge, the company's industry, or other contextual variables and the framework's evaluation are initially less relevant to the present work. The developed framework is intended to support startups in designing their BM, regardless of their maturity level, context, or prior knowledge of the founders. Therefore, more important than the sample size is the heterogeneity of the participants. Here, the sample could include participants with different prior knowledge from teams with different development stages, products, customer groups, and markets. Hence, the sample can be considered sufficient for the goal of the survey.

Furthermore, it should be noted that only those founders could participate in the evaluation survey who also worked with the framework in one of the workshops. This obligation limits the possible group of participants. Nevertheless, 90% and 75% of all workshop participants could be won over as participants in the surveys, which corresponds to a very good response rate.

In this context, two other bias effects must be taken into account, the acquiescence bias and the social desirability bias. The questionnaires in the evaluation cycles show overall very positive response rates. Item difficulty was very high for some questions, indicating a general affirmative tendency of some questions and a possible acquiescence bias. However, these questions generally referred to the general evaluation of the workshop or the workshop leader and can therefore be neglected for the artifact's actual evaluation. Nevertheless, these response rates may also reveal a social desirability bias, as participants were aware that the workshop leader also developed the artifact himself. To intentionally counteract this bias, students conducted the data collection of the surveys and the interviews. This division of tasks was intended to ensure a clear separation between workshop leadership and evaluation of the artifact.

During both survey processes, the preliminary study and the evaluation, the challenge of recruiting startups as survey participants became apparent. Due to their limited time, it is recommended to keep the questionnaire very short and focus on the most important research questions. Optimally, the survey should be limited to about 12 to 18 questions, and participants should be able to complete the survey in less than ten minutes. Besides, other incentives could help motivate entrepreneurs to participate in such studies (e.g., the chance to win a one-day BMD workshop, an interview published in a journal, or the opportunity to pitch to business angels). Feedback from entrepreneurs with purely technical backgrounds also illustrates that questions can be difficult to understand if they are heavily related to business management theories. Therefore, survey questions should be abstracted from theory as much as possible to better adapt to different audiences. Finally, most of the preliminary study responses could be collected at startup events or through connections in the personal network. Therefore, it is recommended to attend startup events and use direct networks to increase the data sample.

Considering that the artifact's exact use should be analyzed in its environment in the context of the field evaluation, it was necessary to add a qualitative research approach to the surveys, allowing for more in-depth information on problems or challenges in using the artifact. Therefore, the following will consider the fulfillment of six general quality criteria of qualitative research concerning this work (Mayring 2016):

1. Procedural documentation
2. Argumentative validation of interpretation

3. Rule guidance
4. Proximity to the object
5. Communicative validation
6. Triangulation

The procedural documentation can be regarded as fulfilled since the development, execution, and analysis of the evaluation were presented in detail. The criterion of argumentative validation of interpretation concerns that the qualitatively obtained results must be justified argumentatively, which has been done in detail in this thesis. Thus, this requirement is also fulfilled. Furthermore, it is important to conduct qualitative research using process models to ensure the analysis results' quality. These were applied and followed in every evaluation step so that the requirement of rule-guidance is also considered fulfilled. Proximity to the subject matter has been fulfilled by going into the "field" and having direct and open exchanges with the users. Communicative validation means that to check the validity of the results, they must be discussed with the interviewee. In the context of the interviews, this was done by asking questions. Hence, this criterion is also considered fulfilled. Triangulation of the research design, data collection, and data analysis methods ensured high-quality results.

Overall, all six necessary general quality criteria of qualitative research were met, demonstrating the quality of this study's findings.

The study's strengths include using an evaluation design developed on the current research state in a real setting with real participants (field observation and validation). The good participant retention within the interventions also contributes to the quality of the collected data. The very detailed presentation of the methodological elaboration, application, and evaluation increases the transparency, comprehensibility, and credibility of the results. The inclusion of relevant, neighboring research fields such as qualitative social research improves the level and value of the elaborated research process and results. In the qualitative study's application and analysis, insights were also gained concerning the artifact's requirements. Thus, important statements could also be made regarding the degree of fulfillment of the functional, environmental, and user-related requirements.

However, several limitations must be considered here, which may influence the evaluation results. One important limitation is because the total number of users surveyed is small. Therefore, generalizing the results should be done with caution. It might also be useful to evaluate the artifact in a broader context concerning the proposed improvements and confirm the lessons learned for meeting the requirements.

It should also be noted that most of the participants in the study were highly educated men. However, in terms of gender, it is not uncommon for men to be overrepresented in entrepreneurship in general. Therefore, the fact that fewer women are reached in this study is not surprising. Nevertheless, to improve generalizability, future studies should include more women who are interested in entrepreneurship. Also, individuals with lower levels of education should be included.

Besides, it would have strengthened the evaluation if more follow-up studies had been conducted. Since only the effects immediately after the workshop could be evaluated, it was impossible to derive long-term effects related to BMD.

Further limitations regarding the quality of the obtained results are based on the fact that the artifact's evaluation is almost exclusively based on studies with self-reported data such as the questionnaires and the interviews. Although this assessment approach is common in similar evaluation studies, these measures may be inadequate for a definitive assessment because they rely solely on respondents' ability to describe the condition accurately. Therefore, there is a possibility that the statements could be biased, such as respondent bias. However, in this study, self-reports are supplemented by a more objective, observation-based method, which mitigates the subjective bias effects mentioned above. Also, for organizational reasons, there cannot be a comparison group without an intervention measure.

Since only some of the potential users of the BMDF participate in the evaluation, dropout from participation and use of the artifact cannot be reliably captured, which may bias conclusions about BMDF uptake. This aspect should be investigated more systematically in future studies to collect more information on the reasons for dropout and to be able to assess them. Such information could be important for assessing the artifact's acceptability and quality, as determining whether dropout is related to certain factors could allow the artifact to be improved and thus reduce nonuse in the long term.

5.3 Outlook and Concluding Remarks

This dissertation's goal was to develop a framework that startups can use to design their BM effectively.

To this end, an artifact was developed that contains significant structural and content improvements compared to existing approaches to BMD. The developed framework supports startups, regardless of their development stage and economic background, in effectively designing their BM. Thus, this research project has achieved its original goal and answered all research questions posed.

Nevertheless, as addressed in the previous chapters, there are several opportunities for further research. First, the data collected could be further analyzed. Another possibility for data analysis is provided by the possible user types of BMDF mentioned above. The qualitative analysis of the interviews and questionnaire already provided initial indications of these.

Depending on the users' prior knowledge and expertise, the BMDF offers different advantages and is used differently after its first use in the workshop. The artifact could be further elaborated in a more application-specific way through a type-building analysis, which could better meet the users' needs. Insights into these user types could hold the potential to tailor the BMDF to specific user groups further. The framework's modular structure would allow the BMD to be tailored to the user group by pre-selecting the components and methods most relevant to the group. The first step in this direction has already been taken with the principles presented for effective BMD. Analyzing user behavior concerning the defined BMD purposes and focusing on specific downstream methods could provide insights for further development or better modularization of the BMDF. This analysis may further improve the quality of the artifact, leading to higher user satisfaction and retention.

This setting may also further analyze how the startup's specific business context influences its BMD process. BMD processes could be aligned with the specific influences of the business context.

Furthermore, in another evaluation study with the same participants, the artifact's long-term effects could be investigated and assessed.

Overall, the present work demonstrated that the developed framework effectively supports startups' BMD. However, future work could investigate whether the new framework is also more effective than the existing ones. For example, an A/B test could be conducted where one group uses the new BMDF to design a BM, and the comparison group uses existing frameworks such as the BM Canvas instead. Following this, both groups could present their BMs to a panel of investors or other experts. This test could also be used to examine whether the BMDF also succeeds in designing better or more appropriate BMs.

Such A/B tests could also be conducted to test the particular methods used within the framework specifically. The presented method set shows excellent results in its entirety. Nevertheless, it cannot be excluded that there are better methods for certain tasks or that even more suitable methods should be developed. A/B tests offer good opportunities to compare certain methods under the same conditions and select the best possible variants.

In any case, due to the inherent limitations of this work, the new BMDF should be continuously challenged and refined. Given the importance of a well-designed BM to startups' long-term success, such an effort is time well spent.

Just as this paper began with a quote from Paulo Coelho's "The Alchemist" (1998), it ends with a quote from the same novel:

"There is only one way to learn. It's through action. Everything you need to know you have learned through your journey."

Like the quote at the beginning of this work, this one also contains two perspectives. This research project was only able to become successful because it transferred theoretical knowledge into practice and then developed this further through intensive action with the user group.

The result of this research journey, the BMDF, is intended to support founders on their journey by giving them the tools they need to design their BM. Ultimately, even the best tools do not add value if they are not based on real information. Therefore, this quote sums up what all founders need to do along the BMD process. Learn by gathering information, analyzing information, making decisions, and then putting into action what they have learned and decided - and observe to keep learning.

