

Designing Digital Platforms: A Synthetization of Relevant Design Topics for Business Models from a Literature Review

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Abstract

Digital platforms (DPs) represent a challenging research object. In this context, scientific literature has produced a large number of publications studying DPs. Given the importance of designing DPs in both academia and practice, the purpose of this study is to synthesize the current research findings on DPs and provide a framework with possible design topics under consideration from a business model perspective. A systematic literature review (SLR) was conducted to identify and synthesize the relevant findings. We analyzed 22 publications published before May 2021. The analysis shows that, in terms of "Value Propositions", most design topics were identified. In contrast, only one design topic was identified for "Customer Relationships", "Customer Segments", and "Cost Structure". In sum, our results present a framework with design topics for DPs and support the alignment of further research. Practitioners receive an overview of design topics for DPs that encourage today's digital transformation projects.

Keywords: business model canvas, digitalization, digital platform, platform design, literature review

1. Introduction

Digital platforms (DPs) have received increasing attention among both practitioners and scholars in recent years. Market competition no longer takes place at product level only, but increasingly at platform level. Moreover, platforms are seen as a core part of today's business ecosystems that companies are developing to intensively cooperate with specialized niche players and to create value for customers (Gawer & Cusumano, 2002; Jacobides et al., 2018; De Reuver et al., 2018). Perhaps, against this background, academic research has dedicated significant effort to advancing the understanding of DPs and the implications for designing and describing them.

Considering the existing research on DPs, the purpose of our study is to add to this body of academic research from a business model (BM) perspective. That means that our study focuses on the synthesis and identification of design topics for DPs. Existing work on the topic has shown that DPs are a challenging research object, whose interdisciplinary character poses major challenges for both scholars and practitioners (De Reuver et al., 2018; Gawer, 2021; Rietveld & Schilling, 2021). Vital issues in the realization of DPs range from platform design over transformation of firms and industries to data-driven value creation on platforms.

In our study we focus on possible design topics for the BM of a DP to synthesize existing research and to provide a design framework, as we argue that both scholars and practitioners lack an overview of possible design topics for a DP BM. Previous research has revealed a variety of configuration options for DP BMs and a lack of conceptual clarity in designing them (Staub et al., 2021). Based on a BM perspective, we detail the BM design of a DP with a framework that includes a set of design topics. For this, we rely on the Business Model Canvas (BMC) (Osterwalder & Pigneur, 2010), which, to the best of our knowledge, is an eminent and detailed concept in the design of BMs (Doligalski et al., 2021). The BMC represents an existing, generally valid, and widely used framework, which, however, does not yet have any direct reference to DPs. Our study is based on this reference, which ultimately expands the BMC to include detailed design recommendations for the development of DP BMs. From our point of view, this canvas goes beyond the BM recommendations by Gassmann et al. (2014) and Al-Debei (2010) to provide a sound basis for our research purpose. The research question is as follows: *What are topics for designing the BM of a DP?*

To answer our research question, we conducted a focused systematic literature review (SLR) (Cooper, 2017). Based on 22 publications on DP insights, we

used the insights to synthesize related research results and to devise a framework that helps to design a DP.

We structure the remainder of our paper as follows: Section 2 summarizes the theoretical background of our study. In the subsequent sections we present the methodology and summarize the results of our review. We conclude our paper with a discussion of the findings and ideas that might pave the way for further research.

2. Theoretical Foundations

2.1. Digital Platforms

The advancement of digitalization has meant that the availability of an adequate level of information and knowledge has become critical to the success of a business (Al-Debei & Avison, 2010; Porter & Heppelmann, 2014; Van Alstyne et al., 2016). Companies need to be able to adapt flexibly in order to succeed in an environment of increasing volatility, uncertainty, and complexity. The ability to respond quickly to changes regarding business units or technologies, with high-quality decisions, can be supported by adopting appropriate BMs for this new, digital business environment (Al-Debei & Avison, 2010; Al-Debei et al., 2008; Porter & Heppelmann, 2014; Van Alstyne et al., 2016). This environment likewise requires companies to adopt innovative technologies and DPs for data collection, integration, and use, and to find opportunities for growth to remain competitive (Subramanian et al., 2011).

