



# A hierarchical taxonomy of business model patterns

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## Abstract

Although business model innovation (BMI) is essential to remaining competitive, many firms fail at it. A promising approach is building on reoccurring successful solutions – business model patterns (BMP) – as a blueprint for BMI. However, existing patterns face constraints subject to a high diversity and overlaps among patterns. In addition, literature do not consider relations among BMPs, which limits their potential for BMI. This paper develops a hierarchical taxonomy of BMPs including generalizations and specializations based on inheritance. We conduct a literature review to identify patterns and a cluster analysis to create an inductive structure, followed by a qualitative analysis. The resulting hierarchical taxonomy includes 194 elements. It is the first hierarchical taxonomy of BMPs. The hierarchy addresses the diversity of patterns and overlaps with inheritance. It aids research to structure and understand BMPs. For practice, the taxonomy allows for the application of patterns and supports BMI.

**Keywords** Business model · Business model pattern · Taxonomy · Hierarchical structure · Cluster analysis

**JEL classifications** O310 Innovation and Invention · Processes and Incentives

## Introduction

Market dynamics are changing at an ever-increasing pace and thus becoming more demanding for firms (D'Aveni et al. 2010; Teece 2018; El Sawy and Pereira 2013). Better information and a broader selection of firms has led to a shift in bargaining power toward customers (Teece 2010). To win this battle for customer attention, firms need to shorten development cycles, which increases competition and turbulence in

the market (Schneider and Spieth 2014; Teece 2018). Consequently, firms have to adapt to market dynamics and changing demand continuously.

Business models (BMs) are a crucial aspect to remaining competitive in these turbulent markets (Martins et al. 2015; de Reuver et al. 2013; De Reuver et al. 2009). A BM defines how firms create, deliver, and capture value in a market (Teece 2010).<sup>1</sup> Firms adapt BMs to cope with changing market dynamics by harmonizing the business strategy, internal processes, and information systems (Al-Debei and Avison 2010; Schneider and Spieth 2014; Teece 2018).

However, many firms fail when trying to align BM change with dynamic market requirements (Christensen et al. 2016). Changing an entire BM can involve enormous transformations for an organization (Foss and Saebi 2017). Thus, it is not surprising that this concept of BM change or adaption, termed as Business Model Innovation (BMI), enjoys increasing popularity (Foss and Saebi 2017). However, practitioners often build on trial-and-error experimentation to innovate their BM and fail likewise (Martins et al. 2015; Chesbrough 2010; Sosna et al. 2010; Morris et al. 2005). One reason is a lack of supporting frameworks and tools (Osterwalder and Pigneur 2013; Veit et al. 2014; Heikkilä et al. 2016; Weking et al. 2018a).

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<sup>1</sup> This paper uses BMs as formal conceptual representations (Massa et al. 2017).

A promising approach that supports BMI is learning from recurring phenomena that have proven to be successful in the past in different industries or contexts: business model patterns (BMPs) (Amshoff et al. 2015). BMPs describe successful BM instances or components of it that are applicable on other firms (Osterwalder and Pigneur 2010; Gassmann et al. 2014; Amshoff et al. 2015). BMPs can either be used in isolation or in a combination to form a new complete BM or describe a BM instance (Osterwalder and Pigneur 2010; Böhm et al. 2017). We see BM instances as concrete real world BMs (Osterwalder et al. 2005). BMPs sometimes appear under different names, for instance BM archetypes (Bocken et al. 2014; Weill et al. 2005; Eickhoff et al. 2017; Weking et al. 2018b) or BM configurations (Taran et al. 2016). Gassmann et al. (2014) found that 90% of BMIs in practice are a combination of existing BMPs.

However, current BMP literature faces limitations that restrict their applicability in research and practice. There is a variety of different BMP (i.e., Gassmann et al. (2014), Taran et al. (2016) or Remané et al. (2017), which differ in two dimensions. First, BMPs differ in the covered BM elements. On the one hand, a BMP can relate to one distinct element of a BM, such as the pattern *channel maximization* (Remané et al. 2017), which refers to the BM element *value delivery*. On the other hand, a BMP can relate to several BM elements such as the pattern *merchant model* (Remané et al. 2017), which addresses the BM elements *value creation*, *delivery* and *capture*. Second, BMPs differ in the level of abstraction. BMPs can address a low level of abstraction, such as the pattern *flexible pricing* (Remané et al. 2017) or they can approach a high level of abstraction, such as the pattern *multi-sided platform* (Osterwalder and Pigneur 2010). Further, an *HR broker* is a specific form of a *multi-sided platform*, where a platform provider matches buyers and sellers. Thus, these differences in covered elements and level of abstraction lead to BMPs overlapping in terms of content and substance. Hence, this variety of BMPs leads to overlaps in both dimensions: the degree of coverage and the content resulting from differences in the level of abstraction. Ultimately, this results in a complex and chaotic collection of BMPs, which is hard to use when innovating a BM.

Two contributions aim to resolve this complex collection by structuring BMPs (Taran et al. 2016; Remané et al. 2017). However, no framework provides a compelling categorization that addresses the variety of BMPs in the covered BM elements, level of abstraction and resulting overlaps. To address these issues, it is important to characterize (Remané et al. 2017) and cluster individual BMPs (Taran et al. 2016), but also to identify a structure with relations among BMPs that describes many levels of abstraction with generalizations, specializations and inheritance.

The purpose of this work is to structure BMPs consistently and to leverage their potential for BMI. This paper develops a

hierarchical taxonomy for BMPs. The taxonomy separates patterns present in the extant literature according to different degrees of coverage and levels of abstraction mitigating the issue of overlapping patterns. We build on an iterative taxonomy development approach (Nickerson et al. 2013) to tackle the complex field of BMPs by developing a hierarchical structure among BMPs. First, we perform an empirical-to-conceptual iteration with an agglomerative clustering of BMPs to generate an inductive structure (Kaufman and Rousseeuw 2009; Struyf et al. 1997). Second, we draw on a conceptual-to-empirical iteration with qualitative analysis to derive hierarchical levels within the structure. Scholars and practitioners can build on the hierarchical taxonomy to understand and use BMPs. The hierarchical structure helps to reduce the complexity of BMPs and to increase their applicability in the context of increased market dynamics.

## Related work

Extant BM literature provides a variety of frameworks that characterize the BM of a firm (Täuscher and Abdelkafi 2017; El Sawy and Pereira 2013; Fiel 2013). Research differentiates between general and specific BM frameworks. General BM frameworks focus on common elements to describe a BM. El Sawy and Pereira (2013), for example, show 26 general BM approaches. Common examples are:

- the Business Model Canvas with nine dimensions (Osterwalder and Pigneur 2010),
- the Magic Triangle with four dimensions (Gassmann et al. 2014),
- the BM framework according to Abdelkafi et al. (2013) with five main elements,
- the unified BM framework (Al-Debei and Avison 2010) as a conceptual BM framework and
- the STOF model (Bouwman et al. 2008; de Reuver et al. 2013) as a service oriented BM framework.

All of them cover the following elements to characterize a BM instance: value proposition, value delivery, value creation and value capture. In addition, there are BM frameworks that do not directly address value-based elements, but specific aspects. The casual loop diagram (Casadesus-Masanell and Ricart 2010; Casadesus-Masanell and Ricart 2011) as a logic oriented BM framework uses choices and consequences to describe BM instances and highlights their reinforcing cycles. The matrix-shaped BM framework according to Weill et al. (2005) focuses on four BM archetypes (i.e., *creator*, *distributor*, *landlord* and *broker*) and the type of asset involved (i.e., *financial*, *physical*, *intangible* and *human*) (Weill et al. 2011). IBM's component business model (Chesbrough 2010; Pohle et al. 2005) illustrates the category

of specialization-focused BM frameworks. It includes an accountability level (i.e., *direct*, *control* and *execute*) and does not cover a direct value capture dimension. Besides specialized BM frameworks, there are also BM frameworks tailored toward a specific context: digital BMs (Bock and Wiener 2017), big data (Hartmann et al. 2016), FinTechs (Eickhoff et al. 2017), car sharing (Remané et al. 2016), platform BMs (Täuscher and Laudien 2018), or sustainable BMs (Upward and Jones 2016). The large amount of frameworks as well as their differences emphasize the ambiguity of the concept of BMs.

BMPs are a promising solution to reduce the complexity in characterizing BMs with BM frameworks. BM literature provides many different collections of BMPs with diverse amounts of BMPs. Osterwalder and Pigneur (2010) deduce five BMPs. Gassmann et al. (2014) define 55 BMPs. Both use their BM framework to derive and describe typical BMPs including related example cases. Two contributions build on BMPs from literature. Taran et al. (2016) initially found 97 BMPs and conclude with 71 different BMPs. Remané et al. (2017) started with 356 BMPs and result with 182 different BMPs.

However, the current literature about BMPs has two main limitations. First, the multitude of general BM frameworks leads to a wide range of BMPs that address different BM elements, i.e., one or many. Consequently, some patterns include only a few BM elements, whereas others describe holistic BMs. Osterwalder and Pigneur (2010) deduce five BMPs that change the general setup of a BM and influence all BM elements and many areas of a firm (e.g., *long tail*, *multi-sided platform* or *open business model*). Gassmann et al. (2014) define BMPs that vary in their addressed BM elements. Some BMPs focus on a few elements of a BM. Examples are the patterns *pay what you want* and *subscription* addressing mainly value capture mechanisms, and *white label* addresses mainly the value proposition. Others affect all elements of a BM, such as *no frills*, *peer-to-peer* or *two-sided market*. Likewise, the work of Taran et al. (2016) covers BMPs influencing all BM elements, such as *broker* (i.e., “bring together buyers and sellers and facilitate transactions”) and BMPs influencing only a few BM elements. *Channel maximization* (i.e., “product is distributed through as many channels as possible to create the broadest distribution possible”), for example, refers to the value delivery. Remané et al. (2017) similarly covers very different BMPs. Examples are *e-mail* (i.e., “communicate with stakeholders via e-mails rather than print and mail”) that influences the value delivery only, whereas *connection* (i.e., “provide physical and/or virtual network infrastructure to gain (internet) access”) or *software firms* (i.e., “create software and license/sell it”) describe holistic BMs.