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Appendix

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Appendix A – State of the Art

A1 – List of studies included in the selection of the BM components

List of studies included in the selection of the BM components

	Author	Year	Titel	Journal
1	Slywotzky, Adrian J.	1996	Value migration. How to think several moves ahead of the competition	
2	Timmers, Paul	1998	Business models for electronic markets	Electronic Markets
3	Mahadevan, Balasubramaniam	2000	Business models for Internet-based e-commerce: An anatomy	California management review
4	Linder, J.; Cantrell, S.	2000	Changing Business Models: Surveying the Landscape	
5	Tapscott, Don; Ticoll, David; Lowy, Alex	2000	Digital capital: Harnessing the power of business webs	Ubiquity
6	Hamel, Gary	2000	Leading the Revolution Harvard Business School Press	Boston, MA, USA
7	Petrovic, Otto; Kittl, Christian; Teksten, Ryan Dain	2001	Developing Business Models for Ebusiness	SSRN Journal (SSRN Electronic Journal)
8	Rayport, Jeffrey F.; Jaworski, Bernard J.	2001	E-commerce	
9	Wirtz, Bernd W.	2001	Electronic Business	
10	Afuah, Allan; Tucci, Christopher L.	2001	Internet business models and strategies: text and cases	MacGraw-Hill/Irwin
11	Alt, Rainer; Zimmermann, Hans-Dieter	2001	Introduction to special section-business models	Electronic Markets-The International Journal
12	Hamel, Gary	2001	Leading the revolution	Strategy & Leadership
13	Weill, Peter; Vitale, Michael R.	2001	Place to space. Migrating to eBusiness models	
14	Amit, Raphael; Zott, Christoph	2001	Value creation in e-business	Strat. Mgmt. J. (Strategic Management Journal)
15	Dubosson-Torbay, Magali; Osterwalder, Alexander; Pigneur, Yves	2002	E-business model design, classification, and measurements	Thunderbird International Business Review
16	Maitland, C.; van de Kar, E.	2002	First BITA case study experiences with regard to complex value systems	
17	Stähler, Patrick	2002	Geschäftsmodelle in der digitalen Ökonomie. Merkmale, Strategien und Auswirkungen	
18	Knyphausen-Aufseß, Dodo zu; Meinhardt, Yves	2002	Revisiting Strategy: ein Ansatz zur Systematisierung von Geschäftsmodellen	
19	Bieger, Thomas; Rüegg-Stürm, Johannes; Rohr, Thomas von	2002	Strukturen und Ansätze einer Gestaltung von Beziehungskonfiguration—Das Konzept Geschäftsmodell	
20	Hoque, Faisal	2002	The alignment effect: How to get real business value out of technology	
21	Chesbrough, Henry; Rosenbloom, Richard S.	2002	The role of the business model in capturing value from innovation: evidence from Xerox Corporation's technology spin-off companies	Industrial and corporate change
22	Bouwman, Harry	2002	The sense and nonsense of Business Models	
23	Magretta, Joan	2002	Why business models matter	Harvard business review
24	Pateli, Adamantia G.; Giaglis, George M.	2003	A methodology for business model evolution. Application in the mobile exhibition industry	

List of studies included in the selection of the BM components (continued)

	Author	Year	Titel	Journal
25	Faber, Edward; Ballon, Pieter; Bouwman, Harry; Haaker, Timber; Rietkerk, Oscar; Steen, Marc	2003	Designing business models for mobile ICT services	
26	Afuah, Allan; Tucci, Christopher L.	2003	Internet business models and strategies: Text and cases	
27	Chesbrough, Henry William	2003	Open innovation: The new imperative for creating and profiting from technology	
28	Bouwman, Harry	2003	State of the art on Business Models	Enschede, Telematica Instituut
29	Hedman, Jonas; Kalling, Thomas	2003	The business model concept: theoretical underpinnings and empirical illustrations	European Journal of Information Systems
30	Gordijn, Jaap; Akkermans, J. M.	2003	Value-based requirements engineering: exploring innovative e-commerce ideas	Requirements Eng (Requirements Engineering)
31	Mahadevan, B.	2004	A framework for business model innovation	IMRC Conference, Bangalore
32	Afuah, Allan	2004	Business models. A strategic management approach	
33	Haaker, Timber; Bouwman, Harry; Faber, Edward	2004	Customer and network value of mobile services: Balancing requirements and strategic interests	ICIS 2004 Proceedings
34	Osterwalder, Alexander	2004	The business model ontology a proposition in a design science approach	
35	Voelpel, Sven C.; Leibold, Marius; Tekie, Eden B.	2004	The wheel of business model reinvention: how to reshape your business model to leapfrog competitors	Journal of Change Management
36	Yip, George S.	2004	Using Strategy to Change Your Business Model	Business Strategy Review
37	Osterwalder, Alexander; Pigneur, Yves; Tucci, Christopher L.	2005	Clarifying business models: Origins, present, and future of the concept	Communications of the association for Information Systems
38	Schweizer, Lars	2005	Concept and evolution of business models	Journal of General Management
39	Lehmann-Ortega, Laurence; Schoettl, Jean-Marc	2005	From buzzword to managerial tool: The role of business models in strategic innovation	CLADEA, Santiago de Chile
40	Tikkanen, Henrikki; Lamberg, Juha-Antti; Parvinen, Petri; Kallunki, Juha-Pekka	2005	Managerial cognition, action and the business model of the firm	Management Decision
41	Morris, Michael; Schindehutte, Minet; Allen, Jeffrey	2005	The entrepreneur's business model: toward a unified perspective	Journal of Business Research
42	Shafer, Scott M.; Smith, H. Jeff; Linder, Jane C.	2005	The power of business models	Business horizons
43	Girmscheid, Gerhard	2006	Strategisches Bauunternehmensmanagement: prozessorientiertes integriertes Management für Unternehmen in der Bauwirtschaft	
44	Ernest, Mark; Nisavic, John M.	2007	Adding value to the IT organization with the component business model	IBM Syst. J. (IBM Systems Journal)

List of studies included in the selection of the BM components (continued)

Author	Year	Titel	Journal
45 Ballon, Pieter	2007	Business modelling revisited: the configuration of control and value	info
46 Ballon, Pieter	2007	Business modelling revisited: the configuration of control and value	info
47 Lambert, Susan	2008	A conceptual framework for business model research	BLED 2008 Proceedings
48 Al-Debei, Mutaz M.; El-Haddadeh, Ramzi; Avison, David	2008	Defining the business model in the new world of digital business	School of Information Systems, Computing and Mathematics;
49 Hwang, Jason; Christensen, Clayton M.	2008	Disruptive innovation in health care delivery: a framework for business-model innovation	Health affairs
50 Johnson, Mark W.; Christensen, Clayton M.; Kagermann, Henning	2008	Reinventing your business model	Harvard business review : HBR
51 Richardson, James	2008	The business model: an integrative framework for strategy execution	Strategic change
52 Shi, Yuwei; Manning, Tom	2009	Understanding business models and business model risks	The Journal of Private Equity
53 Zott, Christoph; Amit, Raphael	2010	Business model design: an activity system perspective	Long Range Planning
54 Demil, Benoît; Lecocq, Xavier	2010	Business Model Evolution: In Search of Dynamic Consistency	Long Range Planning
55 Osterwalder, Alexander; Pigneur, Yves	2010	Business model generation: a handbook for visionaries, game changers, and challengers	
56 Al-Debei, Mutaz M.; Avison, David	2010	Developing a unified framework of the business model concept	European Journal of Information Systems
57 Johnson, Mark W.	2010	Seizing the white space: Business model innovation for growth and renewal	
58 Bieger, Thomas; Reinhold, Stephan	2011	Das wertbasierte Geschäftsmodell-ein aktualisierter Strukturierungsansatz	
59 Onetti, Alberto; Zucchella, Antonella; Jones, Marian V.; McDougall-Covin, Patricia P.	2012	Internationalization, innovation and entrepreneurship. Business models for new technology-based firms	Journal of Management & Governance
60 Onetti, Alberto; Zucchella, Antonella; Jones, Marian V.; McDougall-Covin, Patricia P.	2012	Internationalization, innovation and entrepreneurship: business models for new technology-based firms	Journal of Management & Governance
61 Zutshi, Aneesh; Grilo, António; Jardim-Gonçalves, Ricardo	2014	A dynamic agent-based modeling framework for digital business models: Applications to Facebook and a popular Portuguese online classifieds website	
62 Joyce, Alexandre; Paquin, Raymond L.	2016	The triple layered business model canvas: A tool to design more sustainable business models	Journal of Cleaner Production

Appendix B – Quantitative Pre-Study on BMD Practice

B1 – Questionnaire of the pre-study

Entrepreneurial Business Model Design

1 With which one of the following Business Model definitions do you most agree with?

Fragesupport: *Please choose the answer you most agree with*

- A Business Model is the economic model of a company. It defines the method for making money in a concrete business environment.
 A Business Model is an architectural configuration that defines the structures and processes to create value.
 A Business Model is a set of decisions on the most relevant business aspects. This includes decision making on internal and external arrangements.
 I don't know