Platforms are not a new phenomenon; indeed, they have existed for years (Van Alstyne et al., 2016; Zhu & Furr, 2016; Rietveld & Schilling, 2021). For example, shopping malls connect consumers and retailers, and newspapers connect subscribers and advertisers. What has changed tremendously over the past few decades, however, is that information and communication technologies have dramatically reduced the need to own physical infrastructure and assets (Thomas et al., 2014; Van Alstyne et al., 2016; Vaska et al., 2021). In doing so, these technologies make it easier and cheaper to build and scale platforms, enable simplified participation that, in turn, enhances network effects, and also foster the ability to capture, analyze, and evaluate enormous amounts of data, increasing the value of the platform for all participants (Van Alstyne et al., 2016).

Prominent examples of platform companies range from Uber to Alibaba to Airbnb, whose disruptive potential abruptly turned an entire industry upside down (Van Alstyne et al., 2016). DPs do not create content but merely provide an infrastructure for market participants, on which the platform mediates products

(Gawer, 2021; Van Alstyne et al., 2016; Liu et al., 2021) or data-driven services (Zhu & Furr, 2016) between participants. Thus, a central role of the platform is to enable and mediate interactions between two or more market participants (Rochet & Tirole, 2006; Armstrong, 2006; Koh & Fichman, 2014; Parker et al., 2016; Liu et al., 2021), with the goal of creating value for the different sides. Therefore, we understand a DP as *"a business based on enabling value-creating interactions between external producers and consumers. The platform provides an open, participative infrastructure for these interactions and sets governance conditions for them. The platform's overarching purpose: to consummate matches among users and facilitate the exchange of goods, services, or social currency, thereby enabling value creation for all participants"* (Parker et al., 2016, p. 5). Whenever we use the term platform in the following, we refer to the preceding definition of a DP.

Companies with DPs and underlying BMs are going to shape today's markets. In recent years we have observed the trend that more economic activities are organized on DP markets rather than traditional markets (Liu et al., 2021; Rietveld & Schilling, 2021; Kretschmer et al., 2022). Parker et al. (2016) also points out that a DP business is primarily based on innovative BMs that create greater value for the players involved than traditional models. These developments clearly show that competition in DP markets is more complex and dynamic. The competitive forces described by Porter (1979) still apply, but they behave differently on platforms and new aspects come into play (Van Alstyne et al., 2016). Henceforth, competition is no longer about how to control the value chain but about how to attract generative activities related to a platform (De Reuver et al., 2018) and to generate interaction between different participants (Van Alstyne et al., 2016). If one follows the preceding description, a discussion of DP BMs is essential, as they have also evolved rapidly.

2.2. Business Model

A suitable BM is essential for an organization (Magretta, 2002) because it provides powerful capabilities to understand, analyze, communicate, and manage strategically oriented decisions (Pateli & Giaglis, 2004; Osterwalder et al., 2005; Shafer et al., 2005). However, organizations need to have the capabilities to find the design of the appropriate BM for their defined goals from an individual combination of assets (Teece, 2010; Massa et al., 2017; Ritter & Lettl, 2018; Ahmad et al., 2020). Especially in an environment increasingly influenced by volatility, uncertainty, and complexity, these capabilities will

determine whether or not an organization successfully creates value in a particular way. Even though the origin of the concept lies in business practice (George & Bock, 2011; Lecocq et al., 2010), the term BM has been present in academic discussions for more than fifty years, and there is still a high number of publications dealing with the topic of BMs (Zott et al., 2011).

In our study we follow the definition of Osterwalder and Pigneur (2005): "...a conceptual tool that contains a set of elements and their relationships and allows expressing the business logic of a specific firm. It is a description of the value a company offers to one or several segments of customers and of the architecture of the firm and its network of partners for creating, marketing, and delivering this value relationship capital, to generate profitable and sustainable revenue streams" (Osterwalder & Pigneur, 2005, pp. 17–18).

Congruent with Osterwalder and Pigneur (2005), we understand this definition to be broad enough to capture the various BM considerations that are made in different academic fields, such as informatics or management, thus allowing a broad basis for our research purpose. In other words, the theoretical perspective of our study is that of the BM. An essential tenet of the BM is the BMC (Osterwalder & Pigneur, 2010). This notion illustrates nine building-blocks for designing a BM and therefore serves as a framework for structuring our findings.

3. Research Design and Methodology

In line with Cooper (2017), we performed a SLR to identify relevant literature on DPs for our research focus. All steps applied are illustrated (see Figure 1) and described in the following.