Second, there is a variety in the level of abstraction of BMPs. Some are specializations, while others are generalizations of BMPs. *Multi-sided platforms*, for example, bring

together two or more customer segments (Hein et al. 2018c). The presence of each segment creates value for the other segments (Remané et al. 2017; Osterwalder and Pigneur 2010). Thus, *multi-sided platforms* are generalizations of *brokerage* that define two segments as buyers and sellers and add a commission fee (Remané et al. 2017; Weill et al. 2005). Further specializations are *financial broker*, *HR broker*, *physical broker* and *information broker* (Remané et al. 2017; Weill et al. 2005). Another example is *subscription* where customers regularly pay upfront for products or services (Remané et al. 2017; Rappa 2001). Specializations are *flat-rate*, where the customer receives unlimited access and *membership* where the access to products or services and the time-dependent payment is the focus (Remané et al. 2017; Gassmann et al. 2014; Tuff and Wunker 2010). These differences in the level of abstraction of BMPs and in the covered BM elements leads to overlapping BMPs and increased complexity. Collections of BMPs are hard to apply for BMIs.

Two contributions aim to reduce this complexity by creating a comprehensive structure for characterizing BMPs. Taran et al. (2016) introduce the five-V framework. It clusters the 71 BMPs into five dimensions: value proposition, value segment, value configuration, value network, and value capture. Remané et al. (2017) introduce a matrix-shaped BM taxonomy. They used BMPs to create a morphological box for characterizing BMs. The BM framework has four initial dimensions based on Günzel and Holm (2013): value proposition, value delivery, value creation and value capture (Remané et al. 2017). Remané et al. (2017) include two hierarchical levels in the form of *prototypical* as holistic patterns and *solution* patterns as specific building blocks. Both studies focus on clustering and classifying existing BMPs by deriving typologies or BM frameworks to reduce complexity (Taran et al. 2016; Remané et al. 2017). They both cover the basic four elements ranging from value proposition, to value delivery, to value creation, and value capture. They can characterize BMPs as well as BM instances from practice.

However, both frameworks focus only on characterizing BMPs. BM literature address neither the variety in covered BM elements of BMPs nor the diversity in the level of abstraction of BMPs nor the resulting overlaps among BMPs. Likewise, general BM frameworks are not able to address these issues. The four BM elements are not enough to address the main drawbacks of BMPs. Current literature only characterizes individual BMPs. Despite the importance of reducing complexity among BMPs by structuring, no paper has taken into account the relations and hierarchical structures among BMPs yet. Thus, this paper focuses on relations among BMPs in the form of a hierarchical taxonomy of BMPs covering specializations and generalizations based on the inheritance of characteristics of BMPs to address the differences in covered BM elements, the diverse abstraction levels, and the resulting overlaps among BMPs.

## Research method

We followed a two-step research approach. First, we used a structured literature review (Webster and Watson 2002) to identify a comprehensive set of BMPs. Second, we used an iterative taxonomy development approach (Nickerson et al. 2013) to structure BMPs according to their relationships.

To identify articles with BMPs and similar constructs, we built on a literature review conducted by Remané et al. (2017). With a literature review according to Webster and Watson (2002), they identified 182 different BMPs out of 22 collections of BMPs and six reviews of BMP collections. To ensure the validity of their findings, we conducted a follow-up literature review based on Webster and Watson (2002) to cross validate and supplement their results. We used the four databases: ProQuest – Business, EBSCOhost, Science Direct and Scopus with the following search string: “‘Business model\*’ AND (characteristics OR framework\* OR taxonomy OR pattern\* OR design OR development OR evolution)”. We reviewed 776 papers, from which we have chosen 33 relevant articles. The search included articles in academic journals and conference proceedings written in English. We included only articles that focus on BMPs or similar constructs that meet the definition of BMPs. We found two more papers through a backward and forward search resulting in 35 papers.

In the coding process, two researchers iteratively checked and consolidated the BMPs presented in each publication to ensure intercoder reliability. We confirm the comprehensiveness of the list of BMPs according to Remané et al. (2017) and found only two additional patterns (i.e., *data as a service* and *R&D contractor*). Overall, we derived a set of 184 BMPs.

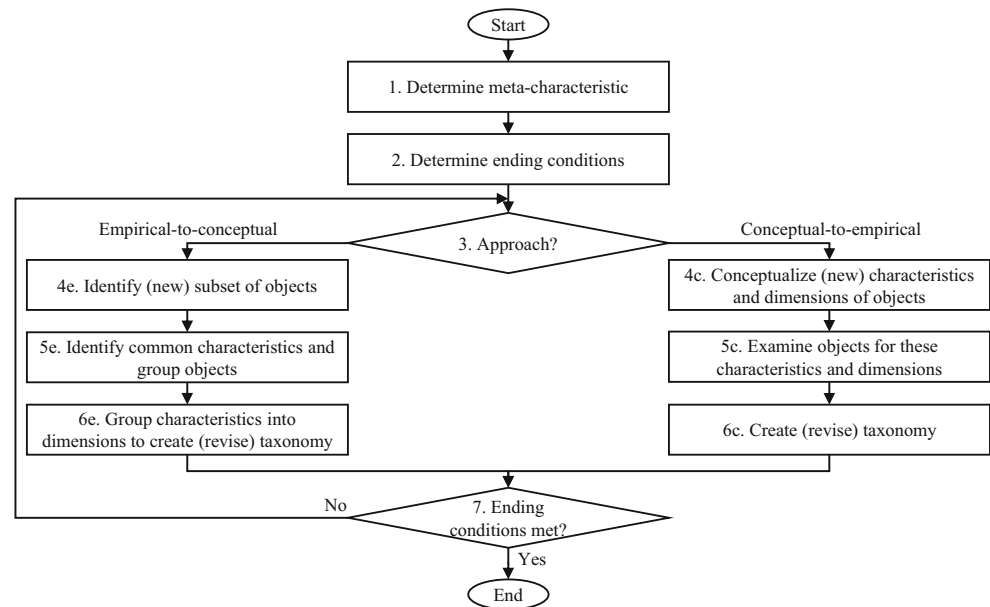
Next, two researchers coded each of the BMPs to verify their relevance according to three criteria. First, we include only patterns that cover at least one of nine building blocks of the Business Model Canvas (Osterwalder and Pigneur 2010). We have chosen the Business Model Canvas for this relevance criterion and the coding in the first iteration for three main reasons. First, it is a widely applied and practical BM framework (Massa et al. 2017). Second, it is a general BM framework and not specific for certain contexts. Third, with nine dimensions and two to ten characteristics each, it is very comprehensive (Osterwalder and Pigneur 2010). Thus, we exclude patterns that do not cover any BM element and do not meet the definition of BMPs. An excluded example is *e-mail* (i.e., “communicate with stakeholders via e-mails rather than print and mail”) (Strauss and Frost 2016; Remané et al. 2017). Second, BMPs must not be specific for one industry. BMPs that are specific for one industry do not meet the definition of BMPs. An excluded example is *misdirection* for search engines (i.e., “send customers to locations different from what they initially searched for if the searched company did not pay sufficient listing fees to the search engine”) (Clemons 2009; Remané et al. 2017). Other examples are

BMPs for the electric vehicle industry (Bohnsack et al. 2014). Third, BMPs must not solely build on a business practice that has established itself as common practice. Excluded examples are *customer relationship management* (i.e., “collecting and integrating all information on each customer touch point”) and *enterprise resource planning* (i.e., “use an integrated back office system to optimize business processes and thereby reduce cost”) (Strauss and Frost 2016; Remané et al. 2017). To ensure intercoder reliability and internal validity, two researchers alternatively created (researcher A) and revised (researcher B) the coding until both agreed. We excluded 19 patterns and concluded with 164 BMPs for the taxonomy.

We built on the iterative taxonomy development according to Nickerson et al. (2013) to develop the hierarchical taxonomy (see Fig. 1). Before starting with the method, Nickerson et al. (2013) suggests to determine a meta-characteristic (step 1). However, since this paper creates an inductive hierarchical structure, we refrained from this step so as not to affect the inductive result. In the second step, we defined ending conditions (step 2). In addition to conditions defined by Nickerson et al. (2013), we added the following criteria due to our research purpose. First, the resulting classification structure should be a hierarchical tree, consisting of several branches and layers. Accordingly, one ending condition is that the taxonomy considers hierarchical relations among BMPs, including specializations and generalizations based on inheritance. Second, the taxonomy structure should be free from unnecessary branches or layers to have a concise taxonomy without redundancy or duplication (Nickerson et al. 2013).

The first iteration followed the empirical-to-conceptual approach (Nickerson et al. 2013). Since there is significant data available (164 BMPs), an inductive, empirical approach is suitable to create an initial structure (Nickerson et al. 2013). In step 4e, we included all objects, since we build on a quantitative approach. To identify common characteristics between BMPs (step 5e), we built on an agglomerative cluster analysis with a preceding coding. Two researchers iteratively coded all 164 BMPs according to the dimensions and characteristics defined by Osterwalder and Pigneur (2010). To not bias results, we choose this widely applied, general and comprehensive BM framework as a coding scheme. Table 1 shows the coding scheme with the BMP *razors/ blades* as an example (highlighted in italic). Within the coding, we stick to the definitions of the BMPs and the definitions’ overall essence. For example, the essence of razors/ blades is not to offer *complements*, but to *lock-in* the customer with overpriced complements that are needed to use a product. During the coding, we noticed that some few characteristics fit for many BMPs and that some essential characteristics of BMPs were not part of the characteristics defined by Osterwalder and Pigneur (2010). Thus, we added some characteristics (\*) to increase the discriminatory power and to ensure a collectively

**Fig. 1** Iterative taxonomy development approach (Nickerson et al. 2013)



exhaustive coding scheme (see Table 1). Two researchers alternatively created and revised the coding to ensure intercoder reliability. This resulted in three iterations of coding (researcher A) and revising (researcher B) all 164 BMPs until both agreed to the coding of all BMPs.

Thereafter, we used agglomerative clustering on the 164 coded BMPs to derive an initial inductive taxonomy (Nickerson et al. 2013). We used R with the package *cluster*, the function *agnes* and the *ward* method (Kaufman and Rousseeuw 2009; Struyf et al. 1997). It resulted in the best discriminatory power compared to *single*, *complete* or *average* linkage. We used the following indices to determine an optimal amount of clusters: McClain (McClain and Rao 1975), C-index (Hubert and Levin 1976), Silhouette (Rousseeuw 1987) and Dunn (Dunn 1974). The McClain and Silhouette index indicate seven clusters; the C-index suggests 27 clusters, whereas the Dunn index recommends 51 clusters. We applied all three suggestions to create a structure with three hierarchical levels, i.e., seven high-level clusters and 27 and 51 low-level clusters (step 6e). The left part of Fig. 2 shows the seven high-level clusters.