2 What is the main purpose to execute Business Model Design in your startup?

Fragesupport: *Please select one answer*

- Presenting business ideas to stakeholders - for example, potential investors.
 Validating business idea(s).
 Identify opportunities and risks.
 Getting a general overview of the configuration of the most important business components.
- Defining all business components in detail.
 Reduction of complexity.
 There is no specific purpose for Business Model Design.
 I don't know

3 What is the primary design goal for the Business Model concept of your startup?

Fragesupport: *Please select one answer*

- Identifying the option for the highest possible profit margin.
 Creating the highest possible value for potential customers and other stakeholders.
 Finding a solution to realize a sustainable business and growth.
 There is no specific design goal for the Business Model.
- I don't know

4 How often do you actively execute Business Model Design in your startup?

Fragesupport: *Please select one answer*

- Business Model Design is/was a one time action in the early startup phase.
 Business Model Design is/will be a continuous process and therefore a standard activity in the startup.
 Business Model Design is executed irregularly and only in case of needs for adaption of the current Business Model.
 Business Model Design is not executed actively.
- I don't know

Entrepreneurial Business Model Design

5 Who is currently responsible for the Business Model Design in your startup?

Fragessupport: *Please select one answer*

- It is the founder's responsibility.
 It is the responsibility of the Business Development Department.
 The responsibility is shared between founders and external partners.
 The responsibility is assigned to a specific employee independent of a department.
 I don't know

6 How can the offer(s) of your startup be classified?

Fragessupport: *Please choose at least one main category and additional categories only if applicable*

	main offering(s)	additional offering(s)
Consumer Product(s)	<input type="checkbox"/>	<input type="checkbox"/>
Industrial Product(s)	<input type="checkbox"/>	<input type="checkbox"/>
Digital Product(s)	<input type="checkbox"/>	<input type="checkbox"/>
Personal Service(s)	<input type="checkbox"/>	<input type="checkbox"/>
Online Service(s)	<input type="checkbox"/>	<input type="checkbox"/>
I don't know	<input type="checkbox"/>	<input type="checkbox"/>

7 In which market(s) is your startup mainly active in?

Fragessupport: *Please select one answer*

- B2C
 B2B
 B2C and B2B
 I don't know

8 To what extent do you agree with the following statements about the effectiveness and efficiency of the Business Model Design process in your startup?

Fragessupport: *Please select one answer in each row*

	I fully agree	I mostly agree	neutral	I mostly disagree	I fully disagree
The time effort for the Business Model Design is very high.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The time effort for the Business Model Design is very high.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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The results of the Business Model Design are very satisfactory.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The prioritization of solution alternatives and the design of detailed business model concepts is very successful.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The idea creation and design of solution alternatives is very successful.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The information collection and analysis of business context is very successful.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The overall Business Model Design process is very efficient.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

9 Which one(s) of the following Business Model frameworks are you using for your startup?

Fragesupport: Please select one or several answers

- Business Model Canvas
- St. Gallen Business Model Navigator
- Platform Business Model Canvas
- Lean Canvas
- Blue Ocean Strategy
- Jobs-to-be-done
- no Business Model Design frameworks are used
- other frameworks are used
- I don't know

10 To what extent do you agree with the following statements regarding your Business Model Design process?

Fragesupport: Please select one answer in each row

	I fully agree	I mostly agree	neutral	I mostly disagree	I fully disagree
The tools for Business Model Design used are very helpful and supportive.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Guided workshops related to Business Model Design are very helpful.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The tools for Business Model Design used are very satisfactory.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The existing Business Model Design tools meet the individual requirements for creating a business model concept.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The existing Business Model Design tools cover all information needed to design a complete Business Model.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Entrepreneurial Business Model Design

11 In which order do you most likely consider the following aspects of Business Model Design?

Fragesupport: *Please change the order of items according to your preferences. (the first - the most important, the last - least important).*

Customer & Market	<input type="text"/>
Products & Services	<input type="text"/>
Organizational Processes & Structures	<input type="text"/>
Financial Aspects	<input type="text"/>
Partner & Networks	<input type="text"/>
Resources & Competencies	<input type="text"/>

12 How important do you consider the different components for your Business Model(s)?

Fragesupport: *Please choose an answer in each row*

	highly important	important	neutral	less important	not important
Activities & Processes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Competencies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cost Factors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Customer Relationships	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Customer Segments	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Distribution Channels	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Funding	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Market & Competitors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Partnerships	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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Resources & Assets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Revenue Streams	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Strategy & Vision	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Value Network	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Value Proposition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

13 How would you allocate the time effort in the three Business Model Design phases for your startup?

Fragesupport: *Please distribute 100% in total to the different phases below*

Zuordnen: 100 Punkte

Initiation - Information collection and conducting analysis for the Business Model Design	<input type="text"/>
Ideation - generating different Business Model ideas and concepts	<input type="text"/>
Integration - designing selected Business Model concepts in detail	<input type="text"/>

14 How important do you perceive the following analysis for the Business Model Design of your startup?

Fragesupport: *Please choose an answer in each row*

	highly important	important	neutral	less important	not important
Competitor & Bechmark Analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Customer Analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Financial Analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Market Analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Network Analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Scenario- & Strategic Foresight Analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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Stakeholder Analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Trend Analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Internal Organization Analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

15 How detailed do you actively execute the following analysis for the Business Model Design of your startup?

Fragesupport: *Please choose an answer in each row*

	very detailed	detailed	less detailed	not executed	I don't know
Competitor & Bechmark Analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Customer Analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Financial Analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Market Analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Network Analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Scenario- & Strategic Foresight Analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder Analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Trend Analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Internal Organization Analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

16 From which country is your startup (originally) from?

Fragesupport: *Please enter the founding country of your startup as full name (i.e. Germany)*

Entrepreneurial Business Model Design

17 Since when does your startup exist (actively working on your startups business idea)

Fragessupport: *Please choose one answer*

- 1 year or less More than 1 year until 2 years More than 2 years until 3 years More than 3 years I don't know

18 How many employees does your startup have?

Fragessupport: *Please choose one answer*

- < 10 employees 11 to 50 employees 51 to 100 employees > 100 employees I don't know

19 What is the current phase of your startup?

Fragessupport: *Please choose one answer*

- Seed (Ideation, Concepting) Startup (Commitment, Validation) Growth (Scaling, Establishing) I don't know

20 Is or was your startup part of an accelerator or incubator?

Fragessupport: *Please select one answer*

- Yes No I don't know

21 What is the current reach of your startup?

Fragessupport: *Please choose one answer*

- Local - market presence in a small region in the country of origin National - market presence in the main regions of the country of origin International - market presence in several countries Global - market presence in (almost) all world regions
- I don't know

Entrepreneurial Business Model Design

22 What branch does your startup mainly belong to?

Fragesupport: *Please select one branch that represents your startup best*

- | | | | | |
|--|---|---|---|---|
| <input type="radio"/> Agriculture & Forestry | <input type="radio"/> Aviation & Aerospace | <input type="radio"/> Artificial Intelligence & Data Analysis | <input type="radio"/> Art, Entertainment & Recreation | <input type="radio"/> Automotive |
| <input type="radio"/> Bio Technology | <input type="radio"/> Chemistry & Raw Materials | <input type="radio"/> Construction | <input type="radio"/> Consulting | <input type="radio"/> Consumer Goods |
| <input type="radio"/> Cosmetics | <input type="radio"/> E-Commerce | <input type="radio"/> Education | <input type="radio"/> Electronics & Metals | <input type="radio"/> Energy & Power Supply |
| <input type="radio"/> Finances & Insurances | <input type="radio"/> Food | <input type="radio"/> Health | <input type="radio"/> Hotel, Gastronomy & Tourism | <input type="radio"/> IT & Technology |
| <input type="radio"/> Legal Services | <input type="radio"/> Logistics industry | <input type="radio"/> Media & Marketing | <input type="radio"/> Real Estate & Housing | <input type="radio"/> Pharma |
| <input type="radio"/> Politics | <input type="radio"/> Public Administration | <input type="radio"/> Service Industry | <input type="radio"/> Shipbuilding & Marine Engineering | <input type="radio"/> Telecommunications |
| <input type="radio"/> Textile & Clothing | <input type="radio"/> Trade | <input type="radio"/> Transportation & Storage | <input type="radio"/> Water, Sewage & Disposal | <input type="radio"/> Other |

23 In case you are interested in our results and possible new ideas for Business Model Design tools, you are welcome to optionally leave your e-mail address below

Fragesupport: *In case you're interested in our results, please enter your e-mail address*

Thank you for your support, your time, and for sharing your startup experience with us!

