

**Development of Value Propositions for Ecosystem Initiatives:
A Qualitative Analysis**

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The President:

Prof. Dr. Bernhard Ehrenzeller

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Executive Summary

A customer-centric approach to innovation and product development is considered state of the art today. At the same time, new technologies, data and merging industry boundaries are opening up new opportunities and making customers even more demanding. As a result, some individual companies are no longer able to adequately address these increased customer needs. Instead, partners with complementary capabilities and resources are leveraged to drive joint value creation. Often an ecosystem is formed as a specific way for partners to collectively create value. Ecosystems are an association of at least three partners who contribute complementary modules in order to jointly create a superior value proposition. There are different types of complementarity in ecosystems. By creating value propositions together, companies can achieve the next level of customer orientation.

Value propositions are the core of the ecosystem and are developed for the customer. Yet at the same time, the partners who contribute the complementary modules that form the joint value proposition cannot be managed hierarchically. Therefore, the development of the value proposition is very coordination intensive. Within the relevant, contemporary topic of ecosystems, the question of how to develop value propositions for ecosystem initiatives has not yet been adequately addressed.

This thesis addresses this gap with two qualitative multi case studies, one at the strategic level, the other at the operational level.

From these two studies, four archetypes of value propositions in ecosystem strategies emerge at the strategic level, resulting from different combinations of complementarities. The determining factor is the intensity of market competition. On the operational level, four approaches for the materialization of the value proposition emerge. Depending on the complementarity, these approaches differ according to the intensity with which partners and customers are to be involved in the development process. Thus, on the one hand, this work contributes to the ecosystem literature focusing on the development of the value proposition and, on the other hand, it helps practitioners by illuminating the core challenges and procedures of the respective strategies and approaches.

Zusammenfassung

Ein kundenorientierter Ansatz für Innovation und Produktentwicklung wird heutzutage als zeitgemäss angesehen. Gleichzeitig eröffnen neue Technologien, Daten und zusehends zusammenwachsende Branchengrenzen neue Möglichkeiten und machen die Kunden noch anspruchsvoller. Infolgedessen ist es für einzelne Unternehmen manchmal nicht mehr möglich, diese gestiegenen Kundenanforderungen angemessen zu erfüllen. Stattdessen werden Partner mit komplementären Fähigkeiten und Ressourcen genutzt, um die gemeinsame Wertschöpfung voranzutreiben. Eine besondere Form der Wertschöpfung zusammen mit Partnern ist das Ökosystem. Ökosysteme sind ein Zusammenschluss von mindestens drei Partnern, die komplementäre Module einbringen, um gemeinsam ein überlegenes Wertversprechen zu schaffen. Es gibt verschiedene Arten der Komplementarität. Durch die gemeinsame Wertschaffung kann die nächste Stufe der Kundenorientierung erreicht werden.

Wertversprechen als Kern des Ökosystems werden einerseits für den Kunden geschaffen und benötigen gleichzeitig die Partner, welche die komplementären Module beisteuern, aber nicht hierarchisch geführt werden können. In diesem Umfeld ist die Entwicklung der Wertversprechen sehr koordinationsintensiv. Innerhalb des relevanten, aktuellen Themas der Ökosysteme wurde die Frage, wie Wertversprechen für Ökosysteminitiativen entwickelt werden können, bisher noch nicht adäquat behandelt.

Die vorliegende Arbeit adressiert diese Lücke mit zwei qualitativen Fallstudien bestehend aus insgesamt elf Fällen, eine auf der strategischen Ebene, die andere auf der operativen Ebene. Dabei kristallisieren sich auf der strategischen Ebene vier Archetypen von Wertversprechen in Ökosystemstrategien heraus, die sich aus unterschiedlichen Kombinationen von Komplementaritäten ergeben. Der entscheidende Faktor ist die Intensität des Wettbewerbs. Auf der operativen Ebene ergeben sich vier Ansätze zur Materialisierung des Wertversprechens. Je nach Komplementarität unterscheiden sich diese Ansätze durch die Intensität, mit der Partner und Kunden in den Entwicklungsprozess einbezogen werden sollen. Damit leistet diese Arbeit einerseits einen Beitrag zur Ökosystemliteratur, die sich mit der Entwicklung des Wertversprechens befasst, und andererseits hilft sie Praktikern bei ihrer Vorgehensweise, indem sie die zentralen Herausforderungen und das Prozedere der jeweiligen Strategien und Ansätze aufzeigt.

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List of Abbreviations

3D	three dimensional
B2B	Business-to-Business
B2C	Business-to-Customer
C	Complementor
CEO	Chief Executive Officer
CIO	Chief Innovation Officer
CMO	Chief Marketing Officer
CO	Co-Orchestrator
e.g.,	exempli gratia (for example)
et al.	et alii (and others)
FO	focal offer
i.e.,	id est (that is)
MVP	Minimum Viable Product
O	Orchestrator
OEM	original equipment manufacturer
SM	supermodularity
SME	small and medium enterprise
RQ	research question
VP	value proposition
U	uniqueness

1 Introduction, motivation, and relevance

Living in the twenty-first century means living in a world in which customer orientation in product development and innovation can be seen as the way to go (Latinovic & Chatterjee, 2019; Schögel & Herhausen, 2012; Shah, Rust, Parasuraman, Staelin, & Day, 2006; Sheth, Sisodia, & Sharma, 2000). Product-focused innovation has long been obsolete and has been replaced by customer-centric thinking and approaches that aim to satisfy customers' increasingly demanding needs (Greer & Lei, 2012; Selden & MacMillan, 2006). The big winners of this decade have shown the way: market giants from different industries, such as Slack, Netflix, and Uber¹, focus on the customer to constantly develop and adapt their products and services through rapid learning and customer feedback. Even Amazon is led by a vision "to be Earth's most customer-centric company."² These examples demonstrate that today, customer-centric thinking is key and is the state of the art approach for companies, especially in the context of product innovation (e.g., Baldassarre, Calabretta, Bocken, & Jaskiewicz, 2017; T. Brown, 2008; Elsbach & Stigliani, 2018; Micheli, Wilner, Bhatti, Mura, & Beverland, 2019; Von Hippel & Von Krogh, 2016) and marketing, for which the customer experience has the greatest relevance to reach customer satisfaction (e.g., Homburg, Jozić, & Kuehnl, 2017; V. Kumar & Reinartz, 2016; Lemon & Verhoef, 2016). Traditionally, customer needs have been addressed either through the company's in-house capabilities or by using what immediate suppliers along the supply chain could deliver. However, this degree of innovating from within the company's resources is often no longer sufficient. New digital technologies are now the relevant drivers and enablers (Sestino, Prete, Piper, & Guido, 2020). These technologies create access to a broad range of data that provide a wealth of information (Bharadwaj, El Sawy, Pavlou, & Venkatraman, 2013; Vial, 2019). Using such technologies enables a situation in which more and more markets are converging and growing together, creating new customer needs that a single company can no longer address on its own (Alturi, Dietz, & Henke, 2017). On the one hand, digital technologies as enabler are fundamentally reshaping traditional business logic, opening up entirely new dimensions and

¹ <https://www.forbes.com/sites/blakemorgan/2019/06/30/100-of-the-most-customer-centric-companies/?sh=6902b6ad63c3> (retrieved on August 5, 2021)

² <https://www.aboutamazon.co.uk/uk-investment/our-mission> (retrieved on May 17, 2021)

opportunities (Bharadwaj et al., 2013) and requiring new business models (Gassmann, Frankenberger, & Choudury, 2020). On the other hand, this market trend creates more and more demanding customers. Due to the apparent overload of not being able to meet the increased customer needs as a single company, as well as the lack of skills (Fitzgerald, Kruschwitz, Bonnet, & Welch, 2014; Rachinger, Rauter, Müller, Vorraber, & Schirgi, 2019), value co-creation together with partners is becoming increasingly interesting. As Granovetter (1973) already pointed out decades ago in his groundbreaking essay, “The Strength of Weak Ties,” these partnerships are about loose ties that follow neither hierarchy nor market logic. Many years after the publication of that essay, one form of value co-creation has gained increasing relevance: the ecosystem. The ecosystem concept is to better address increasingly demanding customer needs through innovative joint value propositions together with partners (Adner, 2017; Jacobides, Cennamo, & Gawer, 2018).

Ecosystems are an attractive way to compete in the market in the long term and work together with partners to innovate customer offerings because this new form of value co-creation can address more sophisticated customer needs. Therefore, a company can use partners’ complementary skills, knowledge, and resources that it does not possess to move into new areas and present better offerings (Jacobides et al., 2018). These developments have led to ecosystems being identified as an important and upcoming concept in both research and practice. From a research perspective, leading authors in this area have addressed relevant questions around the ecosystem topic from a strategic, innovative or organizational perspective (e.g., Adner, 2017; Autio & Thomas, 2019; Iansiti & Levien, 2004a; Jacobides et al., 2018; Kapoor & Agarwal, 2017; Teece, 2016). Ecosystems are also a hot topic in practice. McKinsey & Company estimated that the income that theoretically crosses traditional sectoral boundaries in 2025 would represent approximately 30 percent of the world’s revenue sources in that year (Alturi et al., 2017). Boston Consulting Group also underlined the strong emergence of ecosystems in practice and noted that the term “ecosystem” appeared thirteen times more frequently in 2019 annual reports than it did a decade before (Pidun, Reeves, & Schüssler, 2019). This development motivates this dissertation on ecosystems.

In short, ecosystems from a structural view³ (Adner, 2017; Jacobides et al., 2018) are seen as an association of at least three partners whose connections with each other cannot be broken down into bilateral links and who work together to offer a common superior value proposition. This value proposition—as the very core of an ecosystem—is composed of complementary modules contributed by partners that need to be aligned (Adner, 2017; Jacobides et al., 2018). As previously described, the goal and *raison d'être* of an ecosystem is always to create an innovative value proposition that cannot be achieved alone without the partners (Adner, 2017; Shipilov & Gawer, 2020). As a result, the ecosystem takes customer centricity to the next level with these superior value propositions when addressing increasingly demanding needs. The value proposition is the absolute core of an ecosystem because it is why an ecosystem is established in the first place and partners are brought together to build these superior value propositions for the customer (Dattée, Alexy, & Autio, 2018).

As will be discussed in detail in the literature review, ecosystems have some characteristics that make them special. These characteristics all occur together at the same time in ecosystems and have implications for their development. Because this field is so new (Bogers, Sims, & West, 2019), this dissertation focuses on these aspects of ecosystem development. Of course, such a focus does not indicate that topics relevant to ecosystems are not also covered in other forms of value co-creation, such as the alliance literature (for an overview, see Niesten & Jolink, 2015), network literature (for an overview, see Provan, Fish, & Sydow, 2007; Sydow, 1992), business model innovation literature (see Gassmann et al., 2020), platform literature (for an overview, see De Reuver, Sørensen, & Basole, 2018), or open innovation literature (for an overview, see Dahlander & Gann, 2010). However, these forms only touch on single aspects of ecosystem characteristics, as shown in the literature review. Yet, they do not exclude co-occurrence with ecosystems, which is why they should not be ignored. At the same time, considering all of these forms in detail would go beyond the scope of this dissertation. Therefore, the aim of this work is to focus on the core aspects that are extremely important in an ecosystem and the occurrence of all of them at the same time,

³ The motivation why this thesis is based on the structural view, can be found in chapter 2.

which gives a high probability of delimitation from other forms of value co-creation research.

As previously stated, one characteristic—the value proposition—is at the very core of an ecosystem. With the ecosystem, on the one hand a new level of customer orientation can be reached, but at the same time the partners who make the complementary contributions have to be managed. This brings with it new, ecosystem specific challenges in the development of the value proposition. However, despite Jacobides et al. (2018, p. 2263) stating that “*ecosystem design is becoming ever more important as the question of what drives value,*” surprisingly, the literature on ecosystems has rarely addressed even the broad question of the “*underlying mechanisms of value creation and capture in and across ecosystems*” (see also Dattée et al., 2018; Jacobides et al., 2018, p. 2268), especially the definition and creation of the value proposition—even though this aspect is “*the starting point for ecosystem research*” (Kapoor, 2018, p. 10). What has not yet been answered, on the whole, is the question about the development of value propositions for ecosystem initiatives. Therefore, this thesis pursues the following core research question.

RO: *How are value propositions for ecosystems developed at the strategic and operational levels?*

Of course, extensive value proposition literature already exists in other areas, such as marketing (see, for example, Frow & Payne, 2011; Payne, Frow, & Eggert, 2017) or innovation management (see, for example, Baldassarre et al., 2017). Nevertheless, this overarching research question focuses on the specifics of an ecosystem setting. In this way, the value proposition is composed of various complementary modules that are contributed by the partners. A setting, which brings along various specifics. The details of these specifics are derived in the literature review (chapter 2). Various recent calls encourage that a novelty is on its way with this gap of value proposition development for ecosystem initiatives and that it is relevant for the ecosystem literature as well as practice (Adner, 2017; Dattée et al., 2018; Hou & Shi, 2021; Jacobides et al., 2018; Lingens, Miehé, & Gassmann, 2020).

The topic of value proposition development is aimed on the one hand at a strategic level, but in the second step also includes operational implementation in the form of “instantiation,” as Adner (2017, p. 43) describes this materialization of the value

proposition. In line with this, the research question is organized into two sub-questions, one addressing the strategic level and the other the operational level. These two sub-questions will be argued and explained in the literature section (chapter 2). In order to answer the research question, this thesis proceeds according to the following structure:

In chapter 2, a closer look is taken at the literature. Ecosystems are examined in detail and their core characteristics according to the structural view are identified (Adner, 2017; Jacobides et al., 2018), how they differ from other forms of value co-creation, the current state of research on value propositions in the field of ecosystems, the exact gaps, and the concrete research questions that result from these gaps. Subsequently, the individual research gaps are derived step by step on the basis of the specifics of the ecosystem understanding according to the structural view and resulting implications, as well as the literature on value propositions in ecosystems and corresponding calls for research.

Chapter 3 explains the research procedure of qualitative multi-case studies and introduces the cases treated. Because the concept of ecosystems per se and the value proposition, in particular, is still very young and unexplored, a multi-case study approach (according to Eisenhardt, 1989) on the basis of two studies is suitable for qualitative research.

Chapter 4 presents the strategic level findings on value proposition development in ecosystems, highlighting four possible value proposition archetypes on the basis of the different types of complementarity and the respective challenges. Chapter 5 is dedicated to the findings at the operational level on the materialization of the value proposition in ecosystems and introduces four possible development approaches.

Chapter 6 discusses the findings of chapters 4 and 5 and illustrates the contributions to the literature. Chapter 7 illuminates the findings from a practitioner's perspective and highlights key managerial implications. Finally, chapter 8 presents a conclusion to the development of value propositions in ecosystems and concludes with an outlook on future research. Figure 1 provides an overview of the outline of this thesis.

In doing so, this thesis delivers several contributions: Overall, this thesis shows how value propositions for ecosystem initiatives can be developed on a strategic and operational level and what needs to be taken into account in each case. At the strategic level, the first step is to understand that different archetypes of value propositions can

emerge depending on the different complementarities. This leads to the argumentation of which type is advisable under which circumstances, and in general under which conditions a setup of/participation in an ecosystem can be considered meaningful, and what needs to be taken into account in the respective forms of value co-creation. After having decided on the ecosystem strategy in terms of the type of value proposition, the operational level focuses on ecosystem-specific challenges to move from the ecosystem strategy to a tangible materialization of the value proposition for the end customer (Adner, 2017). Therefore, the thesis presents four distinct approaches and their chances and limitations for companies. On the one hand, this improvement contributes to ecosystem literature and, on the other hand, assists practitioners in developing ecosystems.

Introduction	Chapter 1: Introduction Introduction of topic, motivation, relevance; overview of research area and outline	
Foundation & Approach	Chapter 2: Literature review Understanding of ecosystems and value propositions, presentation of research gaps and questions	Chapter 3: Research methodology Explanation of research approach (qualitative multi-case study) and introduction of cases
Findings	Chapter 4: Strategic level of VP development Presentation of findings on four types of value propositions using complementarity and respective challenges	Chapter 5: Operational level of VP development Presentation of findings on four approaches on the materialization of value proposition in the focal offer
Discussion & Implications	Chapter 6: Discussion and literature contributions Discussion of findings on strategic and operational levels and corresponding contributions to literature	Chapter 7: Key managerial implications Discussion of findings from a practitioner's perspective and deduction of managerial implications
Conclusion & Outlook	Chapter 8: Conclusion and future research Illustration of summary, limitations, and outlook for future research	

Figure 1: Outline of thesis

2 Literature review⁴

The following literature review starts with a short reflection on the background of the different ecosystem streams and then focuses on the characteristics of ecosystems according to the structural view (Adner, 2017; Jacobides et al., 2018) on which the present work is based. These characteristics also explain the differences between other similar forms of value co-creation and assist in deriving the specific sub-research questions from the characteristics of the ecosystem according to the structural view and from specific calls in the literature.

2.1 The term “ecosystem” in literature

The term “ecosystem” was first used by Moore (1993) in the form of “business ecosystem” in the management literature as a reference to the pictorial understanding of an ecosystem derived from nature. He used the term as a biological metaphor for co-evaluation within an overall system that transcends industrial boundaries, which is characterized by cooperation and competition between the partners. Moore (1996) showed how the market is similar to a biological ecosystem and how—analogue to different organisms in nature—different companies interlock and co-evolve to survive in the best possible way. The interplay of cooperation and competition in and between ecosystems characterizes today’s market competition and innovation and demonstrates that individual companies will not be the ones competing but, rather, entire ecosystems, essentially shaping the understanding of value co-creation and capture in ecosystems. However, apart from the following definitional approach, Moore leaves the exact understanding of ecosystems undefined (Thomas & Autio, 2020):

“In a business ecosystem, companies co-evolve capabilities around new innovation: they work cooperatively and competitively to support new products, satisfy customer

⁴ Within the ecosystem topic, we work as a close research team at the Institute of Technology Management. Together with Maximilian Böger (Orchestration of Innovation in Ecosystems: An Analysis of the Development and Management of Ecosystem Initiatives), Florian Huber (Towards Ecosystems: A Qualitative Analysis on the Early Stage of Inter-Firm Collaboration), and Lucas Miché (forthcoming), we have developed a similar fundamental understanding of ecosystems. Their dissertations may contain similar lines of argumentation regarding the fundamentals.

needs, and eventually incorporate the next round of innovations.” (Moore, 1993, p. 76)

Moore also elaborates on the resulting increasing disappearance of sectoral boundaries, which McKinsey & Company took up again more than 20 years later in the article “Competing in a world of sectors without borders,” as relevant for practice (Alturi et al., 2017). As this two-decade period shows, for ecosystem issues to be embraced and addressed in practice and for the issue to receive increased attention in research have taken almost 20 years. Bogers et al. (2019) called attention to the fact that, of the more than 300 articles on ecosystems that were distributed during the most recent 20 years, two-thirds were published in the last five years until 2019. Practice also shows that the term “ecosystems” appears 13 times more frequently today than a decade ago, such as in annual reports (Pidun et al., 2019). However, this recent increase in occurrence is also leading to the development of different research streams within the topic, and the understanding and definition of ecosystems is evolving in different directions. For example, in addition to business ecosystems, a number of concepts coexist, such as innovation and platform ecosystems and knowledge or entrepreneurial ecosystems (Thomas & Autio, 2020). Such coexistence makes these concepts difficult to grasp and distinguish from each other and related concepts. Before elaborating on a precise understanding of ecosystems, a typology and classification of these different characterizations of ecosystems should be undertaken.

The classification of the individual ecosystem concept is based on the Thomas and Autio (2020) “Ecosystem Typology,” supplemented by the Adner (2017) understanding (see also Böger, 2021; Huber, 2021). Thomas and Autio (2020) first distinguished between types of ecosystems on the basis of output, which leads to the distinction among knowledge, entrepreneurial, and a third category that includes platform, modular, and business ecosystems.⁵ Figure 2 summarizes the classification.

⁵ Thomas and Autio (2020) called this stream “innovation ecosystem.” However, this umbrella term is already occupied by earlier representatives (Adner, 2006; Adner & Kapoor, 2010), which is why I refrain from using it here.

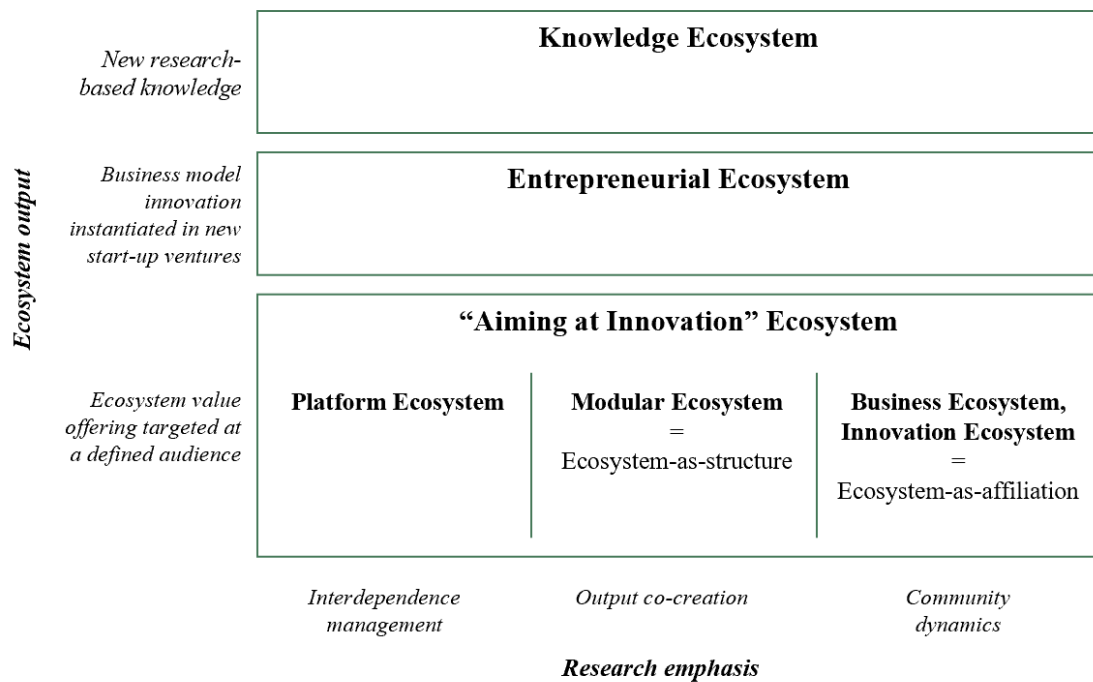


Figure 2: Typology of ecosystems using presentation of Thomas and Autio (2020)

The first type of ecosystem—*knowledge ecosystems*—focuses, as the name suggests, on new research-based knowledge in output (Thomas & Autio, 2020). This type of ecosystem usually comprises public research, knowledge institutions, universities and for-profit firms that work together to create knowledge that one participant would not be able to do alone (Clarysse, Wright, Bruneel, & Mahajan, 2014; Järvi, Almpnanopoulou, & Ritala, 2018; Valkokari, 2015; Van der Borgh, Cloudt, & Romme, 2012). Moreover, they are usually located around geographical hotspots, such as universities or knowledge institutes (Clarysse et al., 2014).

Regarding *entrepreneurial ecosystems*, their approach “lays in the focus on (productive) entrepreneurship as an output of the ecosystem” (Acs, Stam, Audretsch, & O’Connor, 2017, p. 3). Therefore, new start-up ventures here enable and facilitate new entrepreneurial opportunities through radical business model innovation (Autio, Nambisan, Thomas, & Wright, 2018; Spigel, 2017). However, entrepreneurial ecosystems do not pursue a specific value offering for a defined customer group and are primarily a regional phenomenon (Thomas & Autio, 2020).

In contrast to the two preceding forms, the third block aims at a “value offering targeted at a defined audience” as output (Thomas & Autio, 2020, p. 16). Thomas and Autio (2020) used the term “innovation ecosystems” here. However, I avoid this term and refer to “ecosystems aiming at innovation.” The term “innovation ecosystem” is used in many different ways. In the mainstream literature, the term “innovation ecosystems” is associated with the stream marked by Adner (2006) and Adner and Kapoor (2010). Thus, I also use this term in this dissertation and avoid the use of Thomas and Autio (2020). Based on the latest research, these ecosystems can be further clustered into subcategories of business ecosystems, modular ecosystems, and platform ecosystems. The three subcategories, which all focus on ecosystem value offering as the output, might have different perspectives and, thus, cannot be clearly distinguished from each other because they look at similar occurrences from different research perspectives.

Regarding *platform ecosystems* as the first subcategory, the research emphasis is on interdependence management with the assistance of a platform technology as a shared connectivity interface (Gawer, 2014; Gawer & Cusumano, 2014; McIntyre & Srinivasan, 2017; Thomas & Autio, 2020). Platform ecosystems elaborate on different standard-setting levels regarding technical interfaces and discuss governance structures between sponsors and complementors as they are viewed as “semi-regulated marketplaces” (Wareham, Fox, & Cano Giner, 2014) or multisided markets (see also Cennamo & Santalo, 2013; Jacobides et al., 2018).

The *business ecosystem* stream builds on Moore’s definition and focuses particularly on the research lens of community dynamics (see also Böger, 2021):

“An economic community supported by a foundation of interacting organizations and individuals—the organisms of the business world.” (Moore, 1996, p. 26)

This stream is continued by Iansiti and Levien (2004a, 2004b), who focused on “keystones” as “hubs” that align the different participant interests and act as “critical regulators of ecosystem wealth” (Iansiti & Levien, 2004a, p. 9). This emphasis on community dynamics is described by Adner (2017) in the form of *ecosystems as affiliation*. This approach views ecosystems as “communities of associated actors defined by their networks and platform affiliations” (Adner, 2017, p. 40) and tends to view government, access, and openness of ecosystems or the role of ecosystem managers but does not focus on joint value creation. The research by Teece (2007, 2016)

can also be classified here, and it describes ecosystems primarily as the community of players who act toward and influence each other through their activities (see also Jacobides et al., 2018). Thomas and Autio (2020) now use the term “innovation ecosystems” as an umbrella term for these three subcategories even though it was initially used partly in reference to and partly synonymous with “business ecosystems” and has a group of partners at the forefront who then define new value propositions within their gathering and opportunities therein (Aarikka-Stenroos & Ritala, 2017; Adner, 2006; Vasconcelos Gomes, Salerno, Phaal, & Probert, 2018).

The third subcategory of “aiming at innovation” ecosystems is built by so-called *modular ecosystems*. This research emphasis highlights the output co-creation of the ecosystem value offering (Thomas & Autio, 2020) and is called *ecosystem as structure* by Adner (2017). To summarize, these three streams cannot be strictly demarcated but overlap to provide different perspectives of how an ecosystem value offering is viewed as an output of the ecosystem. The criticism of these various streams is that ecosystems cannot be defined as a classical concept here because the concept definition is very vague (Adner, 2017)—exactly why the structural view (ecosystems as structure) is so prominent, as will be explained in the next chapter. Because this dissertation chooses the structural view as the primary method for evaluating ecosystem value offerings, the following chapter elaborates on this view in the next section, including why this approach is chosen.