The second iteration followed a conceptual-to-empirical approach (Nickerson et al. 2013) to analyze and validate the clusters qualitatively. A qualitative analysis is necessary since a cluster analysis cannot recognize the different levels of abstraction of BMPs. Further, we validate the clusters qualitatively. Figure 2 summarizes the development process. It shows the quantities of BMPs in each cluster (1. Iteration) or subtree (2. Iteration) and includes initial names for clusters (1. Iteration). Two researchers studied all BMPs in one cluster to detect generalizations (step 4c) and specializations (step 5c) and to revise the taxonomy continuously (step 6c). BMPs with a higher level of abstraction became superordinate BMPs. If there was no high-level BMP that covers the intersection of

low-level characteristics, we created a new BMP. We also split high-level clusters by building on lower-level clusters that resulted in 27 and 51 clusters from the analysis. For example, the value proposition cluster from the first iteration has 70 elements (see Fig. 2). Thus, we used the low-level clusters within the value proposition cluster to further differentiate BMPs. Subordinate clusters supported the separation between *payment/ pricing models*, *revenue streams*, *target customers*, *value propositions* and *development processes*. Other clusters could be used with almost no changes for the hierarchical structure (i.e., *merchant model*, *multi-sided platforms* and *value network*). For splitting and merging clusters and forming the hierarchical levels, we highly built on subordinate clusters from the first iteration that resulted from the analysis with 27 and 51 clusters. Eventually, the classification structure included hierarchical relations and all ending conditions were met (step 7).

## Business model pattern taxonomy

The resulting hierarchical taxonomy of BMPs has 194 elements and comprises four hierarchical levels.<sup>2</sup> It is similar to a class diagram including the inheritance of properties, generalizations and specializations. BMPs on a lower level of abstraction inherit all properties of superior BMPs of this branch. BMPs on the same level do not exclude each other, since a BM covers several BMPs. A BM instance from practice can apply several BMPs on several levels. Speaking in terms of a UML class diagram, the inheritance in the taxonomy is composed of partial or incomplete specializations since we cannot

<sup>2</sup> Table 2 in the appendix shows the complete list of detailed definitions.

**Table 1** Coding scheme based on Osterwalder and Pigneur (2010) with added characteristics (\*) and an example coding of razors/ blade (italic) (own illustration)

Value Proposition	Revenue Streams	Customer Segments	Cost Structure	Customer Relationship	Partners	Resources	Activities	Distribution Channels
Price	<i>Asset/ service sale</i>	Segmented	Value-driven	Personal assistance	Strategic alliances between non-competitors	Physical	Problem solving	Indirect
Newness	Advertising	Mass market	Cost-driven	Self-service	Strategic partnerships between competitors	Intellectual/ Intangible	Production	Direct
Convenience/ usability	Brokerage fees	Niche market		Co-creation		Human	Platform/ network	
Risk reduction	Licensing/ Renting/ Leasing	Multi-sided platforms		Communities	Buyer-supplier relationships	Financial		
Accessibility	Usage fee			<i>Lock-In*</i>		Data/ Information*		
Customization	Subscription fees							
Getting the job done								
Brand/ status								
Performance								
Cost reduction								
Complements*								
Experience*								

make sure that literature covers every possible BMP. The first level has eight high-level BMPs or subtrees, each one with several hierarchical layers. Figure 3 shows the first level of the hierarchical taxonomy. All elements that we added during the process and that are not directly defined as a BPM in literature are marked with an asterisk (\*). In the following, we describe each of the eight subtrees.

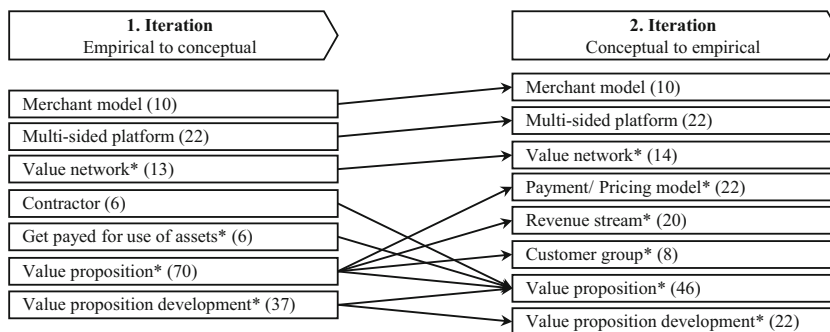
*Merchant model* describes “wholesalers or retailers of goods and services” (Remané et al. 2017) (see Fig. 4). This BMP includes *supermarket*, where firms offer a great diversity of products with a low price (Gassmann et al. 2014) and three subordinate BMPs to further specify merchants in terms of what they offer (i.e., intangibles and/ or physical products) and how they offer it (i.e., *shop*). On the one hand, *merchant of intangibles* and *physical wholesaler* further specifies the asset of trading in intangibles and physical assets (Weill et al. 2005). An *e-retailer*, for example, sells physical assets solely online (Rappa 2001; Wirtz et al. 2010). On the other hand, a *shop* describes that a provider uses a shop to offer his value proposition. *Bricks and clicks*, for example, defines that a shop has an online and offline presence (Johnson 2010).

*Multi-sided platforms* “bring together two or more distinct but interdependent groups of customers, where the presence of each group creates value for the other groups” (Remané et al. 2017) (see Fig. 5). This BMP include specialized platforms, such as *collaboration platforms* and *trust intermediaries*, as well as various forms of *brokerage* and *portals*. Brokerage concentrates on buyers and sellers only and charges a transaction fee. Brokers can again have specific assets (*broker of specific assets*) and/ or can operate exclusively on the internet (*internet platform*). *Portals* bring together contents from diverse sources. For example, an *e-mall* aggregates several e-shops, whereas a search engine can be a *horizontal portal*.

*Customer group* comprises BMPs that focus on a certain customer group or market segment (see Fig. 6). It generalizes BMPs, such as *long tail*, which focuses on offering a large number of niche products, where each sells relatively infrequently (Osterwalder and Pigneur 2010). Other specializations are *affinity clubs* where a product is exclusively offered to members, *aikido* where offerings are opposite to the offering of the competition, and *own the undesirable* where the target customer group might not appear immediately attractive (Remané et al. 2017; Gassmann et al. 2014). We added one BMPs in this subtree: *serve convenience seekers* targets customers valuing convenience over all other attributes. It involves offering more convenient, simple products (i.e., *dial down features*) and offering products in a convenient way (i.e., *one-stop convenient shopping*).

The subtree *Payment/ pricing model* cover BMPs that define how a price can be compounded and determined (see Fig. 7). It includes general pricing models, such as *auction*, *disaggregated pricing* or *freemium*, and specialized ones for low prices (*sell at low prices*). Examples for general pricing

**Fig. 2** Development of the hierarchical structure (\* not a BMP from literature) (own illustration)



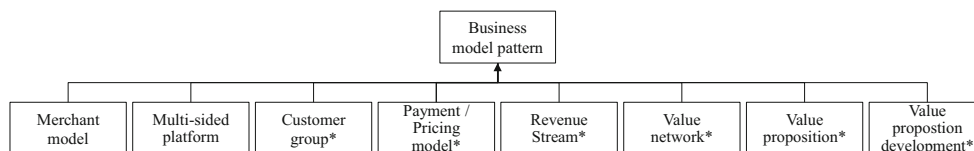
models are *demand collection system* where a buyer’s final bidding is arranged (Rappa 2001; Remané et al. 2017) and *disaggregated pricing* where customers can buy exactly what they want (Tuff and Wunker 2010; Remané et al. 2017). Examples for low pricing are *buying club* where providers use high volumes to negotiate discounts (Linder and Cantrell 2000; Remané et al. 2017) and *under the umbrella pricing* where provider underprice market leaders (Linder and Cantrell 2000; Remané et al. 2017). Some patterns, such as *add-on, free, freemium* or *product sales*, are closely related to the value proposition. However, the essence of these patterns is the pricing, which leads to a changed value proposition in a second step. Therefore, the patterns are specializations of the *payment/ pricing model*.

*Revenue streams* describe how the BM generates revenues (see Fig. 8). In contrast to *payment/ pricing models*, *revenue streams* utilize pricing models to generate revenue. This can include general approaches (i.e., *negative operating cycle* and *scaled transactions*), revenues from advertising, revenues from lending out assets and revenues from usage fees. *Lending/ renting/ leasing* is “temporarily granting someone the (exclusive) right to use a particular asset for a fixed period in return for a fee” (Osterwalder and Pigneur 2010). Especially for this BMP, we found further differentiating patterns, for instance allowing customers to use software for a continuous service fee (*application service providers*) or other kinds of *landlords*. In *subscription* models, we found *trust services*. They include memberships with a subscription fee and specific code of conduct (Rappa 2001). With *usage fees* a customer pays depends on a certain variable, such as (short) time usage (*pay per use*) or the performance/ result of the product usage (*performance-based contracting*). Accordingly, the pricing for *usage fee* is variable, while the pricing for *lending/ renting/ leasing* builds on a fixed characteristic, such as a period of time.

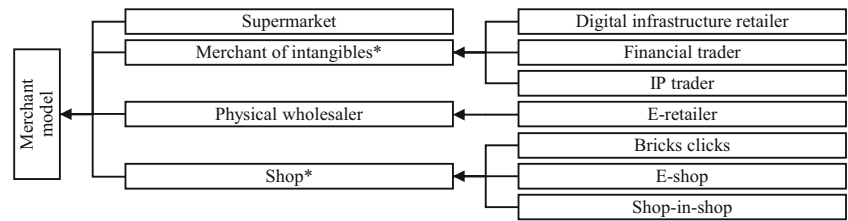
The *value network* as a BMP involves changes in the *actors* of the value network or changes in *how* they interact (see Fig. 9). This also includes extending the value network with new forms of advertising (*buy advertising*), cover more parts of the value chain (*integrator*), and more closely link different actors of the supply chain (*supply chain management*). Examples here are the *value chain integrator* that distributes information and coordinates activities in the value network and the *orchestrator* that concentrates in core competencies with outsourcing and coordinates the value chain (Andrew and Sirkin 2006; Remané et al. 2017). Other examples are sharing of infrastructure (*shared infrastructure*), revenues (*revenue sharing*) or risks (*risk sharing*).