We appreciate your contribution a lot. We are very excited about new insights from the entrepreneurial business model design practice and hope to gain new findings that we can share with you and the startup world.

We wish you a successful day, full of entrepreneurial spirits!

Please continue and click "submit" on the right to send your answer and leave the questionnaire.

B2 – Importance level versus activity level of statistical analyses

Importance and Activity Level of Strategic Analysis in Business Model Design		very detailed	detailed	less detailed	not executed	I don't know	Total
Competitor & Benchmark Analysis	highly important	13.3%	6.7%	0.0%	0.0%	0.0%	20.0%
	important	6.7%	31.1%	4.4%	2.2%	0.0%	44.4%
	neutral	2.2%	8.9%	11.1%	0.0%	0.0%	22.2%
	less important	0.0%	4.4%	4.4%	0.0%	0.0%	8.9%
	not important	2.2%	0.0%	2.2%	0.0%	0.0%	4.4%
Customer Analysis	highly important	28.9%	20.0%	2.2%	0.0%	0.0%	51.1%
	important	15.6%	15.6%	2.2%	0.0%	0.0%	33.3%
	neutral	4.4%	0.0%	11.1%	0.0%	0.0%	15.6%
	less important	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	not important	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Financial Analysis	highly important	11.1%	8.9%	2.2%	0.0%	0.0%	22.2%
	important	6.7%	24.4%	8.9%	2.2%	0.0%	42.2%
	neutral	0.0%	8.9%	13.3%	0.0%	0.0%	22.2%
	less important	0.0%	2.2%	8.9%	2.2%	0.0%	13.3%
	not important	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Market Analysis	highly important	26.7%	17.8%	6.7%	0.0%	0.0%	51.1%
	important	2.2%	20.0%	8.9%	0.0%	0.0%	31.1%
	neutral	2.2%	4.4%	8.9%	2.2%	0.0%	17.8%
	less important	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	not important	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Network Analysis	highly important	2.2%	2.2%	2.2%	0.0%	0.0%	6.7%
	important	6.7%	11.1%	15.6%	2.2%	0.0%	35.6%
	neutral	2.2%	11.1%	20.0%	2.2%	0.0%	35.6%
	less important	0.0%	2.2%	2.2%	8.9%	4.4%	17.8%
	not important	0.0%	0.0%	0.0%	4.4%	0.0%	4.4%
Scenario- & Strategic Foresight Analysis	highly important	2.2%	6.7%	0.0%	0.0%	0.0%	8.9%
	important	8.9%	26.7%	13.3%	4.4%	0.0%	53.3%
	neutral	0.0%	8.9%	8.9%	11.1%	0.0%	28.9%
	less important	2.2%	2.2%	2.2%	0.0%	0.0%	6.7%
	not important	0.0%	0.0%	0.0%	2.2%	0.0%	2.2%
Stakeholder Analysis	highly important	0.0%	4.4%	0.0%	0.0%	0.0%	4.4%
	important	0.0%	17.8%	26.7%	2.2%	0.0%	46.7%
	neutral	0.0%	4.4%	20.0%	8.9%	0.0%	33.3%
	less important	0.0%	2.2%	2.2%	6.7%	2.2%	13.3%
	not important	0.0%	0.0%	0.0%	2.2%	0.0%	2.2%
Trend Analysis	highly important	17.8%	6.7%	2.2%	0.0%	0.0%	26.7%
	important	4.4%	8.9%	15.6%	4.4%	0.0%	33.3%
	neutral	0.0%	6.7%	20.0%	2.2%	0.0%	28.9%
	less important	0.0%	2.2%	2.2%	4.4%	0.0%	8.9%
	not important	0.0%	0.0%	2.2%	0.0%	0.0%	2.2%
Internal Organization Analysis	highly important	6.7%	4.4%	4.4%	2.2%	0.0%	17.8%
	important	2.2%	15.6%	15.6%	0.0%	0.0%	33.3%
	neutral	0.0%	2.2%	20.0%	4.4%	0.0%	26.7%
	less important	0.0%	2.2%	4.4%	8.9%	0.0%	15.6%
	not important	0.0%	0.0%	0.0%	2.2%	4.4%	6.7%

Appendix C – Design of the Artifact

C.1 – List of potential accompanying methods to be used within BMD

List of potential accompanying methods			
Business Model Component	Accompanying Methods		
Purpose & Team	<ul style="list-style-type: none"> · Benchmarking · Gap Analysis · Porter's Generic Strategies · Scenario Analysis · SWOT Analysis · Walt-Disney Method 	<ul style="list-style-type: none"> · Blue Ocean Strategy · PESTEL Analysis · Profitability path and breakeven time · Scrum · Team Canvas 	<ul style="list-style-type: none"> · Business Wargaming · Porter's Five Forces · Risk Analysis · Strategic Framework · Team Core Values
Customer Segments	<ul style="list-style-type: none"> · Categories of Customer Relations · Diffusion of Innovation · Market Entry Guideline · Persona · Storytelling 	<ul style="list-style-type: none"> · Customer Journey Maps · Innovation-Decision Process · Mom-Test · SERVQUAL 	<ul style="list-style-type: none"> · Customer Lifetime Value · Jobs-to-be-done · Net Promoter Score · System 1 and 2 Thinking
Value Proposition	<ul style="list-style-type: none"> · (Blog) Post · Brainstorm Rules · Crowdsourcing · Event · Idea Profiles · Mash-Up Innovation · Online Advertising · Problem/Solution Interview · Six Thinking Hats · Unique Selling Point 	<ul style="list-style-type: none"> · Affinity Map · Business Model Navigator · Delphi Survey · Flyer · Landing Page · Method of Analogies · Picnic in the Graveyard · Prototype · Survey · Value Proposition Explorer 	<ul style="list-style-type: none"> · Assessment Spreadsheet · Collective Notebook · Design Thinking · Future Workshop · Lotus Blossom · Minimal Viable Product · Pop-up Store · SIMALTO · The 7Ps · Value Proposition Statement
Core Activities & Processes	<ul style="list-style-type: none"> · Business Process Model Notation · The 7Ps 	<ul style="list-style-type: none"> · Concierge Test · Unique Selling Point 	<ul style="list-style-type: none"> · Porter's Value Chain
Core People	<ul style="list-style-type: none"> · PESTEL Analysis · The 7Ps 	<ul style="list-style-type: none"> · Porter's Value Chain · VRIO Framework 	<ul style="list-style-type: none"> · SWOT Analysis
Core Assets	<ul style="list-style-type: none"> · PESTEL Analysis · VRIO Framework 	<ul style="list-style-type: none"> · Porter's Value Chain 	<ul style="list-style-type: none"> · SWOT Analysis
Value Network	<ul style="list-style-type: none"> · Network Mining · Value Net 	<ul style="list-style-type: none"> · Stakeholder Analysis · Value Network Analysis 	<ul style="list-style-type: none"> · Value Delivery Architecture Model · Value Network Mapping
Market & Competitors	<ul style="list-style-type: none"> · Bottom-Up Approach · Four Corners Framework · Market Definition · Online Advertising · Pop-Up Store · Top-Down Approach · Value Theory Approach 	<ul style="list-style-type: none"> · Competitor Analysis Framework · Landing Page · Market Segmentation · Online-Community Analysis · Porter's Five Forces · Unique Selling Point 	<ul style="list-style-type: none"> · Flyer · Letter of Intent · Market Size Estimation · PESTEL Analysis · Pre-Order · Value Equivalence Line
Customer Relationships	<ul style="list-style-type: none"> · Categories of Customer Relations · Diffusion of Innovation · Net Promoter Score 	<ul style="list-style-type: none"> · Customer Journey Maps · Innovation-Decision Process · SERVQUAL 	<ul style="list-style-type: none"> · Customer Lifetime Value · Market Entry Guideline · System 1 and 2 Thinking
Distribution Channels	<ul style="list-style-type: none"> · Cost-Benefit Analysis · Marketing and Sales Funnel 	<ul style="list-style-type: none"> · Customer Journey Maps · The 7Ps 	<ul style="list-style-type: none"> · Distribution Phases
Strategic Partnerships	<ul style="list-style-type: none"> · ABC Analysis · Porter's Five Forces · Stakeholder Analysis 	<ul style="list-style-type: none"> · Carter's 10Cs Model · Procurement Phases 	<ul style="list-style-type: none"> · PESTEL Analysis · Procurement Types
Revenue Streams	<ul style="list-style-type: none"> · ABC Analysis · Cost-Based Pricing Approach · Pop-Up Store · The 7Ps · Van-Westendorp Pricing Approach 	<ul style="list-style-type: none"> · Business Model Navigator · Landing Page · Pre-Order · Value Equivalence Line 	<ul style="list-style-type: none"> · Competition-Based Pricing Approach · Market Entry Strategy · Price Service Positioning Matrix · Value-Based Pricing Approach
Cost Factors	<ul style="list-style-type: none"> · Cost Planning 	<ul style="list-style-type: none"> · Cost-Benefit Analysis 	<ul style="list-style-type: none"> · Scenario Analysis
Capital & Funding	<ul style="list-style-type: none"> · Cash Flow Plan · Funding Cycle and Sources 	<ul style="list-style-type: none"> · Early Stage Valuation · Scaling Stage Valuation 	<ul style="list-style-type: none"> · Exit Stage Valuation · WACC

