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Journey to the Big Bang: How firms define new value propositions in emerging ecosystems

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ABSTRACT

The goal of an ecosystem is the creation of a value proposition firms could not offer alone. But how are new value propositions being defined in emerging ecosystems? Our study with eight cases yields several implications along these lines: First, how to come up with an initial idea for a value proposition and convince partners to commit to it? And, second, how to set-up the iterative process of value proposition adaption? And how to find a way to align both customer and partner interests along that way? Overall, this helps to understand how factors in the early stages of ecosystem development affect its value proposition.

1. Introduction

As an answer to rapidly advancing levels of digitalization, competition, and market dynamics, firms are increasingly performing their innovation activities in a collaborative setting instead of merely relying on their internal capabilities. This made the ecosystem concept one of the "hottest" topics in strategy and innovation, both in industry practice and scientific research alike (Alturi et al. (2017), Cenamor and Frishammar, 2021; Jacobides et al., 2018, Tan et al., 2020). Within that ever-growing body of literature, one of the most recent and fastest-growing ecosystem streams is focusing on innovation (Thomas and Autio, 2020; Jacobides et al., 2018). From this perspective, ecosystems are defined as constructs being purposefully created for the instantiation of innovative value propositions a single firm could not create in isolation (Adner, 2017; Dattée et al., 2018; Jacobides et al., 2018). Since the resulting value proposition is the ultimate goal of such ecosystems, literature focusing on the question of how value propositions are being created has always been very prominent within ecosystem research (for an overview, please, see Adner (2017) and Jacobides et al. (2018)). It is even considered one of the most important aspects and even "the starting point for ecosystem research" (Kapoor, 2018:10).

But most of this literature is focusing on new value propositions emerging from existing ecosystems, based on the interplay of existing ecosystem partners (please, see Adner, 2006; Adner and Kapoor, 2010; Dedehayir et al. (2018); Feng et al. (2019); Kapoor and Lee, 2013). Thus, what is largely missing is research on the emergence of novel ecosystems (Dattée et al., 2018; Jacobides et al., 2018, Thomas and Autio, 2020) and, even more so, on the question of how new value propositions are being created in such setting (Aversa et al., 2020; Thomas and Autio, 2020; Jacobides et al., 2018). Addressing that blind spot is of great significance for both literature and practice. From the perspective of the latter, firms being interested in building-up ecosystems must understand how new value

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Table 1
Overview of sample cases.