2.2 Structural view of ecosystems

The structural view of ecosystems is built on the work of Adner (2017) and Jacobides et al. (2018) (Hou & Shi, 2021). Adner (2017) sets the groundwork for this view with the following definition:

“The ecosystem is defined by the alignment structure of the multilateral set of partners that need to interact in order for a focal value proposition to materialize.”
(Adner, 2017, p. 43)

Whereas at first glance, Adner (2017) focused primarily on the focal value proposition as the goal and justification for the partners to come together, Jacobides et al. (2018)

based their understanding particularly on the complementary components of the value proposition (see also Hou & Shi, 2021):

“An ecosystem is a set of actors with varying degrees of multilateral, nongeneric complementarities that are not fully hierarchically controlled.” (Jacobides et al., 2018, p. 2264)

Before the elaboration of the individual aspects of this approach, I briefly explain the arguments that motivate me to follow this approach (see also Lingens et al., 2020). First, in the multitude of developing research directions for ecosystems, the definition of ecosystems based on the structural view is “more clearly distinguishable from other available strategy constructs” (Adner, 2017, p. 40). At the same time, it does not exclude adjacent streams (Lingens et al., 2020). In addition to the structural view being clearly definable, it allows for a clear delimitation of the players that are participating in the ecosystem and those that are not. Additionally, despite its novelty, the stream is already highly relevant, as demonstrated by a multitude of recent studies based on it (see for example, Autio & Thomas, 2019; Ganco, Kapoor, & Lee, 2020; Hannah & Eisenhardt, 2018; Hou & Shi, 2021; Kapoor, 2018; Lingens, Böger, & Gassmann, 2021; Lingens et al., 2020). In addition, the structural view is aimed at innovation management because its goal is an innovative value proposition (Ganco et al., 2020; Hou & Shi, 2021). Moreover, the structural view has a special focus on the creation of a joint value proposition by the ecosystem partners involved (Jacobides et al., 2018). Because this work focuses on the development of the value proposition, the structural view is an ideal lens.

2.2.1 Characteristics of ecosystems according to the structural view

Ecosystems defined by the structural view have some characteristics that, on the one hand, distinguish ecosystems from other forms of inter-firm collaborations and, at the same time, lead to specific, relevant, but unanswered questions, as the following sections show.

According to the structural view, the understanding of ecosystems focuses on the materialization of the focal value proposition at the ecosystem’s core (Adner, 2017; Williamson & de Meyer, 2012). This joint value proposition initially distinguishes the ecosystem from the alliance and network literature. The focus of the latter is not on the creation of a joint value proposition but on the exchange of knowledge among the firms

involved (Gulati, 1999; Powell, Koput, & Smith-Doerr, 1996; Shipilov & Gawer, 2020). This *joint value proposition* is composed of various individual modules that must be adapted to each other. In turn, the individual modules are introduced by partners who must be aligned to achieve the focal value proposition and are characterized by various multilateral complementarities (Jacobides et al., 2018; Li, 2018).

Although *modular architecture* (Baldwin & Clark, 2000) is a necessary prerequisite for an ecosystem, it is rounded out by the presence of various *complementarities* that require coordination (Jacobides et al., 2018; Shipilov & Gawer, 2020). These “nongeneric complementarities,” which “characterize relationships between actors within ecosystems” (Jacobides et al., 2018, p. 2261), can take the form of uniqueness or supermodularity. The complementarity is called unique if one module cannot function without the other module or if it is maximized by the other module (Teece, 1986). Thus, if one actor/partner firm does not fulfill its obligations toward the ecosystem or leaves the ecosystem, the entire ecosystem will not work (Teece, 2016). An example would be e-cars. It focuses on one superior solution, where all of the elements, such as the car and the entire charging infrastructure, must be present for this solution to work. The complementarity is called supermodular if one module increases the value of the other module, but each *could* still function on its own (Milgrom & Roberts, 1990; Topkis, 1998). Furthermore, such complementarity can appear on the production and/or the consumption sides (Jacobides et al., 2018). In production, complementarity occurs when coordinated investments in several modules lead to higher returns than would be achieved without coordination (Arora & Gambardella, 1990; Cassiman & Veugelers, 2006; Shipilov & Gawer, 2020). Classical transaction platforms, such as Airbnb, are a good example of this. Numerous providers within the “accommodation” category are brought together in a marketplace, and the customer is provided with full transparency to select the most suitable accommodation. Complementarity in production usually leads to network effects (Boudreau & Jeppesen, 2015). On the consumption side, this occurs when the use of the value proposition by one party leads to higher benefits for the other parties (Farrell & Saloner, 1985; Parker & Van Alstyne, 2005), which is called the direct network effect (see Jacobides et al., 2018), or the use of two or more offerings together leads to higher benefits than the sum of the benefits when the offerings are used separately (Shipilov & Gawer, 2020), which is called the indirect network effect (see Jacobides et al., 2018). This effect can be seen

in one-stop shop solutions, such as Amazon or Apple. For Amazon, initial complementarity exists on the production side; however, ultimately, every conceivable product—from books to household items to web services—can be purchased in one place. Such a situation can also be observed with the Apple iOS operating system and Apple iPhones. The smartphones work immediately out-of-the-box, but using different apps on the phones makes the user experience more valuable (P. Kumar, Dass, & Kumar, 2015). However, although these cases are good examples of the complementarity that occurs on either the consumption or the production side, they do not count as ecosystems according to the structural view. The structural view of ecosystems requires complementarities to occur on both sides—usually leading to more innovative solutions than these mere transaction-based marketplaces (Jacobides et al., 2018).

Jacobides et al. (2018) found that complementarity in ecosystems occurs on both sides (production and consumption) to a certain degree, whereas classical platforms are characterized by network effects between suppliers and consumers in the form of two-sided or multisided markets. These different complementary modules, which come together in an ecosystem, are *multilaterally dependent on each other* rather than being broken down into bilateral relationships (Adner, 2017). Through such dependence, ecosystems also differ from platforms (Gawer & Cusumano, 2002; Parker, van Alstyne, & Choudary, 2016) and open innovation (Chesbrough, 2006; Von Hippel, 2006) because these settings are characterized by bilateral relationships (Shipilov & Gawer, 2020).

All of these modules are delivered by *actors/partners*⁶. What is special about these actors is that they follow their *own agendas* and, thus, are *not fully hierarchically manageable* relative to classical supplier relationships; rather, they present an intermediate form of governance between market and hierarchy. This characteristic again distinguishes ecosystems from supply chains (Porter, 1985; Simchi-Levi, Kaminsky, & Simchi-Levi, 2008). Within the partners, one or more *orchestrators* can exist who function as managers of the ecosystem (Altman & Tushman, 2017) and advance the *alignment* in co-specialization. Different terminologies for “orchestrator”

⁶ The terms “actor” and “partner” are used synonymously for the various ecosystem players

are just becoming established in the various literature streams, such as “focal actor” or “focal firm” (Adner, 2017; Adner & Kapoor, 2010; Autio & Thomas, 2019; Dattée et al., 2018; Kapoor, 2018), “hub firm” (Jacobides et al., 2018; Nambisan & Baron, 2013), “keystone” (Clarysse et al., 2014; Iansiti & Levien, 2004a), or “ecosystem leader” (Moore, 1996; Teece, 2016). In the remainder of this thesis, the term “orchestrator” is used⁷ without distinguishing it from the other terminologies.

This *co-specialization*, meaning the adjustment of the complementary modules to each other, directly influences the so-called *fungibility*, which provides insight into how well one module can be used elsewhere without a significant adjustment effort. If fungibility is high, a module can be used relatively easily elsewhere; however, if it is low, the adaptation effort is high and resource-intensive, and the module cannot simply be used elsewhere (Jacobides et al., 2018).

The existence of complementarity results in several specifics that, according to the structural view, make ecosystems a unique concept and distinguishable from other forms of value co-creation. Table 1 summarizes familiar forms of inter-firm collaborations and highlights key differences to ecosystems. Additionally, these specifics are why the literature on related forms of value co-creation is unlikely to provide an answer to the key question of the development of value propositions in ecosystems (Jacobides et al., 2018).

Table 1: Overview of other inter-firm collaborations and key differences

Construct	Business Models	Network and Alliances	Open Innovation	Platforms	Supply Chains
Definition	“A business model defines who your customers are, what you are selling, how you produce your offering, and why your business is	“We define a network as a set of nodes and the set of ties representing some relationship, or lack of relationship,	“Open innovation is a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and	“A platform is a business based on enabling value-creating interactions between external producers and consumers. The platform	“The supply chain encompasses all activities associated with the flow and transformation of goods from raw materials

⁷ Analogue the other participants of the research group (Dr. Bernhard Lingens, Maximilian Böger, Florian Huber, Lucas Miehé).

	profitable.” (Gassmann et al., 2020, p. 7)	between the nodes” (Brass, Galaskiewicz, Greve, & Tsai, 2004, p. 795; see also Provan et al., 2007); An alliance “is an agreement between firms to do business together in ways that go beyond normal company-to-company dealings, but fall short of a merger or a full partnership.” (see also Elmuti & Kathawala, 2001; Wheelen & Hungar, 2000, p. 125)	internal and external paths to market, as firms look to advance their technology.” (see also Chesbrough, 2006, p. xxiv; Dahlander & Gann, 2010) (see also Huber, 2021)	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) (see also Huber, 2021)	stage (extraction), through to the end user, as well as the associated information flows. Material and information flow both up and down the supply chain. Supply chain management (SCM) is the integration of these activities through improved supply chain relationships to achieve a sustainable competitive advantage.” (Seuring & Müller, 2008, p. 1700)
Selection of relevant authors	Gassmann et al. (2020); Osterwalder, Pigneur, and Tucci (2005); Zott, Amit, and Massa (2011)	Gulati (1998); Powell et al. (1996); For a literature overview, see Provan et al. (2007); Niesten and Jolink (2015)	Chesbrough (2006); Von Hippel (2006); For a literature overview, see Dahlander and Gann (2010)	Gawer and Cusumano (2002); Parker et al. (2016); For a literature overview, see De Reuver et al. (2018); (Rietveld & Schilling, 2021)	Porter (1985); Simchi-Levi et al. (2008); For a literature overview, see Seuring and Müller (2008); Burgess, Singh, and Koroglu (2006)
Key difference to ecosystem logic	Business models do not necessarily have an alignment of complementary modules from	Focus on exchange of knowledge and not on creation of joint value proposition	Focus on bilateral relationships, no multilateral dependency, and no alignment to	Ecosystems can be based on platforms as technical interfaces, but platforms are only ecosystems if	Mostly bilateral relationships with contractual elements; no alignment necessary but

	different partners		joint value proposition	they focus on the creation of a joint value proposition based on complementary modules. Platforms focus on governance of interfaces and not the structure of interdependence	hierarchically manageable
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2.2.2 Role and understanding of the value proposition

Given the development of value propositions for ecosystems as the focus of this thesis, clarifying the understanding of the value proposition terminology is relevant. First, from an ecosystem perspective on value propositions, these propositions are seen in the Adner (2017) definition as the core and absolute foundation of the ecosystem when he describes “ecosystems as configuration of activity defined by a value proposition” (Adner, 2017, p. 40). Adding that the structural view “starts with a value proposition and seeks to identify the set of actors that need to interact in order for the value proposition to come about,” (Adner, 2017, p. 41) created a clear boundary of the ecosystem when including the contributing partners. Furthermore, the value proposition is the connecting element between partners who create the value proposition and customers/users⁸ who consume the value proposition.

Because ecosystems include the duality of value creation and value capture (Khademi, 2020), the circle of creation of value for the customer together with the partner seems to turn to value capture from the customer and share it with the partners. This dissertation is based on the understanding of value propositions as the core of the ecosystem from a customer/user perspective, analogous to Kapoor (2018), who spoke of a “focal offer’s user value proposition” and viewed it as “a link between the supply-side and the demand-side” (Kapoor, 2018, p. 2; see also Shipilov & Gawer, 2020), or Hannah and Eisenhardt (2018, p. 3164), who “define ecosystems as groups of firms,

⁸ Throughout this study, it will be assumed, that the user and the customer are equivalent. The connotations (customer or user) are in accordance with the cited sources.

that produce products or services that comprise a coherent solution.” Therefore, this work can be located in the value creation phase, where value for the customer means value for the partners.

A clear definition of value propositions is needed when making the argument for why value propositions are as important as the core of ecosystems. However, the entire ecosystem literature is very quiet on this point. Adner (2017, p. 42) merely offered the definition of “the promised benefit that the target of the effort is to receive, as opposed to what a firm is to deliver.” This understanding of promised benefit can be supplemented by Kotler and Armstrong (2012, p. 6), who defined value propositions as “the set of benefits or values [that a brand] promises to deliver to consumers to satisfy their needs,” leading to a detailed examination of two aspects. First, superior value is seen from a customer’s point of view. Second, it is complemented by the “perceived value,” meaning the perceived increase in a benefit from a customer’s perspective (Belz & Bieger, 2004; Schögel & Schulten, 2006). This perceived value is also mentioned by Kotler (2017, p. 170), who writes, “a company’s job is to create superior value in the mind of the customer. [...] The challenge is to assist the customer in perceiving more total value than the cost of acquisition and usage.” When translated to the ecosystem understanding, one very important aspect is the superiority of the offering. Given the necessity to align the complementary modules within the ecosystem, some costs are not fully fungible and higher coordination costs arise (Jacobides et al., 2018). Therefore, higher prices and customer willingness to pay must be justified by superior perceived value from the customer perspective. As a result, the superior perceived value exceeds the core benefits of an offering and includes the sum of all benefit components (Kotler, Keller, Goodman, Brady, & Hansen, 2019; Meffert, Burmann, Kirchgeorg, & Eisenbeiss, 2019). Such components could be new, innovative offerings that better solve existing needs (based on uniqueness) or offerings that provide greater convenience or transparency as a result of one-stop shop solutions or marketplaces with comparison functions (based on supermodularity), or new solutions that awake new needs, for example. The following refers to the value proposition at the strategic level and to the materialization of the value proposition in the form of the focal offer at the operational level.

2.3 Specification of research gaps⁹

As previously argued, ecosystems are an important topic in the area of value co-creation, and value propositions are at the heart of ecosystems. Yet, because ecosystems from a structural view represent a relatively new topic, they have barely been explored from this value proposition perspective. As already mentioned in the introduction, the general topic of value proposition development in ecosystems is important but not sufficiently explored (Dattée et al., 2018; Jacobides et al., 2018; Kapoor, 2018). Furthermore, the call for more demand-side considerations should be mentioned, especially in the business model innovation context (Priem, Wenzel, & Koch, 2018) and from the perspective of customer complementarities (Aversa, Haeflinger, Hueller, & Reza, 2020). This “value creation for consumers, as the *conditio sine qua non* for value capture” (Priem et al., 2018, p. 22) is essential, especially in the ecosystem, to illuminate one side of value creation and capture. The following two paragraphs elaborate on the derivation of the corresponding research gaps. This elaboration offers great research potential to shed light on this crucial question of value proposition development on the strategic and operational levels, which will be pursued and elaborated in this dissertation from both research and practitioner perspectives.

2.3.1 Development of value propositions for ecosystems on a strategic level

As previously discussed, according to the structural view, ecosystems always focus on the creation of an innovative value proposition. Partners are selected and integrated into the ecosystem using the complementary modules needed for the instantiation of the value proposition (Jacobides et al., 2018). This complementarity is particularly crucial because modularity and complementarity form the absolute core of ecosystems, given that all specifics and questions that arise in the ecosystem context can be derived from the core question of complementary modularity (Hannah & Eisenhardt, 2018; Jacobides et al., 2018).

⁹ Parts of this thesis have been presented at the SEI Doctoral Consortium, Bologna, 7th/8th November 2020 and have been submitted in journals with my co-authors Bernhard Lingens and Oliver Gassmann (Technovation, Industry and Innovation). They contributed substantially with their reviews, edits, changes, and feedback, but most of the content of the following chapters has been written by myself.

Complementarity can manifest itself in two forms, as explained in chapter 2.2.1: as either supermodular modules or unique modules (Jacobides et al., 2018). As shown, depending on the type of complementarity (uniqueness and supermodularity) and their occurrences (production and consumption), vastly different types of value propositions emerge, as has been shown with the examples of the e-car, Airbnb, Amazon or Apple's iOS. However, these examples only feature one-sided occurrences of complementarity and still led to substantially different types of value propositions. For ecosystems, where complementarity needs to occur on both sides, this has to apply as well, as mentioned by Jacobides et al. (2018, pp. 2266-2267):

“More broadly, we argue, that [...] the question of whether they are unique, supermodular, or both, [...] all become important descriptors of an ecosystem that can help us understand when and why alignment occurs—or fails. By looking at the nature of complementarities, and describing whether they happen for consumption or production, we arrive at different types of ecosystems.”

The question that logically follows, and remains unanswered, is which type of complementarity (unique/supermodular) to choose and, as a result, which type of ecosystems and—therefore—type of value proposition as core emerges.

Essentially, ecosystems are based on complementary modules delivered by partners, who are multilaterally dependent on each other, and their relationships cannot be broken down to mere bilateral relationships (Adner, 2017). Additionally, complementarity can only be established if it is being carefully developed. Thus, the necessity to develop the complementarities points towards clear hierarchies, while at the same time the different modules are coming from partners with their own agendas, which does not allow for strict hierarchy. Hierarchy distinguishes the product offering development in the ecosystem from the development of assortments in a supermarket logic because there are mere supplier relationships in that logic (Dattée et al., 2018; Jacobides et al., 2018).

Following from the argument beforehand, it can be established that ecosystems are formed in a *partly designed process* driven by the orchestrator, which leads to significant coordination efforts for all parties involved (Jacobides et al., 2018). Unlike the situation in platform ecosystems, which often allows partners to enter based on predefined criteria, according to the structural view, partners in an ecosystem need to be carefully selected, integrated, and aligned toward the joint value proposition. This

process is time-consuming and requires clear prioritization of partners and activities (Adner, 2017; Jacobides et al., 2018). This idea is reinforced by *fungibility*. Through complementary modules (whether unique or supermodular), a certain co-specialization is required to adapt these modules to each other. Doing so requires investment, and as explained in chapter 2.2.1 the more specific the investment and the less it can be reused elsewhere, the lower the fungibility (Dattée et al., 2018; Jacobides et al., 2018). In reality, the investment required will not be the same from all partners. *Ceteris paribus*, unique modules will have higher investments and, thus, lower fungibility than supermodular modules. Common business logic dictates that the lower the fungibility, the higher the risk of investing in integrating partners who will, in turn, strive for higher returns.

These considerations have implications for partner interaction. Given the nature of partners having their *own agendas* and fungibility, they will only enter an ecosystem if this serves their own interests. Therefore, partners should be given incentives to enter and stay in the ecosystem. At the same time, the customer is relevant because all incentives that can be offered ultimately come from the customer. Accordingly, a strong value proposition needs to be delivered to the customer, which results in a tradeoff between partner and customer interests. This implies, that there will be different settings with regard to fungibility, partner management and focus topics. In this context, understanding the following is relevant (Jacobides et al., 2018, p. 2268):

“How [do] membership roles vary, what drives this variation and how does this relate to standards, modularity, and the nature of complementarities?”

Furthermore, ecosystems in our digital world exist in a digital context. IT and digital technology are crucial in this context. However, being digital also means potentially being in a global competition and that local marketplaces become less essential (Lingens et al., 2020). Of course, this means that competitiveness (even on a global scale) is important in this respect because it functions as a driver of complementarity and is listed as such by Jacobides et al. (2018, p. 2268) in their call for research:

“Finally, our framework suggests that we need to consider ecosystems in their competitive context.”

Taken together, the strategic decision about the complementarity approach (based on uniqueness or supermodularity) and, thus, the resulting strategy of ecosystem—and

archetype of value proposition as the core—are at the very heart of the ecosystem concept. Scholars have repeatedly called for research (Adner, 2017; Hou & Shi, 2021; Jacobides et al., 2018; Nambisan, Zahra, & Luo, 2019) into how firms can make this decision. This decision is also of the utmost significance for practitioners and comes with numerous additional questions: Should you build up a marketplace? Or an ecosystem focusing on one specific customer demand? How do you implement the different strategies, and what are the consequences? Surprisingly, despite this question of whether firms should focus on supermodularity or uniqueness being so paramount to the structural view, research has fallen short of providing an answer (Dattée et al., 2018; Jacobides et al., 2018; Kapoor, 2018; Lingens et al., 2020), leading to the following research question:

RO1: Which ecosystem strategy (based on uniqueness or supermodularity) and, thus, which resulting type of value proposition is most beneficial for firms under which boundary conditions?

This question is addressed in chapter 4. Once the most suitable ecosystem strategy, considering the various complementarities and the associated challenges, has been identified at the strategic level, challenges also exist at the operational level in building up the value proposition materialized in the focal offer. These challenges are also the result of the specifics of the ecosystem. As the next section shows, corresponding research gaps also exist here.

2.3.2 Development of focal offers as materialization of value propositions for ecosystems on an operational level

In an ecosystem, firms jointly create superior value propositions and address even more sophisticated customer needs by offering value propositions that any firm would not be able to produce on its own (Adner, 2006, 2017). Because the focal offer as the materialization of the value proposition is the starting point for ecosystem development (Kapoor, 2018), a strong customer focus is essential on the one hand and is seen as state of the art in product development and innovation. On the other hand the specifics of the ecosystem bring along the need for a selection of partners on the basis of their ability to deliver complementary modules for the underlying value proposition. The objective is to align the partners in the ecosystem with the shared value proposition, which requires some level of hierarchy. At the same time, they are independent companies pursuing

their own agendas, which is why they cannot be managed in a fully hierarchical manner. Thus, a setting is created that requires strong coordination efforts and dependency among the partners (Adner, 2017; Jacobides et al., 2018). Although the extra challenge of multilateral partner coordination is added here, the value proposition still aims to please the customer. Following this logic, the following question arises:

RQ2: How does the orchestrator manage the development process of the focal offer in a coordination-intense setting between customer orientation and partner alignment?

(For the sake of simplicity and brevity, for the remainder of the dissertation, I will refer to this as the “focal offer development process.”)

The reason this question is so specific lies in the ecosystem’s combined characteristics of complementarity, multilaterality, co-specialization, and the intermediate form between market and hierarchy with partners with their own agendas, as shown in chapter 2.2.1 in detail. As pointed out in this previous chapter, Table 1 summarizes why this question is so relevant in the ecosystem setting and differentiates it from adjacent forms of inter-firm collaboration. Not surprisingly, this has led to repeated calls for research (Aversa et al., 2020; Dattée et al., 2018; Jacobides et al., 2018; Kapoor, 2018; Priem et al., 2018).

The following considerations based on the characteristics of ecosystems, the main features of which have already been explained in chapter 2.2.1, shape the argumentation for the development of the focal offer. Jacobides et al. (2018) found that complementarity as core of each focal offer in ecosystems occurs on both sides to a certain degree (production and consumption). The nature of these leads to the assumption that the different types of complementarity (uniqueness and supermodularity) on both sides will lead to different approaches chosen in the focal offer development process depending on the type of complementarity on each side.

Furthermore, the complementary modules contributed by the partners need a certain degree of co-specialization to be adapted to each other. The level of co-specialization affects the risks for the partners involved in case the ecosystem does not perform as expected. Because the partners pursue their individual agendas, varying co-specialization levels make it more or less difficult to convince them to commit to the

ecosystem (Jacobides et al., 2018), making co-specialization and fungibility an important boundary condition for the focal offer development.

In addition, the setting of partners with their own agendas being not fully hierarchically manageable also has some implication for the focal offer development. As, it can be concluded that this intermediate form between market and hierarchy will be a continuum that, on the one hand, will affect different ways of dealing with different partners and, on the other hand, will make alignment in the “partly designed [focal offer development] process” (Jacobides et al., 2018, p. 2263) even more challenging. Chapter 5 illustrates the corresponding findings.

2.3.3 Existing literature on the development of value propositions for ecosystems

After the derivation of these two sub-questions and their justification for relevance, the question now arises: if these aspects are so important, what has been said yet?

With regard to the first sub-question RQ1, namely, “*which ecosystem strategy (based on uniqueness or on supermodularity) and thus which resulting type of value proposition is most beneficial for firms under which boundary conditions?*”, some works studied complementarity in isolation without focusing on the value proposition and value creation in ecosystems: Teece (2018) stated that understanding the nature of complementarities and distinguishing it into even more fine-grained types is important. Shipilov and Gawer (2020) studied complementarities on the production and consumption sides. Ganco et al. (2020) investigated the effect of complementarities on the innovativeness of the ecosystem. Moreover, Cennamo and Santaló (2019) used the concept of complementarities when examining the relationship between the diversity of ecosystem outputs and respective user satisfaction. In contrast, Ritala, Aarikka-Stenroos, and Gnyawali (2020) and Wolff and Hakanen (2021) were interested in the development of value propositions in the context of the structural view but did not connect it with aspects of complementarity.

Thus, the research question remains unanswered, as demonstrated by several recent calls for further investigation into the topic. In particular, Jacobides et al. (2018), Nambisan et al. (2019), and Rietveld and Schilling (2021) explicitly identified the need for studies on different types of complementarities on production versus consumption and a better understanding of the types of ecosystems that might emerge, which is exactly the research question.

Regarding the second research question, RQ2, namely, *“How does the orchestrator manage the development process of the focal offer in a coordination-intense setting between customer orientation and partner alignment?”*, broad research on focal offer development in ecosystems was started and identified the following directions.

The existing literature on so-called innovation ecosystems might be a source of insights into the focal offer development process. However, a recent literature review analyzing 21 definitions of innovation ecosystems by Granstrand and Holgersson (2020) highlighted that these “typically focus on collaborating actors, while much less commonly include components of competition/substitution and artifacts (products, services, resources, technologies, etc.)” (Granstrand & Holgersson, 2020, p. 8). Furthermore, research exists on how collaborative agreements between partners influence the coordination of investments in and the commercialization of new technology (see for example, Jacobides et al., 2018; Kapoor & Lee, 2013; Leten, Vanhaverbeke, Roijakkers, Clerix, & van Helleputte, 2013). Innovation ecosystems with their origin in Adner (2006) focused in particular on “collaborative arrangements” (Adner, 2006, p. 98) and the management of existing partners that generate innovation and look at upstream (components) and downstream (complements) (Adner & Kapoor, 2010; Dedehayir, Mäkinen, & Roland Ortt, 2018; Frankort, 2013; Kapoor & Lee, 2013). The structural view follows the very opposite logic, starting from “the value proposition, considers the activities required for its materialization and ends up with actors that need to be aligned” (Adner, 2017, p. 44). Accordingly, insights into the focal offer development under the conditions of the structural view are largely missing (Shipilov & Gawer, 2020; Thomas & Autio, 2020).

The platform ecosystem literature (for an overview see McIntyre & Srinivasan, 2017) provided recent insights into focal offer development (for example Ozalp, Cennamo, & Gawer, 2018). For example, one study focused on user preferences as a driver of value co-creation and strategic interactions in platform ecosystems (Panico & Cennamo, 2020). Another study considered customers when analyzing consumer switching versus provider multihoming in platform competition (Basaure, Vesselkov, & Töyli, 2020). Another study examined how orchestrators of platforms manage value creation by promoting individual complements (Rietveld, Schilling, & Bellavitis, 2019). However, as previously mentioned, this stream is missing the multilateral connections among the partners involved, the resulting dependencies, and the coordination efforts and aspects

of multilateral co-specialization that are so typical for the focal offer development from a structural view.