The BMP *value proposition* can further specialize in the products or services provided or the way providers offer them (see Fig. 10). Examples are *lock-in, forced scarcity, breakthrough markets* or *reverse innovation* and *experience* or *premium* value propositions. On the one hand, *forced scarcity* describes the limitation of the supply to boost demand and prices (Tuff and Wunker 2010; Remané et al. 2017). *Breakthrough markets* means investing in new markets to achieve a short-time monopoly (Linder and Cantrell 2000), whereas *reverse innovation* refers to selling simple products in industrial countries that were developed for emerging markets (Gassmann et al. 2014). All three BMPs describe how to offer a value proposition. *Customization* BMs describe both the value proposition and how it is offered. It generalizes *mass customization* or customization for individual customers (i.e., *custom supplier of hardware* or *software*). On the other hand, various BMPs describe complementary products or services, for example: *digitally-charged products, cross selling, service-wrapped commodity, servitization of products* or *value-added reseller*. *Vertical portals* inherit properties of *content providers* since they specialize in a particular area by providing very deep content and functionality (Applegate 2001;

**Fig. 3** First hierarchy level of taxonomy (\* not a BMP from literature) (own illustration)



**Fig. 4** Business model patterns of merchant models (own illustration)



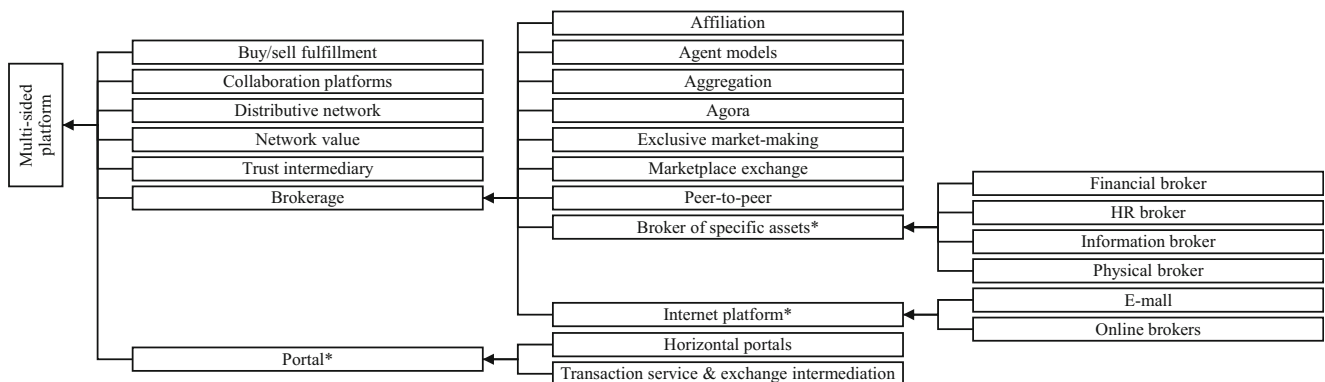
Clemons 2009). In this way, the pattern creates an own value proposition and is more than a multi-sided platform connecting two customer groups. Another *content provider* as a BMP is *data as a service*, where data is a key resource and the offering of data is the value proposition (Hartmann et al. 2016). We derived the BMP *getting the job done* from Osterwalder and Pigneur (2010) as “helping a customer get certain jobs done”. Thus, *advisors*, *audience measurement services*, *R&D contractors* and *search agents* are specializations. *R&D contractors* are engaged with technology development and building prototypes (Libaers et al. 2010).

*Value proposition development* describes how an offering is developed or produced (see Fig. 11). It generalizes BMPs, such as *open business model*, *open content*, *reverse engineering*, *user designed* or *crowdsourcing*. *Reverse engineering*, for example, describes to use information from a competitor’s product to build a similar one. (Gassmann et al. 2014), whereas *trash-to-cash* is when used products are sold in different markets or used in new products (Gassmann et al. 2014). It further covers BMPs, such as *develop intangibles* (i.e., *digitization*, *entrepreneur*, *incomparable products/services* and *inventor*) and *internal use of data* that describes the development process (i.e., *business intelligence*, *context* and *knowledge management*). *Context* as a BMP produces a value proposition by sorting or aggregating information and provide information for a specific context (Wirtz et al. 2010). *Production* further specializes BMPs according to the type of asset (i.e., *produce physical products* and *produce intangibles*). It further includes the concrete production approach *from push to pull*. The patterns *crowdsourcing* and *user designed* are

assigned here and not part of *value network* since they have a higher impact on development processes than on the value network.

**Discussion**

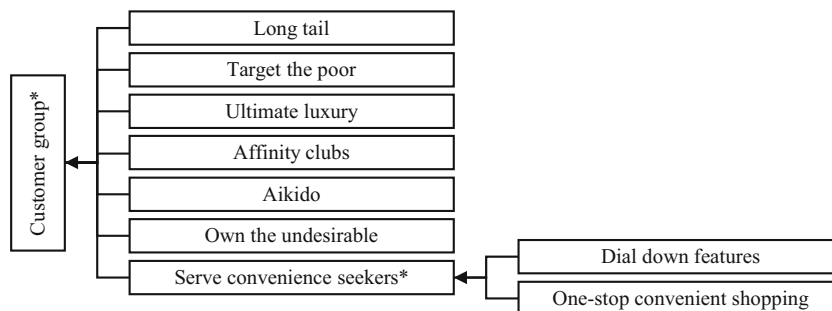
A current limitation of BMPs is that they have varying degrees of coverage in terms of BM elements and have different levels of abstraction. Some BMPs are straightforward and illustrate how firms can adapt their value stream (e.g., *membership*), while others touch all aspects of a BM (e.g., *multi-sided platform*). The consequence is that BMPs are overlapping, hard to compare, and thus not easy to use when innovating a business model. Existing BMP frameworks (Remané et al. 2017; Taran et al. 2016) are designed to illustrate and define patterns. Thus, they are not intended to analyze relations among BMPs or to address the variety in the degree of coverage, the different levels of abstraction and the overlaps. This paper builds on hierarchical relations among BMPs and creates a hierarchical taxonomy including generalizations and specializations based on inheritance to address all three issues. This work’s literature review reveals 164 BMPs. Using an iterative taxonomy development method (Nickerson et al. 2013), we derive a hierarchical taxonomy with eight BMPs on the top level of abstraction and three further levels including more detailed BMPs. Since an instance of a BM in practice can comprise many BMPs, more than one BMP within one branch or subtree can apply to one complete instance of a BM.



**Fig. 5** Business model patterns of multi-sided platforms (own illustration)



**Fig. 6** Business model patterns specifying customer groups (own illustration)

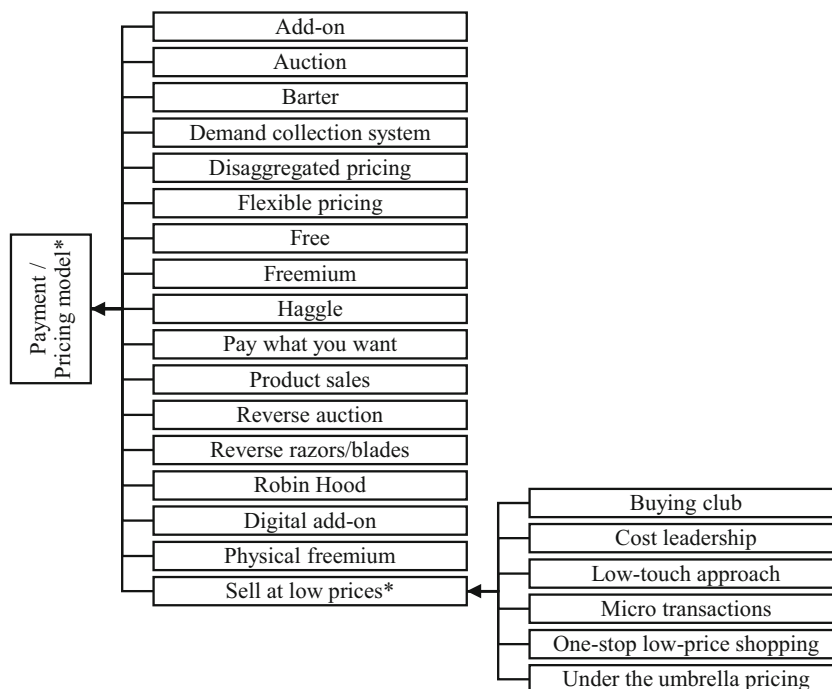


The hierarchical taxonomy shows eight overarching BMPs that comprise dominant and holistic BMPs or cover common BM elements (i.e., *value proposition*, *value delivery*, *value creation* and *value capture*). On the one hand, two of eight high-level BMPs of the taxonomy cover holistic and well-known BMs. First, the *merchant model* describes wholesalers and retailers of goods and service (Remané et al. 2017). This BMP has existed for a long time and has been digitalized during e-commerce (Rappa 2001). Second, the *multi-sided platform* describes serving two or more customer segments, where the presence of each segment creates value for the other segments (Remané et al. 2017). This BMP similarly have been around for a long time (Osterwalder and Pigneur 2010). However, multi-sided platforms spread heavily with the rise and support of information technology (Parker et al. 2017; Hein et al. 2018a). Examples are Google, Facebook and Visa (Osterwalder and Pigneur 2010; Parker et al. 2017; Hein et al. 2018b; Schreieck et al. 2018). Both high-level BMPs, merchant model and multi-sided market, draw on a long history and show enormous business success in practice

(Hein et al. 2016). The inductively derived taxonomy shows that both stand out as two very dominant BMPs in the BMP literature. On the other hand, the remaining six of eight high-level BMPs of the taxonomy address common *elements* of BM frameworks: value proposition, value delivery, value creation and value capture. The subtree *value proposition* addresses to the identically named BM element. The subtree *customer groups* refers to the value delivery, whereas the subtrees *value proposition development* and *value network* refer to the value creation. *Payment/pricing models* and *revenue streams* address the value capture element. Consequently, the taxonomy confirms dominant and common elements of BM frameworks. Moreover, the taxonomy highlights two dominant BMPs. For both aspects, dominant BM elements and dominant BMPs, it provides further specifications with its hierarchical structure of BMPs.