Case	Firm size (#employees smallest - largest partner)	Value Proposition	Partner and respective contribution to value proposition	Type of complementarity and level of co-specialization
3D-printed ski boot	1–10–1.000–10.000	Custom ski boot with 3D-printing of the sole, foot scan done by retail partner	1. Retail partners for customer access and sale, scan customers' feet in store 2. 3D scanning software provider delivers software to scan and read out feet data 3. Morphing partner provides the technology to morph feet and align in shape 4. 3D-printing company prints soles	All modules are specifically created or at least strongly adapted to the value proposition at hand. All modules are unique, since, for instance, the scanning software or 3D-printing or morphing would be without value in isolation. Given the specific development, all modules result in higher levels of co-specialization
Digital car key on smartphone	10–100–1.000–10.000	Smartphone as digital key for cars and cloud-based access control	1. Automotive OEM to integrate solution in cars and as customer access 2. Automotive OEM business innovation unit relevant to generate the need for modern solution in company 3. Hardware supplier delivers installation element for car 4. Frontend supplier in the form of app control	All modules are specifically created or at least strongly adapted to the value proposition at hand. All modules are unique. The solution had to be specifically developed, the car OEM had to adapt the infrastructure of the car, frontend and app were specifically developed. All of this resulting in higher co-specialization.
Digital factoring	1–10 to over 10.000	Factoring of complete sales ledger as portfolio solution for SMEs	1. Insurance company hedges the portfolios 2. Funding partner provides funding 3. Insurance broker as initial customer access, gets exchanged with bank 4. Bank as customer access and funding provider 5. Software company develops algorithm to access the risk of SME claims	Unique complementarity of all modules since all of them were specifically developed. However, some differences in degree of co-specialization. Insurance and software were tailor-made for the value proposition. Funding however is almost generic (but the risk profile of the investment is more specific). Broker and bank are mere sales partner but need to upskill their employees, resulting in some co-specialization.
Autonomous bus	1–10–100–1.000	Autonomous driving public transport solution in city centers	1. National logistics provider contributing knowledge, funding and contacts, customer interface 2. Self-driving bus company, delivering the vehicle 3. City and cantonal legal administrations offer test sites and legal aspects	Unique complementarity since the legislation and the situation at the test ground had to be adapted to the bus and vice-versa. All firms had to exchange extensively for that mutual adaption, resulting in higher co-specialization.
Mobility provider	10–100–100–1.00	Delivery of mobility solutions through one app/ platform	1. Local companies such as car sharing, scooter provider, train ticket provider 2. Car OEM providing mobility knowledge and network, internationally leading software firm providing software, internationally leading consulting firm contributes knowledge and network on smart mobility and smart city	The OEM, software firm and consulting firm (2) had to work closely together to create the solution for integration into the ERP software of clients. However, the modules such as mobility solutions, ERP integration or knowledge on smart city/ mobility existed already and would have had value in isolation. Together, however, they create greater value by providing the smooth ERP integration. This can be viewed as supermodularity. High co-specialization due to intense collaboration of partners. The firms listed in (1) provide existing mobility and entertainment solutions that work in isolation and require little effort when integrated into the platform. Thus, supermodularity and lower co-specialization.
Car datalytics	10–100–1.000–10.000	Reading data from cars and making predictive analyses plus Dongle as integrable data collection tool for cars. Based on that, offering of ancillary services for mobility (e.g., insurance, maintenance, fuel usage)	1. National telecommunications provider contributing data component (IoT, analytics, storage) 2. National automobile importer/dealer bringing automotive competence and customer interface 3. Use case partners, such as insurance companies, garages, gas stations etc.	Unique, all elements of the data collection system need to be tailor-made and specifically developed for the case at hand (e.g., sensors, connectors to the car, telemetry). Resulting in higher co-specialization. The modules for the specific use-cases are standardized and integrated into the platform without major efforts.

(*continued on next page*)

Table 1 (*continued*)

Case	Firm size (#employees smallest - largest partner)	Value Proposition	Partner and respective contribution to value proposition	Type of complementarity and level of co-specialization
				Work in isolation but greater value when combined together in order to provide customers with smart mobility solutions. Thus, supermodular with lower co-specialization.
Mobile payment	10–100–1.000–10.000	Payment solution integrated in app plus offering of payment solution for different use cases	1. Banks with core banking knowledge and funding and customer access 2. Software provider 3. Payment service provider as technical interface to retail integration 4. Core national retailer 5. Use case partners, such as parking operators, invoice interfaces, bonus cards etc.	Unique core, all elements of the payment solution need to be tailor-made and specifically developed (e.g., app, Bluetooth-sensor for the cashbox, software), resulting in higher co-specialization. The complements for specific use cases are supermodular since the more use cases and applications, the higher the value of the system. Partners delivering those complements need to be onboarded quickly to build-up network effects, which results in lower co-specialization.
Car sharing	10–100/ 1.000–10.000	Offering transaction platform for C2C car sharing	1. Insurance with unique solution to cover possible damages 2. Hardware provider to deliver box for installation in car that allows opening via smartphone 3. Garage for installation of boxes in cars 4. Peers offering and renting cars	Hardware and insurance both unique since they were tailor-made for the value proposition, resulting in higher co-specialization. Garages almost generic and lower co-specialization since no major instruction or teaching needed to install box, if anything slightly supermodular since the more garages the more value for partners and customers. But since installation only needs to be done once and target market is small, this is not a strong supermodularity. Peers with lower co-specialization since they only need to download app plus need to have box installed (but this is for free and box can be easily removed. Supermodularity of peers since the more peers the higher the value.

Table 2
Data sources.