C.2 – Observation protocol

Observation protocol from the systematic observation within the first evaluation cycle

Conditions

Location Business Model Design Workshop within the framework of the upCAT-Accelerator,

Period 08.-10.04.19 from 09:30 to 17:00 each day,

Lecturer Markus Lau

Number of participants 10

Number of Teams: 4

Observation notes	Theoretical notes	Methodological notes
Participants were informed about the observation project by the workshop leader		
Subjects sit together in constellations of two distributed around the room at tables	Possibility of cooperation, sparring	Observation from a table in the front right corner as seen by the workshop leader.
Workshop leader welcomes participants and introduces topics and focus	Thematic overview for better understanding	
Introduction of the participants including their own business idea	Concise formulation of the idea not yet possible	
Start of the presentation about what Business Models are and why they are necessary, one person takes notes and asks questions about the delimitation of the stakeholders, the rest listens	Introduction seems too long for people with previous experience and therefore uninteresting	
Questioning and subsequent presentation of the definition of the	There is no uniform idea or definition of the term business model among the participants	
Business Model, one person asks questions regarding the level of detail		
Presentation of aspects that will be looked at, explicit demand for stakeholder analysis and network analysis, value exchange and transaction, participants take notes	Attention of the participants increases	
Presentation of Core Assets and Core People, presentation of the example of Xerox	Interest decreases again at first, with example great interaction, interesting for participants	
Presentation of the five phases of Business Model Design		
Participants receive Business Model Design poster in A0, which can be taken away after the workshop, participants want to fill it in immediately and take pictures of it	Thematic overview for better understanding, possibility for analog filling, very high interest in it	The poster is presented to the observer in digital form
Participants start the practical part, quiet work in teams of two with exchange among each other, some teams finish quickly, others need more time	Thesis: teams with previous experience find it easier at first and therefore finish faster, but go into less detail	
Presentation of the Vision, feedback on the distinction between Mission, Vision and Goals	Differentiation between mission, vision and goals to be worked out more precisely	
Practical part Team Core Values, participants use Post-Its, remain seated on their chairs, behave relatively quietly, two teams finish earlier, the rest still need time, workshop leader gives feedback to the individual teams, query on demarcation of personal or company Values	Practical phase very undynamic and quiet, animation of the teams to more exchange by leadership, pin canvas on memo boards for more active sparring, values should be more abstracted	Observer now stands up and moves freely around the room to look over participants' shoulders
Practical part Persona, participants start directly into the elaboration, use Post-Its and one team uses a book they brought along, they ask questions about detail degree and sensing	Important aspect in the design of the business model	

Observation protocol from the systematic observation within the first evaluation cycle (continued)

Observation notes	Theoretical notes	Methodological notes
Presentation Solution Space, a lively discussion starts regarding the definitions Excitement and Differentiator,	Define terms more clearly	
Practical part Solution Space, participants have problems finding Excitement	Example of excitement	
Practical part Value Proposition Statements, participants work in teams on formulation, participants express difficulties with formulation	Formulation aid is a good help, otherwise further difficulties could arise	
Workshop leader asks the participants about their state of mind regarding the end of the workshop, their state of mind is good and they continue to be receptive	Timeline planned in advance makes sense, earlier end not necessary	
Presentation BPMN, participants have questions about how exactly to model which processes, participants digress	Example is necessary, high complexity, possibly too complex in this framework	
Presentation Value Network, participants listen attentively, participants ask questions about the exact process and beginning	Go into more detail during presentation to minimize queries	
Presentation Network Mining, practical part, teams discuss lively, questioning by lecturer to individual teams, teams need longer time	Extend time of practical part, approaches are good	
Feedback on day one by participants, lecturer talks to teams individually, participants would need more time, long discussions	Sparring in large group makes more sense, allow more time for participants with no prior knowledge	
Presentation VRIO Framework, participants are partly uninvolved, others take notes	Only interesting for participants without prior knowledge	
Practical part Assets/People, questions about patent, limited time and taxes, some teams are done	Only problematic for participants without prior knowledge	
Practical part Market Analysis, unknown to participants, lively interest, questions regarding where to find sources	Important aspect for participants	
Presentation Competitor Analysis including Magic Quadrant, Competitor Analysis Framework and Value Profile, questions about parameters	Overall easy to understand part	
Closing round including feedbacks and distribution of the questionnaire Workshop Evaluation with instructions for completion, presentation of the final voluntary interviews with reference to time of implementation	Use the same pen to fill in the form, to prevent conclusions about the person	Observer hands out Workshop Evaluation Questionnaire and collects it back after completion
Participants say goodbye and leave the room		

C.3 – Results from the test for intercoder reliability

Intercoder reliability quantifies the coding system's reliability between two (or more) persons who code the data material (so-called coders). Unlike this, intracoder reliability measures the reliability of an encoder's coding at different points in time. The latter was not analyzed further in this paper. Intercoder reliability describes the degree to which different individuals match in their coding results when applying the same rules (Gläser und Laudel 2010).

Since the developed code systems in this work are very detailed and some of the units are short, the presence or non-presence of the code in the document is chosen as the criterion for matching (Müller-Benedict 1997). The intercoder reliability is therefore calculated by means of the simple percentage agreement, using the following formula (Mayring 2015):

$$\text{Intercoder reliability} = \frac{\text{Number of coders} * \text{number of matching codes}}{\text{number of codes from coder 1} + \text{number of codes from coder 2}}$$

If the percentage agreement of the coding is greater than 0.9, there is high intercoder reliability. If the percentage agreement is significantly smaller than 0.8, this indicates less reliable results (Allen 2017). The following table shows the code matches between coder one and coder two in the respective evaluation cycles. On average, the intercoder reliability for the interviews from the first evaluation cycle is 0.78. For the second evaluation cycle, the average is 0.84. Thus, both values are at the lower edge of the acceptable range.

Calculation of intercoder reliability (Version One)



Respondent (Code)	Codes Coder 1	Codes Coder 2	Sum of all codes	Matching codes	Intercoder reliability
Respondent 1 (R01)	25	20	45	17	0.76
Respondent 2 (R02)	37	34	71	26	0.73
Respondent 3 (R03)	23	19	42	16	0.76
Respondent 4 (R04)	37	35	72	31	0.86
Respondent 5 (R05)	40	36	76	28	0.74
Respondent 6 (R06)	21	20	41	16	0.78
Respondent 7 (R07)	16	14	30	11	0.73
Respondent 8 (R08)	18	19	37	15	0.81
Respondent 9 (R09)	22	24	46	20	0.87
Respondent 10 (R10)	11	9	20	8	0.80
	250	230	480	188	0.78

Calculation of intercoder reliability (Version Two)

Respondent (Code)	Codes Coder 1	Codes Coder 2	Sum of all codes	Matching codes	Intercoder reliability
Respondent 11 (R11)	26	25	51	19	0.75
Respondent 12 (R12)	38	34	72	28	0.78
Respondent 13 (R13)	48	42	90	33	0.73
Respondent 14 (R14)	27	25	52	21	0.81
Respondent 15 (R15)	32	30	62	29	0.94
Respondent 16 (R16)	42	39	81	34	0.84
Respondent 17 (R17)					
Respondent 18 (R18)	45	43	88	41	0.93
Respondent 19 (R19)	31	34	65	26	0.80
Respondent 20 (R20)	32	31	63	28	0.89
Respondent 21 (R21)	27	25	52	22	0.85
Respondent 22 (R22)	34	36	70	30	0.86
Respondent 23 (R23)	18	19	37	17	0.92
	400	383	783	328	0.84

C.4 – Questionnaire for the artifact evaluation

Vorschau - nicht drucken

SurveyGrid	Workshop Evaluation 'Business Model Design'	
		

Bitte so markieren: Bitte verwenden Sie einen Kugelschreiber oder nicht zu starken Filzstift. Dieser Fragebogen wird maschinell erfasst.
 Korrektur: Bitte beachten Sie im Interesse einer optimalen Datenerfassung die links gegebenen Hinweise beim Ausfüllen.