Although some of the aforementioned works from related streams touched on single aspects of the value proposition development in ecosystems, the structural view introduced a very new and distinct perspective. However, even within the structural view, the development of value propositions has rarely been addressed, even though the value proposition on a strategic level and the focal offer as the materialization of the value proposition constitute the very heart of the concept (Adner, 2017; Jacobides et al., 2018).

On the one hand, only a few studies looked at the value proposition development with a customer orientation and transferred the original concept of value propositions (Bower & Garda, 1985) to an ecosystem. For instance, one study (Joo & Shin, 2018) focused primarily on the role of the customer and the customer experience in the ecosystem development process but not on the partner alignment necessary to create the focal offer.

On the other hand, certain studies focused on the partner side when developing the focal offer. A recent study (Talmar, Walrave, Podoyntsina, Holmström, & Romme, 2020) was the first to combine innovation ecosystems with the structural view by combining the constructs (actors, resources, activities, value addition, value capture, value propositions, dependence) of the structural view in an ecosystem pie model to provide a strategic view of the interplay among partners. However, the study did not focus on the focal offer development process while managing the participating partners. Some studies focused on value co-creation in ecosystems surrounding the aspects of competition, cooperation, and value capturing in the context of ecosystem value creation (Khademi, 2020). This happened from a strategic point of view (Brusoni & Prencipe, 2013; Clarysse et al., 2014; Hannah & Eisenhardt, 2018; Hoffmann, Lavie, Reuer, & Shipilov, 2018; Letaifa, 2014) or with a focus on the dynamics of development (Adner & Kapoor, 2010, 2016) without considering the customer perspective. Another study investigated the innovativeness of companies in ecosystems depending on the structure of interdependencies (Ganco et al., 2020). In turn, another study examined the value proposition of a novel technology with a focus on co-evolutionary interdependencies (Ritala et al., 2020). However, these studies focused on partner management but did not integrate the coordination effort of addressing customer

orientation. Similarly, streams exist that focused explicitly on handling knowledge and the resulting co-learning between partners without integrating the customer perspective (Adner & Kapoor, 2010; Alexy, George, & Salter, 2013; Brusoni & Prencipe, 2013; De Meyer & Williamson, 2020; Frankort, 2013; see also, Jacobides et al., 2018; Thomas & Autio, 2020).

Some works combined both the partner and customer perspectives in the context of the focal offer development process. One contribution addressed the interplay during value creation in service ecosystems through institutionalization (Vargo, Wieland, & Akaka, 2015). Apart from this, three papers focused on value creation in ecosystems under different aspects. Dattée et al. (2018) analyzed the process from the point of view of reducing uncertainties to convince partners to join the system. In doing so, they showed that a “broad protovision” must be in the mind of the orchestrator from the beginning to leverage it to convince potential partners and present it to potential customers, which is then subsequently adjusted using dynamic checkpoints and loops. Ansari, Garud, and Kumaraswamy (2016) studied the tension between the need for cooperation with ecosystem partners and that this cooperation will subsequently be destroyed by the innovation when partners and customer interests are brought together. Snihur, Thomas, and Burgelman (2018) focused on the disruption of business models through innovators in the ecosystem context and reviewed the alignment process of framing as static element and adaptation as a dynamic element. They examined the “uncertainties about customer and partner needs, the viability of the new ecosystem’s value proposition and underlying technology” (Snihur et al., 2018, p. 1279) from a disruption perspective but did not shed light on the development process under the aforementioned coordination aspects.

Overall, to the best of my knowledge, no single approach combines the value proposition development of ecosystems or the following materialization in the focal offer development with customer orientation and partner management under the aforementioned aspects that make the structural view unique (Adner, 2017; Jacobides et al., 2018). This gap can be emphasized by recent and repeated calls for research along these lines (Aversa et al., 2020; Dattée et al., 2018; Jacobides et al., 2018; Priem et al., 2018). Thus, the research questions appear highly attractive and relevant and are logically anchored in the specifics of the ecosystem according to the structural view, but no research has yet addressed them sufficiently. Therefore, the following work will

be dedicated to answering these questions and will present the research approach in the next chapter. Figure 3 summarizes the relevant research gaps that will be addressed, including the anchoring in the ecosystem specifics.

How are value propositions for ecosystems developed at the strategic and operational levels?

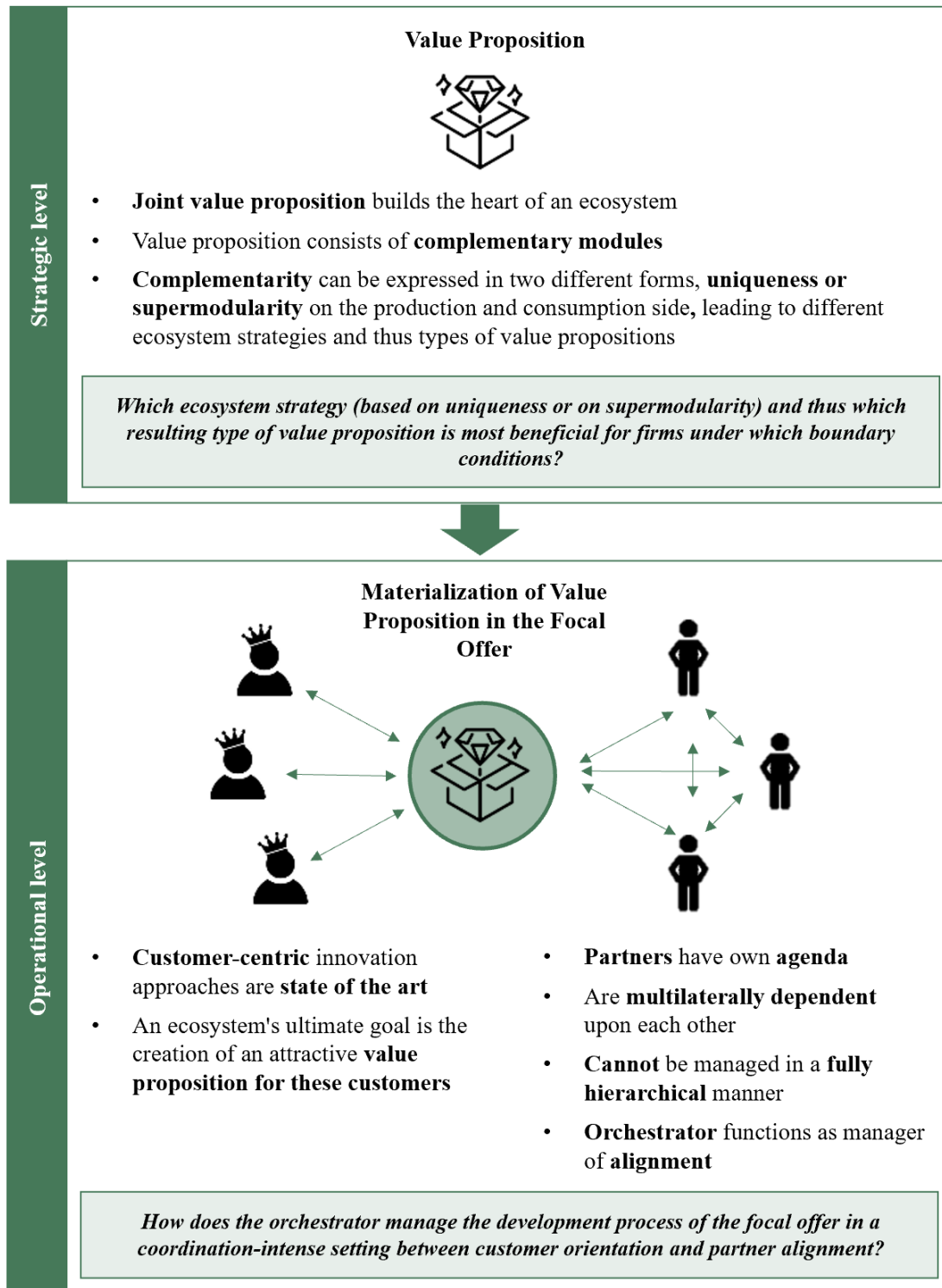


Figure 3: Overview of research questions

3 Research methodology and introduction to case basis

This work aims to comprehensively address the research questions motivated in the foregoing section in a way that does justice to them and is based on multiple case studies as a qualitative research approach.¹⁰ Case studies are “rich, empirical descriptions of particular instances of a phenomenon that are typically based on a variety of data sources” (Eisenhardt & Graebner, 2007, p. 25). In particular, the case study approach “focuses on understanding the dynamics present within single settings” (Eisenhardt, 1989, p. 534). Therefore, qualitative research based on case studies is especially applicable in new research fields in which one wants to answer the “why” and “how” questions in the respective field (Eisenhardt & Graebner, 2007). As already mentioned, case studies are enriched by collecting data by different methods and are, thus, predisposed to generate more generalizable theory from case study evidence than a single case study (Eisenhardt, 1989; Eisenhardt & Graebner, 2007; Yin, 2014). Furthermore, this theory-building process is characterized by “recursive cycling among the case data, emerging theory, and later, extant literature” (Eisenhardt & Graebner, 2007, p. 25).

The case study approach is used for several reasons. As previously shown, the topic of ecosystems and, in particular, the development of the value proposition in ecosystems, is a rather new and little-known topic. This is particularly true from the perspective of the so-called structural view of ecosystems. For this reason, it is appropriate to conduct a qualitative multi-case study because this approach is very suitable for new and unexplored topics (Eisenhardt, 1989, 1991; Yin, 2014). More specifically, a multi-case study approach is preferable over a single case study because it can supplement the details within each case analysis with a cross-case comparison to identify recurring patterns that can then be summarized into a theoretical approach (Yin, 2014). Moreover, because many studies in this field are conceptual, this approach could be helpful to understand this phenomenon (Lingens et al., 2020) and build external validity—in other words, find a universal way to apply the findings to other cases and simultaneously generate relevant knowledge for management because all cases are selected from real

¹⁰ See also Böger (2021), Huber (2021), Lingens et al. (2020) and Miehé (forthcoming)

ecosystems currently being developed or already established (Gibbert, Ruigrok, & Wicki, 2008).

As previously discussed, this dissertation aims to address two specific research questions and, thus, sets up two different case study samples to address these questions, given the definition of case studies, which can be viewed as a series of experiments (Eisenhardt, 1989). The case sampling then determines whether the research question can be adequately addressed using the present sampling or whether further cases should be added. This procedure is repeated until the sample fits so well that each additional case provides only marginal added value to answering the question (Eisenhardt, 1989). This process naturally implies that some cases are suitable for both research questions and some are not, resulting in two different samples.

3.1 Case selection

The case selection was guided by three main criteria. In accordance with Eisenhardt (1989), it aims for a case sample of four to ten cases per study.

First, all cases needed to be ecosystems according to the structural view (Adner, 2017; Jacobides et al., 2018), which means that they have a fully developed joint value proposition for the customer materialized in a focal offer in the form of a product or service as their ultimate goal of existence. Furthermore, regarding the question of partners' affiliation, this work very closely follows the approach of Adner (2017), which requires all accompanying partners to contribute modules that have a noticeable degree of nongeneric complementarity in the form of uniqueness or supermodularity in production and consumption with a need for co-specialization to align them. Furthermore, the partners are not fully hierarchically manageable and multilaterally dependent on each other.

Second, because the value proposition is the absolute core of this research, that the value proposition—having a focal offer for customers as a target—is clearly defined, describable, and in a well-developed stage is essential because it represents the core of the analysis.

Third, to ensure sufficient information about a case and an understanding of the motivation for the development steps over time, having access to the leadership at the

orchestrator firm as the unit of analysis was essential. This thesis is focussed on this role because the orchestrator drives the selection of partners, comes up with the idea for the focal offer, and plans its development; therefore, the orchestrator has an overview of the ecosystem's development and is responsible for the materialization of the value proposition (Moore, 1993, 1996).

Furthermore, I strive for polar cases to be able to map the different extreme situations (Eisenhardt, 1989) and for some expected variations (Eisenhardt & Ott, 2017). Variations could be, for example, in the type of value proposition, the size of the participating companies, or the backgrounds and activities of the orchestrators.

Because ecosystems by definition always combine partners from different industries, value propositions and, thus, ecosystems from different industries are considered (see also Lingens et al., 2020). This approach of comparing cases from different industries that share common logics was generally seen (e.g., Chatman & Jehn, 1994; De Wulf, Odekerken-Schröder, & Iacobucci, 2001; Frankenberger & Sauer, 2018) and was specifically used in other works on ecosystems (Davis, 2016; Lingens et al., 2021; Lingens et al., 2020). This approach prevents the findings from being distorted by industry-specific situations. In contrast, each ecosystem involves partners from similar industries and the same types of partners, which increases the comparability and generalizability of the findings (Davis, 2016; Rong, Wu, Shi, & Guo, 2015).

Based on these criteria, an iterative case selection process (Eisenhardt & Graebner, 2007) emerged, marked by case selection, data collection, and a first data analysis. Therefore, after a first round of interviews out of a set of approximately 15 ecosystems, about a quarter was selected on the basis of the previously defined criteria to be examined in greater detail, understood, and analyzed, and to have first theoretical conclusions to be drawn. After this first round, selective cases were discarded if their fit was not sufficient to answer the research question—as this issue became apparent during the analysis, new cases were sought to increase the sample size. As shown in the literature review, the type of complementarities plays a pivotal role; hence, the cases are selected in such a manner that all four combinations of uniqueness and supermodularity on the production and consumption side are covered (Jacobides et al., 2018). Figure 4 provides an overview of the case classification according to the complementarities. Tables 15 and 16 indicate the exact justifications for the

classifications. Depending on the research focus of the two studies, Table 15 works primarily from the perspective of the different types of value propositions and the underlying types of complementarity attributes. In contrast, Table 16 focuses on the types of complementarities through the lens of the developmental logic of the focal offer. However, both have different argumentation but lead to the same results concerning the types of complementarities per case. The understanding of the respective complementarity types underlying the classification is analogous to Jacobides et al. (2018), as already described in the literature review.

1. *Complementarity on the production side:* Unique complementarity on the production side means that “the items cannot be produced without coordination across producers or adherence to a standard within a modular system” (Jacobides et al., 2018, p. 2266) and supermodularity in production means “the more agents A are involved in producing B, the better quality B is or the more activities A are conducted, the more efficiently activities B and C are performed” (Jacobides et al., 2018, p. 2266).
2. *Complementarity on the consumption side:* Jacobides et al. (2018) found that complementarity on the consumption side is defined by the strength of the value for the customer through the interaction and joint consumption of the modules. Uniqueness means that “these complements have less value when not consumed together” (Jacobides et al., 2018, p. 2266). With uniqueness, the utility decreases to virtually zero when a module is missing. In the case of supermodularity, we have “increasing returns of joint consumption of complements” (Jacobides et al., 2018, p. 2266).

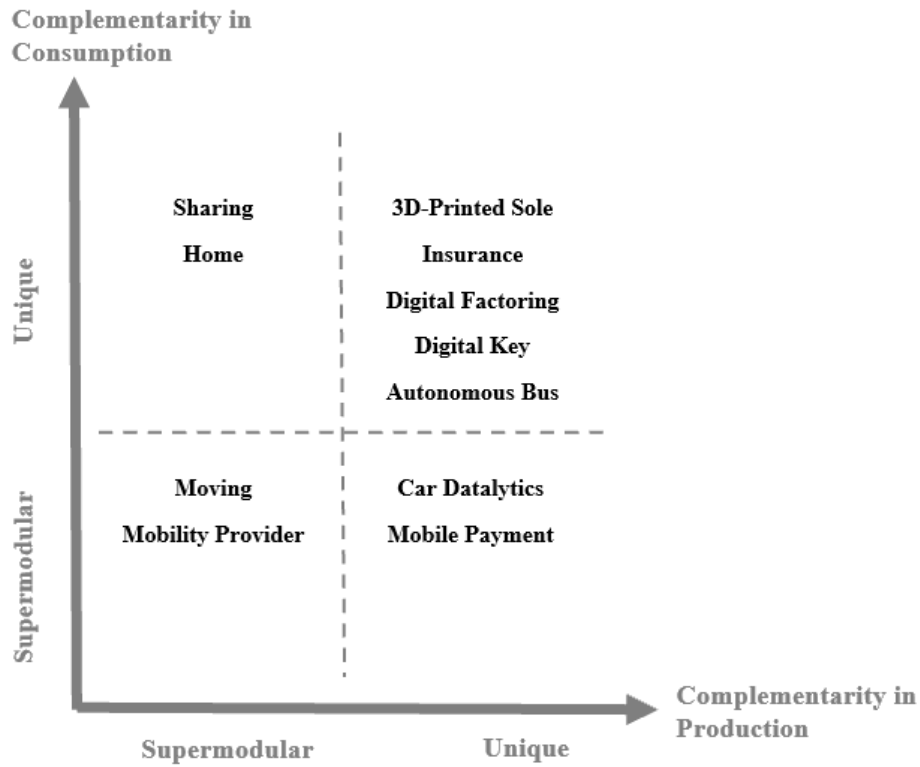


Figure 4: Case classification by complementarity

This case selection was an iterative process with constant adaptation circles and results in a final sample of eight cases for RQ1 and eight cases for RQ2, as shown in the following tables.

3.2 Case introduction

Tables 2–12 introduce the overarching profiles of the selected ecosystem cases¹¹, their relevance for the studies (I/II), and the orchestrator’s role as the focus of my research lens, the participating partners, and their contributions.

¹¹ This interview pool as a source is also used by Maximilian Böger, Florian Huber, and Lucas Miehé, which is why individual case profiles may also appear in their work.

Table 2: Profile 3D-printed sole case

3D-printed sole		case studies I and II
Value proposition	Custom fit footwear based on 3D-printed customized soles, foot scan done by retail partner	
Field of business	Sports equipment	
Type of VP	Differentiating standalone product/solution	
Size	1–10/1.000–10.000 (number of employees, smallest/largest partner)	
Orchestrator incl. statement on role and contribution to value proposition	3D printed sole start-up “We’re the conductor in the middle. I’m sure it always comes from us.”	Idea, knowledge, and technology solution provider “We understand the functionality that is needed in sports. Know the market. Have developed our own expertise in 3D printing.” “And act as a link between our retail partners and the producer.”
Partner and respective contribution to value proposition	Retail partners for customer access and sale, scan customers’ feet in store 3D scanning software provider delivers software to scan and read out feet data Morphing partner provides the technology to morph feet and align in shape 3D-printing company prints soles	

Table 3: Profile insurance case

Insurance		case study I
Value proposition	Personalized fee for health insurance based on data-driven health index (e.g., doing sports, eating, drinking, smoking behavior)	
Field of business	Insurance	
Type of VP	Differentiating standalone product/solution	
Size	1–10/1.000–10.000 (number of employees, smallest/largest partner)	
Orchestrator incl. statement on role and contribution to value proposition	Start-up “We are the orchestrator, the other parties would have too much dead weight”	Providing health index in app as technology and innovation driver as well independent party, connecting the different insurances in the country “I was invited to McKinsey’s Global Life Leader Forum and they said it so beautifully, they said the Switzerland of Insurance, because in the future it needs an independent party.”

Partner and respective contribution to value proposition	Public meta data necessary to generate the health index Health insurance provides primary insurance Reinsurance in the background
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Table 4: Profile digital factoring case

Digital factoring		case studies I and II
Value proposition	Simplest, debtor-supported financing solution for SMEs, enabled by factoring of complete sales ledger as portfolio solution for SMEs	
Field of business	Finance	
Type of VP	Differentiating standalone product/solution	
Size	1–10/over 10.000 (number of employees, smallest/largest partner)	
Orchestrator incl. statement on role and contribution to value proposition	Factoring start-up “Because each of the partners is a specialist. The insurance company can insure, the broker can find clients, the funding partner can provide money. And we are doing the administrative part and orchestrating the whole thing.”	Factoring start-up as idea provider “We basically built the whole ecosystem.” “We are getting attention for being the spider in the web. Because it would be difficult to replicate the web.”
Partner and respective contribution to value proposition	Insurance company hedges the portfolios Funding partner provides funding Insurance broker as initial customer access, gets exchanged with bank Bank as customer access and funding provider Software company develops algorithm to access the risk of SME claims	

Table 5: Profile digital key case

Digital key case		case study II
Value proposition	Smartphone as digital key for cars and cloud-based access control	
Field of business	Security	
Type of VP	Differentiating standalone product/solution	
Size	10–100/1.000–10.000 (number of employees, smallest/largest partner)	
Orchestrator incl. statement on role and contribution to value proposition	Digital car key start-up “Because we have an overarching perspective on the vision and the market and therefore the ecosystem compared to our customer.”	Digital car key start-up as idea, knowledge, and technology solution provider (software) “So that we are the ones who bring together technological components to make the whole system work.”

	“Back then, we proactively chose the approach of orchestrating.”	
Partner and respective contribution to value proposition	Automotive original equipment manufacturer (OEM) to integrate solution in cars and as customer access Automotive OEM business innovation unit relevant to generate the need for modern solution in company Hardware supplier delivers installation element for car Frontend supplier in the form of app control	

Table 6: Profile autonomous bus case

Autonomous bus		case study II
Value proposition	Autonomous driving public transport solution in city centers	
Field of business	Mobility	
Type of VP	Differentiating standalone product/solution	
Size	1–10/100–1.000 (number of employees, smallest/largest partner)	
Orchestrator incl. statement on role and contribution to value proposition	Autonomous bus start-up “Partly, we’ve taken on the role of a translator.”	Autonomous bus start-up as idea, knowledge, and software provider “We brought in the software for coordination between partners.”
Partner and respective contribution to value proposition	National logistics provider contributing knowledge, funding and contacts, customer interface Self-propelled bus company , delivering the vehicle City and cantonal legal administrations offer test sites and legal aspects	

Table 7: Profile car datalytics case¹²

Car datalytics		case studies I and II
Value proposition	Phase 1: Reading data from cars and making predictive analyses; Dongle as integrable data collection tool for cars Phase 2: Offering ancillary services (e.g., insurance, maintenance, fuel usage) to make customers’ lives related to their cars easier by making it cheaper and more convenient via one access point	
Field of business	Automotive	
Type of VP	Phase 1: Differentiating core technology Phase 2: One-stop shop with various use cases	

¹² This case was also used during data collection for a bachelor (Schultz, 2020) and master (Maurer, 2021) thesis.

Size	10–100/1.000–10.000 (number of employees, smallest/largest partner)	
Orchestrator incl. statement on role and contribution to value proposition	Newly founded car datalytics spin-off “We are more of a hub.” “At the end of the day, we decide whether to go into business or not.”	New spin-off with the aim of orchestrating “It’s the start-up as the pacesetter in the sense that we control the ecosystem.” “Naturally, you must now ensure that these strategies are being implemented.”
Partner and respective contribution to value proposition	Phase 1: National telecommunications provider contributing data component (IoT, analytics, storage) National car importer/dealer bringing automotive competence and customer interface Phase 2: + use case partners, such as insurance companies, garages, gas stations etc.	

Table 8: Profile mobile payment case

Mobile payment		case studies I and II
Value proposition	Phase 1: Payment solution integrated in app Phase 2: Offering of payment solution for different use cases as the country’s digital wallet for all value-adding services around payment	
Field of business	Banking	
Type of VP	Phase 1: Differentiating core technology Phase 2: One-stop shop with various use cases	
Size	10–100/1.000–10.000 (number of employees, smallest/largest partner)	
Orchestrator incl. statement on role and contribution to value proposition	Newly founded mobile payment spin-off “We are acting as a scheme. That’s correct. We’re sort of in the center.”	New spin-off with the objective of offering infrastructure (software) and scheme “Provide infrastructure and do app development.” “You make a new scheme.” “Currently three functions: Core function is the scheme, then acquirer, and issuer.”
Partner and respective contribution to value proposition	Phase 1: Bank with core banking knowledge and funding and customer access Software provider Payment service provider as technical interface to retail integration	

	Core national retailer as customer interface Phase 2: + use case partners, such as parking operators, invoice interfaces, bonus cards, etc.
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Table 9: Profile sharing case

Sharing		case studies I and II
Value proposition	Peer-to-peer car sharing marketplace offers convenience and security through car opening via mobile phone without key handover and with integrated insurance in case of an accident	
Field of business	Car sharing, mobility	
Type of VP	Marketplace with unique add-on services	
Size	1–10/1.000–10.000 (number of employees, smallest/largest partner)	
Orchestrator incl. statement on role and contribution to value proposition	Start-up, connecting car owners with car renters	Sharing platform “The client pays fees set by the renter, but it is orchestrated by us.”
Partner and respective contribution to value proposition	Box provider (Hardware) enables opening of car via mobile phone Garages install the boxes in the private cars Software provider in box to enable opening of car via mobile phone, technically Insurance company covering in case of accident Many private car owner who make their car available for rental	

Table 10: Profile home case

Home		case study I
Value proposition	Marketplace with services that assists customers with saving time, energy, and resources in real estate search, financing, retirement planning, information about real estate during ownership, refinancing, selling	
Field of business	Buying, owning, selling properties	
Type of VP	Marketplace with add-on unique services	
Size	10–100/1.000–10.000 (number of employees, smallest/largest partner)	
Orchestrator incl. statement on role and contribution to value proposition	Mortgage platform	Mortgage platform, manages and offers the independent offers from different banks, customer interface

Partner and respective contribution to value proposition	Insurance company delivering insurances in addition to properties Micro-location data company delivers data that enable unique application Software provider integrates micro-location data to enable utilization of data for personalized services, such as refinancing optimization Banks offering mortgages
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Table 11: Profile moving case

Moving	case study I	
Value proposition	Marketplace for moving and final cleaning, where the customer has the possibility of comparing different qualified companies. Acts as neutral point of contact throughout process	
Field of business	Service	
Type of VP	Diversified marketplace	
Size	1–10/1.000–10.000 (number of employees, smallest/largest partner)	
Orchestrator incl. statement on role and contribution to value proposition	Start-up, connecting movers and moving companies “We just do the conversion, we are kind of the orchestrator, we bring the partners together and then we need ecosystem partners to cover the individual services.”	Moving platform “We are neutral. We do not do it ourselves, but an independent company that offers through us.”
Partner and respective contribution to value proposition	Software provider integrates solution on platform for processing Moving companies offering moving service via platform Marketing partners promote platform and enable scaling Box shop offers boxes before moving date via platform Insurance company backs up service in case of accident Cleaning companies offering cleaning service in addition to moving via platform	

Table 12: Profile mobility provider case

Mobility provider	case study II	
Value proposition	Delivery of mobility solutions through one app/platform	
Field of business	Mobility	
Type of VP	Diversified marketplace	
Size	10–100/100–1.000 (number of employees, smallest/largest partner)	
Orchestrator incl. statement on role and	Multiorchestration: Car manufacturer	Re 1: Automotive competency, smart mobility competency

contribution to value proposition	Software provider Consulting company	Re 2: IT partner needed to connect services in cloud Re 3: Neutral partner and project management and network “In the future, we will not be able to map these services alone, because these customer journeys are merging more and more, and are creating single points of contact. We simply don’t have the expertise for this.”
Partner and respective contribution to value proposition	Local companies such as car sharing, scooter provider, train ticket provider City administration	

3.3 Data collection

After extensive desk research, review of relevant business journals and newspapers, personal market knowledge, and visits to summits such as the Swiss Start-up Days to get in touch with potentially interesting ecosystems, the initial talks are set up.