Problem Formulation					
Research Question: What are topics for designing the BM of a DP?					
Locating Publications					
Search string	(smart* OR digital* OR iot* OR *sided* OR cloud*) AND (platform* OR market*) AND (taxonom* OR typolog* OR classif*)				
Academic databases		Ebsco	AISeL	Web of Science	Science Direct
	Title	18	5		
	Keywords	15	9	231	596
	Abstract	1,434	193		
	Σ Database	1,467	207	231	596
	Σ Total	2,501			
Screening of Search Results and Article Selection					
Exclusion criteria	Duplicate removal	2,152			
	Limitation to English language	2,024			
	Journal ranking (ranked in VHB or ABS)	478			
Inclusion criteria	DP BM design relevance in title, abstract, full text, as well as sufficient research method	10			
Sample after forward and backward search		+6	10	-6	
Final sample		22			

Figure 1: SLR after Cooper (2017)

3.1. Problem Formulation

As suggested by Cooper (2017), we began our literature review by formulating the problem statement.

As pointed out in the introduction, we formulated the following research question: *What are topics for designing the BM of a DP?*

3.2. Locating Publications

Consistent with Cooper (2017), we proceeded by defining the following four academic databases for our search: EBSCO host, Web of Science, ScienceDirect, and AISeL. Each of these databases is commonly used for literature reviews (e.g., Fan & Stevenson, 2017; Cooper, 2017) and was selected to identify DP design-related publications from both the business and the information systems domain (Ackermann et al., 2017).

Furthermore, to identify literature that specifically addresses design topics for DPs, the following search string was defined by combining three keyword clusters using the Boolean operators AND and OR, as well as truncations (Cooper, 2017): (smart* OR digital* OR iot* OR *sided* OR cloud*) AND (platform* OR market*) AND (taxonom* OR typolog* OR classif*). Since the phenomenon of DPs is described using various terms in different publications, the search string reflects regularly used DP synonyms, such as a multi-sided or two-sided market (Asadullah et al., 2018). Searching for this string during May 2021 in the title, abstract, and keywords yielded a total of 2,501 hits across all four databases.

3.3. Screening of Results and Article Selection

In a third step we filtered the initial result list for studies providing relevant information contributing to solving the described problem (Cooper, 2017).

We started by removing all duplicates, leaving 2,152 distinct hits. We further defined ineligible criteria to determine which of the remaining hits were of sufficient quality to be included in the further synthesis (Cooper, 2017). First, at a formal level, all studies were excluded that were not written in English and which were neither scientific conference papers nor journal publications, resulting in a list of 2,024 hits. Moreover, we excluded journals that do not represent appropriate academic quality, according to ABS or JOURQUAL quality guide, which narrowed the results to 479 publications. Subsequently, the title, abstract, and full text of each remaining publication were carefully screened to ensure relevance and quality at content level. Simultaneously, a forward and backward search was performed according to (Webster & Watson, 2002), resulting in a final sample of 22 publications.

3.4. Analysis and Synthesis of Publications

We analyzed the publications selected for relevant design aspects. For a synthesis of the findings found in the publications, the BMC served as an underlying framework for structuring.

Considering the framework, and by conducting a qualitative content analysis (Mayring, 2019), design recommendations and related aggregated design topics were identified from the publications. The design topics were synthesized by the authors with reference to the building-blocks of the BMC. All authors supported the synthesis of topics to ensure reliability and validity. The following sections present our descriptive and content-related analysis.

4. Results

4.1. Descriptive Analysis

The identified final sample consists of 10 conference papers, 7 journal papers, 3 anthology contributions, and 2 reports. Conferences considered include the European Conference on Information Systems, the International Conference on Advanced Information Systems Engineering, the International Conference on Conceptual Modeling, the International Conference on Engineering, the International Workshop on Software-intensive Business, the Hawaii International Conference on System Sciences, and the Wirtschaftsinformatik. The Computers & Industrial Engineering Journal, the Enterprise Information

Systems, the European Management Journal, the Information Systems and e-Business Management, the Information Systems Journal, the International Journal of Electronic Commerce, as well as the Sinergie Italian Journal of Management were the source for the 7 journal papers.