1. Respondant's Demographics

1.1 Age: 20-30 years 31-40 years 41-50 years
 > 50 years

1.2 Position in the startup: Founding Team CxO Employee

1.3 Startup development stage:
 Ideation Phase First Customer Feedback MVP developed
 First pilot customers Already market traction Already founded
 External funding raised

1.4 Prior knowledge regarding Business Model Design
 no previous knowledge some previous knowledge already used similar methods
 already developed a first Business Model already participated in a startup support program (e.g., Accelerator)

2. Workshop management

2.1 The workshop management appeared to be technically competent. I fully agree I fully disagree

2.2 The workshop management was sufficiently focused on the needs of the participants (e.g. queries). I fully agree I fully disagree

2.3 The workshop leader was open for suggestions and criticism. I fully agree I fully disagree

3. Working atmosphere

3.1 The learning atmosphere among the participants was good. I fully agree I fully disagree

3.2 The behaviour of the participants in the discussion was appropriate. I fully agree I fully disagree

3.3 I actively participated in the discussions in the workshop. I fully agree I fully disagree

4. Content of the workshop

4.1 All subject areas were sufficiently addressed. I fully agree I fully disagree

4.2 It was possible for me to clearly understand the topics presented. I fully agree I fully disagree

4.3 My expectations with regard to the workshop have been fully met. I fully agree I fully disagree

5. Organization


5.1 In the workshop there was a lot of room for discussions. I fully agree I fully disagree

5.2 The theme plan was dynamic and flexible. I fully agree I fully disagree

5.3 There was enough time for breaks and recreation. I fully agree I fully disagree

5.4 The duration of the workshop was appropriate. I fully agree I fully disagree

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SurveyGrid	Workshop Evaluation 'Business Model Design'	
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5. Organization [Fortsetzung]

5.5 The information in the run-up to the workshop was sufficient and comprehensible. I fully agree I fully disagree

6. Learning Success


6.1 I think I learned a lot in this workshop.	very important	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	not important
6.2 The workshop has provided enough knowledge.	very important	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	not important
6.3 The workshop was valuable for me, because my knowledge or abilities have significantly improved.	very important	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	not important
6.4 Please rate each of the following topics of the workshop regarding their importance to you:	very important	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	not important
6.5 a) Purpose & Team	very important	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	not important
6.6 b) Customer Segments	very important	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	not important
6.7 c) Value Proposition	very important	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	not important
6.8 d) Core Activities & Processes	very important	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	not important
6.9 e) Core People	very important	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	not important
6.10 f) Core Assets	very important	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	not important
6.11 g) Value Network	very important	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	not important
6.12 h) Market & Competitors	very important	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	not important
6.13 i) Distribution Channels	very important	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	not important
6.14 j) Customer Relationships	very important	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	not important
6.15 k) Strategic Partnerships	very important	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	not important
6.16 l) Revenue Streams	very important	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	not important
6.17 m) Cost Factors	very important	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	not important
6.18 n) Capital & Funding	very important	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	not important

7. Practical Relevance and applicability

7.1 The workshop provided a lot of practical knowledge.	I fully agree	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	I fully disagree
7.2 I consider the acquired knowledge to be well applicable.	I fully agree	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	I fully disagree
7.3 What I have learnt I will definitely apply in my job.	I fully agree	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	I fully disagree
7.4 I will continue using techniques that were developed in the workshop.	I fully agree	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	I fully disagree

8. Durability of the learned

Vorschau - nicht drucken

SurveyGrid	Workshop Evaluation 'Business Model Design'	 Electric Paper EVALUATIONSTRENE
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8. Durability of the learned [Fortsetzung]

- | | | | | | | | | |
|-----|--|---------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|------------------|
| 8.1 | The knowledge gained in the workshop will facilitate my future activities. | I fully agree | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | I fully disagree |
| 8.2 | The contents of the workshop are conveyed in a sustainable way. | I fully agree | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | I fully disagree |
| 8.3 | I think that the workshop will have a positive impact on my behaviour. | I fully agree | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | I fully disagree |

9. Evaluation of the Framework

- | | | | | | | | | |
|------|--|---------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|------------------|
| 9.1 | The framework contained all necessary information to design our Business Model. | I fully agree | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | I fully disagree |
| 9.2 | The framework helped us finding and processing the relevant information about the aspects of the business model. | I fully agree | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | I fully disagree |
| 9.3 | The framework helped us presenting the business idea and the chosen Business Model. | I fully agree | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | I fully disagree |
| 9.4 | The framework helped us to identify opportunities and risks. | I fully agree | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | I fully disagree |
| 9.5 | The framework provided clear guidance on the process of Business Model Design. | I fully agree | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | I fully disagree |
| 9.6 | The framework helped us to validate the current business ideas and contributed to decision making. | I fully agree | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | I fully disagree |
| 9.7 | The framework reduced complexity by implementing a structured business model design. | I fully agree | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | I fully disagree |
| 9.8 | The framework itself is easy to understand. | I fully agree | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | I fully disagree |
| 9.9 | The framework itself is easy to use. | I fully agree | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | I fully disagree |
| 9.10 | The framework supported all our relevant purposes for Business Model Design. | I fully agree | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | I fully disagree |
| 9.11 | Using the framework enhanced the effectiveness (quality of goal achievement) of our Business Model Design. | I fully agree | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | I fully disagree |


10. General Judgement

- | | | | | | | | | |
|------|---|---------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|------------------|
| 10.1 | I was interested in the topics. | I fully agree | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | I fully disagree |
| 10.2 | I liked the workshop. | I fully agree | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | I fully disagree |
| 10.3 | I am satisfied with the workshop. | I fully agree | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | I fully disagree |
| 10.4 | I would recommend the workshop to others. | I fully agree | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | I fully disagree |

11. Suggestions and comments

- 11.1 In your opinion, what were the most important weaknesses of the workshop?

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SurveyGrid	Workshop Evaluation 'Business Model Design'	
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11. Suggestions and comments [Fortsetzung]

11.2 In your opinion, what were the most important strengths of the workshop?

11.3 What improvements would you suggest for the next workshop?

11.4 Do you have other general comments about the framework and its application?

C.5 – Code systems from interviews regarding Version One

Main Code: Introduction & Presentation

Level 1: Startup	Mentions
Level 2: Funding	3
Level 2: Location of the Startup	9
Level 2: Team	10
Level 1: Startup phase	Mentions
Level 2: Orientation phase (Pre-Seed)	4
Level 2: Planning phase (Seed)	3
Level 2: Formation phase (Startup)	2
Level 2: Development phase (1st Stage)	1
Level 1: Prior activities	Mentions
Level 2: Startup events	3
Level 2: Grant applications	2
Level 2: Customer acquisition	4
Level 2: Product development	3
Level 2: UI/UX	2
Level 2: Sales	4

Main Code: Prior knowledge

Level 1: No previous knowledge	Mentions
Level 2: no prior knowledge	3
Level 1: Prior knowledge	Mentions
Level 2: Attending workshops	6
Level 2: Accelerators	1
Level 2: Univeristy	2
Level 2: independent training	4
Level 1: Business Model Tools	Mentions
Level 2: Lean Startup	1
Level 2: Business Plan	3
Level 2: Blue Ocean Strategy	2
Level 2: Business Model Canvas	5
Level 2: Jobs-to-be-done method	1
Level 2: Value Proposition Canvas	3

Main Code: Fundamentals of business model design and the framework

Level 1: Perception of the workshop	Mentions
Level 2: workshop valuable	3
Level 2: easy	2
Level 2: intuitive	2
Level 2: Business Model Design Framework well positioned	1
Level 2: indifferent	2
Level 2: negative: fictitious work	1
Level 2: overall positive	6
Level 1: New insights from the workshop	Mentions
Level 2: Comprehensive overview	4
Level 2: Customer insights	2
Level 2: Analysis of character traits of founders	2
Level 1: Content of the Business Model Design Framework	Mentions
Level 2: Customer development	2
Level 2: Startup language	3
Level 2: Marketing	1
Level 2: Good division	1
Level 2: Clear business model	2
Level 2: Shareholder	1

Main Code: Application of the framework

Level 1: Improvements with the framework	Mentions
Level 2: Maturity of the idea	2
Level 2: Market analysis	3
Level 1: Learnings from the framework	Mentions
Level 2: Values of founders	2
Level 2: Persona	6
Level 2: Jobs-to-be-done	4
Level 2: Legal form	1
Level 2: Value Proposition Statement	4
Level 2: Distribution channels	2
Level 2: Way to the finished business model	1
Level 1: Valuable Business Model components	Mentions
Level 2: Partnerships	2
Level 2: Vision	4
Level 2: Purpose	3
Level 2: Revenue Stream	3
Level 2: Customer Segments	4
Level 2: Value Network	5
Level 2: Value Proposition	6
Level 2: Market Analysis	2
Level 2: Cost Stream	2
Level 2: Core People	1
Level 2: Core Assets	2
Level 2: Financial Planning	3
Level 1: Benefit of the Business Model Design Framework	Mentions
Level 2: Display of all the crucial information	4
Level 2: Structured process	2
Level 2: Getting a new perspective	4
Level 2: Development of the Startup after the workshop	1
Level 2: Defining basic structure	3
Level 2: Vision Statement	1
Level 2: No benefit	1
Level 1: Use of the tool after the workshop	Mentions
Level 2: Set of slides of the workshop	5
Level 2: Specific methods of the Business Model Design Framework	4
Level 2: no further use	4