The resulting hierarchical taxonomy of BMPs addresses three shortcomings of literature. First, it creates a structure for the various BMPs in literature including the relations among BMPs. It considers individual BMPs as well as

**Fig. 7** Business model patterns specifying payment and pricing models (own illustration)



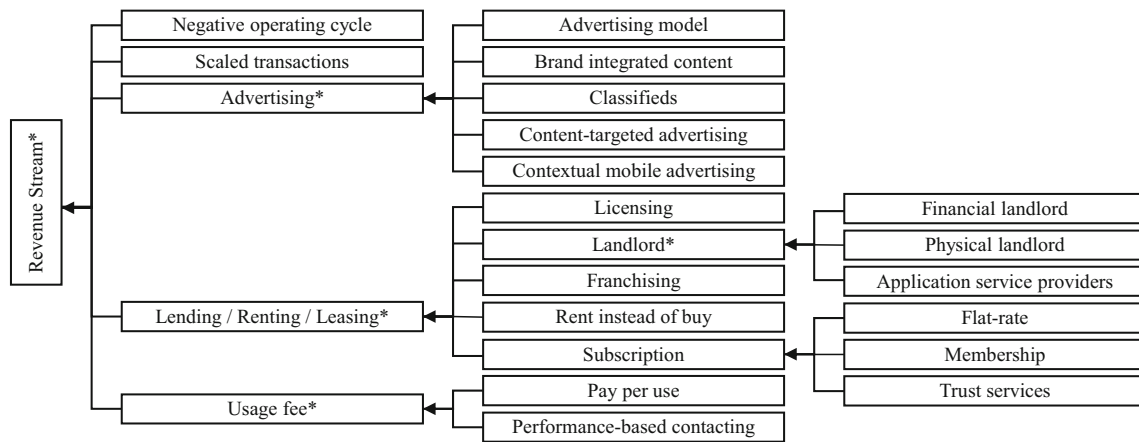


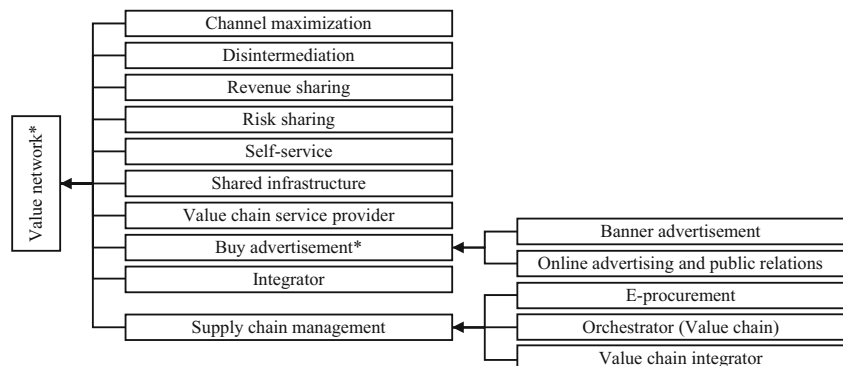
Fig. 8 Business model patterns specifying revenue streams (own illustration)

relations among them and thus mitigates the complexity of the large amount of BMPs in extant literature. Patterns are easier to find in the hierarchical structure than in an alphabetically sorted list. For example, if a user is looking for a pricing model, she can look at this subtree and see possible options. Second, the hierarchical structure takes into account the diversity of BMPs concerning their various degrees of coverage in terms of BM elements. The taxonomy with its different levels and relations among BMPs covers all kinds of different degrees of coverage and hence explains overlaps. The six of eight high-level BMPs that address common elements of BM frameworks and BMs clearly differentiate BMPs concerning their essence. The remaining two high-level BMPs (i.e., *merchant model* and *multi-sided market*) express two common holistic BMs. The taxonomy further specifies these BMs with lower-level BMPs, namely specializations. In this way, the taxonomy mitigates the various degrees of coverage in terms of BM elements by structuring BMPs according to BM elements and common holistic BMPs. Hence, it also clarifies overlaps in the dimension of coverage. Third, the taxonomy addresses the various hierarchical levels of BMPs with specializations and generalizations based on inheritance. BMPs inherit characteristics of superior BMPs and, thus, are specializations of BMPs on a higher level. While BMPs on a higher level in the taxonomy address a higher level

of abstraction, BMPs on a lower level in the taxonomy also show a lower level of abstraction and cover BM elements in detail. In this way, it also clarifies overlaps in the dimension of abstraction levels. Summarizing, the taxonomy considers the variety in the covered BM elements of BMPs and the diversity in the level of abstraction of BMPs and incorporates overlapping BMPs with its hierarchical structure.

This work has three main implications for theory. First, to the best of our knowledge, this is the first inductively derived BM classification as well as the first classification considering relations among BMPs. It is the first BM taxonomy that address the diversity of BMPs concerning their various degrees of coverage, different hierarchical levels of BMPs, and overlaps of BMPs and relations among BMPs. The taxonomy helps to structure and understand the vast amount of BMPs available in literature. In contrast to existing BM frameworks (Osterwalder and Pigneur 2010; Gassmann et al. 2014), the hierarchical taxonomy of BMPs is able to characterize individual BMPs and BM instances from practice. Additionally, it allows for putting a BMP or BM instance in relation to other BMPs. In this way, BMs can be analyzed against the backdrop of other BMPs and in a higher order structure of BMPs with higher and lower levels of abstraction. Second, the taxonomy further serves as an extendable structure for future BMPs as well as current BMPs that literature does not cover yet. In

Fig. 9 Business model patterns specifying the value network (own illustration)



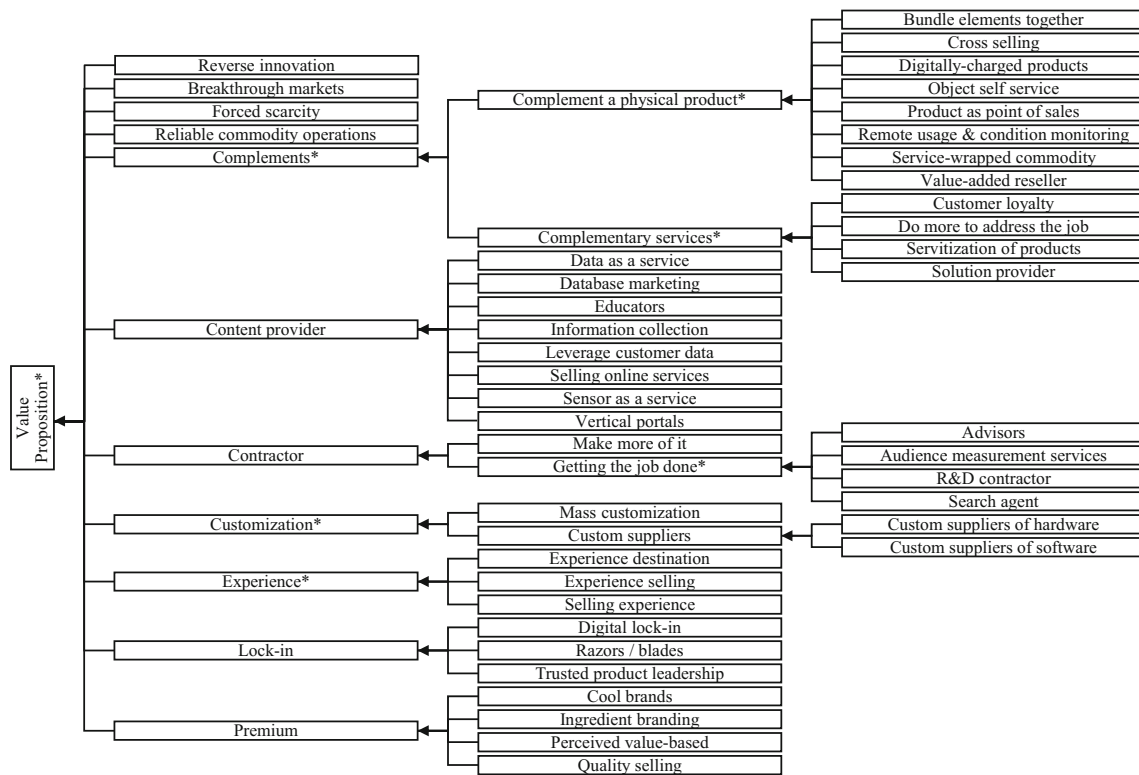


Fig. 10 Business model patterns specifying value propositions (own illustration)

contrast to existing BM frameworks, the taxonomy defines hierarchical dimensions for classifying BMPs and for describing them. The taxonomy functions as an overall structure. Currently, there are two holistic and overarching BMPs, namely merchant model and multi-sided market as well as six overarching BMPs that address different BM elements. Sparse parts of the taxonomy show possible areas for areas for new BMPs and future research. Third, the hierarchical structure as a supporting tool for BMI addresses several calls for research. The hierarchical taxonomy represents a holistic, exhaustive and systematic classification structure for BMs

(Fielt 2013) including the derivation of specific sub-classes of BMs (Veit et al. 2014). It supports the conceptual modeling and formalization of BMs (Osterwalder and Pigneur 2013).

For practice, the hierarchical BM taxonomy allows for the application of BMPs. The taxonomy consists of BMPs with examples cases from practice in a hierarchical structure. The structure makes it easier to use than an alphabetically sorted list of BMPs, and the example cases provide the basis for analogical thinking (Gavetti and Rivkin 2005). Thus it helps practitioners to identify related BMPs (sharing the same parent node) to find a creative solution for a specific problem of

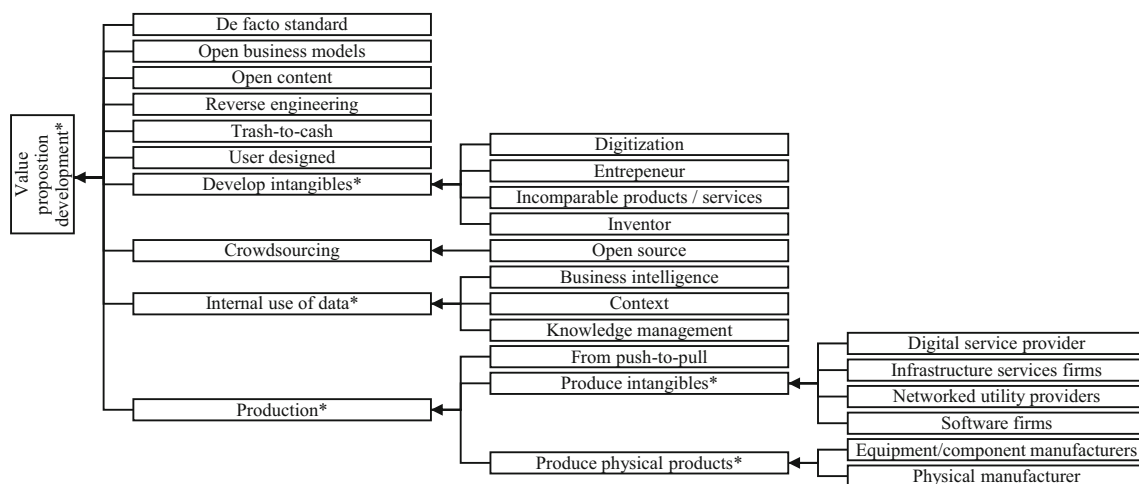


Fig. 11 Business model patterns specifying value proposition developments (own illustration)

their BM (e.g. *payment/ pricing models*). Furthermore, practitioners can characterize their current BM with the taxonomy of BMPs. They can decide for each branch and BMP if it is relevant for their current business or not. Then, they can identify analogies to BMPs and related example cases from literature. Practitioners can assess possible opportunities for BMI based on the taxonomy, the BMPs and example cases. For instance, they can assess related patterns within one branch as possible incremental BMI or analyze different branches as possible radical BMI. Here, the hierarchical taxonomy as a graphic tree helps to visualize the initial and planned combination of BMPs within an intended BMI. The taxonomy further shows the *path* that has to be traveled in the hierarchical structure for a certain BMI. This visualizes the changes of the current BM that are necessary to reach the target BM. In this way, the hierarchical taxonomy of BMPs can serve as a practical tool to support BMI. It addresses numerous calls for research. It helps to find options for BMI and new and viable BM alternatives as well as its visualization (Osterwalder and Pigneur 2013; Veit et al. 2014). The taxonomy supports incremental, i.e. similar BMPs within one branch, as well as radical changes of BMs, i.e. leaping from one branch to another, with example cases for each BMP (El Sawy and Pereira 2013).