The data collection took place in several iterative steps during a two-and-a-half-year period between October 2018 and March 2021. At this point, to be noted is that, in addition to myself, four other researchers were active in the research group on ecosystems, which is why the interviews were sometimes conducted together. Each researcher brought his or her focus. However, each interviewer independently documented and took notes. As a consequence, some data and information were partially used for other research projects that had a different research focus. Thus, parts of this information can be found in colleagues’ publications.¹³

A first interview round was started with the orchestrator to explore the basic structure of the ecosystem and gain a rough understanding. The aim of this first round was to check whether the targeted ecosystem meets the defined criteria (see chapter 3.1) and works as a good fit for the respective study. The orchestrator perspective as a primary research lens is chosen for specifically two reasons. First, the orchestrator as manager of the ecosystem is responsible for its functionality and the alignment of partners; therefore, it has a good overview of the participants and their contributions. Second,

¹³ Dr. Bernhard Lingens, Maximilian Böger, Florian Huber, and Lucas Miehé

because the orchestrator is the manager of the ecosystem and responsible for creating the value proposition, it is a good match to the research questions on the development of value propositions. Please see the relevant questions in Appendices 1 and 2. These basic questions are relevant in the same way for both studies.

The aim of the second, in-depth, semi-structured interview with the orchestrator was to understand the ecosystem, the partners and their respective contributions, the dependencies and value proposition, and the materialization in the focal offer (Legard, Keegan, & Ward, 2003). A semi-structured interview is a good approach for such incidents because nondirective, open-ended questioning (DiCicco-Bloom & Crabtree, 2006; Hannah & Eisenhardt, 2018) allows for predefined guiding questions that are adapted to the flow, and further questions can be added depending on interviewees' answers (McIntosh & Morse, 2015).

After the basic mechanisms of the ecosystem were understood, further extensive semi-structured interviews were conducted focusing on the value proposition. For study I, this process means understanding the different steps of the value proposition development on the basis of the type of value proposition and corresponding complementarities as well as the different components of value propositions in the form of products or services in a chronological manner (see Appendix 1). The milestones during the value proposition development were mapped, and the market/consumer and partner/production sides were separately spotlighted. The market competition was analyzed and the focus topics and challenges during the development process were documented. For study II, this process means similarly understanding the materialization of the value proposition in a chronological manner, elaborating on the changes in the composition of the focal offers and understanding customers' and partners' participation during this process (see Appendix 2). This approach assists with increasing the internal validity (Gibbert et al., 2008). Furthermore, The event-tracking interview technique was used to lead mentally interviewees step by step through the individual events and run through the events in their minds (Hannah & Eisenhardt, 2018). I frequently asked "what happened next" and "why did this happen" to gain a detailed understanding of the processes and underlying reasons.

Although the orchestrator as designer (Teece, Peteraf, & Leih, 2016) is the key source of information, additional interviews were conducted with at least one other ecosystem

participant. These additional interviews were especially useful and recommended to reduce biases coming from only one interviewer's perspective (Eisenhardt, 1989).

The interviews lasted on average between 30 and 90 minutes and were recorded and promptly transcribed. In addition, during the interviews notes were collected. Together with the interview partner, sketches of the ecosystem mechanisms and the interactions among the partners were executed.

After the interviews with the orchestrator and at least one other ecosystem partner, complementary sources were used for triangulation to validate the findings and avoid biases (Golden, 1992; Jick, 1979). These sources included both internal firm sources and publicly accessible sources. In particular, the presentation of the focal offer as materialization of the value proposition as a customer interface was publicly available on websites and in documents, brochures, and articles. Additionally, I extensively used follow-up emails and calls with the interview partners. Table 13 summarizes the conducted interviews and additional sources.

Overall 11 cases were examined and 73 semi-structured interviews conducted for a total of 3530 minutes at an average of 30–90 minutes. Moreover, I accompanied one case (the home case) during 2.5 years of development from the orchestrator and complementor perspectives (taking into account internal strategy meetings, decision meetings with C-level, and more than 20 customer interview evaluations). Therefore, only one officially conducted interview is listed for this case. However, the information and documentation include personal records and internal documents from the entire period and provide a very well-founded treasure pool of data.

Table 13: Overview of data per case¹⁴

<i>Case</i>	<i>#</i>	<i>Interviewee positions</i> <i>Inter-views</i>	<i>Interview duration (min)</i>	<i>Additional data</i>	<i>Source (additional data)</i>
3D-printed sole (A) ¹⁵	4	Chief Executive Officer (O) (A1)	101 + 27 + 15 + 34	Company website Blog post and online articles	internal external
Insurance (K)	5	Chief Executive Officer (O) Head of Sales Europe (O) Head of Strategy (C)	80 + 44 + 46 60 51	Company website Blog post, newspaper & online articles Radio and TV reports	internal external external
Digital factoring (C)	10	Head of Sales & Marketing (O) Innovation Consultant (C)	23 + 140 + 81 + 27 + 22 + 32 + 27 + 81 + 57 36	Company website documents Online articles about the orchestrator	internal external
Digital key (B)	6	Chief Executive Officer (O) (B1) Chief Sales Officer (O) (B2) Head Ecosystems & Venturing (C) (B3) Venture Fund Manager (C) (B4)	62 + 20 + 66 81 60 21	Company website Company website documents Blog post and online articles	internal internal external
Autonomous bus (D)	7	Head of Open Innovation (CO) (D1) Head Project Lab (CO) (D2) Lab Coordinator (CO) (D3) Head of Strategy & Innovation (CO) (D4) Operational Director (CO) (D5)	52 76 + 49 45 + 13 57 26	Company website documents Technical report Newspaper, online articles, and TV reports	internal internal external
Car datalytics (F)	6	Chief Executive Officer (O) (F) Chief Digital Officer (C) Products Lead (O)	36 49 47	Company website Working documents Blog post, newspaper and online articles	internal internal external

¹⁴ This interview pool as a source is also used by Maximilian Böger, Florian Huber, and Lucas Miehé

¹⁵ These letters are used to allocate the quotes in chapter 4 and 5

<i>Case</i>	<i>Interviewee positions</i>		<i>Interview duration (min)</i>	<i>Additional data</i>	<i>Source (additional data)</i>
	#	<i>Inter-views</i>			
		O = Orchestrator company CO = Co-Orchestrator C = Complementor company			
		Managing Director Innovation & Ventures Lab (C) Chairman of the Board of Directors (O)	10 + 26 45	TV reports	external
		Chief Innovation Officer (C)	55		
Mobile payment (G)		Head of Marketing (O)	49	Company website	internal
		Head Mobile Payments (C)	45 + 60	Company website documents	internal
	10	Innovation Strategist and Project Manager (C)	76 + 61	Blog post, newspaper and online articles	external
		Former Chief Executive Officer (O)	99 + 58 + 58	Radio and TV reports	external
		Current Chief Executive Officer (O)	48		
		Chief Executive Officer (O)	38 + 41	Company website	internal
Sharing (H)	6	Head of ecosystems (C)	24	Internal company presentation	internal
		Car tenants (3) (C)	22 + 18 + 23	Radio and TV reports	external
		Chief Innovation Manager (O)	34	Company website	internal
Home (J)	1	Chief Executive Officer (O)	Attended approximately 50 internal meetings 20 customer interviews	Company website documents	internal
		Innovation Manager (C)			external
		Chief Executive Officer (O)	66 + 53		
Moving (I)		Chief Innovation Officer (O)	24 + 26	Company website	internal
	12	Business Development Manager (O)	85 + 9 + 38	Company website documents	internal
		Innovation Manager (C)	59	Online articles about the orchestrator	external
		Chief Ecosystem Manager (C)	40 + 37 + 58 + 20		
Mobility provider (E)		Project Manager Ecosystem Initiative (CO) (E1)	51 + 60 + 120 + 30	Working documents	internal
	6	Head of Business Development (CO) (E2)	60 + 60	Newspaper and online articles	external
<i>Total</i>	<i>73</i>		<i>3530</i>		

3.4 Data analysis

The data analyses procedure resulting from more than 3500 minutes of interview material and the conclusions presented in the findings followed the same logic and the same process for both case studies but differed depending on the topic. They were guided by their respective research questions for which answers were sought. Thus, each case was first examined and processed individually in the within-case analysis, meaning that I did individual case study write-ups with a lot of details (Eisenhardt, 1989). These write-ups were condensed into diagrams to highlight the most important data. In a second step, in the cross-case analysis, attention was paid to similarities and differences along different dimensions between the cases to derive patterns (Eisenhardt, 1989).

I start the analysis of the data from case study I. For this case study, the individual steps in the value proposition development were arranged on a timeline and in particular the state of the value proposition over time was recorded and the changes in both the customer and partner sides were plotted. Special attention was paid to the growth of the individual building blocks within a value proposition and the complementarities behind them. Figure 5 shows an example of the mapping of the sequences and underlying reasons. In addition, the type of value proposition, the underlying complementarities, the market situation and competition and the respective challenges in the development steps were analyzed in each case with a particular focus on the relevance of partners and customers.

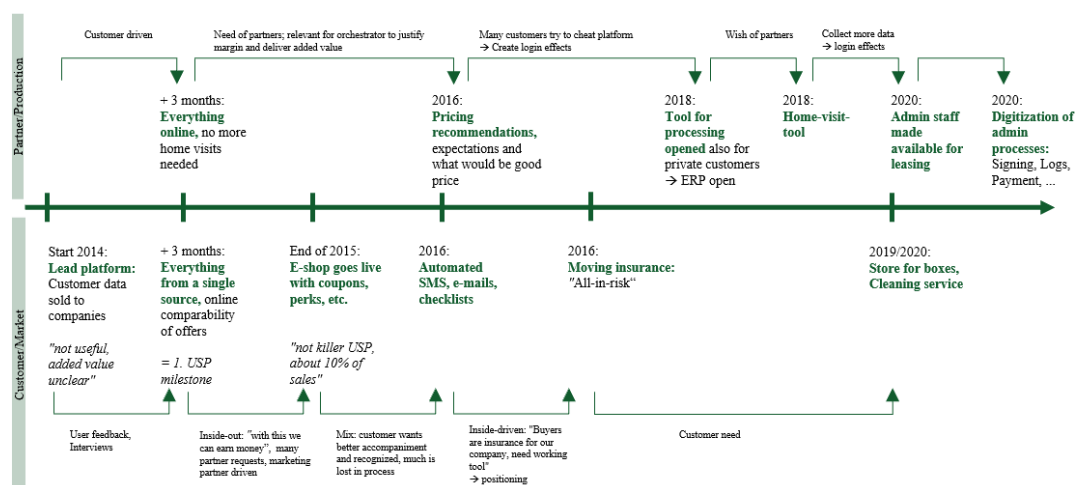


Figure 5: Example of mapping of value proposition development (study I)

After this within-case analysis, the cases were compared to find similarities and differences and carved out four different combinations of complementarity as a basis for the different forms of value proposition, as will be described in the findings (chapter 4).

Case study II was also started in the same way and the interview transcripts were used as a basis to map out the process of developing the focal offer, from the first idea to the final offer. During this mapping of the process steps, it was figured out that all standard product development processes can be divided into three phases for easier orientation. Phase one is “idea generation” and contains the starting point of the original idea (Adams, 1986; T. Brown, 2008; Liedtka & Ogilvie, 2011). This phase is followed by the so-called “idea testing” phase, which entails further development of the idea and receives its name from the many adaptations and cycles—and the prototype results (S. Brown & Eisenhardt, 1995; Eppinger, 2001; Kline, 1985; Unger & Eppinger, 2011). The third phase is called “elaboration” because it entails the implementation and realization of the prototype (Biazzo, 2009; Iansiti, 1995; Shenhar & Dvir, 1996; Verganti, 1999). This is summarized in Figure 6.

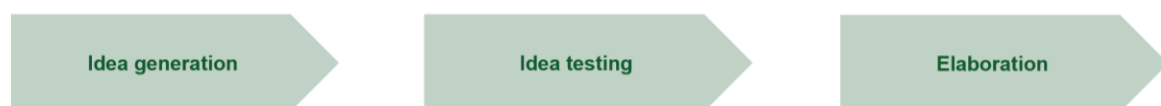


Figure 6: Standard development steps as structure for focal offer development process (study II)

I mapped each case independently, case by case, and recorded the insights from the participants (partners and customers) and the changes during the development process of the focal offer to identify high level themes. The process steps, including the changes and the participants, are shown in Table 14 and are described in detail in the findings. At the same time, the complementarity per case was worked out to ensure that the basic criteria per ecosystem are present (see Table 16 in chapter 5). In a further step, cases were paired to identify differences and similarities in the development process of the focal offer (Ozcan & Eisenhardt, 2009). Inspired by recent work, for example, by Hannah and Eisenhardt (2018) or Ozcan and Eisenhardt (2009), the documentation was

focused on visualizations, such as process diagrams in the findings, and particularly on tables with core topics. These tables were filled with quotes from the coding process to achieve the best possible validity. After the process evaluation was concluded, whenever necessary, participants were reinterviewed, or the processes were further confirmed. After a few iterative elaboration rounds, four different sample processes emerged that describe in detail the development of the focal offer in the findings.

In parallel, to support the findings with research, I returned to the literature to continue more specific research on the upcoming and elaborated topics. At the beginning of the research process, I worked more broadly on the ecosystem literature with a focus on value propositions and focal offers. Currently, specific deep-dives can be done, such as into complementarity argumentation. This process is very iterative and consists of researching and constantly comparing the findings from practice with those in the literature. In this way, similarities, confirmations, deepenings, and partial contradictions could be identified and prepared for discussion.

Table 14: Process steps in focal offer development and participants (partners/customers) during phases (study II)

Case	First idea for focal offer	Idea generation for focal offer	Idea testing for focal offer	Elaboration of focal offer	Focus	Approach
3D-printed sole	Custom ski boot with 3D-printed shoe based on self-scanned foot by customer	Concrete offer idea from orchestrator “The idea of what our product must be able to do was clear to us from the beginning.” “Because it needs someone who has the bright idea, who’s the force behind it.”	Prototype built by orchestrator alone; modification by start-up itself • <i>Print inner shoe and not shoe shell: “on one hand, we have a product offering that we didn’t even think about at the beginning”; “in the beginning, this was actually the most important thing.”</i> • <i>Do not sell directly online, but via dealers: “People cannot scan themselves anatomically.”</i> “Just like that, driven by myself [...] because no partner has any idea about the ski boot product” “Exactly, we manufacture all the prototypes here ourselves.” “Experimented a lot myself.”	Decoupling; integrate partners, search online	Short check customer acceptance; production focus “First finish the products, then test the market.”	Revolutionary Solution
Digital key	Smartphone as key for cars	Concrete offer idea from orchestrator “In the beginning was the idea. Then we built a prototype. Then we spoke directly to the OEM partners. Then we tried to put it on the market.”	Prototype built by orchestrator alone “We had a couple of prototypes that showed a lock opening but were not ready for the mass market.”	Decoupling; change through negotiating strength of core partner “The promise to the end customer has remained the same, but the composition of the contributions has	Short check customer acceptance; production focus; core partners have negotiating power “We must first show that what we have here as a vision works technically.”	Revolutionary Solution

				<i>changed and one partner was exchanged. “</i> <i>“What has changed is the integration partner.”</i> <i>“Then our integration partner basically took him out and replaced him with another partner.”</i>	<i>“Because I am convinced that our technology is simply the best. And it’s also clear that customers will want and need to adopt this technology at some point.”</i> <i>“So, the systems integrator, he’s the one who drives the value proposition. That’s who we’re primarily going after.”</i>	
Digital factoring	Factoring for big, single invoices for export SMEs	Offer idea by orchestrator, concept feasibility only possible together with core partner insurance <i>“Our value proposition evolved together with the partners we acquired ... Everyone wanted a say in the matter.”</i>	Prototype together with core partner insurance and funding provider. Change through insurance Not insuring individual tickets but portfolios, strongly driven by the insurance company: <i>“Then the insurance company said, okay, if you don’t want a deductible, we make a hard cut and don’t go down to individual tickets, but go to the portfolio level.”</i> <i>“And we developed this together with insurance and funding partners, this was simply the sweet spot where we said we were going to get an attractive product.”</i>	Decoupling; partner integration and customer interface partner is being supplemented because the partner does not perform, which results in a change in the target group Not export companies but SMEs with a regional focus, strongly driven by the bank as a customer interface: <i>“In terms of sector and regional focus, on the one hand, we get what the bank brings us. So, here you can also say that we have perhaps misjudged the market a bit. Get the customers to whom the bank cannot give credit. We are now strong in specific niches.”</i>	Short check customer acceptance; production focus, core partner strong negotiating power <i>“How strongly was this driven by our partners? Relatively strongly, because they very much preferred this portfolio approach.”</i> <i>“Because our CEO came very much from the structural side.”</i> <i>“It was certainly driven by founders with product strengths, and customer demand, that’s definitely coming.”</i>	Revolutionary Solution

						“The petrification of the value proposition actually resulted more from the fact that we had to work together with the partner and that’s where the end product came from a bit.”	
Autonomous bus	Autonomous bus	Offer idea of software start-up as a spin-off of a university research project, feasibility only possible with partners “At that time, the university had made one of the first tests with an autonomous vehicle on its campus as part of a research project. That’s where the start-up came from and we said, ‘Actually, you’d have to test it on public roads.’”	Prototype together with core partners–bus manufacturer, logistics provider–as well as city and legal department to enable feasibility on roads “Now this is not what I simply wrote down, it’s what we worked out with the partners.” “This is very much dependent on regulation.” “First we did tests on the army’s private property. Parallel to that we defined the route and got permission.” “This is also something new, the field is also being developed, the know-how must also be built up.”	Technical decoupling after feasibility tests “We do this to test the technology, the technical feasibility.”	Short check customer acceptance; strong production focus and partner dependence “Did they make any promises to the customer? I think the discussion came up rather later, to be honest—because it was mainly about the idea.” “But I don’t think it was a clear promise to the end customer, because sometimes you didn’t even know who the end customer could be.” “The former, is strongly partner-driven. [...] The whole customer experience management is an issue, but not when it comes to finding ideas.”	Revolutionary Solution	
Mobility provider	Strategy diversification from core business (car production)	Strategy-driven by corporation, no concrete idea for use cases	Idea development right from the start together with pilot customer	No decoupling, further modules can be integrated and exchanged	Strong market focus and active customer participation	Diversified Marketplace	

	“With our ecosystem, we want to offer mobility customers greater added value by combining core competencies from different industries and from different companies.”	“Our idea is actually classic, to combine the core competencies on this mobility customer journey and offer customers from a single source.” “We then said we had to have a pilot client that we would work with on the value proposition of this first MVP.” “We then teamed up with the pilot client and defined this initial marketability of the product in a series of workshops.”	“In the first week, we did a classic design thinking together with the pilot customer, first generating ideas together, then defining them in a catalog of requirements and putting them into a backlog.” “Modifying is wrong, we add to the MVP up to a certain range. So, in addition to parking lot sharing, car sharing, we’re adding electric scooter capability, public transportation integration.” “The test customer is iteratively involved, he has been actively involved in the project for two years now.”	“We will continue to expand it.” “Adjustment is wrong, but it’s always expanding.” “We have Category A partners, where it’s all about finding the right partner for optimal client performance. This is, for example, a supplier of electric scooters, where I can well imagine that the current partner will be replaced if his services do not meet the customers’ requirements.” “And the plan is also to get four more pilot customers on the platform, to define the further services together with the customers and bring them on the platform.”	“That’s actually how we came up with this value proposition together with the three partners and the pilot customer.” “The pilot client had the ability to shape, parking management came in all new through him.” “Customer opinion and customer feedback is the most important, so we always say, there is only one single truth in the universe and that’s the customer.”	
Car datalytics 1	Strategy-driven diversification with data analysis solution in automotive sector “That technology will advance and perhaps replace our current core business.”	Strategy driven by corporation “Both partners, independently of each other, have reflected on the subject.” “Where can we, as a telecommunications company, do more than just add horizontal value?”	Prototype for technology together with core partners “Did we put together a project team relatively quickly... worked on the business case from a strategic perspective... and agreed on the value proposition first [B2B and B2C].” “Then we decided to spin this out.”	Decoupling of technology “I thought the way to go first for technology, to make a technologically fit product and now, in a second step, to go for customer-friendliness was just right.” “A product, technology, you have to have first, then the others will follow.”	Production focus and partner dependence “The data from the vehicle has always been the primary focus” “Without an ecosystem, it’s of relatively little use to me as a customer. I can see where my vehicle is, mileage, battery levels and	Anchored One-Shop (production-focus)

		“Strategic market analysis and found two fields of interest: automotive or smart metering.” “We want to do it explicitly; we believe in it; we can provide the operation.” “There’s a huge potential, there are no telling how many vehicles there are, and only then did people start thinking about what use cases like this could be.”	“Started proof of concept with the players.” “Automotive team, historically B2B, telecommunication provider team, historically B2C, to merge.” “Then we founded here and did tech testing.” “In the beginning, they didn’t do much testing.”	so on. But it doesn’t do me much good.” “We have worked with relatively little qualitative focus groups. We’ve gone more quantitative and tried data-based analysis.” “We said this is our idea, our vision, we believe in it. We try it. Then I validated it, but not from the beginning.” Including customer: “Rather later, simply because of resources and it was done later.”		Anchored One-Shop (market-focus)
Car data 2	Use of data to offer services to customers “We built the local ecosystem around the vehicle.”	Focus on customer needs “On the one hand, we strategically consider which partner can be exciting. But that also comes from our customers. On the basis of discussions with the customer, we naturally quickly sense what else could be exciting in the ecosystem. Second, competition... And third, the partners themselves. They come up to us and say: ‘Hey, we’d love to work with you guys.’”	Prototype based on customer understanding “The process is quite clearly structured.” “But we still mostly develop on behalf of our clients.” “We’ve tested an MVP with 500 clients. Via email, then he got on a landing page, and then I saw what he clicked on.”	No decoupling, further modules can be integrated and exchanged “We have the customer in focus, but because of the skills of the core team, technology was extremely important from the beginning. Now they want the product to be customer friendly.” “If we see it doesn’t work, it doesn’t work, it’s clear we’d	Market focus and customer consideration (understanding behavior, gains, pains) “In the end, it’s all about having a digital route or channel to the customer.” “Simply to provide convenience, to make various things easier, on the one hand to the customer, because in the end, the customer decides	

Mobile payment 1		“What’s the added value that the client will accept that he has a dongle in his car? And based on that, the ecosystem is then added.” “We’ve tested this with companies that have fleets and asked, ‘What are the needs that you have?’”	“This is a question of iteration.” “We always test this with a proof of concept so that there are really no expectations that are not fulfilled somewhere. You just try it out, is that a value proposition that is successful? And if it’s really successful, you go one step further.” “Experience, largely also feedback from customers, which then led to the value proposition being revised again.” “We measure by two perspectives: the scaling potential and the customer value added.” “There are some areas that we look at.”	end up cutting it pretty quickly.” “The partners only come in if the product is really good.”	whether he becomes a customer or not.” “We are constantly developing, regularly adding new features, expanding, improving, simplifying, etc.” “If you find it doesn’t add any value to the customer, partner is thrown out again.”	Anchored One-Shop (production-focus)
	Use everything around payments in one app	Strategy driven by corporation “Then we made business plans and applications. It was atypical. It was already clear that we were gonna do this.” “Then the company was founded.”	Prototype for technology together with core partners “Then first major retailers were brought in... very critical to the specification of the solution.” “The vendors had more of the informal bargaining power, so that we knew from the beginning, such a system and those days were over, where you can put up a system and say, take it.”	Decoupling of technology “After 12 months, then went live, the first version, the pilot. Then we recruited our first customers.” “Then we started to bring banks into the system. In the sense that we give you access. You bring us the customers and you get access to a solution.”	Production focus and partner dependence “We talked to retailers, but not in such a way that we made a huge market research, but we said, ok, let’s do it.” “We’d be certainly in the second group saying we’re just building the network first. We see that it works	

		“Rewriting developing stuff.”	“And then the banks, of course, when they came in, they had a lot of formal influence.” “And at the end I have an MVE (Minimum Viable Ecosystem).” “Then I cocreate to say, ‘Do you see the benefits of the system and join in?’” “And so I can use different loops in the first phase to design those ecosystems.”	Started acquiring banks: “With us, the idea was: We make a pact with the retailers.” “First really develop new software, then develop, operate, and scale.” “It was important that all the banks were in on it.” “We’re building a retail network now, and then end customers are following.”	for us and we were convinced that it will work.” “Exactly, in the first year we didn’t really care about the retailers, because we had to get the system up and running.” “Customers in the beginning? I’d say they were relatively unimportant, because we knew we had to ramp up the system.”	
Mobile payment 2	Use payment solution for further services	Focus on customer needs “We always asked the customers, they were more like generic stories, like, if I get coinless, that’s great, but they didn’t know exactly how, either.” “It always came between us and the retailers. We don’t have a point where you have to say, now we haven’t thought of anything, and the customer suddenly had a great idea.”	Prototype based on customer understanding “Look, what are the necessary parameters to satisfy all personas.” “Paying in the digital world must have added value. That’s why we have integrated coupons, stamp cards, etc.” “A solution that has to work everywhere and it has to add value.”	No decoupling, further modules can be integrated and exchanged “No. I think the core functions are peer-to-peer, e-commerce, point of sale. These are obvious, in the sense that they’re not being replaced. But there will always be constant work, there’s no decoupling.”	Market focus and customer consideration (understanding behavior, gains, pains) “In the end we did too few customer surveys. Especially at the beginning of the design questions, you have too few.” “Because people give you feedback, make everything as simple as possible.” “In product development, it’s quite true that people	Anchored One-Shop (market-focus)

		<i>"We knew we needed a story, we needed retailers."</i> <i>"But you also noticed with the customers: in the end you have to give them the whole package."</i>			<i>only jump up when they see something. I'd like to have this and that—that's not really happening."</i> <i>"The customer as such? In the end, of course, they were very important."</i>	
Sharing	Offering transaction platform for C2C car sharing	Concrete idea for platform by orchestrator <i>"We are a booking platform and simplify an existing process."</i>	Need for differentiating element recognized and, therefore, focus on unique partners to develop differentiating module <i>"You have to give the idea a space and develop technological principles."</i> <i>"This is not a standard product, but one that we have developed together with the insurance company."</i>	Decoupling of unique module; adding supermodular partners for scaling <i>"This is actually quite pragmatic, which partners are brought in and when. When you need them, they come in."</i>	Focus on development of differentiating module <i>"Because there is no other concept in the world that can do this at all, could do it then, or can do it today."</i>	Upgraded Marketplace

4 Strategic level of value proposition development

To start the presentation of the findings on a strategic level for RQ1 “Which ecosystem strategy (based on uniqueness or supermodularity) and, thus, which resulting type of value proposition is most beneficial for firms under which boundary conditions?”, Figure 7 summarizes the relevant cases clustered by their respective complementarities. These cases have different characteristics and follow different logical approaches, as will be illustrated. The classification of the cases is analogous to the logic of Jacobides et al. (2018).