Main Code: Strengths and weaknesses of the framework

Level 1: Strengths of the framework	Mentions
Level 2: Quick overview for outsiders	5
Level 2: Information basis for a business plan	3
Level 2: Way to the finished business model	1
Level 1: Problems with the Business Model Design Framework	Mentions
Level 2: little time in the workshop	5
Level 2: overloaded and complex	5
Level 2: very much theory	2
Level 2: time intensive	4
Level 2: fear of contact	2
Level 2: confusing	3

Main Code: Feedback from the participants on the framework

Level 1: No suggestions	Mentions
Level 2: No improvements necessary	2
Level 1: Suggestions for improvements	Mentions
Level 2: Starting point missing	3
Level 2: Adding more examples	4
Level 2: Adding sustainability as component	4

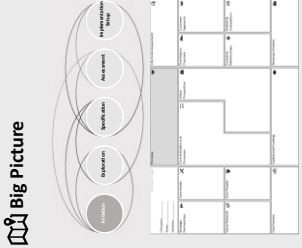
C.6 – Five posters for the five BMD phases from Version Two



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Business Model Design | Phase 1: Initiation

Big Picture



Objectives

- ✓ Follow a Business Model Design Purpose
- ✓ Align the Business Model Target with the overall strategic goal
- ✓ Build on adequate information
- ✓ Strategic framing of the project
- ✓ Identify your team core values
- ✓ Develop a Vision Statement
- ✓ Develop a Mission Statement

Key Takeaways

- ✓ ...
- ✓ ...
- ✓ ...
- ✓ ...
- ✓ ...


1 Design Purpose

Follow a Business Model Design purpose

Business Model Design Purpose	Business Model Role	Business Model Design Requirements
What is the main purpose of the Business Model Design?	What main role does the Business Model take on?	What requirements for the Business Model Design process identify possible reasons for failure.
Validating business ideas.	Validation tool	Confirm business potential, and identify possible reasons for failure.
Presenting a Business Model to stakeholders, i.e.	Communication instrument	Creation of a storyline for the Business Model opportunity adapted to stakeholders.
Generating a general overview of most relevant Business Model components	Decision-making instrument	Enable and present most central Business Model decisions.

2 Business Model Target

Align the Business Model target picture with the overall strategy and vision

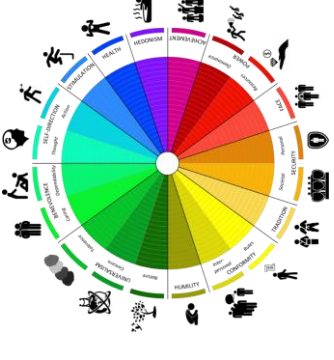


3 Information Basis

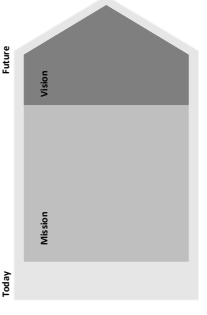
Build on an adequate information basis

Information needs	Analysis	Detail level
What information is needed for making BM decisions?	Which analyses are needed for making BM decisions?	What level of detail is needed?
	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Customer Analysis <input checked="" type="checkbox"/> Market Analysis <input checked="" type="checkbox"/> Competitor & Benchmark <input checked="" type="checkbox"/> Financial Analysis <input checked="" type="checkbox"/> Network Analysis <input checked="" type="checkbox"/> Stakeholder Analysis ... 	very detailed detailed less detailed

4 Team Core Values



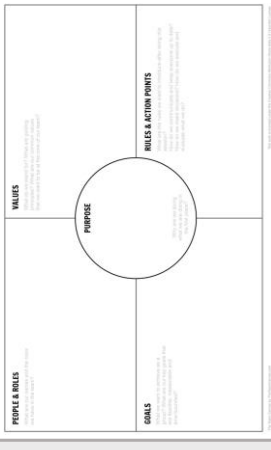
5 Vision and Mission



Your Vision Statement: _____

Your Mission Statement: _____

6 Team Canvas

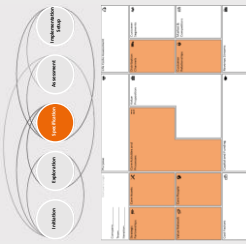


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Business Model Design | Phase 3: Specification



Big Picture



1 Core Activities and Processes

Process:

Phase	Phase	Phase	Phase
Executive	Executive	Executive	Executive
Executive	Executive	Executive	Executive
Executive	Executive	Executive	Executive
Executive	Executive	Executive	Executive
Executive	Executive	Executive	Executive
Executive	Executive	Executive	Executive

2 Core People

V	R	I	O
Valuable	Rare	Inimitable	Organized
NO	NO		
YES	NO		
YES	YES	NO	
YES	YES	YES	NO
YES	YES	YES	YES
			Competitive Disadvantage
			Competitive Parity
			Temporary Competitive Advantage
			Unused Competitive Advantage
			Sustainable Competitive Advantage

3 Core Assets

V	R	I	O
Valuable	Rare	Inimitable	Organized
NO	NO		
YES	NO		
YES	YES	NO	
YES	YES	YES	NO
YES	YES	YES	YES
			Competitive Disadvantage
			Competitive Parity
			Temporary Competitive Advantage
			Unused Competitive Advantage
			Sustainable Competitive Advantage

Objectives

- ✓ Develop Business Model alternatives within the solution space
- ✓ Collect information for different alternatives
- ✓ Develop a rough concept of the alternatives
- ✓ Alternatives are prioritized and checked for plausibility

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<http://etm.entechnon.kit.edu/>

6 Distribution Channels

Customer Side

The Marketing/Sales funnel

Company Side

5 Strategic Partnerships

4 Value Network

Key Takeaways

- ✓ ...
- ✓ ...
- ✓ ...
- ✓ ...
- ✓ ...

7 Customer Relationships

The Customer Journey

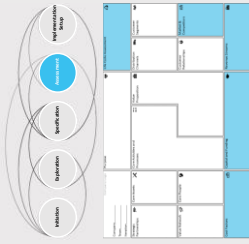
	Awareness	Research	Selection	Delivery	Usage/Relationship
Doing					
Thinking					
Touchpoints					
Weaknesses					
Opportunities					
Data					

8 Defining the MVP

9 Market Entry

Business Model Design | Phase 4: Assessment

Big Picture



1 Market Sizing: TAM/SAM/SOM

1. Clarify the Question
2. Break down the problem
3. Solve each part
4. Consolidate into final result

2 Competitor Identification

3 Competitor Differentiation

Objectives

- ✓ Assessment of one or two alternatives
- ✓ Let's talk numbers!
- ✓ Estimation of Market Potential
- ✓ Estimation of financial sustainability
- ✓ Hypotheses are tested and refined to generate evidence

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<http://etm.entechnon.kit.edu/>

6 Cost Factors

Fixed costs: Constant with increasing output. Example: administrative expenses, taxes, R&D.

Variable costs: Correlate with output. Example: material products, Commissions, sales commissions.

5 Price Determination

4 Revenue Streams

Possible sources of Revenue: _____

Pricing: _____

Recurring Revenue Frequency: _____

Estimated Yearly Revenue: _____

Expected customer conversion rate: _____

Expected ARPU: _____

Expected CLTV: _____

Key Takeaways

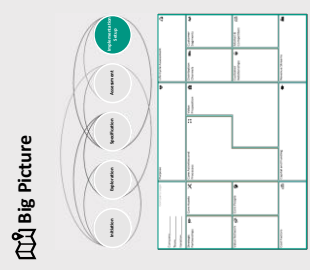
- ✓ ...
- ✓ ...
- ✓ ...
- ✓ ...
- ✓ ...

7 Cash Flow Planning

8 Risk Analysis

9 Life Cycle Assessment

Business Model Design | Phase 5: Implementation Setup



Company Logo Company _____ Team _____ Iteration _____		Purpose		Life Cycle Assessment	
Strategic Partnerships		Core Assets		Distribution Channels	
Value Network		Core People		Customer Relationships	
Core Activities and Processes		Value Proposition		Market & Competitors	
Cost Factors		Capital and Funding		Revenue Streams	

- Objectives**
- ✓ Refinement and harmonization of the components
 - ✓ Check for coherence
 - ✓ Decide for Market Entry Strategy
 - ✓ Decide for Operational Plan
 - ✓ Final Risk Assessment
 - ✓ Final decision for Implementation

For feedback or further information please contact us: markus.lau@kit.edu
<http://etm.entechnon.kit.edu/>

Your Business Model in ten sentences:

1. ...
2. ...
3. ...
4. ...
5. ...
6. ...
7. ...
8. ...
9. ...
10. ...