This work has some limitations. First, the taxonomy solely relies on BMPs from literature. Thus, we cannot ensure that the taxonomy includes all available BMPs. There are probably new BMPs in practice that literature does not yet cover. However, we argue that the taxonomy is extendable and provides a good basic structure that is able to integrate future BMPs. Second, the taxonomy development process and especially the coding of BMPs as well as the second iteration with the conceptual to empirical approach can be subject to the researchers' interpretations of BMPs definitions. However, two researchers discussed the coding and matchings iteratively to prevent a possible bias. Third, there are limitations regarding the taxonomy's applicability in practice. Avoiding superficial analogies is important for strategy development (Gavetti and Rivkin 2005). An analogical case (source) has to be understood thoroughly before its similarities and differences can be assessed and it can be translated into a target case (Gavetti and Rivkin 2005). The taxonomy cannot consider the contextual factors and strategic path dependencies of an applying firm. Practitioners may find possible opportunities with example cases in the taxonomy. However, the taxonomy can only partly support practitioners in evaluating a specific BMP for their context and strategy by providing analogies in the forms of definitions and example cases (Gavetti and Rivkin 2005). Nevertheless, the taxonomy supports BMI in practice by structuring the many BMPs and make them utilizable. Fourth, the taxonomy has some sparse areas. Some dimensions of the structure are more detailed than others and include more BMPs. For example, *brokerage* as a specialization of *multi-sided platform* has many specializing BMPs, whereas

*trust intermediaries* or *buy/ sell fulfillment* have no specializing BMPs. We can see that e-commerce BMPs (e.g., *online advertisement*) and digital BMPs dominate the taxonomy. The reason for this is that we included BMPs from literature only. This leads to promising areas for future research.

The hierarchical taxonomy for BMPs provides four main opportunities for future research. First, in order to address sparse areas of the taxonomy, future research can investigate new BMPs and extend the taxonomy. The taxonomy reveals two overarching and holistic BMPs, namely *merchant model* and *multi-sided platform*. Future research can investigate whether both types are dominant and successful types in practice and extend the hierarchical structure with new patterns further characterize both types. Likewise, the taxonomy shows six overarching BMPs that address BM elements. Future research can investigate in and extend these subtrees. For this purpose, the taxonomy serves as an overall structure and supports the identification of areas for new BMPs. Second, future research can use the taxonomy to describe certain BM instances and developments of a BMI. Like in practice, future research can apply the hierarchical taxonomy to characterize BM instances (e.g., an initial BM and a target BM) with existing BMPs to describe case studies, for example. Third, this work is a first step towards an ontology of BMPs and towards a BM distance measure. For now, the taxonomy includes hierarchical relations only. However, it would be interesting and further facilitate the usage of the taxonomy to include all kinds of relations. This ontology of BMPs would illustrate cross relations within the hierarchy, for instance BMPs that complement or exclude each other. Excluding examples are *disintermediation*, *integrator* and *orchestrator*. Whereas disintermediation and integrators aim to cover more parts of the value chain, an orchestrator tries to focus on core competencies, outsource remaining activities and only coordinate the value chain. An ontology of BMPs would further support a BM distance measure. With an intended BMI including an initial BM (initial combination of BMPs) and a target BM (target combination of BMPs), the hierarchical taxonomy and ontology can support the calculation of a distance between these BMs (combinations of BMPs). It would indicate how many changes of the current BM are necessary to reach the target BM and suggest how revolutionary the BMI would be. Fourth, the hierarchical taxonomy including the definitions of BMPs (see appendix Table 2) can be developed further as a practical tool. For example, a software tool implementing the hierarchical BM taxonomy would strengthen its practical relevance. In this way, the hierarchy can support practitioners with characterizing their current BM with BMPs and suggest possible opportunities for BMI. A hierarchical questionnaire based on the taxonomy can provide guidance for characterizing a firm's BM. Building on the current BMP combination, the tool can suggest possible opportunities for incremental BMI based on the hierarchy.

Possible opportunities for revolutionary BMI can be suggested based on a case study database of successful BMs where the initial and the target BM is characterized with the hierarchical taxonomy of BMPs. Hence, the hierarchy of BMPs can serve as an underlying logic of a practitioner-oriented tool. Overall, the hierarchical taxonomy of BMPs opens up fruitful areas for future research with theoretical as well as practice relevance.

## Conclusion

In increasingly turbulent markets and environments, BMs, their fit to a firm's strategy and the capability to innovate BMs are essential to remain competitive (Martins et al. 2015; Zott and Amit 2008). In research, the concepts of BMs and BMI are gaining more and more attention (Massa et al. 2017; Foss and Saebi 2017). However, innovating a BM is a complex task and many firms fail (Christensen et al. 2016). One approach to supporting BMI is building on successful solutions of the past, i.e. BMPs (Gassmann et al. 2014; Amshoff et al. 2015). However, BMPs and available collections of BMPs have three major limitations that restrict their applicability in research and practice. First, a large amount of BMPs exists with diverse degrees of coverage, i.e., covered BM elements. Second, BMPs show diverse levels of abstraction and resulting overlaps. Third, extant literature only characterize individual BMPs without considering the relations among BMPs to address diversity, hierarchy levels and overlaps. In order to mitigate these issues, this paper develops a hierarchical taxonomy of BMPs that includes generalizations and specializations among patterns based on inheritance to address this diverse degree of coverage, diverse hierarchy levels and overlapping BMPs.

In order to develop this hierarchical structure, we first build on a literature review (Webster and Watson 2002) to identify BMPs and second on an iterative taxonomy development approach (Nickerson et al. 2013). We coded all 164 BMPs according to Osterwalder and Pigneur (2010) and conducted an agglomerative cluster analysis, followed by a qualitative analysis to come up with an inductive structure. The resulting hierarchical taxonomy of BMPs includes 194 elements in its four levels of abstraction. On its highest level, it reveals two overarching, holistic BMPs (i.e., *merchant model* and *multi-sided market*) and six overarching elements of BMs. It is the first hierarchical taxonomy of BMPs, which takes into account relations among BMPs. The hierarchical structure reduces complexity by structuring the large amount of BMPs, respecting the diversity in the degree of coverage and abstraction levels and addresses overlaps with inheritance. It structures the complex field of BMPs and helps researchers to understand BMPs. For practice, the taxonomy allows for the application of BMPs, supports BMI and, thus, addresses several calls for research (Fielt 2013; Osterwalder and Pigneur 2013; Veit et al. 2014; El Sawy and Pereira 2013). The hierarchical taxonomy is extendable and, hence, serves as a robust foundation for further research with yet unidentified BMPs.

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## Appendix

**Table 2** Definitions of business model patterns (adapted from Remané et al. 2017) with added definitions (\*)

Pattern	Definition	References
Add-on	Offer a basic product at a competitive price and charge for several extras	Gassmann et al. (2014)
Advertising model	Provide a product or service and mix it with advertising messages	Gassmann et al. (2014), Hanson and Kalyanam (2007), Rappa (2001), Tuff and Wunker (2010)
Advertising*	Generate revenues with advertising	Own definition
Advisors	Provide consulting and advise	Applegate (2001)
Affiliation	Refer customers to a third party and receive a commission for a specific transaction completed (e.g., click, give information, buy product)	Gassmann et al. (2014), Hanson and Kalyanam (2007), Rappa (2001)
Affinity clubs	Partner with membership associations and other affinity groups to offer a product exclusively to its members	Johnson (2010)