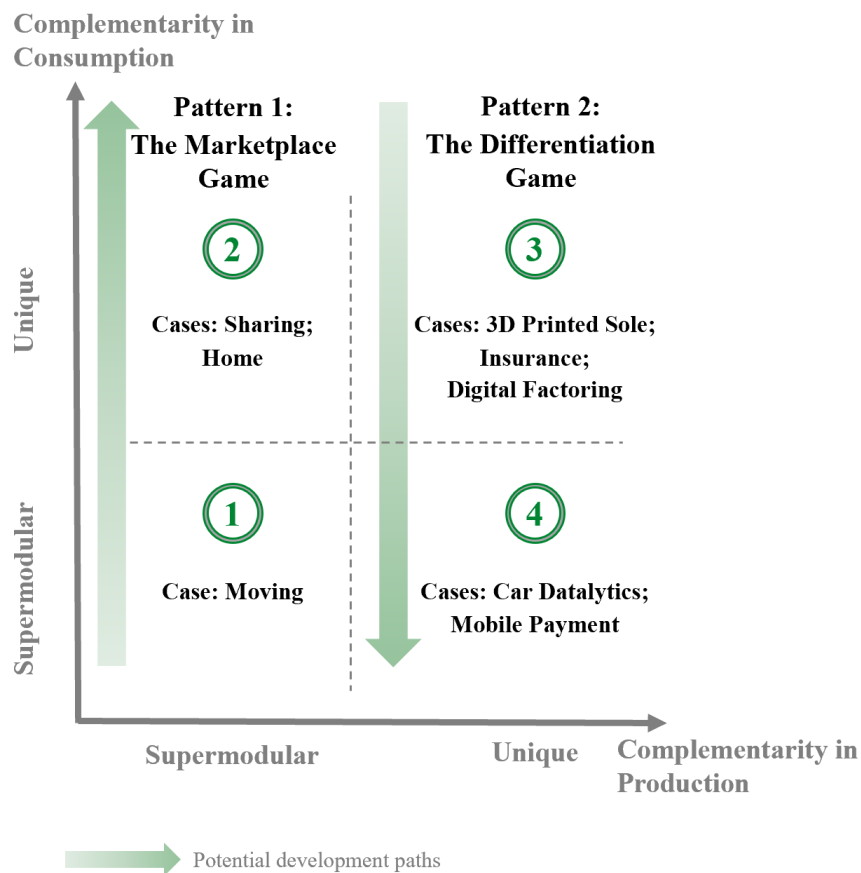


Figure 7: Overview of cases (study I) classified by type of complementarity

As explained in the methods section, the cases represent all possible combinations of the two forms of complementarity (uniqueness and supermodularity) on both sides (production and consumption). In the following, the four resulting strategies are described step by step on the basis of the cases to explain the underlying reasons for choosing a particular strategy and the respective challenges. Important to note is that, although these cases represent the final manifestation of the respective

complementarity, the analysis showed that they did not necessarily start like that but changed over time. Interestingly, the analysis showed that the four possible final combinations of complementarity shown by Figure 7 can be broken down into two main patterns. The two patterns can be distinguished using the type of complementarity on the production side. Accordingly, the findings will be structured along these two main patterns—“the marketplace game” and “the differentiation game.” Table 15 summarizes the classification of the cases in an overview from a strong value proposition perspective.

Table 15: Classification of cases by complementarity (study I)¹⁶

Case	Value Proposition	Modularity Production	Modularity Consumption	Chapter
Moving	Marketplace for moving and final cleaning where the customer has the possibility to compare different qualified companies. Acts as a neutral point of contact throughout the process	Supermodularity in production: Bringing together different suppliers of moving services and offers transparency to find the best fitting offer Product: Marketplace Partner: 1 Moving platform as orchestrator 1 Software provider - Many moving companies - Many marketing partners	Supermodularity in consumption: Adding cleaning services, box services, and insurance to be consumed together from a one-stop shop Product: Diversified marketplace Partner: 1 Box shop 1 Insurance company - Many cleaning companies	4.1.1
Home	Marketplace with services that helps customers save time, energy, and resources in real estate search, financing, retirement planning, information about real estate during ownership, refinancing, and selling	Supermodularity in production: Bringing together different banks and insurance companies offering mortgages, and offering transparency to find the best fitting offer Product: Marketplace Partner: 1 Mortgage platform as orchestrator 1 Insurance company - Many banks	Uniqueness in consumption: Developing and integrating a unique module that assists in allowing the use of micro-location data to offer home-related services that are differentiated from each other on the market Product: Marketplace with unique modules in consumption as upgrade Partner: 1 Mortgage platform (u) 1 Micro-location data company (u) 1 Software provider (u)	4.1.2
Sharing	Peer-to-peer car sharing marketplace offers convenience and security through car opening via mobile phone without key handover and	Supermodularity in production: Bringing together different private cars for sharing and offering transparency to find best fitting nearby offer Product: Marketplace Partner: 1 Sharing platform as orchestrator - Many private car owners	Uniqueness in consumption: Integrating two unique modules to make the offer more valuable: insurance in the event of damage to prevent the car owner's insurance from having to pay up and box (software and hardware) to open car with mobile phone that makes key handover redundant	4.1.2

¹⁶ As explained in chapter 2, this table follows a different classification argumentation than Table 16 because the cases are considered with a different focus (strategic and operational).

	with integrated insurance in case of an accident		Product: Marketplace with unique modules in consumption as upgrade Partner: • 1 Box provider (hardware) (u) • 1 Software provider (u) • 1 Insurance company (u) • Garages for installation	
3D-printed sole	Custom fit footwear based on 3D-printed customized soles	Uniqueness in production: Custom fit soles for ski shoes with innovative, unique core technology Product: Revolutionary standalone solution based on new technology Partner: • 1 Orchestrator with know-how (u) • 1 3D-scanning software provider (u) • 1 Morphing partner (u) • 1 3D-printing partner • Many retailers	Uniqueness in consumption: Custom fit soles for running, biking, work shoes, etc., shoe with innovative, unique technology Product: Multiplying revolutionary standalone solution based on new technology with other use cases Partner: same	4.2.1
Digital Factoring	Simplest debtor-supported financing solution for SMEs	Uniqueness in production: Factoring as a bundle solution thanks to a new core insurance solution Product: Revolutionary standalone solution based on new technology Partner: • 1 Orchestrator (u) with know-how • 1 Insurance company (u) • 1 Bank (u) • 1 Software company	Uniqueness in consumption: Factoring with innovative, unique technology Product: Revolutionary standalone solution based on new technology, multipliable with other use cases Partner: same	4.2.1
Insurance	Personalized fee for health insurance based on data-driven health index (e.g., doing sports, eating, drinking, smoking behavior)	Uniqueness in production: Individual fees in health insurance thanks to new core health index technology Product: Revolutionary standalone solution based on new technology Partner: • 1 Orchestrator providing health index (u) in app • Public meta data (u) • Health insurer provides primary insurance (u) • Reinsurance (u)	Uniqueness in consumption: Individual fees in health insurance with innovative, unique technology Product: Revolutionary standalone solution based on new technology; multipliable with other use cases Partner: Same	4.2.1
Mobile Payment	The country's digital wallet for all value-adding services around payment	Uniqueness in production: A new technology-based payment core element on mobile phone (P2P, in store, online store); not value adding for customers going beyond normal payment function Product: Innovative, unique core element as enabler Partner: • 1 Orchestrator (u) with software system • 1 Bank (u) • 1 Retailer (u) • 1 Payment service provider	Supermodularity in consumption: Value-added services around payment based on a new core element: use as a cash substitute at parking meters, farm store, for coupons, on donation portals, etc. Product: One-stop shop for monetization of innovative, unique core element as anchor Partner: • Many retailers, stores, online shops • 1 Parking invoice operator • Many farmers • ...	4.2.2
Car datalytics	Make your life related to your car easier by making it cheaper	Uniqueness in production: Dongle as core element to read out car data, not value adding for customers	Supermodularity in consumption: Value-added services around car usage based on data readout via dongle: user-based insurance, car	4.2.2

	and more convenient via one access point	Product: Innovative, unique core element as enabler Partner: • 1 Orchestrator (u) with software system • 1 national leading telco provider (u) • 1 national leading car dealership (u)	diagnostics, and automatic connection to garage, digital fuel card, etc. Product: One-stop shop for monetization of innovative, unique core element as anchor Partner: • Many insurance companies • Many garages • Many gas stations • ...	
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4.1 Starting with supermodularity in production: Playing the marketplace game

This pattern is represented by three cases (moving, home, and sharing). The orchestrator of the moving case starts with the goal of “*simplifying the pivotal point of the moving process for the customer as much as possible*” (I). With the orchestrator striving to be the first digital platform for relocation services, a core USP is important: to deliver something “*comparable, transparent, easy to book, online*” (I) when customers find themselves in the stressful situation of moving. This process started with supermodularity in production, following the theory of “more of A makes B more valuable,” meaning that the greater the number of partners offering a moving service, the more transparent the selection of the best offer. This moving case will further add supermodularity in consumption (see 4.1.1).

In a second case, the idea of building an ecosystem around the topic of “home” was the initial strategy of an insurance company that aimed to extend insurance sales by integrating various services along the customer journey: from property search, to ownership, to sales. This case’s approach of starting with pure supermodularity in consumption was a failure but ultimately led to home case 2.0, which also involved the insurance company.

Here is a short explanation of why home case 1.0 failed to start with supermodularity in consumption. The idea of populating a customer journey with different existing offerings and bringing them together corresponds to thinking in terms of supermodularity in consumption but does not consider the production side. Given the limited resources available in an ecosystem setup—in this case, five FTEs working full time to integrate individual services but making slow progress—the added value for consumers is low. However, the effort is enormous and out of proportion to the outcome because only one combined solution with limited added value is available for the

customer. Therefore, the insurance company ultimately decided to join a new orchestrator in home case 2.0, with the goal of bringing transparency to the mortgage market, that is, by starting with supermodularity in production, such as in the moving case. This path turned out to be more promising.

When the orchestrator of home case 2.0 looked back on its beginnings, they were similar to how the moving case started with the idea of bringing transparency and comparability to a mostly nondigitized, nontransparent market. This market covers situations that rarely occur in a consumer's life and, thus, involve uncertainty and inexperience but are also very emotionally charged: "*The moment of financing a real estate purchase.*" (J) This case develops a unique complementarity in consumption in its subsequent path (see 4.1.2).

Sharing as the third case also represents supermodularity in production similar to the moving and home cases. The sharing case offers a marketplace for peer-to-peer car sharing. As an Airbnb for car rental, private individuals can offer their car through the platform, get money from the renter, and give a part of the money to the platform. Whereas the home case adds the uniqueness of consumption over time, the sharing case plans unique consumption modules from the beginning because its business model would not have worked out otherwise (see 4.1.2).

Starting with supermodularity in production when competition is low:

The analysis showed that the intensity of competition and the market environment determine the appropriate type of complementarity. As the three previous examples (moving, home, sharing) demonstrate, starting with supermodularity is possible if competition is weak. As these cases demonstrate, supermodularity as a simpler, less resource-intensive form of complementarity is an effective approach when the creation of transparency and comparability through digitization can already generate added value in the market, which does not yet exist in this form.

When the moving case started its business, "*no single offer comparable to this planned one in this fragmented heterogeneous market of moving companies*" (I) existed. Therefore, the orchestrator began by bringing together as many moving companies as possible to be partners in the ecosystem to obtain transparency and comparability as a neutral intermediary, providing the customer with the added value of easily selecting the best possible supplier.

Similarly, when the idea arose to create a service that makes the mortgage market transparent, no competition existed; therefore, the home case was the first to enter the market. As an independent mortgage broker, the orchestrator of the home case brought together supermodular partners—banks and insurance companies—to set up a platform that allowed customers to compare loans from different providers in one place: an “*interest supermarket or discounter for real estate buyers*” (J). This platform is particularly suited to assisting customers navigate exceptional, emotionally charged events with which they have little experience.

Ongoing task of strengthening the core because ecosystems based on supermodularity can be easily copied:

In these cases, an increasing number of providers are added on the production side in the form of moving companies (moving case), banks and insurance companies (home case), and cars (sharing case). These additions are essential to strengthening each ecosystem’s core and continuing to make the offer better and more valuable for the customer (in an otherwise fragmented, heterogeneous, and underdigitized market). The greater the number of partners added and the offers included in the transparent comparison process, the more easily a customer can select a suitable, comprehensive, and differentiated offer. This situation results in lower prices as an added value for the customer and is particularly relevant for products that barely differ in terms of characteristics. As soon as a certain number of providers exist on the platform, a network effect sets in (Farrell & Saloner, 1985; Parker & Van Alstyne, 2005). Therefore, the more participants there are on the other side, the more attractive it becomes for both suppliers and customers and the better the system can differentiate from competition on the market. At this point, we observe a typical platform ecosystem based on network effects.

The fact that resources are limited is why prioritizing correctly and choosing the relevant pain points to address is so important, as the Chief Executive Officer (CEO) of the moving case explains:

“Focus, focus, focus [...]. The most difficult topic of all is to develop a first core USP. [...] In the beginning, you need one or two core market fits to earn money, retain users, and generate growth. With limited resources, it is therefore essential to address an issue relevant to the customer and to strengthen the core offering first.” (I)

A strengthening of the offering core can be seen here in that the supermodularity on the production side is strengthened, and a network effect is reached. For this reason, starting with only supermodularity in consumption is very difficult and is why it failed in the first attempt at the home case.

Lock-in effects created for partners when fungibility is high and, thus, they can easily leave:

A core challenge of working with supermodular complementarity is retaining the partners. As described in the literature chapter (2.2.1 and 2.3.1), supermodularity often leads to more fungibility. Therefore, bringing partners into the ecosystem is easy because the integration effort is rather low—but partners can just as easily leave the ecosystem. In the moving case, the service offering for partners was extended by offering a tool to price recommendations, expanding the tool to process private orders, and developing the digitalization of the process handling for all partners. These changes made it more attractive and convenient for partners to stay in the ecosystem.

“This request was from certain companies to collect even more data and achieve a higher lock-in effect.” (I)

The home case offers its partners added value, creating lock-in effects by linking banks and insurance companies more and more closely to enable mortgages to be ultimately released via the platform. Thus, banks save time because they do not need to conduct a review of potential mortgage customers.

4.1.1 Supermodular start on production with supermodular continuation on consumption: Scaling the marketplace

Continuing with a supermodular approach makes sense given weak competition:

Thus, to approach the value proposition, companies in the moving case took the next step to further integrate customer offerings into the system. Because this type of service was not yet available on the market and, thus, no direct competition existed, continuing to proceed via supermodularity was possible. In addition to continuing to pursue supermodularity in production, supermodularity in consumption was added, allowing consumers to buy different offerings related to “moving” from a single source and making the process easier. As the CEO put it:

“We do not have so much direct competition. [...] The online comparability with the accompaniment through the entire process and the additional services around it, that doesn’t exist yet.” (I)

Understand the services consumed together:

Over time, an e-shop for vouchers was added to the moving case, followed by automated SMS and emails as reminder functions for customers. Final cleaning, removal insurance, and a box store were also added to make the offering more attractive for customers by allowing them to use multiple services together. The challenge here is understanding the services that the customer wants to combine to offer added value as a diversified marketplace, offering different services from a single source. As the CEO puts it:

“How can we achieve higher customer satisfaction, better stickiness [...] Does it really fit into our USP, into our branding, into our platform thinking?” (I)

Because of supermodularity, the possibility exists that the offer can be copied by other providers. This possibility is confirmed by the fact that the moving case is constantly expanding its range. In the context of working with supermodularity, the goal is always to further improve and expand the range of products on offer to enable one to be one step ahead of possible competitors, as the orchestrator of the moving case describes:

“All the modules we build for this purpose help us to maintain, expand, or differentiate ourselves from the competition.” (I)

4.1.2 Supermodular on production and uniqueness on consumption: When competition hits the marketplace

If competition increases, adding uniqueness on consumption is a good idea:

In contrast to the moving case, the home case, which initially supplemented pension solutions on the customer side as an add-on via supermodular partners, then added uniqueness on the consumption side. Similar to in the moving case, the orchestrator of the home case felt the need to further develop the services offered to the customer in such a way that not only enabled a mortgage to be obtained in combination with a pension provision by selecting from many providers but also ensured that added value is also provided from a single source through joint consumption.

However, unlike in the moving case, numerous providers in the home case market have emerged, such as the various real estate search platforms around the world. These providers are gaining significant market share, which is why merely be the umpteenth search platform in a crowded market is inadequate:

“A milestone was, I think, finding out where we can deliver the greatest added value. There are various ecosystems now, in the home and other areas. And there is always a mixture of what we can credibly deliver and what we as an ecosystem are really good at and better than others.” (J)

This is possible through unique modularity on the consumption side. Because the resources required are much higher given the higher level of co-specialization, first ensuring that the right pain point is addressed of both customers and partners is necessary to ensure significant willingness to pay by the first and to commit to the ecosystem by the latter. In the home case, the integration of two unique partners who can provide these unique data and the relevant technology has enabled the platform to be developed into much more than just a property search function. Interesting to note is that the unique modules were added on the consumption side. Why not on the production? Both cases—sharing and home—provide an answer. The cases started with supermodularity on production, that is, many partners offering the same product to the customer (mortgages or cars), with the latter choosing and consuming only one of them. If a unique module is added to the consumption side, per definition, the customer will always consume that module jointly with the one product chosen from the multitude of offers on the production side. Thus, the USP provided by the additional, unique module on the consumption side differentiates the entire offering on the production side.

The sharing case is similar. One way would have been to develop a simple platform similar to Airbnb, where the key is handed over in person or by mail, and the lessor is liable in the event of damage. However, as competition in the mobility sector has become fierce with various car original equipment manufacturers (OEMs) entering the market, differentiation was important from the beginning. In a second step, whereas the home case adds unique complementarity in consumption to differentiate itself in the increasing competition, the sharing case follows this approach from the beginning for the same reasons. A box is inserted in the car to be rented, allowing it to be opened with a cell phone and making superfluous the handover of the key. In addition, insurance

covers in the case of damage and is not passed on to the owner. These two modules make car sharing much more convenient. However, uniqueness also comes with challenges, which are described in the next chapter.

4.2 Starting with uniqueness in production: Playing the differentiation game

The second pattern related to starting to develop a value proposition in an ecosystem is through unique modules. This approach is represented by the 3D-printed sole, digital factoring, insurance, mobile payment, and car datalytics cases. Generally, there can be observed two strategies to how unique modules in production are used as the start of ecosystem initiatives. In the first strategy, innovations exist that are only possible because of unique modules, providing added value to the customer as a standalone solution. This is the situation in the digital factoring, insurance, and 3D-printed sole cases. In the second approach, a unique core can serve as part of a planned path toward supermodularity in consumption, that is, a one-stop shop. In the latter case, the unique core allows an ecosystem to differentiate itself from and beat its competition, as demonstrated in the mobile payment and car datalytics cases.

In the digital factoring case, the orchestrator—together with an insurance company and a bank, which act as the capital provider and customer interface, as unique partners—started an ecosystem initiative with the goal of building an alternative solution to classic factoring. The 3D-printed sole case, similar to the digital factoring case, is driven by the idea of providing superior innovation that addresses an existing need in a competitive market. The ecosystem meets the need for a comfortable, well-fitting ski boot with new technology. To achieve this, the orchestrator, who brings the core idea and know-how, has included a partner in the ecosystem who can translate 3D-scans of feet into a software solution, along with a partner who can morph these scans and enrich them with data, producing coordinated sole templates that another partner can 3D-print.

The insurance case wants to innovate the health insurance market by offering personalized fees using a health index, meaning that your personal health data based on your behavior is leveraged against public health data. This unique solution is only

possible in collaboration with an insurance, reinsurance, and public health data provider being integrated with unique complementarity in production.

The mobile payment case started when a bank needed to establish itself in the mobile payment sector to keep up with its competitors. To build this mobile payment solution, the orchestrator spin-off, which was spun off from the bank, is developing an ecosystem in partnership with the bank and a nationwide leading retailer. The car datalytics case was triggered by a telecommunication company's increasing loss of parts of its core business. Therefore, based on analyses, it decided to enter the connected car sector. Together with a newly founded spin-off acting as the orchestrator and a leading car dealership, the telco provider established an ecosystem that aims to offer everything to do with cars from a single source, making it less expensive and more convenient for customers.

Start with uniqueness in production during strong market competition:

The factoring market has, for years, had many traditional solutions around the assignment of credit, which is why starting with a unique solution that does not yet exist makes sense. The core of this solution is that an insurance company is running in the background, which allows factoring as a bundle solution to cover more than single tickets, thus solving the problems of traditional factoring (it is expensive, regionally limited, and conspicuous for the customer). This solution is possible because of the new, unique insurance module:

“The market is tiny, and we can offer an alternative to factoring, where there were already many mini players.” (C)

The 3D-printed sole case also operates in a highly competitive market and aims to introduce an alternative to established ski boot products. Only by bringing together unique partners is it possible to develop a unique solution:

“What makes us unique is that we are still the only industrially manufactured individual product in the footwear sector.” (A)

This high competition context also represents the insurance case environment.

The mobile payment and car datalytics cases also started in markets that were already characterized by high competition; therefore, they began with uniqueness, as the Chief Innovation Officer (CIO) of the car datalytics case explained:

“The reason for this is certainly because the competition hasn’t slept at all since. [...] Maybe that’s why we deliberately do things differently. [...] What definitely makes us unique is the setup with two such strong brands that have built the platform together.”

(F)

Finding and convincing the right partner to work with you:

Because the fungibility of unique modules is relatively low, and investments are rather high, selecting the right strategic partners is essential to endure together after the intensive integration process. The Chief Marketing Officer (CMO) of the digital factoring case described the huge success of finding the insurance company as a partner, without which they would not have entered the industry. The CEO of the 3D-printed sole case also described the selection of the right partners as essential:

“That’s where you have to come to a deal with people that really bewitches in the sense that they can’t drop you right away because you can’t just go to the next one.”

(A)

In the mobile payment case, the bank and the nationwide leading retailer are unique partners distinguished by their national presence and customer access. The car datalytics case also demonstrates that the number one challenge is finding and convincing partners who represent the right mindset to do things together in the long term. The case also shows that these unique partners are on the same level and that both significantly contribute to the development process:

“This was also driven a bit because these are the two strongest ecosystem partners.

And these two wanted to have a service that would benefit them.” (G)

Identifying customers’ pain points before building the core solution based on uniqueness in production:

Understanding the customer’s exact pain point is crucial before a solution can be found in a long, resource-intensive approach. In the payment case,

“The customer does not download an extra app for everything; it must come conveniently from one source. [...] Whatever is lost through mobile payment in cashless transactions must also be covered, such as parking, donations, and farm stores, etc.” (G)

The car datalytics case also involved a time-consuming process that took half a year to identify the right pain points. Similarly, the 3D-printed sole case very clearly pinpoints the customer's pain point to be addressed: having a painless, snug-fitting ski boot.

Develop the core element based on uniqueness in production:

Initially, the focus is on elaborating the unique core element, which is very costly and time-consuming because of the high degree of partner integration, as the CMO of the digital factoring case described:

“We have been working for 4 years to make a niche product good.” (C)

The 3D-printed sole case also describes the elaboration process as essential and time-consuming. The aim was to solve the existing pain points with individually manufactured insoles that replace different series of ski boots that overfilled retailers' warehouses.

In the payment case, the three partners built up the core functions around payment, namely, the use of peer-to-peer, point of sale, and e-commerce solutions. The partners viewed these solutions as a basic prerequisite for the next step of building in value-adding services related to payment:

“In the beginning, we went into depth on the payment issue, before we went into breadth.” (G)

The car datalytics case also develops a core module in a very complex and resource-intensive manner in the form of a dongle that can read out car data:

“But you can't buy anything big with it. It will only be of use to you when you start sharing this data with the ecosystem, because then it can offer you services.” (F)

On the partner side as well, evidence exists that the construction of the unique core module—ultimately usable for various services—is an investment before it bears fruit.

Whereas the digital factoring, insurance, and 3D-printed sole cases function as innovative standalone solutions based on uniqueness in production and consumption, the payment and car datalytics case develop further different solutions as one-stop shops with supermodularity in consumption on top of this uniqueness in production.

4.2.1 Unique start on production and unique continuation on consumption: Scaling your innovation

Extending the core offer into different use cases through uniqueness in consumption:

The question for scalability arises as soon as the unique, innovative solutions are usable when consumed together, which shows uniqueness in consumption. The 3D-printed sole case faced the challenge of scaling. That the demand for insoles for ski boots is seasonally limited became apparent very quickly. Whereas the digital factoring, insurance, and 3D-printed sole cases follow similar paths with standalone solutions, the 3D-printed sole case is positioned to be applied to different types of shoes through its innovative core technology, allowing the ecosystem to produce unique solutions that do not have to be consumed together:

“It always goes with the same technology, the same basic idea, to bring truly customized products to market.” (A)

This example shows how scaling is possible in expanding the core offering to various other areas, such as insoles for soccer, golf, field hockey shoes, work shoes, and walking shoes.

4.2.2 Unique start on production and supermodular additions on consumption: Building a one-stop shop based on an innovative core

Scaling the solution through supermodularity in consumption to increase revenue as a core challenge:

A core challenge with unique solutions is to scale the solution sufficiently to make the product relevant for as many customers as possible. A CMO described the problem as follows:

“We have a strong core, that’s great. But no matter how strong the core is, if it is simply attractive to too few people, then you just need another strong core that you can offer to other people.” (G)

After the core function in the mobile payment case was thoroughly elaborated on, scaling the solution became the issue:

“You can have the nicest features, but if you don’t have the base to spread the stuff, if you can’t scale, then the nicest features are of no use if nobody uses them.” (G)

For this reason, integrating services into the system that have a high frequency of use yet are also represented on the market nationwide is also essential *“to be the one that occupies the market.”* (G)

Diversifying partners providing the same service to be attractive to a broader clientele and to reduce dependencies:

An ecosystem that integrates further partners who can offer the same services in a substitutable fashion can assist in making the product in its various forms even stronger and, thus, accessible to more customers.

In the mobile payment case, the integration of several banks over time also shows that the service can be made available to all citizens of the country regardless of the bank that they use. This integration reduces the independence from individual industry players and simultaneously increases the pressure on banks to enter the system because—if they are not a part of it—the risk exists that their customers will switch banks to access the ecosystem’s services. As the CEO of the car datalytics case confirmed:

“Everyone really has an individual composition of partners.” (F)

Integrating different solutions (supermodularity in consumption and network effects):

Supermodularity in consumption is used here to create network effects. For example, in the mobile payment case, extending the system to include several substitute banks and integrating different use cases are possible. Eventually, the app will also be usable for the following services (in addition to pure payment): at parking meters in lieu of cash, in the farm store where customers can freely enter an amount for coupons, and in donation portals to top up credit. When the P2P function is with friends or colleagues, it is also intended to create network effects. When selecting partners, the aim is also to increase the frequency of use by enabling various value-added services to be obtained via the app as a one-stop shop in the mobile payment area and to ensure broad coverage:

“The fields of application are very powerful for users. The parking provider brought tens of thousands of parking meters. The requirement was that customers must be able to make many transactions from this partner. And in the end, of course, this strengthens the network in turn, and the customers are more loyal.” (G)

In the car datalytics case, the development of a one-stop shop combines various services that can be used as needed depending on the read out car data. These services already include remote diagnostics for the car, automatic booking of service appointments (if required), in-car Wi-Fi, logbook, and timeline evaluation for use in tax returns, payment at gas stations via the digital fuel card, and pay-per-use insurance. Other services are planned. This case demonstrates how supermodularity often takes the form of network effects because critical mass has been reached through the unique core and, thus, becomes self-reinforcing and more attractive for the other side through the addition of several offerings on one side. This scaling effect and the underlying winner-takes-all logic allow for additional differentiation by making the product even more attractive in a highly competitive environment.