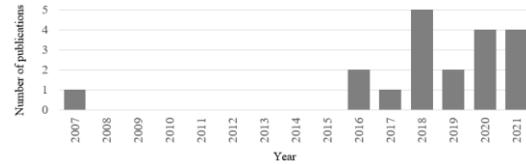


Figure 2: Yearly distribution of publications

Analyzing the number of publications per year reveals that all but one of the papers were published between 2016 and 2021. On this basis, it can be concluded that academic interest in DP configuration options has increased slightly over the last seven years, as displayed in Figure 2.

In addition, examining the nature of publications reveals a predominance of conceptual approaches, with 17 papers developed a taxonomy, two a typology, one a classification, one an architecture, and one a framework of DP design topics (see online appendix).

4.2. Content-related Analysis

Figure 3 synthesizes our results and provides an overview of the design topics identified. These findings are outlined in the following.

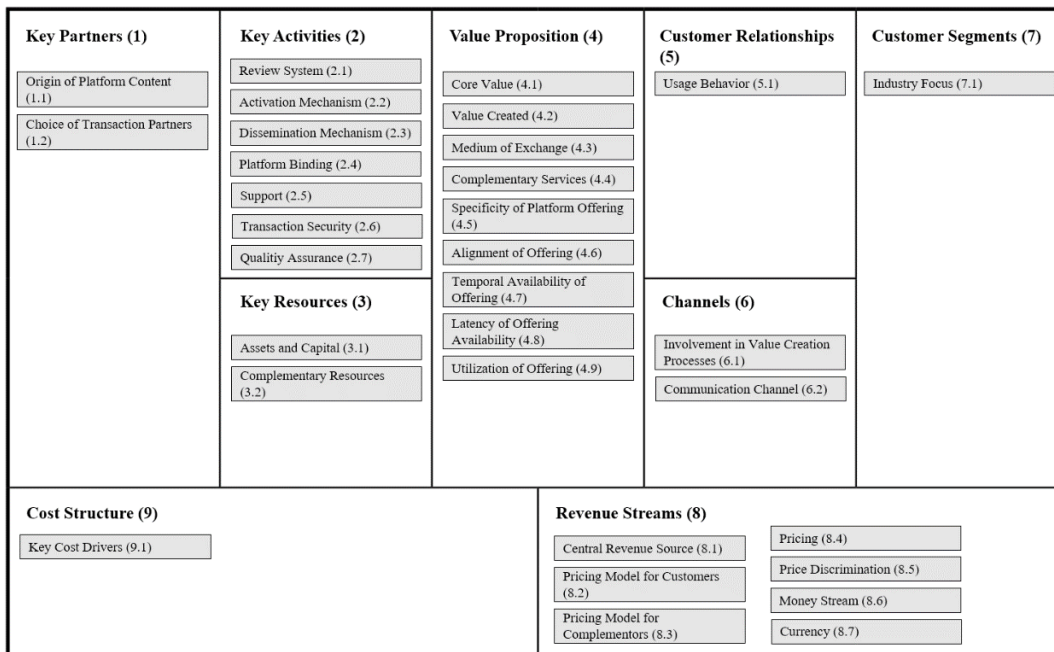


Figure 3: Overview of design topics identified for each building-block of the Business Model Canvas

4.2.1. Key Partners. This building-block outlines the network of suppliers and partners that are necessary for the BM to work (Osterwalder & Pigneur, 2010). The key partners are the individuals and organizations that take on some of the responsibility. They can supply raw materials or finished goods, send customers to you, or act as sponsors. Accordingly, companies may enter partnerships for various reasons, for example, to optimize their BMs, reduce risks, or acquire resources. In our literature analysis we were able to identify the following topics to key partnerships: origin of platform content (1.1); and choice of transaction partners (1.2).

The origin of platform content (1.1) refers to the source or producers of the content that is mediated or offered by the platform. Here, the literature distinguishes between forms, such as "self-generated", "user-generated", and "generated by a community" or "generated by institutions" (Fruhworth et al., 2020). When trading different goods or services, it must first be determined who allocates the transaction partners (1.2). The literature refers to the entity, which selects the partner: here, the buyer or seller comes into question but, on the other hand, the transaction partner can also be determined by the platform (Rix et al., 2020).