**Table 2** (continued)

Pattern	Definition	References
Agent models	Represent the buyer or the seller and earn commissions for successful facilitation of transactions	Hanson and Kalyanam (2007), Strauss and Frost (2016)
Aggregation	Build a specific form of broker preselecting products/ services and target audience – hence, key process is matching of needs	Applegate (2001), Bienstock et al. (2002), Linder and Cantrell (2000), Rappa (2001), Tapscott et al. (2000)
Agora	Build a specific form of broker allowing buyer and seller to freely negotiate and assign value to goods – hence, key process is price discovery	Applegate (2001), Bienstock et al. (2002), Tapscott et al. (2000)
Aikido	Offer products to the customer that are the opposite of what the competitors are offering, thereby making competitor's strengths a weakness	Gassmann et al. (2014)
Application service providers	Allow customers to use software that is hosted on remote servers for continuous service fee	Applegate (2001), Eisenmann (2001)
Auction	Make customers name the maximum price they are willing to pay; the highest price wins the product or service	Applegate (2001), Bienstock et al. (2002), Gassmann et al. (2014), Hanson and Kalyanam (2007), Johnson (2010), Rappa (2001), Tapscott et al. (2000), Timmers (1998), Tuff and Wunker (2010)
Audience measurement services	Conduct market research on online audience as agency for other customers	Rappa (2001)
Banner advertising	Place advertising banners on websites	Hanson and Kalyanam (2007), Rappa (2001)
Barter	Allow customers to trade a non-monetary compensation in exchange for a product or service	Bienstock et al. (2002), Gassmann et al. (2014)
Brand integrated content	As manufacturer of other products create content for the sole basis of product placement	Rappa (2001)
Breakthrough markets	Invest in opening new markets to gain at least a temporary monopoly	Linder and Cantrell (2000)
Bricks + clicks	Integrate both an online (clicks) and an offline (bricks) presence to browse, order, and pick up products	Johnson (2010), Rappa (2001)
Broker of specific assets*	Broker that deal with specific assets	Own definition
Brokerage	Bring together and facilitate transactions between buyers and sellers, charging a fee for each successful transaction	Chatterjee (2013), Linder and Cantrell (2000), Johnson (2010), Tuff and Wunker (2010)
Bundle elements together	Make purchasing simple and more complete by packaging related products together	Hanson and Kalyanam (2007), Johnson (2010), Tuff and Wunker (2010)
Business intelligence	Gather secondary and primary information about competitors, markets, customers, and other entities to predict important information	Strauss and Frost (2016)
Business Model Pattern	describe components of successful BM instances or holistic successful BM instances that are applicable in other firms	Osterwalder and Pigneur (2010), Gassmann et al. (2014), Amshoff et al. (2015)
Buy advertising*	Promote your value proposition with advertising	Own definition
Buy/sell fulfilment	Take customer orders to buy or sell a product or service, including terms like price and delivery	Rappa (2001)
Buying club	Round up buyers with attractive prices and use purchase volume to gain discounts	Linder and Cantrell (2000)
Channel maximization	Leverage as many channels as possible to maximize revenues	Linder and Cantrell (2000)
Classifieds	List items for sale or things of interest and charge listing or membership fees in exchange	Rappa (2001)
Collaboration platforms	Provide a set of tools and an information environment for collaboration between enterprises	Timmers (1998)
Complement a physical product*	Offer a complement in addition to a physical product	Own definition
Complementary services*	Offer complementary services	Own definition
Complements*	Offer complementary products or services	Own definition
Content provider	Provide content such as information, digital products, and services	Applegate (2001), Clemons (2009), Eisenmann (2001), Strauss and Frost (2016), Weill and Vitale (2001), Wirtz et al. (2010)
Content-targeted advertising	Identify the meaning of a web page and then automatically deliver relevant ads when a user visits that page	Rappa (2001)
Context	Sort and/or aggregate available online information	Wirtz et al. (2010)

**Table 2** (continued)

Pattern	Definition	References
Contextual mobile advertising	Tailor advertising to the context, e.g., location, preferences, or status	Clemons (2009)
Contractor	Sell services provided primarily by people, such as consulting, construction, education, personal care, package delivery, live entertainment, or healthcare	Weill et al. (2005)
Cool brands	Earn premium prices with competitive products through expert brand marketing	Hanson and Kalyanam (2007), Linder and Cantrell (2000)
Cost leadership	Keep variable costs low and sell high volumes at low prices	Tuff and Wunker (2010)
Cross selling	Offer complementary products in addition to the standard offering	Gassmann et al. (2014)
Crowdsourcing	Solve a problem by outsourcing it to the crowd (e.g., an internet community)	Gassmann et al. (2014), Johnson (2010)
Custom suppliers	Design, produce, and distribute customized products and services	Applegate (2001)
Custom suppliers of hardware	Produce and customize IT equipment or components	Applegate (2001)
Custom suppliers of software	Create and customize software and license/ sell it	Applegate (2001)
Customer group*	Focus on a certain customer group or market segment	Own definition
Customer loyalty	Increase customer loyalty by reward programs	Gassmann et al. (2014), Rappa (2001)
Customization*	Offer customized products or services	Own definition
Data as a service	Offer a provision of information to the customer as the value proposition. The key resource is represented by data.	Hartmann et al. (2016)
Database marketing	Collect, analyze and disseminate electronic information about customers, prospects, and products to increase profits	Strauss and Frost (2016)
De facto standard	Develop and use proprietary component technology to provide high product functionality, but also license it broadly throughout the industry to establish it as the dominant design	Linder and Cantrell (2000)
Demand collection system	Let prospective buyers make a final bid for a specified good or service and arrange fulfilment	Rappa (2001)
Develop intangibles*	Develop intangibles in an innovative way	Own definition
Dial down features	Target less-demanding consumers with products or services that may not be superior but are adequate and perhaps more convenient, simple, etc.	Johnson (2010)
Digital add-on	A physical asset is sold at a small margin; over time, the customer can purchase or activate any number of digital services with a higher margin	Fleisch et al. (2014)
Digital infrastructure retailers	Take control of inventory and sell digital infrastructure	Applegate (2001)
Digital lock-in	Use digital technologies to limit the compatibility of physical products and thus lock customers to your ecosystem	Fleisch et al. (2014)
Digital service provider	Produce and deliver a wide range of services online	Applegate (2001)
Digitally-charged products	Charge classic physical products with a bundle of new sensor-based digital services and position them with new value propositions	Fleisch et al. (2014)
Digitization	Offer a traditionally physical product as a digital version	Gassmann et al. (2014)
Disaggregated pricing	Allow customers to buy exactly – and only – what they want	Tuff and Wunker (2010)
Disintermediation	Deliver a product or service that has traditionally gone through an intermediary directly to a customer	Gassmann et al. (2014), Johnson (2010), Rappa (2001), Strauss and Frost (2016), Weill and Vitale (2001)
Distributive network	Provide infrastructure to connect other actors of the economy such as logistics, energy, mobility, or communication	Tapscott et al. (2000)
Do more to address the job	Look beyond your typical offering and address other jobs your customers are trying to get done	Johnson (2010)
Educators	Create an deliver educational offerings, often online	Applegate (2001)
E-Mall	Build a platform for a collection of e-shops, usually enhanced by a common umbrella, for example, of a well-known brand	Rappa (2001), Timmers (1998)
Entrepreneur	Create and sell financial assets, often creating and selling firms	Weill et al. (2005)

**Table 2** (continued)

Pattern	Definition	References
E-procurement	Conduct tendering and procurement electronically	Strauss and Frost (2016), Timmers (1998)
E-retailer	Assume control of inventory, set a non-negotiable price, and sell physical products online	Applegate (2001), Eisenmann (2001), Rappa (2001), Wirtz et al. (2010)
E-shop	Build a web shop to sell products or services online	Gassmann et al. (2014), Strauss and Frost (2016), Timmers (1998)
Exclusive market-making	Bring together specific, highly targeted, qualified audiences for trading	Linder and Cantrell (2000)
Experience destination	Use a carefully designed environment to attract customers who pay premium prices	Gassmann et al. (2014), Linder and Cantrell (2000)
Experience selling	Allow the client to experience the product, often via a sales force and a pyramid commission structure; traditionally applied for cosmetic products	Linder and Cantrell (2000)
Experience*	Provide experiences	Own definition
Financial broker	Match buyers and sellers of financial assets	Weill et al. (2005)
Financial landlord	Let others use cash (or other financial assets) under certain (often time-limited) conditions	Linder and Cantrell (2000), Tuff and Wunker (2010), Weill et al. (2005)
Financial trader	Buy and sell financial assets without significantly transforming (or designing) them	Weill et al. (2005)
Flat-rate	Charge a fixed price and allow the customer unlimited access in exchange	Gassmann et al. (2014)
Flexible pricing	Vary prices for an offering based on demand	Strauss and Frost (2016), Tuff and Wunker (2010)
Forced scarcity	Limit the supply of offerings available to drive up demand and prices	Tuff and Wunker (2010)
Franchising	Allow franchises to use a business concept, including brand and products, in compensation for financial compensation	Gassmann et al. (2014)
Free	Provide customer with a free-of-charge offer and use other sources such as advertising to generate revenues	Linder and Cantrell (2000), Osterwalder and Pigneur (2010)
Freemium	Offer basic services for free, while charging a premium for advanced or special features	Gassmann et al. (2014), Hanson and Kalyanam (2007), Tuff and Wunker (2010)
From push-to-pull	Make production more flexible in order to ideally produce a product just when it is ordered and not upfront as stock article	Gassmann et al. (2014)
Getting the job done*	Helping a customer get certain jobs done	Osterwalder and Pigneur (2010)
Haggle	Allow the buyers to negotiate over the price	Bienstock et al. (2002)
Horizontal portals	Create a portal that provides a gateway to Internet's content and offerings, such as search engine, e-mails, news etc.	Applegate (2001), Eisenmann (2001), Rappa (2001), Strauss and Frost (2016)
HR broker	Match buyers and sellers of human services	Weill et al. (2005)
Incomparable products / services	Use deep R&D skills to develop and exploit proprietary technology to offer unique products that command high margins	Linder and Cantrell (2000)
Information broker	Match buyers and sellers of information or other intangible assets	Applegate (2001), Hartmann et al. (2016), Rappa (2001), Timmers (1998), Weill et al. (2005)
Information collection	Collect and commercialize information gathered from the Internet	Hanson and Kalyanam (2007)
Infrastructure services firms	Produce and deliver complementary services for the internet	Applegate (2001), Hartmann et al. (2016)
Ingredient branding	Build a brand of a product component that is part of an end product	Gassmann et al. (2014)
Integrator	Cover most parts of the value chain in-house in order to keep control of innovations, efficiency, etc.	Andrew and Sirkin (2006), Gassmann et al. (2014)
Internal use of data*	Use available data internally to develop new offerings	Own definition
Internet platform*	Broker that operate exclusively in the internet	Own definition
Inventor	Create and then sell intangible assets, such as patents and copyrights	Weill et al. (2005)
IP trader	Buy and sell intangible assets	Rappa (2001), Weill et al. (2005)
IT Equipment/ component manufacturers	Produce IT equipment and components	Applegate (2001)
Knowledge management		Strauss and Frost (2016)