Benefiting from partner loyalty through market power:

Although attracting partners initially is particularly difficult, that additional partners are eager to join the ecosystem becomes clear in an ecosystem with a unique start in which certain market power is assured by including dominant partners. Thus, it is an added value for the provider of the parking payment use case who had an own app—that was, unfortunately, not downloaded just for one parking space—to be part of the ecosystem in the form of the one-stop shop that allows the company to benefit from the credibility of the other partners:

“We (the mobile payment ecosystem) have had a certain credibility right from the start because we are backed by large partners.” (G)

Figure 8 summarizes the core findings.

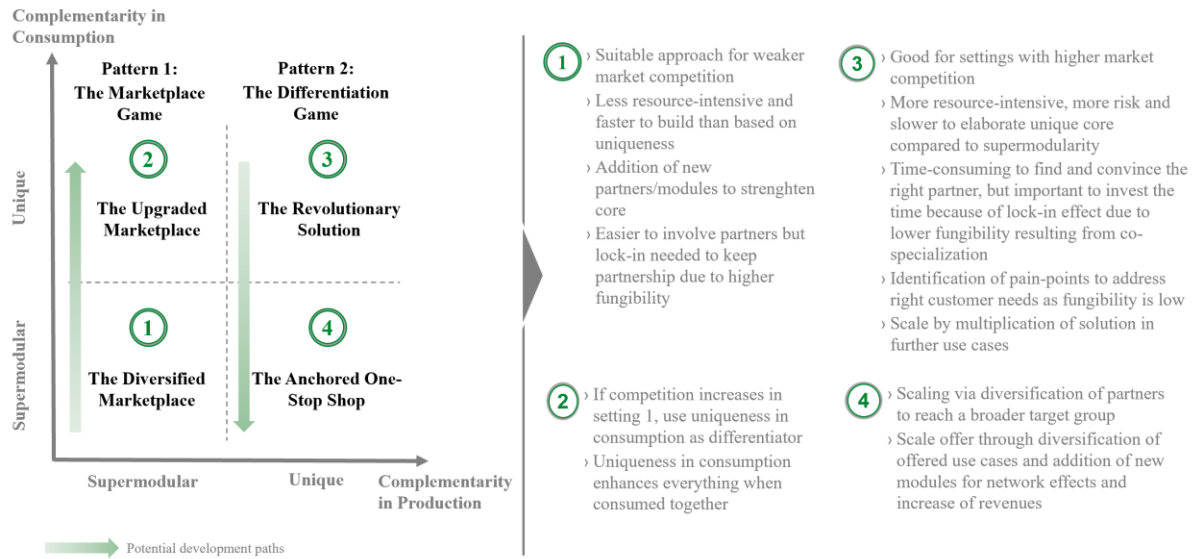


Figure 8: Core findings of study I

5 Operational level of focal offer development as materialization of customer value proposition

This chapter addresses the findings to RQ2 “*How does the orchestrator manage the development process of the focal offer in a coordination-intense setting between customer orientation and partner alignment?*” All four approaches that result from the possible complementarity combinations (unique and supermodular, production and consumption) as explained in chapter 2.3.2 and 3.1 have as a starting point an idea of the focal offer and its nature, which is to be developed. As Dattée et al. (2018) described, the orchestrator needs a certain “protovision” at the beginning to be able to start the development at all. Moreover, this type of focal offer can be translated from practitioner language into the underlying theoretical complementarity that significantly shapes the development process. Please note that some level of complementarity on both sides must exist to fulfill the criteria of an ecosystem (Jacobides et al., 2018). In this respect, this thesis follows the definitions of Jacobides et al. (2018) in the “translation” of complementarities, as shown in chapter 3. Please see Figure 9 and Table 16, which present the type of complementarity present in the selected cases.

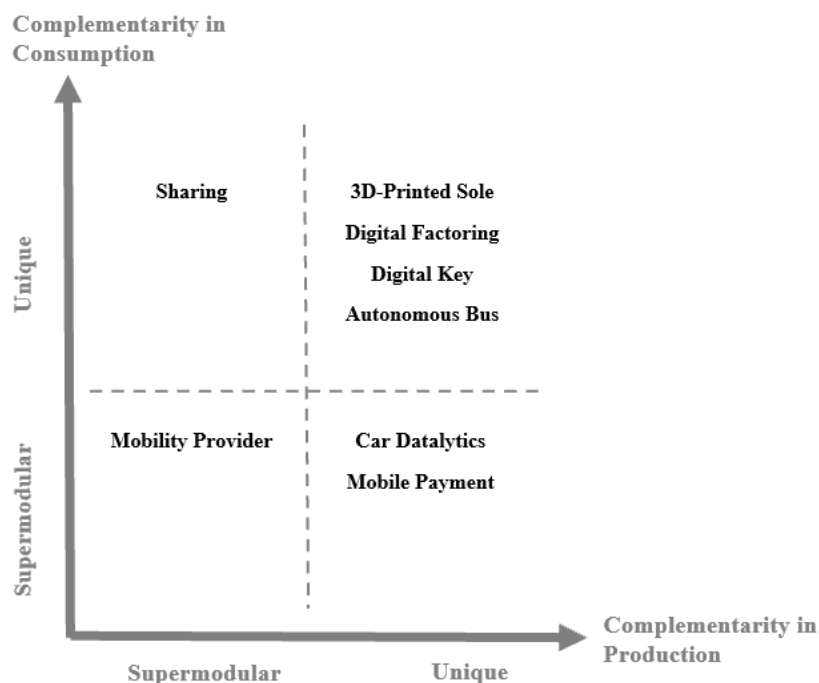


Figure 9: Overview of cases (study II) classified by type of complementarity

Table 16: Classification of cases by complementarity (study II)¹⁷

Case	Type of complementarity (Production)	Justification for complementarity assessment (Production)	Type of complementarity (Consumption)	Justification for complementarity assessment (Consumption)
3D-printed sole	Unique	3D-printed sole cannot be produced without coordination across producers (orchestrator with know-how, 3D-scanning partner, morphing partner, 3D-printing partner)	Unique	Complements have far less value when not consumed together, all modules are needed (scanning of foot necessary to do morphing of foot in second step before sole can be printed using that information)
Digital key	Unique	Car opening solution (smartphone as digital key for cars) cannot be produced without coordination across producers (orchestrator with know-how and technology, hardware supplier with installation element in car, frontend supplier with app, leading automotive OEM with car)	Unique	Components have far less value when not consumed together, all modules are needed (app as “key on smartphone” to open car needs to be consumed together with technology integrated in car that enables opening and car as objective to open)
Digital factoring	Unique	Factoring as bundle solution thanks to a new core insurance solution cannot be produced without strong coordination effort to align very unique components stemming from partners (orchestrator with know-how, insurance company delivering completely new background insurance invisible for the customer, bank as one of the two leading state banks)	Unique	Components have far less value when not consumed together, all modules are needed (background insurance makes the insurance solution possible, needs to be consumed together)
Autonomous bus	Unique	Autonomous driving public transport solution cannot be produced without strong coordination effort to align very unique components stemming from partners (national logistics provider with knowledge, self-propelled bus company with vehicle, software provider and data analytics, city and legal administrations offering test sites and legal aspects)	Unique	Components have far less value when not consumed together, all modules are needed (integrated software and underlying data analytics within bus make autonomous control possible, needs to be consumed together)

¹⁷ As explained in chapter 2, this table follows a different classification argumentation than that of Table 15 because the cases are considered with a different focus (strategic and operational).

Mobility provider	Supermodular	The more partners for use cases are integrated, the better the quality of the offer for the customer; supermodular partners are integrated via interfaces and can be replaced if not attractive for customer (e.g., rental car, train tickets, scooter access, etc.)	Supermodular	Increasing returns of joint consumption of complements, for example, getting train tickets for long distance and at the same time renting a scooter for the last mile from one source offers convenience; individual use cases continue to provide benefits offered from one source, if one falls out, the overall value simply decreases but does still work
Car datalytics	Unique	Phases 1 and 2: Core technology (dongle to read out car data) cannot be produced without high coordination effort to align very unique components stemming from partners (orchestrator, national leading telecommunications provider contributing data component, national automobile dealer contributing automotive competence and customer interface). Additional use cases in Phase 2 could be integrated via interfaces, but intense alignment needed to fit the core technology	Unique Supermodular	Phase 1: Complements have far less value when not consumed together, all modules are needed (dongle) Phase 2: Increasing returns of joint consumption of use cases, offering everything around someone's car offers great convenience, such as get workshop forecast and arrange appointment directly; the individual use cases continue to provide benefit offered from one source; if one use case fails, the overall value decreases but still exists
Mobile payment	Unique	Phases 1 and 2: Core technology (payment solution app) cannot be produced without strong coordination effort to align very unique components stemming from partners (orchestrator, national leading banks with core banking knowledge and customer access, payment service provider, and core national retailer). Additional use cases in Phase 2 could be integrated via interfaces, but intense alignment is needed to fit the core technology	Unique Supermodular	Phase 1: Complements have far less value when not consumed together, all modules are needed (app) Phase 2: Increasing returns of joint consumption of use cases offering everything around payment with a digital wallet in one app (convenience), such as for example payment in stores or integrated bonus cards but also pay where cash was needed in the past, such as parking machines; the individual use cases continue to provide benefits offered from one source; if one use

				case falls out, the overall value still exists
Sharing	Supermodular	The more cars are integrated in production, the better the quality of the transparency offer; supermodular partners are integrated via interfaces and can be replaced if not attractive for the customer	Unique	Components have far less value when not consumed together, all modules are needed (car, insurance, box in car to enable automatic opening via cell phone)

The cases and corresponding approaches (Revolutionary Solution, Diversified Marketplace, Anchored One-Stop Shop, and Upgraded Marketplace) are now explained through a cross-case analysis structured according to the three building blocks of a focal offer development process (idea generation, idea testing, and elaboration), as introduced in the data analysis paragraph (chapter 3.4).

5.1 The Revolutionary Solution Approach

This approach is driven by an orchestrator's motivation to develop a revolutionary, new, unique product/solution that is better than anything on the market for an existing customer issue, which allows for strong differentiation. Translated into complementarity, this approach means that a concrete, unique offer is to be built. Figure 10 shows a process overview of the development of a focal offer for this approach.

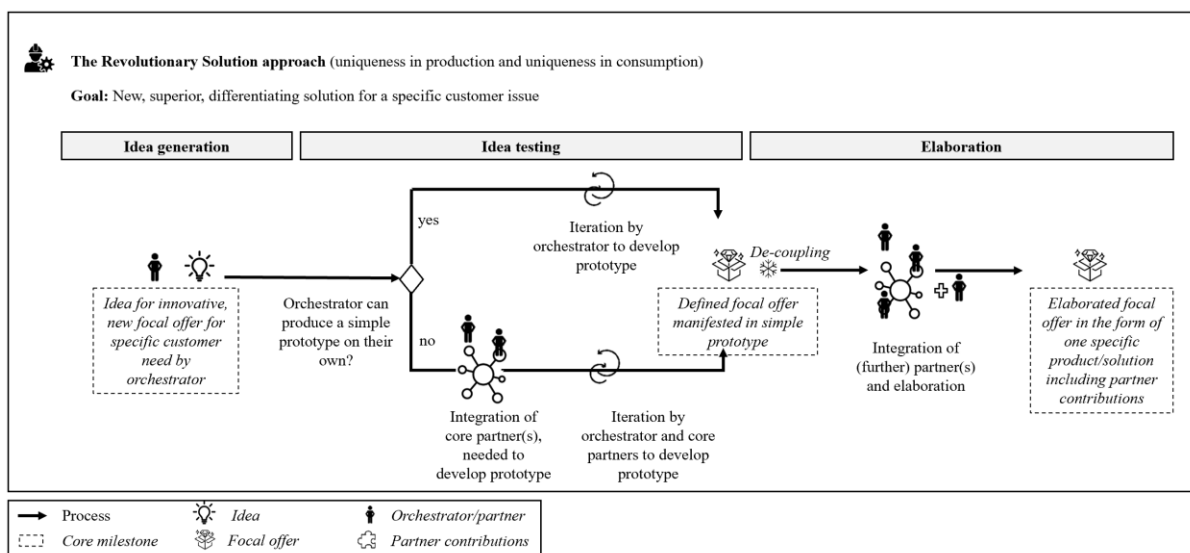


Figure 10: The Revolutionary Solution approach

5.1.1 Idea generation

All four cases (3D-printed sole, digital key, digital factoring, and autonomous bus case), characterized by unique production and consumption complementarity, entered the ideation phase similarly: with a specific idea for a focal offer having been initially sketched by the ecosystem's orchestrator. Please see Table 14 (chapter 3.4) for an overview. This solution needs to first be completely newly developed.

Uniqueness has been shown to enable and require a new solution to be of a higher quality than anything currently available on the market for customers to be willing to pay a premium to enable the ecosystem firms to cover the additional costs that arise from the alignment effort and transaction costs (Jacobides et al., 2018).

The challenge in this approach, which can be faced on both a technical feasibility level and at the partner attraction and coordination level, is whether it would be possible to address the agenda of the individual partners to incentivize them to commit to the ecosystem. All four cases confirmed this challenge; as the CEO of the 3D-printed sole case put it:

“There was a lot of uncertainty as to whether everything was technically feasible.”

(A1)

Consequently, complexity management focuses little on the market or the customer and requires only a quick check of whether a market and potential customers exist before the start of the complex development can begin. As the CEO in the digital key case describes it:

“We gathered evidence and looked at whether this had a market of customers [...] that just refined and essentially confirmed the picture.” (B1)

Therefore, the approach starts here—from the customer need perspective—but then decouples this mentally. Instead, to solve the core challenge, the focus is on the production side and the relevant partners working on new, revolutionary solutions to obtain the focal offer implemented for the customer:

“We have all the technology that didn't exist before, or that no one has ever assembled.” (A1)

The CEO of the digital key case explains the production and partner focus as follows:

“Because I am convinced that our new solution is simply the best. And it is also clear that customers will, at some point, upgrade to this solution.” (B1)

5.1.2 Idea testing

An orchestrator starts the idea testing phase on the basis of a specific idea for the focal offer and the assumption of a reasonably sized market for it. With a mere focus on the production side, the goal is to translate the idea into a specific prototype and test it. We consider a specific focal offer to exist as soon as it becomes tangible as a simple prototype. Here is some difference between the cases. Among the four cases, two cases exist in which the orchestrator can develop the prototype in isolation and two cases in which core partners are needed for that very purpose. As all four cases revealed, the orchestrators attempted to involve as few partners as necessary in that stage of the process. As the CEO of the digital key case described the stage:

“The effort [to test and elaborate the idea] can only be managed by keeping the number of partners low.” (B1)

Accordingly, if an orchestrator possesses the resources and knowledge to produce the prototype in isolation (as in the 3D-printed sole and digital key cases), the idea testing will be done without involving partners. In contrast, if an orchestrator cannot build the prototype alone (as in the digital factoring and autonomous bus cases) because of a lack of knowledge or resources, further core product partners are involved. From a practical perspective, an assumed goal is to keep the complexity and coordination effort as low as possible to keep the agility in rapid learning and adaptation processes high and to benefit from the knowledge gained in the learning process. The head of Marketing & Sales in the digital factoring case describes the learning process as follows:

“When we think back to our initial phase, it was not one hundred percent intended, but in retrospect, necessary. We have learned a lot.” (C1)

In the 3D-printed sole case, the orchestrator could build the prototype alone; however, the orchestrator discovered that they needed to make two adjustments in the idea testing process. When building the first prototype, the orchestrator realized that a customer could not anatomically scan his or her foot. This realization led to the idea of performing the scanning process in specialized stores that could be used as future retail partners.

Additionally, the developers figured out that printing only the sole than the entire ski boot was more comfortable.

Similar to the 3D-printed sole company, the digital key firm began by independently working out a prototype. As the CEO explained, this work was mainly driven by the idea of using the prototype to attract potential partners:

“We must first show that what we have here, as a vision, works technically.” (B1)

In contrast to these two companies, the start-up orchestrator of the digital factoring case could not implement an initial solution on his or her own because insurance was necessary as a decisive component of and core partner for the idea and as a funding partner. The CMO of the digital factoring firm summarized the situation:

“And what we developed together with the insurance company and the funding partner was that the portfolio approach was our sweet spot, where we said we would get an attractive offer.” (C1)

However, in this development process, it transpired that the insurance company was unwilling to insure individual invoices; as a strong and essential negotiating partner, the insurance company insisted that it would only insure an entire portfolio. This situation led to a change in the implementation of the basic idea and underscored the strong negotiating power of the core partners. As the CMO put it:

“How much of the change was driven by our partners? Relatively a lot, because they preferred precisely this portfolio approach. [...] strongly insurance-driven. [...] This was not customer-driven; it was strongly influenced by the interaction between the funding partners and the insurance company.” (C1)

The orchestrator of the autonomous bus case could also not develop the prototype on his or her own. Instead, the national logistics provider, with a start-up for self-driving buses and another for the required technology for self-propulsion, was interconnected by highly unique complementarity because one firm alone could not have delivered this solution as a physical prototype. As the project leader summarized the case:

“Disruptive issues, such as autonomous driving, cannot be achieved by ourselves sic [...] this is also something new, a new field, and it requires the development of know-how.” (D2)

5.1.3 Elaboration

As soon as a focal offer is defined, a “decoupling” of the process from the customer perspective to the production perspective takes place; in all four cases, further partners were sought and integrated into the ecosystem. Whereas the focal offer to the customer per se no longer changes at this stage, the composition of the contributions toward achieving the offer might change. The so-called decoupling depends on the time of completion and acceptance of the prototype and serves as a sequencing step to reduce complexity: a focal offer is defined first; then, everything else is done for the implementation. Thus, one also bows to the concerns of key partners to fulfill the defined offer. After the decoupling, additional partners are sought and integrated, and further changes to the composition might occur. The 3D-printed sole case shows how the company searched online for its potential partners and aligned their unique modules afterward. These partners included a 3D-printing company, a software provider, and retail stores.

The implementation of a solution is optimized in consultation with the partners because they have a voice in the process. Some key partners had some negotiating power in the partner alignment process in the digital key and digital factoring cases. During the alignment of an automotive OEM and a hardware supplier, one such partner had the negotiating power to replace one partner with another firm:

“The promise to the end customer has remained the same, but the composition of the contributions has changed, and one partner was replaced.” (B1)

The alignment process in the digital factoring case was also an addition of a partner. It was much more complex because, here, the modules were strongly integrated with unique production complementarity and, thus, low fungibility from co-specialization. A customer-interface partner was integrated with the insurance company and the funding partner; however, it transpired that the latter partner did not meet the expectations and was subsequently replaced by another bank. When unique complementarity in production and co-specialization is high, partners can hardly be exchanged. Thus, planning well is even more important, which shows that everything is done to achieve the defined focal offer, whereas some partners are sufficiently important to have a significant influence. Consequently, the target customer group

changed. However, assurance existed that customers would be found, given satisfaction with the product and the relevance of the customer interface partner:

“Since the beginning, this has certainly been driven by founders, who have strengthened the solution and the customer demand that followed, which then definitely will be found.” (C1)

5.2 The Diversified Marketplace Approach

The Diversified Marketplace approach is characterized by the idea of integrating various standalone use cases in a customer journey, thus offering the customer added value by providing everything from a single source. Translated into complementarity, we have supermodularity in production and consumption. The approach, shown in Figure 11, focuses on the joint development of a focal offer with the customer.

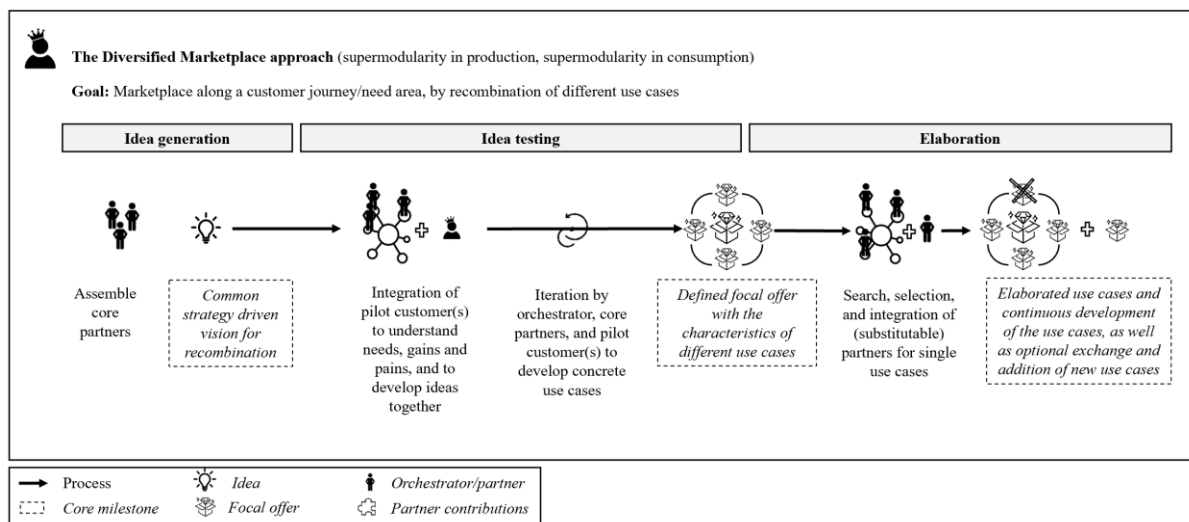


Figure 11: The Diversified Marketplace approach

5.2.1 Idea generation

The mobility provider case originated when three companies—an automobile manufacturer, a consulting firm, and a software provider—met at a trade fair and discovered a shared interest in combining the core competencies of the different companies and offering the customer a mobility journey from a single source. Here a defined focal offer idea is missing at the beginning, whereas consumption

complementarity in the form of supermodularity prevails, indicating that no unique focal offer exists to target but a recombination of different use cases with supermodularity in consumption. This recombination leads to a weaker differentiation of the existing services on the market; therefore, customer focus becomes a must because supermodularity in consumption—and the question of which combination is more valuable—can only be determined from the customer’s point of view. Considering the initial idea, it is clearly customer focused without a specific idea but with a vision for the focal offer:

“With our ecosystem, we want to offer mobility customers greater added value by combining core competencies from different industries and from different companies.”

(E1)

Here, a strong strategy-driven motivation exists to transform a car manufacturer into a mobility provider and, thus, enter new areas. This transformation uses the approach of defining an offer on the basis of a company’s core competences to address the customer’s demand. Because the two partners involved from the beginning require clear co-specialization, retaining them and a focus on the customer makes sense to address the customer need—giving the case a very strong customer focus, as described by the head of the automotive division:

“We have only one single truth in the universe, and that is the customer, the customer’s opinion is the sic absolutely most important.” (E1)

5.2.2 Idea testing

The purpose of this case was to develop concrete use cases for and with the end customer, from the beginning. The challenge with the uncertainty over whether the customer would be willing to accept such a focal offer is summarized by the project leader as follows:

“We try to attack this greatest possible uncertainty in the best possible way by carrying out pilot projects with concrete use cases as early as possible.” (E1)

For this reason, a pilot customer and three co-orchestrators were engaged to help define the use cases from the beginning:

“We said we had to have a pilot client, with whom we could work out the value proposition of this first MVP.” (E1)

This joint development took place in a workshop series and through the application of classic customer-centric design approaches, placing the customer at the center. As a first step, ideas were developed with the customer; the marketability of the offer was then defined in an iterative workshop series. In concrete terms, the pilot customer suggested the services that should be offered through the app, such as renting scooters, car sharing, or buying train tickets. We call these suggestions concrete manifestations of the focal offer use cases.

5.2.3 Elaboration

In the next stage, suitable providers were sought for the respective services. For example, together with the customer, the need to integrate an electric scooter provider was defined; therefore, the partners began exploring the e-scooter supplier that should be included in the system. Market e-scooter providers were screened, and some were negotiated with before a provider was connected to the system and technology. This negotiation required a certain degree of mutual adaptation to enable access to the platform because, given supermodularity in production—meaning integration of partners via interfaces and comparably good fungibility, as well as weaker co-specialization—the individual use cases, that is, e-scooters, car sharing, or tickets for public transport, are interchangeable in the case of low customer acceptance:

“There are category A partners, such as a provider of e-scooters that is to be integrated into the app, and there I can imagine that this partner will be exchanged if its services do not meet the customer’s needs.” (E1)

Therefore, after services are added in areas close to mobility, potential is envisaged to exist to extend these services to areas further away from mobility and to supplement them with insurance services, for example. Therefore, the ecosystem plans to add more test customers as use cases to further develop the focal offer with them.

Given the nature of the output, supermodular complementarity in consumption is evident and requires customer orientation because one can choose from various mobility-related services that can be further supplemented with less mobility-centric services.

5.3 The Anchored One-Stop Shop Approach

The Anchored One-Stop Shop approach is partly a sequential combination of the two previous approaches, with some differences. This approach is motivated by an ambitious vision to revolutionize the market with a unique differentiating solution (uniqueness in production) that will be widely scaled across different use cases (supermodularity in consumption). As Figure 12 shows, it is divided into two phases that also follow the steps of idea generation, idea testing, and elaboration. The first phase focuses on the production side, followed by a switch to the consumption side in the second phase.