Case	*# Inter-views*	*Interviewee positions* O = Orchestrator company CO = Co-Orchestrator C = Complementor company	*Key role of interviewee* 1) Top management 2) Partner manager 3) Project manager 4) Ecosystem partner	*Interview duration (min)*	*Additional data*	*Source (additional data)*
3D-printed ski boot	3	Chief Executive Officer (O) *(A1)*	1 & 2	101 + 27 + 15	Company website Blog post & online articles	internal external
Digital car key on smart-phone	6	Chief Executive Officer (O) *(B1)* Chief Sales Officer (O) *(B2)* Head Ecosystems & Venturing (C) *(B3)* Venture Fund Manager (C) *(B4)*	1 & 2 2 & 3 4 4	62 + 20 + 66 81 60 21	Company website Company website documents Blog post & online articles	internal internal external
Digital factoring	9	Head of Sales & Marketing (O) *(C1)* Innovation Consultant (C) *(C2)*	1 4	23 + 140 + 81 + 27 + 22 + 32 + 27 + 81 36	Company website documents Online articles about the orchestrator	internal external
Autonomous bus	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)*	1 3 2 1 3	52 76 + 49 45 + 13 57 26	Company website documents Technical report Newspaper, online articles & TV reports	internal internal external
Mobility provider	6	Project Manager Ecosystem Initiative (CO) *(E1)* Head of Business Development (CO) *(E2)*	2&3 4	51 + 60 + 120 + 30 60 + 60	Working documents Newspaper & online articles	internal external
Car datalytics	5	Chief Executive Officer (O) *(F1)* Chief Digital Officer (C) *(F2)* Managing Director Innovation & Ventures Lab (C) *(F3)* Chairman of the Board of Directors (O) *(F4)*	1&2 4 4 1	36 49 10 + 26 45	Company website Working documents Blog post, newspaper & online articles TV reports	internal internal external external
Mobile payment	8	Chief Innovation Officer (C) *(G1)* Head of Marketing (O) *(G2)* Head Mobile Payments (C) *(G3)* Innovation Strategist and Project Manager (C) *(G4)* Former Chief Executive Officer (O) *(G5)* Current Chief Executive Officer (O) (G6)	4 1 & 2 4 4 1 1	55 49 45 + 60 76 99 + 58 48	Company website Company website documents Blog post, newspaper & online articles Radio & TV reports	internal internal external external
Car sharing	6	Chief Executive Officer (O) *(H1)* Head of ecosystems (C) *(H2)* Car tenants (3) (C) *(H3)*	1 & 2 2 & 3 4	38 + 41 24 22 + 18 + 23	Company website Internal company presentation Radio & TV reports	internal internal external
Total	***50***			***2443***		

propositions are being defined in an ecosystem context, since ecosystems usually do not emerge self-propelled but are driven by the orchestrator (Jacobides et al., 2018). Without an understanding on how to perform that process, it would be difficult to profit from the ecosystem concept. From a research perspective, the structure of an ecosystem is determined by its value proposition, since the main purpose of an ecosystem is the instantiation of such (Adner, 2017; Lingens et al., 2021b). Since ecosystems develop in a path-dependent fashion, the ecosystem's initial value proposition can be expected to influence also its future course and structure (Dattée et al., 2018; Jacobides et al., 2018; Lingens and Huber, 2021). Thus, creating an understanding of how ecosystem value propositions come into being is like a journey to the big bang of the ecosystem universe!.