4.2.2. Key Activities. This building-block describes the most important processes and tasks that a company must undertake for its BM to work and for the organization to be successful (Osterwalder & Pigneur, 2010). Key activities are essential to generate and offer a value proposition, reach specific markets, maintain customer relationships, and generate revenue (Osterwalder & Pigneur, 2010). By means of our review, the following topics could be identified for key activities: review system (2.1), activation mechanism (2.2), dissemination mechanism (2.3), as well as platform binding (2.4), support (2.5), transaction security (2.6), and quality assurance (2.7).

Users of a platform have various ways to communicate with one another, one of which is an integrated review system (2.1). The literature points to three types of review system: user reviews, marketplace reviews, and mutual reviews (Fruhworth et al., 2020; Täuscher, 2016; Derave, 2019; Rix et al., 2020). Activation and dissemination mechanisms consider specific processes that platforms use to communicate value: activation mechanisms (2.2) are one way to gather the attention and buying behavior of users. Dissemination mechanisms are another possibility (2.3), which use direct and indirect network effects to increase platform awareness. Other forms of these mechanisms are word of mouth, incentive systems, or direct contact (Rix et al., 2020). Platform-providers should also implement procedures to bind users to the platform (2.4). In this respect, the

literature points out lock-in effects, adaptation of platform content, implementation of social network functions, targeted marketing, or additional services that promote platform loyalty (Täuscher, 2016; Rix et al., 2020).

Within the topic of support (2.5), the degree of basic support is discussed, which is carried out via the platform. This could be in the form of personal technical support, which, in turn, can be extended by specific consulting services. However, the platform may also realize none of the above-mentioned types of support (Abendroth et al., 2021; Hodapp et al.; 2019). The literature lists various forms of transaction security (2.6) that protect buyers and sellers from fraud during a transaction via the platform, which can comprise additional features in terms of user verification, deposit, insurance, arbitration services, but also the option that platforms do not apply any of these forms (Fruhworth et al., 2020; Derave, 2019; Rix et al., 2020; Perscheid et al., 2020). Topic 2.7 addresses the aspect of quality assurance. This refers to data exchange or trade and the extent to which the quality of the data is ensured (Derave et al., 2020, 2021).

4.2.3. Key Resources. This building-block addresses the most important assets that are essential to the functioning of a BM (Osterwalder & Pigneur, 2010). These resources enable a company to create and offer a value proposition, reach different markets, maintain relationships with customer segments, and generate revenue (Osterwalder & Pigneur, 2010). Key resources are not purely physical assets but can also be financial, intellectual, or human. Moreover, key resources can be owned by the company, leased by it, or acquired from key partners. We were able to identify the following design topics for this building-block: assets and capital (3.1); and complementary resources (3.2).

In the topic of assets and capital (3.1), the central and most important resources of the platform in the value-creation process are addressed. The literature lists eight different forms: financial, community, physical, knowledge, patents, services, customer data and relationships, and human resources (Perscheid et al., 2020; Rix et al., 2020). The identified topic of complementary resources (3.2) is distinguished in relation to AI services and whether or not additional resources are offered when implementing them (Geske et al., 2021).

4.2.4. Value Proposition. This building-block explains a bundle of products and services that fulfill the requirements of a certain customer segment and thus create a certain value for these customers (Osterwalder & Pigneur, 2010). The value proposition is the reason why customers ultimately choose a company over a competitor. It is not about what the

company sells to the customer but why the customer sees value in it: it solves customer problems or satisfies customer needs. Based on the review, a number of topics could be identified for this block: core value (4.1), value created (4.2), medium of exchange (4.3), complementary services (4.4), specificity of platform offering (4.5), alignment of offering (4.6), temporal availability of offering (4.7), latency of offering availability (4.8), and utilization of offering (4.9).

The core value (4.1) describes how a platform creates value for its users. This can happen in various ways, such as through the matching and exchanging of platform users with and among one another, through mechanisms that enable network orchestration and community-building, through production or content creation of platform content, through innovation and development enabled by the platform, through data storage and data analytics, through device management and control, and many other ways (Holland & Gutiérrez-Leefmans, 2018; Bonina et al., 2021; Täuscher & Laudien, 2017, 2018; Hodapp et al, 2019; Täuscher, 2016; Wang & Archer, 2007; Evans & Gawer, 2016; Staub et al, 2021; Perscheid et al, 2020; Rix et al, 2020). The value that is created by the aforementioned forms of expression is examined in more detail in the topic "value created" (4.2). In the literature these include efficiency gains, emotional and social value, financial value added and cost efficiency, quality enhancement, problem-solving, performance advantages, design and user-friendliness, and platform image (Täuscher & Laudien, 2017; Täuscher, 2016; Staub et al., 2021; Perscheid et al., 2020; Rix et al., 2020).