C.7 – Code system from interviews regarding Version Two

Main Code: Prior knowledge

	Mentions
Level 1: No previous knowledge	
Level 2: No prior knowledge	6
Level 1: Prior knowledge	Mentions
Level 2: Practical previous knowledge	2
Level 2: Theoretical prior knowledge	6
Level 2: Theoretical prior knowledge put into practice	3

Main Code: Prior Business Model Design activities

	Mentions
Level 1: No activities	
Level 2: Acquisition of knowledge	2
Level 2: No previous work	2
Level 2: Pure idea	5
Level 2: Pure product development	3
Level 1: Business Model Design Activities	Mentions
Level 2: Business model canvas developed	5
Level 2: Other Business Model Design method used	4

Main Code: Expectation of the workshop and the framework

	Mentions
Level 1: General expectation	
Level 2: Learning curve related	2
Level 2: Offer	1
Level 1: Expectation	Mentions
Level 2: Expectations met	3
Level 2: No expectation	1
Level 1: Business Model Design related	Mentions
Level 2: General	6
Level 2: More specific part of Business Model Design	2
Level 2: More specific idea of Business Model Design	5

Main Code: Challenges in business model design

	Mentions
Level 1: Challenge of the chosen business model	
Level 2: Framework	5
Level 2: Specific challenges in Business Model Design	15
Level 2: Challenge triggered by chosen modeling approach	3
Level 1: Subjective challenge	Mentions
Level 2: Lack of knowledge or experience	5
Level 2: Priority not Business Model Design	6
Level 2: General approach to Business Model Design	7
Level 1: The Business Model Design Framework as a Challenge	Mentions
Level 2: Business Model Design Framework	1
Level 2: Specific challenge of Business Model Design:	Mentions
Level 3: Profit generation	1
Level 3: Market segment	1
Level 3: Added value of the product	1
Level 3: Financing	1
Level 3: Finding partners	3
Level 3: Unclear target group	5

Main Code: Strengths of the framework

	Mentions
Level 1: Non-content aspects	
Level 2: Concerning the workshop leadership	6
Level 2: Regarding the feedback	4
Level 2: Regarding the slides	2
Level 1: Specific part of Business Model Design related.	Mentions
Level 2: Capital and Funding	1
Level 2: Core People	1
Level 2: Cost Factors	1
Level 2: Customer and Market Segments	4
Level 2: Customer Relationship	2
Level 2: Distribution Channels	1
Level 2: Life Cycle	3
Level 2: Market and Competitors	7
Level 2: Purpose	5
Level 2: Revenue Streams	7
Level 2: Strategic Partnerships	1
Level 2: Value Network	6
Level 1: Assessment of Business Model Design Framework	Mentions
Level 2: Regarding the division of the workshop	3
Level 2: Regarding the examples	2
Level 2: Acknowledgements	2
Level 2: The Business Model Design Framework found helpful	7
Level 2: The Business Model Design Framework was perceived as good	7
Level 2: Fulfillment of expectations	3
Level 2: Continue to use	1
Level 1: Comprehensibility of the Business Model Design Framework	Mentions
Level 2: General	9
Level 2: Concerning the terminology	2
Level 2: Regarding the Canvas	1
Level 1: Business Model Design with Business Model Design Framework	Mentions
Level 2: General	1
Level 2: As a perspective guide	2
Level 2: For details	5
Level 2: For the overview	6
Level 2: As a basis	7
Level 2: As an aid	10
Level 2: For risk assessment	2
Level 2: As a systematic approach	9
Level 2: For goal setting	2
Level 1: Business Model Design Framework as distinct from the Business Model Canvas	Mentions
Level 2: Evaluation of the Business Model Design Framework versus the Business Model Canvas	9
Level 2: Preference of the Business Model Design Framework over the Business Model Canvas	5
Level 2: Business Model Design Framework as an extension to the Business Model Canvas	11

Main Code: Weaknesses or difficulties of the framework

	Mentions
Level 1: no difficulties	
Level 2: No difficulties	7
Level 1: Concerning the workshop	Mentions
Level 2: General remarks	5
Level 2: Concerning the workshop conditions.	2
Level 1: Concerning the Model	Mentions
Level 2: Complexity of the model	3
Level 2: Usefulness of the model	3

Main Code: Follow-up usage of the framework

Level 1: Non-use	Mentions
Level 2: Other method used for Business Model Design	4
Level 2: Reason for non-use	2
Level 1: Use of Business Model Design Framework	Mentions
Level 2: Use of Business Model Design Framework	23
Level 2: Use of a concrete Building Block	43
Level 2: Business model (usually) elaborated	8
Level 2: Specific parts of the business model (usually) revised:	20
Level 2: Use of the Business Model Design Framework:	Mentions
Level 3: General usage	6
Level 3: Use of the slides	4
Level 3: Use in paper form	3
Level 3: Future use	10
Level 2: Use of a concrete Building Block:	Mentions
Level 3: Capital and Funding	2
Level 3: Core Activities and Processes	2
Level 3: Core Assets	2
Level 3: Core People	3
Level 3: Cost Factors	1
Level 3: Customer and Market Segments	4
Level 3: Customer Relationship	3
Level 3: Distribution Channels	2
Level 3: Life Cycle	2
Level 3: Market and Competitors	6
Level 3: Purpose	2
Level 3: Revenue Streams	3
Level 3: Strategic Partnerships	2
Level 3: Value Network	5
Level 3: Value Proposition	4
Level 2: Business model (usually) elaborated:	Mentions
Level 3: Business Model Change	2
Level 3: Business Model Development	3
Level 3: Definition of the business model	3
Level 2: Specific parts of the business model (usually) revised:	Mentions
Level 3: Core Activities and Processes	3
Level 3: Customer and Market Segments	1
Level 3: Market and Competitors	1
Level 3: Revenue Streams	2
Level 3: Value Network	1
Level 3: Value Proposition	1
Level 3: Through feedback from experts	9
Level 3: Feedback from customers	2

Main Code: Improvement suggestions of the participants

Level 1: Concerning the workshop	Mentions
Level 2: General	2
Level 2: Preparation	1
Level 1: Concerning the Canvas	Mentions
Level 2: Logo	2
Level 1: Offering additional services	Mentions
Level 2: General	2
Level 2: Explainer videos	3
Level 2: Web sessions for exchange	3

Main Code: Ideal process for business model design

	Mentions
Level 1: Selected perspective	
Level 2: Market - Pull - Model	2
Level 2: Technology - Push - Model	2
Level 1: Methodical approach	Mentions
Level 2: Methodical approach	1
Level 1: Use of other assistance	Mentions
Level 2: Other medium	2
Level 2: Use of the Business Model Canvas	1
Level 2: Use of the Business Model Canvas or Business Model Design Framework	3
Level 2: Use of the Business Model Design Framework	9

Appendix D – Publications

D.1 – Publications in the scope of the dissertation

Parts of this work were presented and discussed at relevant scientific conferences. Key findings from the theoretical foundation of the work were submitted as a full paper in double-blinded peer review at WMSCI 2019 and presented and discussed on site.

Lau, Markus; Terzidis, Orestis (2019): Systemic Business Modeling – A Pragmatic Tool Grounded in System Theory. In Nagib Callaos, Shigehiro Hashimoto, Bruce Peoples, Belkis Sánchez, Michael Savoie (Eds.): Proceedings of the 23rd World Multi-Conference on Systemics, Cybernetics and Informatics: WMSCI 2019, Volume IV (Post-Conference Edition). Volume IV (Post-Conference Edition). Orlando, Florida, pp. 48–53.

Furthermore, parts of the State of the Art were published as chapters in a textbook.

Lau, Markus; van Dinther, Clemens; Terzidis, Orestis (2022): Business Model Design. In Clemens van Dinther, Christoph M. Flath, Reinhard Madlener (Eds.): Smart Grid Economics and Management. 1st ed.: Springer International Publishing.

The results of the Quantitative Pre-Study on BMD Practice were presented as a conference paper at the G-Forum 2020.

Lau, Markus (2020): Efficient and Effective Business Model Design. 24th Annual Interdisciplinary Conference on Entrepreneurship, Innovation and SMEs. Karlsruhe, Germany, 9/28/2020.

The description of the final version of the artifact and the associated evaluation is, in a condensed form, under consideration for publication in the Journal of Business Venturing Design under the title: "The Framework for Effective Business Model Design - A Design Science Approach".

Eidesstattliche Versicherung

gemäß § 13 Abs. 2 Ziff. 3 der Promotionsordnung des Karlsruher
Instituts für Technologie für die KIT-Fakultät für Wirtschaftswissenschaften

1. Bei der eingereichten Dissertation zu dem Thema

*Using Design Science Research to Develop a Framework for
Effective Business Model Design*

handelt es sich um meine eigenständig erbrachte Leistung.

2. Ich habe nur die angegebenen Quellen und Hilfsmittel benutzt und mich keiner unzulässigen Hilfe Dritter bedient. Insbesondere habe ich wörtlich oder sinngemäß aus anderen Werken übernommene Inhalte als solche kenntlich gemacht.

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Karlsruhe, den 14.02.2021

Markus Lau