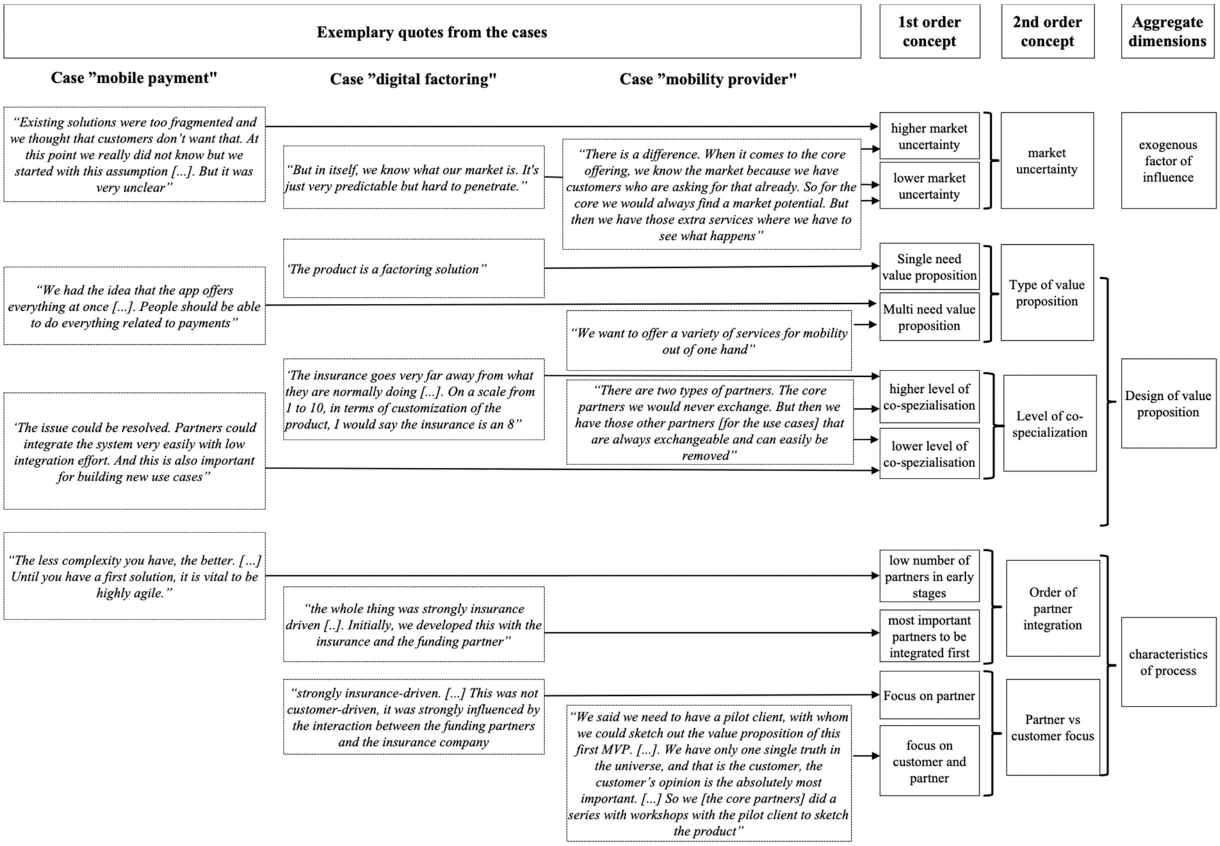

Fig. 1. Exemplary coding scheme.

Given the great significance and novelty of this aspect, we apply a multi-case study with eight in-depth cases (Eisenhardt, 1989). By doing so, we strive to be amongst the first to answer the question of how new value propositions are being defined in emerging ecosystems. In the following section, we will show the existing literature surrounding that aspect to deepen and specify our research question before we go into our qualitative analysis. By doing so, we hope to provide at least three key contributions along two core aspects: First, we show how orchestrators come up with an initial idea for a value proposition and convince partners to commit to it. In this regard, we show how aspects such as uncertainty, partner incentives, and levels of co-specialization are affecting that process. And, second, we show how firms set-up the iterative process of value proposition adaption and how they find a way of aligning both customer and partner interests along that way.

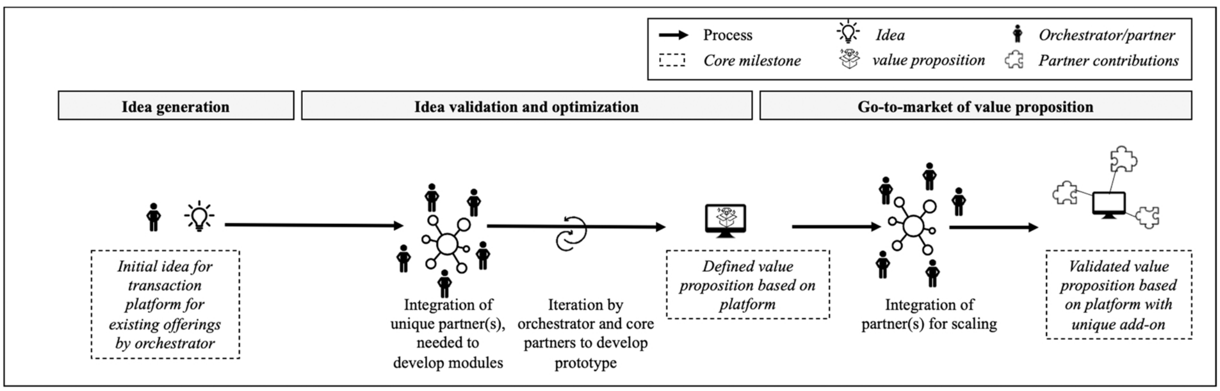

Fig. 6. Overarching framework of our findings.