In the topic of medium of exchange (4.3), the medium traded or exchanged is defined. This includes physical products, offline services, data, information, digital services, or a hybrid service as a combination of the above (Abendroth et al., 2021; Zutshi & Grilo, 2019; Täuscher & Laudien, 2017, 2018; Täuscher, 2016; Chasin et al., 2018; Derave, 2019; Iasevoli et al., 2018; Staub et al., 2021; Rix et al., 2020). The design topic of complementary services (4.4) addresses complementary features, such as data analytics, which can be offered to the user in addition to the purchase. First, a distinction is made about whether complementary services are generally offered and, if so, whether they are included in the price, are only available for additional costs, or a combination of the two variants (Fruhworth et al., 2020; Geske et al., 2021). The offer may also differ in specificity (4.5).

A DP can provide a standardized quote to all of its users, or it can offer a customized quote to specific user groups (Geske et al., 2021; Wang & Archer, 2007; Rix et al., 2020). What the specificity ultimately looks like, and to which user group the offering is aligned (4.6), is

up to the platform. The focus can be on a product, but it can also be outcome- or user-oriented (Derave et al., 2020, 2021; Rix et al., 2020). Regarding temporal availability (4.7), a distinction can be made between the forms continuous, variable, and project-related in order to provide temporal access to the offer (Rix et al., 2020). The latency of supply availability (4.8) is concerned with the immediacy of the supply, that is, whether it is available immediately or with a time delay (Derave et al., 2020, 2021). The utilization of the offering (4.9) describes whether there is a possible over-capacity or under-capacity of the platform offerings (balanced offerings) (Derave et al., 2020, 2021).

4.2.5. Customer Relationships. This building-block describes the type of relationships that a company establishes with specific customer segments (Osterwalder & Pigneur, 2010). A company should clarify what type of relationship it wants to establish with each customer segment (Osterwalder & Pigneur, 2010). Relationships can range from personal to automated (Osterwalder & Pigneur, 2010). Customer relationships are driven by different motives, such as customer acquisition, customer retention, or even increasing sales, and also have a strong influence on the overall customer experience. From our review, only one topic was identified: usage behavior (5.1).

According to the literature, customer usage behavior can be one-time, on-demand, continuous, systematic, or a combination of the aforementioned types of usage; it is also possible to refrain from usage altogether (Geske et al., 2021; Wang & Archer, 2007; Chasin et al., 2018).

4.2.6. Channels. This building-block discusses how a company communicates with and reaches its customer segments to offer a value proposition and thus forms the interface of a company with its customers (Osterwalder & Pigneur, 2010). Channels are customer touchpoints that, in addition to customer relationships, play another important role in terms of the customer experience, as it is through these channels that the value proposition of the organization is communicated. The different channels perform several functions, including, for example, making customers aware of an organization's offerings, helping customers to evaluate an organization's value proposition, conveying a value proposition to customers, or simply enabling customers to purchase products and services. Regarding channels, the following topics could be identified: involvement in value creation processes (6.1); and communication channel (6.2).

In terms of involvement in value-creation processes (6.1), the literature distinguishes between active or strong involvement, passive or weak involvement, and

semi-passive involvement (Chasin et al., 2018; Perscheid et al., 2020). Platforms also have diverse communication channels (6.2) to connect to users. These channels can occur web-based, mobile-based, or app-based, as well as in the form of digital or traditional sales channels (Täuscher & Laudien, 2018; Täuscher, 2016; Staub et al., 2021; Rix et al., 2020).

4.2.7. Customer Segments. This building-block is at the heart of any BM and defines the different groups of organizations or individuals that a company wants to reach and serve through its channels (Osterwalder & Pigneur, 2010). To serve customers more efficiently, a company can group them into different segments with common needs, similar behaviors, or other relevant characteristics, and a BM can, in turn, be developed for one or more of these segments based on the specific customer needs. Regarding customer segments, the following topic could be identified through our review: industry focus (7.1).