**Table 2** (continued)

Pattern	Definition	References
	Transform and store a company's data into useful information and knowledge	
Landlord*	Sell the right to use an asset	Own definition
Lending/ renting/ Leasing*	Temporarily granting someone the exclusive right to use a particular asset for a fixed period in return for a fee	Osterwalder and Pigneur (2010)
Leverage customer data	Collect customer data and use them commercially, e.g., for targeted advertising	Clemons (2009), Gassmann et al. (2014), Rappa (2001)
Licensing	License or otherwise get paid for limited use of intangible assets	Andrew and Sirkin (2006), Gassmann et al. (2014), Rappa (2001), Tuff and Wunker (2010), Weill et al. (2005)
Lock-in	Lock the customers to your ecosystem by strongly increasing the switching costs through high hurdles	Fleisch et al. (2014), Gassmann et al. (2014)
Long tail	Focus on selling a large number of niche products, each of which sells relatively infrequently	Gassmann et al. (2014), Osterwalder and Pigneur (2010)
Low-touch approach	Offer standardized, low-price version of a product or service that is traditionally customized and higher priced	Gassmann et al. (2014), Johnson (2010), Linder and Cantrell (2000)
Make more of it	Offer internal know-how and other resources also as external service to other companies	Gassmann et al. (2014)
Marketplace exchange	Build a specific form of broker also offering a full range of services covering the transaction process, from market assessment to negotiation and fulfilment for an industry consortium	Rappa (2001)
Mass customization	Customize a commodity products to the customers' specific preferences	Gassmann et al. (2014), Linder and Cantrell (2000), Strauss and Frost (2016)
Membership	Charge a time-based payment to allow access to locations, offerings or services that non-members do not have	Tuff and Wunker (2010)
Merchant model	Act as a wholesalers/ retailer of goods and services	Bienstock et al. (2002), Rappa (2001)
Merchant of intangibles*	Wholesalers or retailers of intangibles	Own definition
Micro transactions	Sell many items for as little as a dollar – or even only once cent – to drive impulse purchases	Tuff and Wunker (2010)
Multi-sided platforms	Bring together two or more distinct but interdependent groups of customers, where the presence of each group creates value for the other groups	Gassmann et al. (2014), Osterwalder and Pigneur (2010)
Negative operating cycle	Generate high profits by maintaining low inventory and having the customer pay up front	Gassmann et al. (2014), Johnson (2010), Tuff and Wunker (2010)
Network value	Provide a platform that leads to repeated purchases by a core group of loyal customers	Chatterjee (2013)
Networked utility providers	Create and distribute downloadable software programs that facilitate communication	Eisenmann (2001)
Object self service	Provide physical products with the ability to independently place orders on the internet	Fleisch et al. (2014)
One-stop convenient shopping	Use broad selection and ubiquitous access to attract busy buyers who will pay a premium for convenience	Linder and Cantrell (2000)
One-stop low-price shopping	Use low price and the convenience of broad selection to attract buyers, then convert volume into purchase discounts	Linder and Cantrell (2000)
Online advertising and public relations	Buy advertising on products or services of another companies	Strauss and Frost (2016)
Online brokers	Use the internet to facilitate a transaction between buyer and seller	Bienstock et al. (2002), Hartmann et al. (2016), Rappa (2001), Strauss and Frost (2016), Timmers (1998), Weill and Vitale (2001)
Open business models	Create innovations by systematically integrating partners into the company's R&D process	Gassmann et al. (2014), Osterwalder and Pigneur (2010)
Open content	Develop openly accessible content collaboratively by a global community of contributors who work voluntarily	Rappa (2001)
Open source	Develop a product not by a company, but by a public community with all information being available publicly	Gassmann et al. (2014), Rappa (2001), Tapscott et al. (2000)
Orchestrator (Value chain)	Focus on core competencies and outsource/ coordinate all other activities along the value chain	

**Table 2** (continued)

Pattern	Definition	References
Own the undesirable	Seek to serve segments of the market that might not appear immediately attractive	Andrew and Sirkin (2006), Gassmann et al. (2014), Timmers (1998)
Pay per use	Charge for each use of a product or service	Johnson (2010)
Pay what you want	Invite customers to set the price they wish to pay	Gassmann et al. (2014), Hanson and Kalyanam (2007), Johnson (2010), Rappa (2001), Tuff and Wunker (2010)
Payment/ pricing model*	Use a specific payment/ pricing model	Gassmann et al. (2014), Tuff and Wunker (2010)
Peer-to-peer	Facilitates a transaction among peers, i.e., two or more consumers, through provision of a platform	Own definition
Perceived value-based	Position company's output as a "want" item and command a price premium – invest in knowledge professionals such as scientists, engineers, programmers, or data experts	Gassmann et al. (2014), Rappa (2001)
Performance-based contacting	Determine the fee for usage of a product not by frequency of use but rather by the quality of the result from the use	Chatterjee (2013)
Physical broker	Match buyers and sellers of physical assets	Fleisch et al. (2014), Gassmann et al. (2014), Weill et al. (2005)
Physical freemium	A physical asset is sold together with free digital services while charging a premium for advanced digital services	Fleisch et al. (2014)
Physical landlord	Sell the right to use a physical asset	Weill et al. (2005)
Physical manufacturer	Create and sell physical assets	Applegate (2001), Weill et al. (2005)
Physical wholesaler	Buy and sell physical assets	Rappa (2001), Weill et al. (2005)
Portal*	bring together contents from diverse sources	Own definition
Premium	Price at a higher margin than competitors for a superior product, offering, experience, service, or brand	Tuff and Wunker (2010)
Produce intangibles*	Produce intangibles	Own definition
Produce physical products*	Produce physical products	Own definition
Product as point of sales	Make physical products become sites of digital sales and marketing services that the customer consumes directly at the product or indirectly via another device	Fleisch et al. (2014)
Product sales	Sell a product for a fixed price	Hanson and Kalyanam (2007), Rappa (2001)
Production*	Produce a certain offering or produce it in a certain way	Own definition
Quality selling	Attract customers with high quality and / or hard to find products or services for premium prices	Hanson and Kalyanam (2007), Linder and Cantrell (2000)
R&D contractor	This type of firm is fully engaged in technology development in essence, building prototypes. Furthermore, these R&D contractors provide consulting services in highly technical subjects.	Libaers et al. (2010)
Razors/ blades	Offer a cheap or free basic product ("razors") together with complements ("blades") that are overpriced and thereby subsidize the basic product	Gassmann et al. (2014), Johnson (2010), Linder and Cantrell (2000)
Reliable commodity operations	Provide predictable commodity products or services for which customers are willing to pay a small premium, as they are reliable	Gassmann et al. (2014), Linder and Cantrell (2000)
Remote usage and condition monitoring	Equip products with digital technologies that allow to detect errors preventatively and monitor usage	Fleisch et al. (2014)
Rent instead of buy	Temporarily lend a product to the customer and charge a rent	Gassmann et al. (2014), Johnson (2010), Rappa (2001)
Revenue sharing	Share the revenues with other companies in order to create a symbiotic relationship	Gassmann et al. (2014), Hanson and Kalyanam (2007), Rappa (2001)
Revenue stream*	Use a specific revenue stream	Own definition
Reverse auction	Set a ceiling price for a product or service and have participants bid the price down	Bienstock et al. (2002), Johnson (2010)
Reverse engineering	Break down a product of competitors into its components and use this information to build a comparable product	Gassmann et al. (2014)
Reverse innovation		Gassmann et al. (2014)

**Table 2** (continued)

Pattern	Definition	References
	Transfer cheaper products from less developed countries to more developed countries	
Reverse razors/ blades	Offer an expensive basic product (“razors”) that allows for usage of cheap or even free complements (“blades”)	Johnson (2010)
Risk sharing	Waive standard fees or costs if certain metrics are not achieved, but receive outsized gains when they are	Tuff and Wunker (2010)
Robin Hood	Charge wealthy customers more than poorer customers for a products or service	Gassmann et al. (2014)
Scaled transactions	Maximize margins by pursuing high-volume, large-scale transactions when unit costs are relatively fixed	Tuff and Wunker (2010)
Search agent	Search out the price and availability for a good service specified by the buyer	Rappa (2001)
Self-service	Delegate a part of the value chain to the client	Gassmann et al. (2014)
Sell at low prices*	Offer your value proposition with low prices	Own definition
Selling experience	Offer new experiences through participation in a community, often virtually	Clemons (2009)
Selling online services	Offer to use software services online	Clemons (2009)
Sensor as a service	Collect, process, and sell sensor data for a fee	Fleisch et al. (2014)
Serve convenience seekers*	Target customers valuing convenience over all other attributes	Own definition
Service-wrapped commodity	Distinguish commodity products by services that are added	Linder and Cantrell (2000)
Servitization of products	Sell ongoing services in addition to the product or even sell the service the product performs rather than the product	Johnson (2010)
Shared infrastructure	Share a common infrastructure among several competitors	Weill and Vitale (2001)
Shop*	Offer your value proposition with a shop	Own definition
Shop-in-shop	Build a store within another store	Gassmann et al. (2014)
Software firms	Create software and license/ sell it	Applegate (2001)
Solution provider	Provide a full range of services in one domain directly and via allies and attempt to own the primary consumer relationship	Gassmann et al. (2014), Linder and Cantrell (2000), Weill and Vitale (2001)
Subscription	Continuously provide customers with products or services and regularly charge upfront fees	Gassmann et al. (2014), Hanson and Kalyanam (2007), Johnson (2010), Rappa (2001), Tuff and Wunker (2010)
Supermarket	Offer a large variety of products at a low price	Gassmann et al. (2014), Linder and Cantrell (2000)
Supply chain management	Connect suppliers and distribution channels more closely	Strauss and Frost (2016)
Target the poor	Focus on the bottom-tier clients of the income pyramid and sell a large number of cheap products with low margin	Gassmann et al. (2014)
Transaction service and exchange intermediation	Provide integrated portal to coordinate complex transactions among involved several parties for spot markets	Hartmann et al. (2016), Linder and Cantrell (2000)
Trash-to-cash	Reuse already used products	Gassmann et al. (2014)
Trust intermediary	Provide a third-party payment mechanism for buyers and sellers to settle a transaction	Hartmann et al. (2016), Rappa (2001)
Trust services	Establish membership associations that abide by an explicit code of conduct, and in which members pay a subscription fee	Rappa (2001)
Trusted product leadership	Develop long-lasting product platform architectures to create a non-disruptive product upgrade path for locked-in customers	Linder and Cantrell (2000)
Ultimate luxury	Focus on selling to the top-tier customers of the income pyramid	Gassmann et al. (2014)
Under the umbrella pricing	Under-price the market leader and use marketing to convince customers your offerings are equivalent, fast follow in product/ service development	Linder and Cantrell (2000)
Usage fee*	Customers’ payments depend on a certain variable of the usage	Own definition
User designed	Customers invent products that afterwards are produced by the company	Gassmann et al. (2014)
Value chain integrator	Coordinate activities across the value net by gathering, synthesizing, and distributing information	Timmers (1998), Weill and Vitale (2001) Gassmann et al. (2014), Timmers (1998)

**Table 2** (continued)

Pattern	Definition	References
Value chain service provider	Only support parts of the value chain such as logistics or payments – but for several companies	
Value network*	Change your value network or the way you interact with it	Own definition
Value proposition development*	Develop your offering in a certain way	Own definition
Value proposition*	Offer certain products or services, or offer them in a certain way	Own definition
Value-added reseller	Sell a comprehensive range of undifferentiated products based on value-added services, e.g., through consultative selling, product availability, service, and promotional pricing	Linder and Cantrell (2000)
Vertical portals	Create a portal that specializes in a particular area and provides very deep content and functionality in this area	Applegate (2001), Clemons (2009)

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