2. Literature review

2.1. What are the specifics of ecosystems and why is the value proposition so important?

The research stream within ecosystem literature focusing on innovation (Adner, 2017; Jacobides et al., 2018; Thomas and Autio, 2020) points out that every ecosystem starts with and is characterized by a joint value proposition towards the customer. The value proposition consists of complementary modules provided by the partners. Complementarity can be manifested in two ways (Jacobides et al., 2018; also see Farrell and Saloner, 1985; Parker and Van Alstyne, 2005): Either one module cannot function without another – this is called uniqueness (Jacobides et al., 2018) – or one module increases the value of another, which is called supermodularity (Milgrom and Roberts, 1990). In ecosystems, complementarity occurs on both the production and consumption side (Jacobides et al., 2018). Due to that complementarity, if one ecosystem partner fails or leaves an ecosystem, it will fail as a whole. The resulting dependency amongst the partners creates a setting in which the leader of the ecosystem, the so-called orchestrator, does not have the full hierarchical control. Instead, it must align the partners towards the joint value proposition by creating sufficient incentives and motivation (Jacobides et al., 2018). This makes ecosystems an intermediate form between market and hierarchy: On the one hand, the orchestrator needs to lead the ecosystem partners and align them towards the joint value proposition. On the other hand, it is also dependent on them and cannot lead based on strict contracts and hierarchy (Jacobides et al., 2018).

Furthermore, since modules are complementary to one another, partners involved in an ecosystem need to co-specialize their respective modules. The more co-specialization is required, the more specific the investments of the partners are, and the lower is the fungibility of those investments. This, also, leads to stronger dependencies (Jacobides et al., 2018) and an important implication in the context of our paper: If an orchestrator wants to convince the potential partners, it needs to show the benefits of doing so – typically, by presenting a compelling business case or return on investment (Datée et al., 2018). Since more co-specialization leads to higher risks, we can expect the degree of co-specialization to have an influence on how difficult this task will be. As Datée et al. (2018) and Lingens et al. (2021b) pointed out, the uncertainty can be expected to be another important factor: The more uncertain the future success of the ecosystem, the more it might be difficult to provide compelling incentives for potential partners.

2.2. Why is the definition of the ecosystem's value proposition so challenging and specific?

The focus on the joint value proposition and the implications arising out of complementarities differentiate the ecosystem concept from related constructs such as alliances or networks, which are lacking the focus on a joint value proposition. For explanations on the differences between ecosystems and alliances or networks, please, see the conceptual works of Jacobides et al. (2018) and Adner (2017). Thus, we cannot expect to find useful findings related to our specific research question in those fields but must rely on the works specifically devoted to ecosystem research. On the other hand, supply chains or mere platform ecosystems are characterized by settings of bilateral and hierarchical relationships. They are lacking the challenges that emerge out of the specific hierarchical setting of ecosystems focusing on innovation (Adner, 2017; McIntyre and Srinivasan, 2017; Ozalp et al., 2018; Panico and Cennamo, 2020).

All of those aspects lead to the challenges of ecosystem governance in general. On top of this, there are specific challenges when it comes to the definition of new value propositions in the context of emerging ecosystems. What we know from existing literature is that