In the literature different terminologies can be found with regard to industry focus, but they make a similar core statement: the customer itself is either part of a specific industry or not, and the same applies to the offering provided to the customer, which is either industry-specific or industry-unspecific (Holland & Gutiérrez-Leefmans, 2018; Fruhwirth et al., 2020; Geske et al., 2021; Abendroth et al., 2021; Hodapp et al., 2019; Täuscher, 2016; Wang & Archer, 2007; Staub et al., 2021; Rix et al., 2020).

4.2.8. Revenue Streams. This building-block represents the revenue that a company generates from each of the individual customer segments (Osterwalder & Pigneur, 2010). For the company, the evaluation of customers' willingness to pay is essential in order to generate one or more revenue streams, whereby each individual stream can, in turn, have different pricing mechanisms. Through our review, we were able to identify the following topics for this building-block: central revenue source (8.1), pricing model for customers (8.2), pricing model for complementors (8.3), pricing (8.4), price discrimination (8.5), money stream (8.6), and currency (8.7).

Platform companies have a variety of options for generating revenue through their platform. However, the role of the central revenue source (8.1) and focus of revenue-generating activities can differ from platform to platform. The central source of revenue for the platform company can be buyers, sellers, users, third-party providers, or a combination of the aforementioned entities. Additionally, there is the possibility to offer the use of the platform for free (Täuscher & Laudien, 2017; Täuscher, 2016; Chasin et al., 2018; Perscheid et al., 2020; Rix et al., 2020).

Which pricing model a platform uses goes hand in hand with the choice of the central revenue source.

However, a distinction is made between a customer (8.2) and a complementor (8.3) pricing model. In the case of the former, the literature highlights the following forms of expression: free, non-monetary services such as content creation or advertising, one-time payments such as the purchase of licenses, variable and fixed rates such as subscriptions and transaction-based costs, a freemium approach, or a combination of the aforementioned forms (Holland & Gutiérrez-Leefmans, 2018; Bonina et al., 2021; Fruhwirth et al., 2020; Geske et al., 2021; Abendroth et al., 2021; Derave et al., 2020, 2021; Täuscher & Laudien, 2018; Hodapp et al., 2019; Täuscher, 2016; Wang & Archer, 2007; Chasin et al., 2018; Petrik & Herzwurm, 2018; Derave, 2019; Staub et al., 2021; Perscheid et al., 2020; Rix et al., 2020). The pricing models for complementors (8.3), that is, sellers of platform offerings or third-party providers, are similar to that of customers. However, the literature does not point out a freemium option or a way to combine the different pricing models (Holland & Gutiérrez-Leefmans, 2018; Bonina et al., 2021; Abendroth et al., 2021; Derave et al., 2020, 2021; Täuscher & Laudien, 2018; Täuscher, 2016; Wang & Archer, 2007; Chasin et al., 2018; Petrik & Herzwurm, 2018; Derave, 2019; Staub et al., 2021; Perscheid et al., 2020; Rix et al., 2020). The way in which a certain price is determined and expressed is considered in more detail in the pricing topic (8.4). The literature reveals fixed prices, prices set by buyers or sellers, market-regulated prices, prices through auctions or negotiations, and prices resulting from a specific offer, also mentioning free use regarding the determination (Fruhwirth et al., 2020; Zutshi & Grilo, 2019; Täuscher, 2016; Wang & Archer, 2007; Derave, 2019; Staub et al., 2021; Rix et al., 2020).

Additionally, platforms have the ability to adjust prices based on various factors. This process is called price discrimination (8.5), listing relevant factors such as users' geographic location, users' functions, quantity purchased, belonging to a certain segment, or the timing of the transaction (Derave, 2019; Staub et al., 2021; Rix et al., 2020). Another design topic focuses on the flow of money (8.6). The literature highlights the flow of money from customer to company to customer, from customer to company, or no flow of money as the result of a free model (Chasin et al., 2018). The currency (8.7) in which the transactions take place can also vary. Generally, a distinction is made between payments with crypto or fiat currencies, or a combination of both (Fruhwirth et al., 2020).

4.2.9. Cost Structure. This building-block describes all the costs incurred for the operation of a BM, such as the creation and provision of value, the maintenance of customer relationships, or the generation of revenue (Osterwalder & Pigneur, 2010). These costs can be calculated after determining and defining key resources, key activities, and key partnerships. For the cost structure, we could only identify the topic of key cost drivers (9.1).