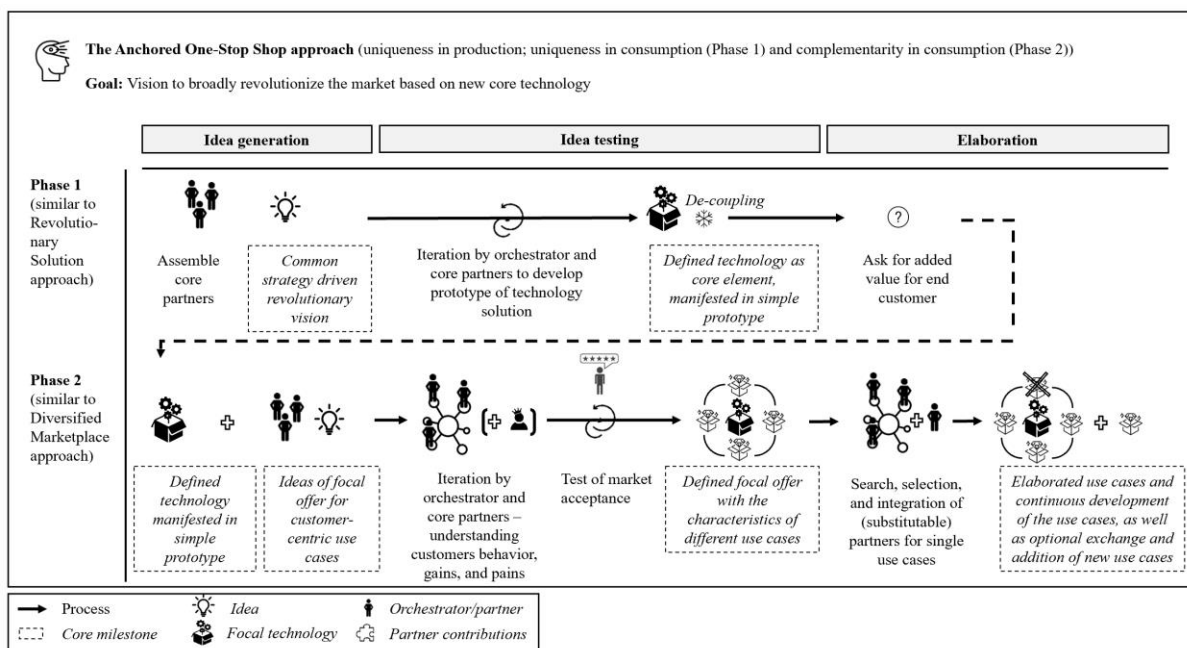


Figure 12: The Anchored One-Stop Shop approach

5.3.1 Idea generation with production-focus

This approach is represented by two cases: car datalytics and mobile payment. Unlike the Revolutionary Solution approach, which is similar to this phase in terms of production focus, this approach does not start with a specific idea for the focal offer but with a specific idea for a technology. Instead, both cases originate in companies driven by strategy and that are specifically looking to identify growth opportunities in innovative areas.

The example of the car datalytics case starts with two companies: a telecommunications provider and a car dealer consider the vision of using car data to create additional services independent of each other. The two firms came together at the very beginning of the ecosystem, as the telecommunications CIO explains:

“From our [telecommunications provider] side, it was relatively clear that without an automotive sales partner, it will sic be relatively difficult.” (F2)

This statement demonstrates that, given the uniqueness in production and strong co-specialization, the orchestrator cannot develop the prototype alone.

The mobile payment case also demonstrates uniqueness in production because the idea of offering “... everything around payment in one app, online as well as offline” could not have been achieved without the merger of a bank, a software solution provider, and a leading national retailer:

“One trigger was that we said the mobile payment issue was coming up and we didn’t have anything in the area in the pipeline.” (G5)

Considering the nature of the ideas, the parties started with a very visionary idea for a technology and were unspecific in terms of use cases for the customer. Meanwhile, challenges existed on both the market and the product sides. The CEO of the car datalytics case described the high degree of coordination effort:

“It is not trivial, technologically, to bring something like this to the ground. The degree of complexity is relatively high.” (F1)

The CEO in the payment case emphasized keeping complexity as low as possible to ensure agility:

“The less complexity you have, the better. [...] Until you have a first solution, it is vital to be highly agile.” (G5)

To solve the key challenges, a clear initial focus was on the technology and the partners in both cases. The mobile payment case is very similar to the car datalytics case, as evidenced by how the CEO of the initiative explained the course of events on the technology side and the initial neglect of the customer:

“It went atypically. We knew then that it would be a big deal if we did it. For sure, we were in the group that said that we first build the system that works for us. [...] The

customer as such? In the beginning? I'd say he was unimportant then, because we knew we had to get the system up first.” (G5)

5.3.2 Idea testing with production-focus

The two core partners in the car datalytics case commenced the idea testing process from a technologically focused perspective, as in the case of the Revolutionary Solution approach. They worked together because neither partner could produce the prototype by itself. They started as a team and agreed on the focal offer because one partner had a strong B2B focus, whereas the other prioritized B2C:

“We network vehicles and enable the end customer to share their vehicle data with third parties who can offer new and better services.” (F1)

This kind of vision in the form of a technology is special in the sense that it does not define specific and tangible added value for the customer but focuses primarily on the technical component of combining data. Regarding the development of this technology, a spin-off was founded to act as the orchestrator to propel the development. Similar to the car datalytics case, the idea for the mobile payment case originated in an established bank that initially founded a spin-off to promote the idea more rapidly and independently of corporate guidelines. The partners' negotiating power was particularly evident here because the spin-off included a retailer in the system that would have to integrate the new solution into its cash registers:

“The first large retailer came into the system [...] he was informally very decisive for the specification of the technical solution.” (G5)

The solution was to elaborate on the technology necessary to collect and evaluate the data and the technology required to integrate a new payment scheme into an app. During this technology elaboration, relatively little customer focus existed:

“I think it's better to have a technology in the ecosystem first, and then enter the market with a good base.” (G5)

5.3.3 Elaboration with production-focus

As soon as a physical prototype was created, the car datalytics case decoupled the technology, as in the Revolutionary Solution approach. This prototype—a dongle that could be plugged into a car—was conceptualized to read car data by the telecommunications provider, the car dealer, and the spin-off. With the new solution in

hand, the challenge of how to generate value for the customer arose because reading data, per se, did not add value for the end customer because only applications generated that value:

“The data from the vehicle have always been in the foreground, the loyalty of the customers then also, above all, to start with the additional services in the group interaction.” (F3)

The mobile payment app provided a solution that enabled payment by mobile phone as a basic service without having integrated further value-adding services because the idea was to offer the customer everything from a single source of payment as added value:

“We knew we needed a story behind it for the customers [...] but you also noticed with the customers: in the end you have to give them a little bit of the overall package.” (G5)

5.3.4 Idea generation with market-focus

With a new technological solution, such as the dongle or the payment app, defining specific use cases for the end customer in the application was needed. Therefore, the customer-focus phase served as a second step to create specific use cases for the focal offer for the end customer, given an existing technical solution without a defined market. The CEO of the car datalytics spin-off aptly described the second step:

“Without an ecosystem, it is of little use to me as a customer –I see where my vehicle is, mileage, battery level, etc. But it does not benefit me very much. [...] I don’t put such a dongle in and then simply have the vehicle tracking data somewhere.” (F1)

Starting with a technology solution as a core element can generate a superior focal offer that no single firm alone can manage. Given the partners’ highly relevant expertise and the correspondingly high dependency and co-specialization between them, starting with the technology was appropriate. A board member in the car datalytics case confirmed the procedure as follows:

“I found the way, that you first go to the technology, that you make a technologically fit product and, in a second step, finish the topic with the customer, I think that’s right.” (F4)

This required a rethinking or a translation, from an engineering perspective, into customers’ needs and language. Customers do not think in terms of products,

technologies, or industries; rather, they seek a better experience and solutions that address their needs and pain. The CEO of the car datalytics spin-off described the switch in focus as follows:

“We were very confident, inside-out driven, to get something exciting. Now, the company is becoming more and more like an outside-in company.” (F1)

At this stage, the ecosystem faced the challenge of developing different use cases for the end customer: a mix of idea creation with the core partners and, simultaneously, acceptance of customer input. Customer input was used to understand customer behavior and journeys—to figure out how to integrate the new, sophisticated solution. The ideas for concrete use cases came from three different sources. First, an understanding of customer needs and an ability to maintain a cohesive relationship with them played an important role in establishing what might be exciting for them. Second, strategic market potential analyses and competitive assessments were performed. Third, potential partners, of their own initiative, approached the system and expressed interest.

In the Anchored One-Stop Shop approach, the ecosystem relies on customers to understand their behaviors, pains, and gains and then uses these valuable insights to create a new customer need linked to the technology that has already been generated. Furthermore, customer input is most helpful if the customers can help address usability and user-friendliness through design:

“We always asked the customers, but they came up with generic stories. [...] Instead, design issues should have been asked more of the client.” (G5)

5.3.5 Idea testing with market-focus

The required alignment with customers in the car datalytics case was through quantitative data-based analyses using a rapid survey of 500 customers. As the CEO of the spin-off explained:

“Customers were written to with different focal offers.” (F1)

Thus, in the proof-of-concept, different click behaviors and reactions were combined with analytics and evaluated to estimate market acceptance. The core partner team decided on specific fields of application, such as using the data for a prognosis regarding the necessary garage appointments or transferring to user-based insurance solutions.

The proof-of-concept was essentially a recombination of the core competencies of the different partner companies:

“Combination of core competencies results in a focal offer for the customer.” (F1)

5.3.6 Elaboration with market-focus

Subsequently, the partners began to search for potential providers for these use cases and negotiated the terms of cooperation with them:

“Then, we developed the product further, adapted it, and brought it to the market, and regularly added new features, but we continue[d] to develop, expand, improve, [and] simplify.” (G5)

As in the Diversified Marketplace approach, these individual use cases were not set in stone but were interchangeable depending on customer acceptance and the revenues generated. From a technical point of view, interfaces, less co-specialization, and comparatively good fungibility made them easier to achieve. As a board member explained, customer feedback played an important role there:

“In part, it was also feedback from customers that led to the offers being revised again. If we see it doesn’t work, then we would end the collaboration quite quickly.” (F4)

Or, as the CEO in the mobile payment case put it:

“There is no freeze, the world does not stand still, and there are still many use cases that should be included.” (G5)

Whereas the core, in the form of the technology, was unique in consumption, this now changed to supermodularity for the use cases because these could be selected and combined as desired. In the payment case, this supermodularity was the result of its applicability to as many online and offline stores as possible and the use of bonus cards. In the car datalytics case:

“You don’t just take the adapter with all of them, the customer chooses the services.” (F3)

The fact of the two phases (production-focus and market-focus) alone shows the strong development effort and the associated high risk with increasing investments, indicating

that this diversification assists in reducing uncertainty and scaling the solution by addressing additional target groups through additional partners:

“New use cases mean more users.” (G5)

5.4 The Upgraded Marketplace Approach

This approach started from a focal offer idea and aimed to develop an outstanding transaction platform that created transparency on the market (production supermodularity). Such a platform incorporates a special feature that differentiated it on the market (consumption uniqueness), and the differentiating element could be consumed in combination with every potentially selected offer. Figure 13 shows the approach.

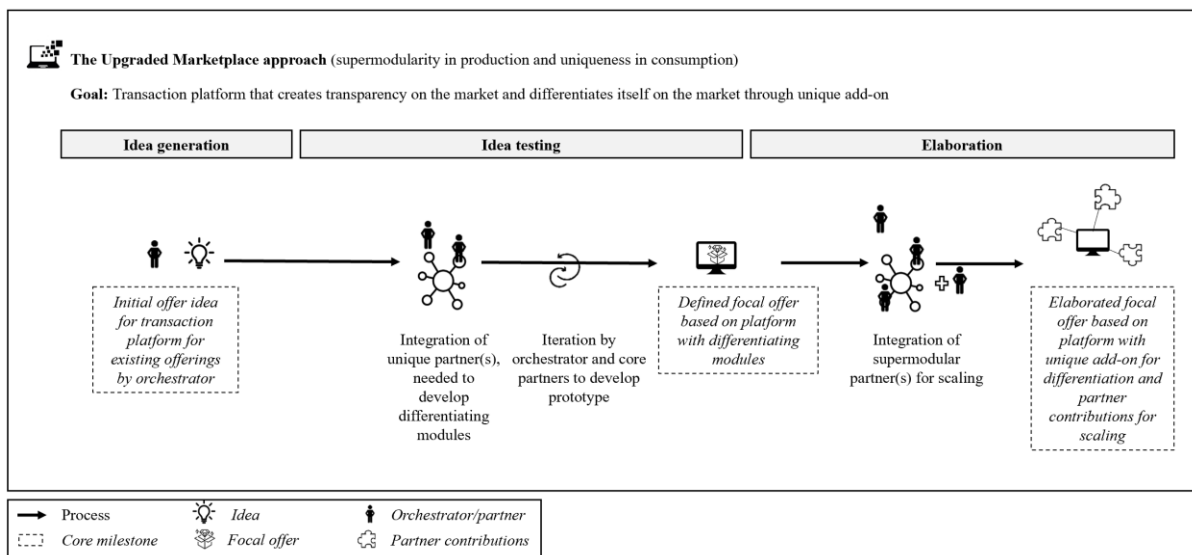


Figure 13: The Upgraded Marketplace approach

5.4.1 Idea generation

The orchestrator of the sharing case had an initial ambition to be an intermediary for car sharing, through whom private customers could rent their cars. However, the aim was for the platform to stand out from the various car rental companies on the market for it to consider itself unique:

“Because there is no other concept in the world that can do this at all, could do it then, or can do it now.” (H1)

Additionally, the idea required a unique component on the consumption side. On the one hand, an insurance policy took effect in the event of damage; therefore, the private renter did not have to pay for it. On the other hand, a box was required to be installed in the respective cars to allow automatic opening via a smartphone. The CEO confirmed that these were unique components:

“Because what they [the insurance company] are offering here is not a standard product, it’s one that we developed with them.” (H1)

5.4.2 Idea testing

This unique component is worked on first to develop this crucial module together with the relevant partners. This development occurred completely without customers, as the CEO confirmed:

“If you go to ten customers at the beginning, and eight say: I would like something. What’s the point? But the customer can’t tell you exactly what they want.” (H1)

Thus, the prototype, as the materialization of the focal offer, was initially contested only with the unique partners.

“It was only when it was demonstrable, and we had a prototype, and the idea was clear, that we presented it.” (H1)

5.4.3 Elaboration

With the prototype in place, the next step was to attract as many car renters onto the platform as possible through supermodularity in production. This step led to a network effect and attracted more customers. Thus, making the offering more attractive to customers by adding many people who wanted to offer their cars helped scale the platform.

“So the first year and a half, two years, it was almost just that: just getting offers onto the platform.” (H1)

6 Discussion and contribution to the literature

This chapter discusses the literature contributions from the previously presented findings of both studies. Study I (Chapter 4) focuses on the strategic aspect of defining a value proposition in the ecosystem, whereas study II (Chapter 5) addresses the development of the value proposition in the form of the focal offer at the operational level. Overall, this thesis contributes to the structural view as an emerging stream in the ecosystem literature (Adner, 2017; Jacobides et al., 2018) and thereby puts a focus on the development of value propositions, which are defined as the core of the ecosystem.

6.1 Development of value propositions for ecosystems on a strategic level (study I)

Study I contributes to the ecosystem literature by developing a framework that shows that, given the different combinations of type (uniqueness or supermodularity) and occurrence (production or consumption) of the complementarities, different archetypes of value propositions and, thus, different ecosystem strategies—of which the value proposition is the core—emerge. This framework enables the following contributions to be made:

First, Jacobides et al. (2018) introduced the structural view on ecosystems on the basis of the notion that ecosystems are built on supermodular or unique complementarity on the production and consumption sides. However, they did not explain which type of complementarity on which side is most suitable given the situation at hand. Additionally, they did not provide detailed differentiation of how the four resulting types of ecosystems differ and lead to different archetypes of value propositions. These findings address that urgent call by Jacobides et al. (2018) (see also Shipilov & Gawer, 2020). I hope to shed light on that unanswered question and to build a bridge to transform these initial conceptual thoughts into practice, by clearly indicating the implications, limitations, and strengths of these four archetypes.

Second, the urgent call (Ganco et al., 2020; Jacobides et al., 2018; Lingens et al., 2020) for research to understand the influence of competition on ecosystem development has not been sufficiently addressed. Competition refers to the existence of other similar ecosystems, such as the existence of multiple comparison platforms for housing on the

market (home case). A comparison platform for moving companies, on the other hand, did not yet exist, only many individual moving companies scattered and non-transparent on the market (moving case). To my knowledge, this study is under the first to show which type of complementarity might be most favourable in situations of strong (Types Upgraded Marketplace, Revolutionary Solution, Anchored One-Stop Shop) versus weak competition (Type Diversified Marketplace). In market situations with strong competition, i.e. where there is already a similar ecosystem, it is helpful to include unique modules for differentiation. However, if there is no comparable competitor at ecosystem level, it is advisable to work with the less resource-intensive supermodular complementarity. Because there are also shown development paths between the different types, it can be demonstrated how changes in the competitive situation drive ecosystem development, such as when the archetype Diversified Marketplace (supermodular in production and supermodular in consumption) is being transformed into Upgraded Marketplace (supermodular in production and unique in consumption) in situations of increasing competition.

Additionally, this study demonstrates which type of complementarity is most favourable on which side and for what purpose. For instance, unique complementarity allows for differentiation of the ecosystem against competition when used on the production and consumption sides. For supermodularity on the production side, uniqueness only differentiates when applied on the consumption side. In this vein, even one unique module on the consumption side can differentiate the entire supermodular offering on the production side! This is shown in the sharing case, where different cars can be selected (supermodularity in production), but every selected car comes with the unique insurance and opening mechanism (uniqueness in consumption). This statement is an addition to Shipilov and Gawer (2020, p. 117), who found that *“one can predict that ecosystems with stronger average complementarities are likely to perform better than ecosystems with weaker average complementarities because the former will have created a higher value for either producers or customers.”* The finding can be added that the type of complementarity and the side it is being used on also plays a role.

Thus, an interesting finding is revealed: The development paths among the four types indicate that the type of complementarity on the production side remains stable whereas the type of complementarity on the consumption side can change over time. As previously stated, the findings indicate that unique modules are most effectively used

for differentiation of ecosystems that have been built on supermodularity on the production side when modules are added to the consumption side. Thus, a transformation from mere supermodularity in production to additional uniqueness does not seem reasonable given the associated efforts. On the other hand, in the case of an ecosystem that started with uniqueness in production and has already gone through these efforts, an additional build-up of the critical mass of supermodular modules on the production side might be less favourable compared to building-up supermodularity on the consumption side, which allows for fast scaling and cross-selling amongst the modules offered to the customer.

Of course, this study also holds some shortcomings. The first is the usual shortcomings associated with a qualitative multi-case study. Apart from that, the following points should be emphasized: The present study pays attention to the partners according to the criterion of complementarity and can deduce how they have to be addressed. To be able to make even more differentiated judgments here, also considering the types of their contributions and sectors in more detail would be helpful. For example, are they especially relevant for customer access? What is the nature of the contributions? Furthermore, in addition to this, another shortcoming is the distribution channel and channel management, which must be considered when thinking of scaling mechanisms, in addition to partner alignment. Third, this study presents the reasoning, why the home case 1.0 was not successful. In addition further analysing less successful cases to understand their stumbling blocks and learn from them would be interesting.

6.2 Development of value propositions for ecosystems on an operational level (study II)

This section discusses the literature contributions of focal offer development at the operational level. When addressing the question of how the value proposition can be materialized in a coordination intensive setting between customer interests and partner alignment, four approaches emerge that differ according to the occurrence of complementarity. The different approaches including the respective foci (partner/customer) are indicated in Figures 10-13. Beyond these specific recommendations, the findings imply several insights for the broader field of ecosystems and innovation management.

First, this study adopts the ideas of Adner (2017) and Jacobides et al. (2018), who showed that ecosystem partners have a strong dependency because of multilateralism. This means that they are connected with each other, while aligning their complementary contributions towards a superior value proposition and as said, these connections are not to be broken down to only bilateral connections. However, this study differs, by showing that the degree of dependency varies depending on the approach and underlying complementarity. For example, the Revolutionary Solution (uniqueness in production and uniqueness in consumption) and Anchored One-Stop Shop (uniqueness in production and supermodularity in consumption) approaches indicate a maximum dependency from the strong uniqueness on the production side, whereas supermodularity-based approaches have weaker dependency.

This study's finding leads to a second contribution: it deepens the findings from Dattée et al. (2018) around the blueprint. The first step in the development of a value proposition is, according to Dattée et al. (2018), a protovision, that gives a general direction. With the protovision uncertainty is still high and alternative options still remain. This first rough picture is especially important, because it can be used to communicate the idea and convince additional partners. On the one hand, the relevance of a protovision in the form of a blueprint, as shown by Dattée et al. (2018), proves in the findings to be particularly important for practitioners, to decide which approach they should follow. Meanwhile, the finding shows that the importance of the blueprint, which Dattée et al. (2018) strongly demand, varies depending on the approach. The blueprint is extremely important in uniqueness cases, namely, the Anchored One-Stop Shop approach (uniqueness in production and supermodularity in consumption) in which the partner must believe in the scalability of the solution, and the Revolutionary Solution approach (uniqueness in production and uniqueness in consumption). By contrast, in the Upgraded Marketplace approach (supermodularity in production and uniqueness in consumption), the blueprint is only of limited importance, because multilateralism is less pronounced, and only the unique partner needs to be convinced. On the other hand, in the Diversified Marketplace approach (supermodularity in production and consumption), no blueprint is needed because of the direct interaction between the partner and the customer.

Third, this study like the previous one adds to the statement by Shipilov and Gawer (2020, p. 117) that “... *in general, one can predict that ecosystems with stronger*

average complementarities are likely to perform better than ecosystems with weaker average complementarities because the former will have created a higher value for either producers or customers” uniqueness and supermodularity to the argument. Furthermore, the study shows that focusing on development with partners resulting from unique complementarity in production leads to more differentiating solutions, whereas focusing on customers that results from supermodularity in consumption leads to more added value for customers. These findings concur with the point made by Kamalaldin, Sjödin, Hullova, and Parida (2021) about seeing customers as “active shapers” and not only as users of the focal offer. This is particularly the case if the added value does not arise from new innovative solutions but from a customer’s perspective, as in the combination of various use cases from a point of contact, including in the Diversified Marketplace approach.

Fourth, I agree with the mixture of static elements in the form of framing and dynamic elements for adaptation during a development process, as introduced by Snihur et al. (2018). For example, the Revolutionary Solution approach (uniqueness in production and consumption) shows how the value proposition is kept stable in the framing through decoupling, whereas flexibility exists on the partner side for the realization and to have “... *flexibility to iron out details ...*” (Snihur et al., 2018, p. 1300) on the partner side. The Anchored One-Stop Shop approach (uniqueness in production and supermodularity in consumption) shows how the unique element remains stable and the individual use cases can be variably supplemented. Here this study agrees with Snihur et al. (2018) in that the framing of a focal offer should be kept as holistic as possible to maintain this flexibility in the interchangeability of the use cases. In the Diversified Marketplace approach (supermodularity in production and consumption), the two processes of partner and customer coincide, making the question of framing superfluous when the two are brought together during development.

Fifth, based on Jacobides et al. (2018), Shipilov and Gawer (2020), and Snihur et al. (2018) it can be seen that the role of the orchestrator is vastly different. The more uniqueness that prevails on both sides, the more the orchestrator plays the framer and blueprint developer roles, specifically bringing partners into the ecosystem and controlling them and developing the ecosystem. In contrast, the more that supermodularity occurs, as in the extreme case of the Diversified Marketplace approach, the less the orchestrator is an active framer. In this case, the orchestrator creates a setting

in which the customer and the partner can develop the ecosystem together. The double uniqueness approach is viewed as the most hierarchical, whereas the double supermodularity approach is the other extreme of market closeness—picking up on Jacobides et al. (2018), who stated that ecosystems are a middle form between the market and hierarchy.

This finding leads to an interesting proposition. Currently, ecosystems are not the norm in most industries. An innovation driven by an ecosystem, that is, by the combined forces of several partners, is arguably superior to such offers having been implemented by a single firm. The innovation might still be successful on the market even without a perfect alignment of such an offer with customer interests. This raises the question of whether this strong partner focus will still be successful in a future business world, which may be dominated by competing ecosystems. Arguably, competitive advantage and market success in an ecosystem world will fall to those firms that can coordinate ecosystem partners even without using decoupling and strict sequencing, thus simultaneously achieving a partner and customer focus.

Two streams might capture single aspects of focal offer development in ecosystems, with some significant differences: platform and innovation ecosystems.

First, the platform ecosystem literature (for an overview, see, for example, McIntyre & Srinivasan, 2017) provided recent insights into focal offer development (e.g., Basaure et al., 2020; Ozalp et al., 2018; Panico & Cennamo, 2020; Rietveld et al., 2019). However, this stream bases its logic on bilateral thinking and misses the multilateral connections among the partners involved, the resulting dependencies, and the coordination efforts and aspects of multilateral co-specialization that are typical of focal offer development from a structural view. One would think that the topic of focal offer development was very different in the two areas, whereas the approaches based on supermodularity in production (Upgraded Marketplace) probably follow a relatively bilateral logic after integrating a unique partner relative to the Diversified Marketplace approach. This belief leads to the implication that, for the Anchored One-Stop Shop approach after the decoupling, and the Upgraded Marketplace approach, insights from the platform development literature can be applied to the focal offer development process in ecosystems.

Although insights can be transferred from the platform ecosystem literature, the overlap with the classic innovation ecosystem literature is limited (Adner, 2006; Adner & Kapoor, 2010; Dedehayir et al., 2018; Granstrand & Holgersson, 2020; Kapoor & Lee, 2013; Leten et al., 2013). This is because innovation ecosystems follow the logic of starting from an existing set of partners, jointly developing a value proposition, and managing the upstream/downstream complements. In contrast, these cases from the structural view follow a reverse logic: they start with a value proposition, and select partners specifically for it.

This study also shows the usual shortcomings of a multi-case study. In addition, this study does not address the issue of co-learning. Co-learning is not only relevant in the co-specialization process among the partners but also is becoming increasingly relevant with respect to long-term improvements of the focal offer through customer feedback and requires future research (Adner & Kapoor, 2010; Autio & Thomas, 2019; De Meyer & Williamson, 2020). It can be assumed that this question becomes even more important to investigate in the context of better coordination in the development process. Furthermore, this study could be extended to cases where customers are not the users. Specifically, reviewing these cases would be exciting against the background of customer and partner orientation.

7 Key managerial implications

The aim of this chapter is to transfer the findings from theory to practical application and to summarize them in a framework. Entering the ecosystem game as a practitioner can be driven by various reasons. On the one hand, it could be the fact that a practitioner can no longer meet the customer's increased needs alone in a stagnating industry due to a lack of skills or resources. On the other hand, it could be idea-driven, a desire to develop something new and superior to meet a specific customer need. In any case, it will be about innovation. And the focus is on the value proposition and the precise products or services that are to be offered to the customer. The initial ideas may be more or less concrete. That's why it's essential in ecosystem building to think about value proposition development. These considerations can be divided into strategic and operational levels. These two levels can be considered either consecutively or independently of each other. This is relevant because strategic decisions about forming or joining an ecosystem will probably be anchored in a different department in the company, i.e., the operational implementation of an ecosystem by an ecosystem manager.

7.1 Strategic level

To start with the strategic level, it is first important to understand that there can be four different archetypes of value propositions. Consider the example of intermediary platforms for relocations (the moving case) to customized soles (the 3D-printed sole case). Both cases involve ecosystems that drive innovation, but the nature of their respective value propositions is very different.

And this difference is rooted in complementarity. There are two types of complementarity, uniqueness and supermodularity, which can occur on the production or the consumption sides. Translated into practice, the individual complementarities can be imagined as described in Figure 14.