For this design topic, all key costs of a platform have to be defined and considered. According to the literature, these can occur in the area of human resources, technology, or operating costs (Perscheid et al., 2020).

5. Discussion and Conclusions

The purpose of our work was to contribute to the existing research on DPs by adopting a BM perspective, giving consideration to the BMC (Osterwalder & Pigneur, 2010). Based on a SLR, our work synthesizes previous findings regarding DPs and offers insights into their design. Therefore, design topics were identified, which were then assigned to the various building-blocks of the BMC (see Figure 3). Behind each of these 33 topics are design options, which are based on academic literature and can be reached by means of an online appendix for further information.

When assigning design topics to the BMC, we noticed several things. The building-block of "Value Propositions" includes the most design topics (nine). This shows that topics related to the value offering, complementary services and exchange are currently addressed very frequently in the scientific literature. This also highlights that benefits for users must be clearly articulated and allow for differentiation in DP competition. With one topic each, the modules "Customer Relationships", "Customer Segments", and "Cost Structure" have the lowest number of assignments. This suggests that the topics surrounding these modules are currently less frequently used as a subject of research. From our point of view, this corresponds to the notion that DPs are complex unit of analysis (De Reuver et al., 2018; Gawer, 2021; Rietveld & Schilling, 2021) and that design topics for "Customer Relationships", "Customer Segments", and "Cost Structure" are especially difficult to recommend as these, for example, depend on industry context (B2B, B2C), DP architecture (closed vs. open), and involved DP actors.

However, the findings of our work make some contributions to the literature. By considering a BM perspective, our results provide insightful design topics and therefore help, in particular, to define the BM of a DP. Our work thus contributes to the challenging

research on DPs (De Reuver et al., 2018; Gawer, 2021; Rietveld & Schilling, 2021) by offering insights into a DP's BM design. Conducting a SLR, we also synthesize existing work that relates to our unit of analysis. From a theoretical point of view, our results advance DP knowledge by structuring existing findings in a conceptual framework that facilitates the design of commercial platforms. Additionally, the design topics of the conceptual framework identified in our review offer insights for the design of DPs in various industries.

Our results also provide guidance for practitioners because they point to specific design topics and therefore help to focus development and resource decisions in complex transformation projects for realizing a DP. In other words, the topics obtained by our SLR synthesize activities for developing the BM of a DP that can be regarded as a design framework. This framework might constitute, on the one hand, a playbook for supporting practitioners in the examination of a digital transformation toward a DP and, on the other, a basis for aligning further scientific research.

Although our study provides interesting insights into DPs, it suffers from limitations that might pave the way for future research in this field. Regarding the methodology, our review depends on the quality of the databases selected. We focused our review on publications with certain search strings in the title, keywords, or abstract to explicitly identify relevant publications with clear design topics for DPs and not the business logic itself. The search strings `taxonom*` OR `typolog*` OR `classif*` helped us to capture relevant publications with design topics and to optimize the relevance sampling process.

From our point of view, more research is still required in order to gain even more comprehensive insights into design topics for the BM of a DP. For example, we found a number of design topics in the following building-blocks: "Key Activities", "Value Propositions", and "Revenue Streams". Unfortunately, we found fewer design topics in the following building-blocks: "Key Partners", "Key Resources", "Customer Relationship", "Channels", "Customer Segments", and "Cost Structure". Further research may also focus on these building-blocks and shed light on platform-specific design topics. Future studies could also examine possible positive or negative interdependencies between design topics so that both researchers and practitioners receive an advanced overview and framework for designing a DP.

Second, our study and review have not focused on a certain industry or context. Thus, a further avenue for research could pertain to the consideration of a specific industry context, such as manufacturing, logistics, or

life sciences and healthcare. For example, logistics-specific design topics for the BM of a DP could be explored. Besides an industry-specific focus, further research may also consider an application of DPs in a public environment. In other words, studies could incorporate a public vantage point and identify important design topics for DPs that support the development of the BM. Further research could also consider a consumer/ user/ customer distinction. Finally, future studies might address the exploration of design topics that facilitate the development and provision of IT applications in today's complex ecosystems (Porter & Heppelmann, 2014), as well as the meaning and characteristics of design topics in different stages of a DP life cycle (Tece, 2017).

6. Online Appendix

The online appendix is available at: <https://figshare.com/s/af99b6a1ba492a0ce8d2>

7. References

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