<i>Type of complementarity</i>	<i>Type of offering (customer perspective)</i>	<i>Description</i>
Supermodularity in Production (substitutes)	Production A or A' or A'' or A''' Consumption	- Various similar offers are brought together at one point for market transparency creation and offer the possibility to select the best fitting option within a product category <i>Example:</i> Airbnb with different accomodation options
Uniqueness in Production	Production A C B Consumption	- One differentiating superior solution, that can not be produced when one module is missing and needs a lot of alignment <i>Example:</i> E-car, only functions with charging infrastructure etc. in combination
Supermodularity in Consumption (different use cases)	Production B and/or C and/or D Consumption	- Various use cases to choose from at one point of sale; this increases the convenience when different solution are offered and can be consumed together <i>Example:</i> Amazon offers different products/services from one source
Uniqueness in Consumption	Production A C B Consumption	- One differentiating superior solution, only useful when consumed together <i>Example:</i> E-car, only functions with charging infrastructure etc. in combination

A Supermodular offering	A B C Aligned unique offering	Ecosystem	A B C Modules A' A'' A''' Substitutes
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Figure 14: Description of the types of complementarity for practitioners

These two types of complementarities (uniqueness and supermodularity) on the two sides (production and consumption) can lead to four different combinations. This is the first relevant insight, namely that the combination of complementarities defines the archetype of the value proposition.

The second insight is that the choice of the appropriate combination of complementarities, and thus the resulting archetypes of value propositions, should not

be made arbitrarily, but should consider the competition for a good indication of which complementarity to choose. This refers to competition at the ecosystem level. If, for example, there are already ten apartment search platforms on the market (home case), the competition there is relatively strong, and it would be advisable to build in uniqueness for differentiation. If, on the other hand, the market is still very non-transparent and fragmented, as in the case of moving companies (moving case), it makes sense to work with supermodularity. The advantage of supermodularity is that it is less resource-intensive, but the disadvantage is that it is also easier for others to replicate. Partners are easier to integrate, because the alignment is less intensive, but it is a perpetual effort to keep the partners, because they can switch to other places easily. Uniqueness, on the other hand, is more resource-intensive, but it is more difficult to imitate. It is also harder to find the right partner, but the alignment is so intense that the partner will be less willing to change once they have decided to join the ecosystem.

These combinations of complementarities and the respective advantages and disadvantages give rise to a third insight: specific focus topics that should be taken into account in the development of the value proposition. In the case of supermodularity, for example, a constant theme is continuing to strengthen the core, which is easy for competitors to copy, and retaining partners within the ecosystem. With uniqueness, on the other hand, it is more challenging to find the right partners and to understand customer needs before the resource-intensive development starts. These findings are summarized in Figure 15. It is also important to mention that it is possible to switch between a Diversified Marketplace and an Upgraded Marketplace as well as between a Revolutionary Solution and an Anchored One-Stop Shop strategy. This is recommended when the intensity of competition increases.

The four possible strategies are summarized here:

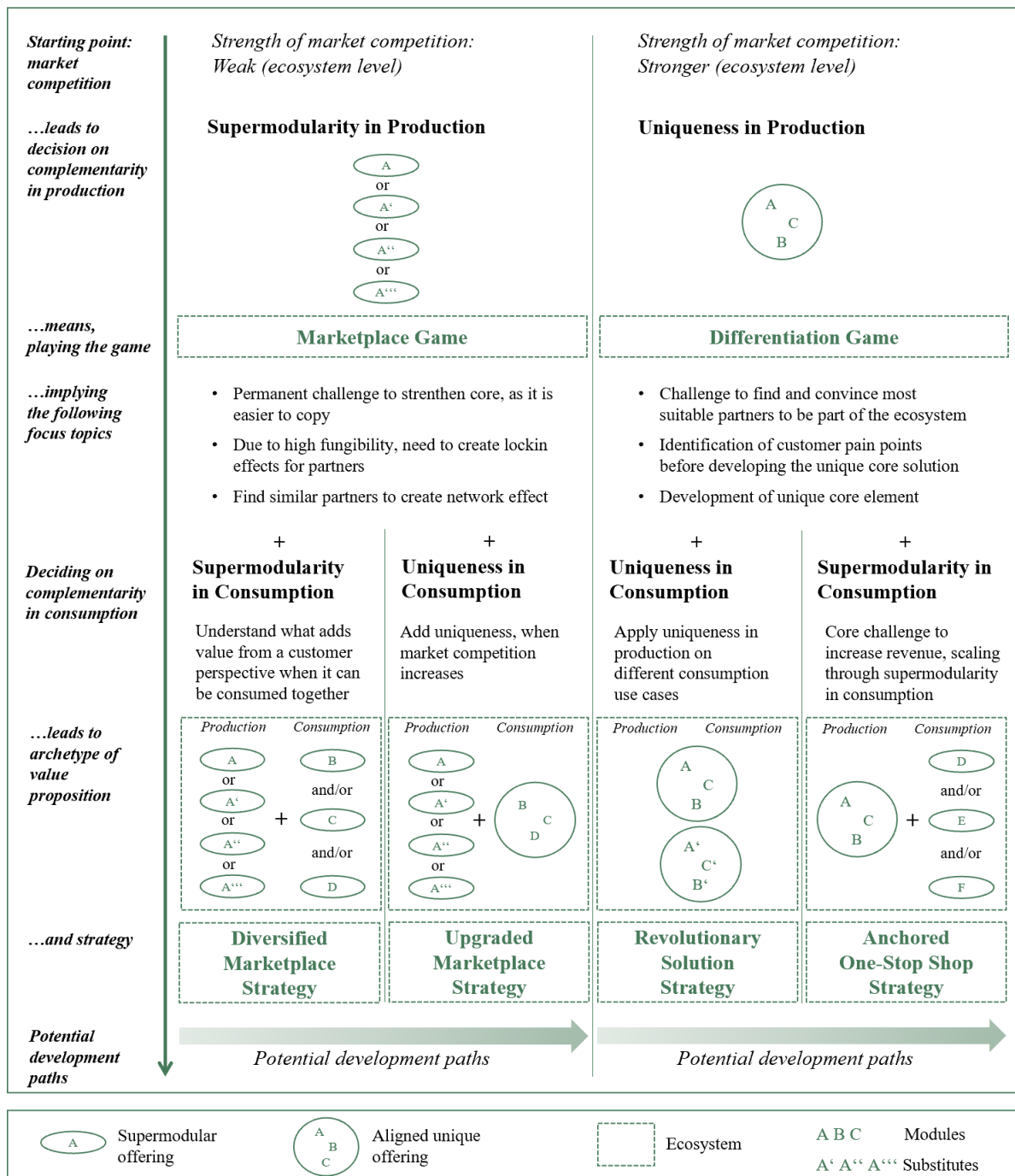


Figure 15: Framework for practitioners on the strategic level

Figure 15 provides a handy framework for practitioners willing to play the ecosystem game. This framework aims to provide important practical implications in several ways:

1) For the development of ecosystem strategies in firms, since companies must decide which type of complementarity on the production vs. the consumption side is most suitable given the situation at hand.

- 2) For the further evolution of an ecosystem in case the situation changes.
- 3) For firms considering joining an existing ecosystem, as the framework helps evaluate whether the ecosystem is using complementarities in the right way.
- 4) For investors in start-ups driving ecosystems, since Lingens et al. (2021) show that start-ups are suitable ecosystem orchestrators. The findings and frameworks help investors interpret the progress of the ecosystem initiative correctly. Ecosystems driven mainly by supermodularity on the production side might scale faster than those characterized by unique complementarity. However, they might struggle to differentiate themselves and maintain network effects over time when competition increases. An ecosystem built upon unique complementarity on the production side, however, might take longer to be built-up, but allows for a wide range of services or products to be offered at a later stage and, thus, for faster scaling once the value proposition based on unique modules has been implemented.

7.2 Operational level

If the entire process of value proposition development is to be implemented in ecosystems from the very first idea to the materialization, once the strategic level has been defined the question now arises as to how operational materialization can best be organized. As shown in the findings, this is extremely relevant because, in addition to a customer focus, the partners, who are not fully hierarchically manageable, are also of great importance for the implementation and must be taken into account accordingly. At the same time, efficient partner management is paramount so that things do not become too slow due to the involvement of too many parties. It is also possible to start here if the strategy is already clear in terms of the value proposition and the question now arises as to how materialization of the value proposition in the form of a focal offer should best take place.

Figure 16 summarizes the operational level of value proposition development. The framework that was introduced with the four approaches may be useful to companies in developing focal offers in their ecosystems. First, it allows firms to categorize themselves, based on the type of desired value proposition in the form of the protovision and the underlying complementarity at hand, to understand the approach they should

follow. Figures 10-13 summarize the respective findings of the approaches in detail. Second, in addition to this initial value for firms, the findings present several important implications, which arise from the approaches.

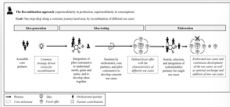
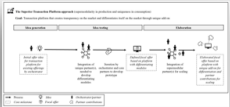
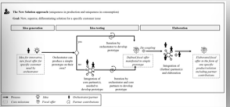
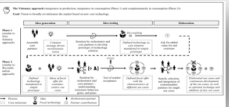
Starting point: Protovision	The goal is to integrate various stand-alone use cases into a customer journey/ along a need area, whereby the added value in the combination is primarily seen from the customer's perspective. The goal is a transaction platform that creates market transparency among similar providers and differentiates on the market with a unique add-on that is combined with any chosen provider. The goal is a new, differentiating, superior solution for a specific customer need. This approach has a vision to revolutionize the market broadly based on a new core technology and scaling across diverse use cases.			
Approach	Diversified Marketplace Approach	Upgraded Marketplace Approach	Revolutionary Solution Approach	Anchored One-Stop Shop Approach
Complementarities	- Various similar offers for transparency creation and selection (supermodularity production) - Various use cases to choose from (supermodularity consumption)	- Various similar offers for transparency creation and selection (supermodularity production) - Differentiation element for any choice (uniqueness consumption)	One differentiating superior solution (uniqueness production/ uniqueness consumption)	- Differentiating core technology (uniqueness production) - Different use cases for scaling (supermodularity consumption)
Development				
Core challenge and focus	- Find the right use case combination that adds value from a customer perspective - Focus on customers to understand their perspective and at the same time bring along the partners with high co-specialization; add use case partners in a second step	- Finding and retaining the right partners for the differentiation element - Focus on unique partners for core element; add supermodular partners in second step	- Find and retain right partners to develop new solution - Brief market acceptance check with customers, then decoupling and full focus on production side with as few partners as possible	- Primarily find and engage right partners to develop new core solution, then find right use case combination to scale - Brief market acceptance check with customers, then decoupling and full focus on production side; switch to customer focus in second phase

Figure 16: Framework for practitioners on the operational level

The Diversified Marketplace approach

The Diversified Marketplace approach confirms that innovation can be achieved by recombining existing solutions, since the solutions are jointly offered by a single point-of-sale to address a new need. This is exemplified by the moving case, where different moving companies customers can choose from are brought together and can be

combined with different additional offerings, such as cleaning services or a packing box supplier. This approach is characterized by supermodularity on both the production and consumption sides. Since supermodularity on the consumption side thrives on the fact that the recombination of already existing modules that reinforce each other creates a higher value from the customer's point of view, it is logical to involve the customer and to build the recombination together with them. Meanwhile, a few particularly important partners are engaged in parallel in the development process. Thus, the orchestrator strives to reduce the complexity of managing the set of multilateral partners by merely focusing on the customer. This approach could be particularly suitable for established corporations that want to move away from being a mere product provider to becoming a need-solver (as seen in the mobility provider case). Interestingly, the innovation potential arises from the recombination of modules provided by the ecosystem partners. This approach allows firms to achieve significant innovations even when they lack a highly innovative idea in the first place. This is because the innovation potential does not arise from an idea, but rather from a clever recombination of existing modules. However, it is crucial to have a close interaction with and an understanding of the customer, since the customer's interests are the starting point in recombining modules. Additionally, an ability to flexibly and quickly reiterate a focal offer, based on customer input, is an essential part of this process.

The Upgraded Marketplace approach

At first glance, this approach may look similar to the Revolutionary Solution approach in the development steps, such as the partner focus. However, the starting points in developing a new solution and having a platform as a target are very different. Additionally, the dependencies, and therefore the differentiability, differ. While in the Revolutionary Solution approach, all of the partners are very closely linked and have a great dependency based on uniqueness, the Upgraded Marketplace approach differentiates between the core partners for the unique add-on and the supermodular partners who enable the scalability of the platform, and are thus more remote, as in a "breaking point". The example of the car sharing case demonstrates a close collaboration with the insurance partner and the partner providing the opening mechanism, but a looser connection with the different car partners. Indeed, this

approach strives for a platform solution, which is why the customer can be deprioritized at first glance and is also why during the development of a protovision (Dattée et al., 2018) it is initially only the unique modules that matter as bottlenecks. This has implications for practice: the Upgraded Marketplace is less risky, compared to the Revolutionary Solution approach, and can scale more easily, due to network effects, while it focuses more on scaling and less on individual customer needs.

The Revolutionary Solution approach

This approach demonstrates the possibility of innovating by meeting an existing need with a superior solution or technology, which can be achieved by building-up an ecosystem. These are mainly very specific often niche offers, like the case of the 3D-printed sole. Since this innovation results from uniqueness on both the production and consumption sides, each module is necessary and difficult to replace, leading to maximum dependency and multilateralism (Adner, 2017; Jacobides et al., 2018). Of course, this also means that the coordination effort is at a maximum, especially because the partners must be coordinated and the relevance to customer needs must be ensured. Hence, a decoupling of the process is carried out, first to check customer acceptance, and then to focus fully on partner alignment. This decoupling of the focal offer reduces the overall coordination effort since it allows orchestrators to focus solely on the management of partners. This approach is a means to create a superior and highly innovative offer without customer involvement in the later stages of the development process. Consequently, it is difficult to perform iterations of focal offers in the later stages of the development process, even when new insights into customer interests may create a necessity to do so. Thus, there is potentially interest for start-ups, which are characterized by a lack of resources and may thus be particularly attracted to less resource-intensive approaches. In addition, this approach is of particular interest to established companies that want to extend their product portfolios: All of our cases demonstrate that established firms with strong customer interfaces are particularly important for start-ups (but also for established firms) to create credibility and provide market access, and thus the ability to scale. This creates a win-win situation if new and innovative offers based on an ecosystem can be integrated into an established firm's product portfolio, such as in the case of the 3D-printed soles: The ecosystem profits

from scaling its focal offer, while the partner provides the customer interface by extending its portfolio.

The Anchored One-Stop Shop approach

The Anchored One-Stop Shop approach, which combines the Revolutionary Solution and Diversified Marketplace approaches, usually leads to highly innovative focal offers, and addresses novel customer interests based on new technologies and solutions. The car datalytics case and the mobile payment case should be mentioned here. This approach differs from the Revolutionary Solution approach since it develops a new technology in a first step, which is based on unique complementarity in production with partners. This creates a basis for the subsequent coupling of several use cases. In a second decoupled step, the focus shifts from the production side to the consumption side, with the customer as the focus of attention. The supermodularity in consumption allows a solution that covers a broad range of needs, since several use cases can emerge from the underlying technology, thus increasing its economic returns. Since this approach is very resource intensive, it is usually initiated by companies with a strong strategic focus on innovation. Because the approach is characterized by strong uncertainty, it requires a great deal of flexibility: Flexible and responsive firm structures are beneficial. For this purpose, firms tend to found spin-offs or other start-up-like structures.

8 Conclusions and future research

To sum up, this work aims to shed light on the development of value propositions for ecosystem initiatives. It is motivated by the relevance of value propositions as the absolute core of the ecosystem, as well as by the existence of blind spots in research based on the structural view. Therefore, the research, which is based on qualitative multi case studies, is divided into strategic and operational levels.

RQ1: Which ecosystem strategy (based on uniqueness or supermodularity) and, thus, which resulting type of value proposition is most beneficial for firms under which boundary conditions?

The strategic level focusses particularly on the complementary modules as the core of the value proposition (Jacobides et al., 2018). Study I demonstrates the appropriate ecosystem strategy under certain circumstances and the role that the competitive environment plays. As a second contribution, this study shows how different archetypes of value propositions emerge through different types of complementarity. Moreover, as a third contribution, this study elaborates on the different challenges that arise depending on the type of complementarity and shows how fungibility influences interaction among ecosystem partners.

RQ2: How does the orchestrator manage the development process of the focal offer in a coordination-intense setting between customer orientation and partner alignment?

The operational level addresses the challenge of addressing not only the customer focus as the state of the art, but also the fact that in development the partners are not fully hierarchically manageable. Study II presents four distinct approaches to the management of the focal offer development process as the materialization of the customer value proposition and their chances and limitations for companies. Second, it demonstrates that, given the strong coordination effort in the ecosystem context, it is beneficial for firms to focus on either partners or customers during the development process, but rarely is it beneficial to focus on both at the same time. Third, it can be shown that firms in an ecosystem setting can increase their customer orientation by improving partner management. On the one hand, this improvement contributes to ecosystem research and, on the other hand, assists practitioners in developing ecosystems.

Ecosystems are a relatively new phenomenon, which have been establishing themselves for a few years. But if we now think about ecosystems as an essential form of value co-creation in the field of innovation management, important questions arise. To build a bridge to the introduction, innovation management and product development have evolved from a pure product focus over the years to the point where customer focus is now the state of the art. Ecosystems are the next stage that can address even more sophisticated customer needs. However, as they are still in their infancy, study II has shown that it is possible to develop a superior value proposition even without a primary focus on customers, but rather with more of a partner and production focus. The study also shows that the customer focus can be visibly increased through partner alignment, thus demonstrating a trend from product to customer focus on the next level. This implies a world where different ecosystems are competing with each other. This outlook raises several relevant questions for future research.

The development of ecosystem competition raises the question of how organizational structures and mechanisms will evolve. Due to new technological possibilities and forms of collaboration, the types of contracts or the rigidity of the agreements will likely change, for example. On the one hand, there is a need for contractual security in order to secure oneself towards the partners, but at the same time there is also a need for a lot of flexibility, since the exact outcome of the value proposition is not clear from the beginning. This setting calls for more flexible elements in the partner relationship, such as framework agreements instead of setting specifics. The establishment of spin-offs, as in the car data analytics and mobile payment case, also shows that these independently operating organizations can ensure faster decisions in a more agile setting. It will also be relevant that the parties will then be involved not only in one ecosystem, but could make use of different co-creation forms. Furthermore, this raises the question of optimal partner management, possibly through new digital tools or technical standards, as well as the possibility of flexibility on the contractual, structural, and processual levels, to manage ecosystems without the need for decoupling. What would it mean if artificial intelligence could take over the coordination function, for example? Overall, competitive advantage in an ecosystem world arises from more than the clever management of internal sources; it can also arise due to the clever management of external partners. It should further be added at this point that the topic of change management will be of great relevance for the success of ecosystems. This is

because a change in thinking must take place, from purely in-house thinking to thinking about joint value co-creation. The corporate culture in particular is of great importance for this shift.

To stay with the organizational forms of collaboration in ecosystems, the orchestrator also plays an important role. As has been shown, research today shows that one or more orchestrators are always involved in building an ecosystem, and they assume the role of the manager. However, the findings of study II have shown that the roles of the orchestrator function vary depending on the complementarity. This raises the question of whether an orchestrator is always necessary, or whether ecosystem building and management is also possible in a decentralized organization.

Jacobides et al. (2018) have already suggested a shift away from the idea of uniformity. This work contributes to this by showing that there are vastly different ecosystem strategies and focal offer development processes, depending on the type of complementarity. Additionally, it shows that the resulting focal offers have vastly different profiles and, thus, so do the ecosystems. For example, dual uniqueness entails high dependency but long-term differentiation, whereas dual supermodularity entails low differentiation, but easier implementation. On the other hand, the former has a much higher risk of failure, because the dependence on the partners is much greater. This raises the question of which of these strategies and approaches promises the best long-term performance under which conditions. This would be interesting to consider, using a large-scale quantitative sample.

In addition to this, the investor perspective for the strategies and approaches seems very interesting. Therefore, whereas the aforementioned dependence on partners through uniqueness in production initially entails a great deal of risk, it has the advantage of differentiation. Supermodularity results in less differentiation, but it can help in making statements about the scalability and, thus, the future economic viability of the approaches. Thus, supermodularity in production presumably promotes the network effect and increases the speed of scaling, while supermodularity in consumption can include new use cases through broad fields of application. However, due to the purely qualitative approach and lack of focus on that topic, more in-depth recommendations in this regard cannot be provided here. Given the increasing relevance of start-ups as

drivers of ecosystems (Lingens et al., 2021) and, thus, venture investments, I would like to encourage future research to examine venture funding in an ecosystem setting.

This work focuses on the value proposition and the focal offer as the materialization of the value proposition for the customer. However, as already mentioned, this is only one part of value creation and value capture (Khademi, 2020; Priem et al., 2018). In this context of value propositions, it would be very exciting to broaden the research lens so that the value propositions for the respective partners are also illuminated and the value creation flows between the customer and partners are thus complementarily intertwined. For this, it is probably especially interesting to consider data as a currency and a source of insights in the flow.

One topic that value propositions and focal offers for the customer implicitly touch on again and again is the topic of branding. Behind a product or service on the market there is usually a company with a brand. Of course, there are differences between low-involvement and high-involvement or umbrella brands and single brands, but there is usually one single company behind them (Aaker, 2004; Kapferer, 2008; Meffert et al., 2019). This changes radically in the case of ecosystems. Here, different brands come together. For example, different suppliers in the same category are listed next to each other, or the fit with brands from other sectors is considered, or the question of a unified ecosystem brand arises. In any case, it is certainly very exciting to examine the topic of value propositions for ecosystems from this branding perspective.

Additionally, this work focuses on the ecosystem strategy in terms of the value proposition as well as the operational implementation of this value proposition in the form of the focal offer for the customer. Since this work reports from the perspective of innovation management, the design perspective is neglected. Thus, the topic of value proposition development could be broadened to include the design component and the types of value propositions could be considered not only according to the types based on the different complementarities, as this thesis does, but also according to their content and the nature of the value proposition.

Due to the purely qualitative nature of my whole thesis, my findings are characterized by the usual limitations, which is why I want to encourage further quantitative studies to validate the findings.

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Appendix

Appendix 1: Interview questionnaire study I

Overarching: Which services were added when and with what consideration (why)?

1. **Time structure** developing the value proposition:
 - When did the ecosystem construction start? When was the last major milestone at the end?
 - Can you name the **biggest milestones** within that time span (do the math) so we have a timeline? Approximately at the three-month level, three to four milestones per year.
2. Let's start from the very beginning and look first at the **consumption side**, that is, in the direction of the market and customers:
 - **Which products/services** were added on the customer side and **when**?
 - **Why** exactly were these services added? (**Drivers in each case**)
3. Let's now look at the **production side**, that is, in the direction of internal, operations, technology:
 - **What were the essential steps** in each case, and **when**, to make the products/services true?
 - **Why** was this done in each case? (**Drivers in each case**)
4. Check test questions:
 - What makes you **unique**?
 - So in your product/service bundle there are X, Y, Z (list) –are **these all products/services**, or have we forgotten something else?
5. **Revelation of framing**: Now, in ecosystem building in general, you could go in two directions: you try to either put as much together as possible or make things unique.
 - So in your specific case, this means you first did ... (U/SM), then (U/SM). Is that correct?

Optional add-on:

- What is the VP of your ecosystem?
- Why the decision to evolve from product manufacturer to needsolver? (Fear competition, digitalization, scaling, ...)
- Why decide on the ecosystem approach?
- Was the decision on the course strategically planned or made at the moment when it had to be decided and then driven by current conditions? (Power Quotes: How does this come out of the strategy? What are the issues?)
- Why this series fugue?
- How do I choose what is self-contributed and what is partner-contributed?
- What are the top three challenges in this, ecosystem specific? (Criteria: multilateral, no hierarchy, ...)

Classify on a 1–5 scale:

- Interests of partners vs. interests of customers? Make offering attractive to customers while retaining partners
- Adapt well vs. integrate much (depth vs. breadth)
- Product development vs. scaling
- Close to core business vs. far beyond industry boundaries
- Competitive vs. complementary
- Open vs. closed
- Complexity and coordination effort vs. strong portfolio
- Arbitrary crossing of industry boundaries vs. not everything can be credibly combined
- Stable vs. fluctuating

Appendix 2: Interview questionnaire study II

Interview questions to [name of company] on the topic of ecosystems

Let's together determine one or more ecosystems in which [name of company] is involved. An ecosystem has the following characteristics:

- At least three partners who together provide a service to the customer that a single partner could not provide alone
- The partners jointly provide the service to the customer
- There exists a wide range of interdependencies between the partners

Ecosystem¹⁸

- Please outline the selected ecosystem of [name of company] by jointly recording the partners, their roles, and relationships.
- What value proposition does the ecosystem of [name of company] offer the customer?
- How is added value generated and distributed within the ecosystem; what are the activities of the respective partners?
- Why is a partner focus, or a customer focus, necessary?
- How are the partners aligned and how rigid or flexible are the respective positions?
- Are the partners strongly intertwined and how strong are the connections between the partners?
- How is the ecosystem managed, if at all (e.g., contracts)?
- Which partner controls it?
- What added value should the ecosystem of [name of company] itself bring; what is the objective of your participation?
 - Or, put differently: How did this ecosystem emerge in the first place?

¹⁸ These general questions about the ecosystem structure are also asked by my colleagues (Maximilian Böger, Florian Huber, Lucas Miché, Dr. Bernhard Lingens)

Focal offer (FO)

- Imagine today's focal offer as it is today (what is it) compared with the initial idea. Was this focal offer like this right from the beginning? Let's go through the development process together step by step, considering changes and their reasons.
 - What was the origin of the first idea?
 - Is your FO addressing an unmet customer need or is it a new combination of partner competencies?
 - How did this FO develop? What were the milestones in its development? How did you respond to them?
 - Why has the FO changed during the development?
 - Which (core) partners were involved during this iterative phase?
 - When did the freeze take place in the development of the FO?
 - Were new partners selectively brought on board after the freeze?
 - What was the process like after the freeze until the FO was on the market?

Focal offer development

- What were the individual steps in the innovation process? How did they proceed?
- Why?
- How was the customer involved?
 - At which point?
 - Was customer feedback decisive for changes to the FO?
 - Which partner collected the customer feedback?
 - Was an MVP tested? If so, by whom?

Miscellaneous

- What happens if the framework conditions change?
 - Should each partner be taken along iteratively or decoupled?
 - Will partners be kicked out?
- What does the FO look like in terms of industry thinking? → Are there fields of need instead of sectors?

Appendix 3: Curriculum Vitae

Curriculum Vitae–Veronika Seeholzer

Birth May 14, 1990, Munich

Nationality German

Education

2018-2021 **University of St. Gallen (HSG)**, St. Gallen, Switzerland

Doctor of Philosophy (Ph.D.) in Management

2013-2016 **University of St. Gallen (HSG)**, St. Gallen, Switzerland

Master of Arts in Business Management

2009-2013 **University of St. Gallen (HSG)**, St. Gallen, Switzerland

Bachelor of Arts in Business Administration

2011-2011 **San Diego State University (SDSU)**, San Diego, USA

Exchange semester

2000-2009 **Wittelsbacher Gymnasium**, Munich, Germany

German Abitur

Work experience

2018-2020 **Institute of Technology Management (HSG)**, St. Gallen, Switzerland

Research Associate

Since 2016 **McKinsey & Company, Inc.**, Munich, Germany

Management consultant, dedicated to Marketing & Sales practice

2015-2016 **Vivaldi Partners**, Zurich, Switzerland

Intern Strategy Consulting, focus on Brand Strategy & Digitalization

2015-2015 **Futureworks/Nose**, Zurich, Switzerland

Trainee Strategy Consulting, focus on Brand Strategy