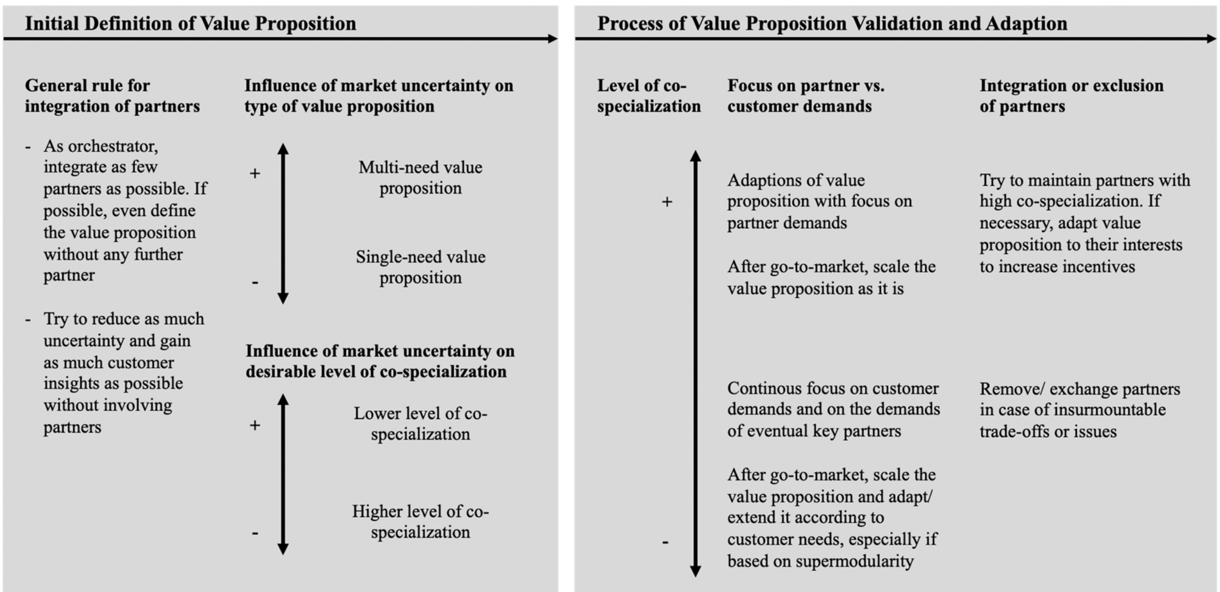

Fig. 2. Value proposition definition process: 3D-printed ski boot, digital-car-key-on-smartphone, digital factoring, and autonomous bus.

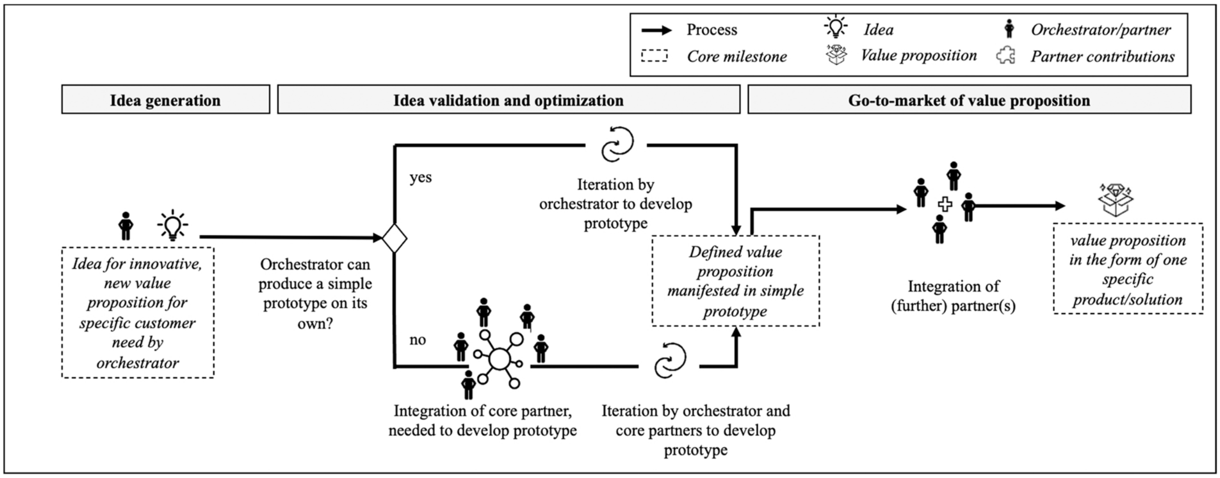

Fig. 3. Value proposition definition process: Case Mobility Provider.

orchestrators are typically coming up with an initial idea for a novel value proposition, trying to find suitable partners, and convince them to commit to the ecosystem (Dattée et al., 2018; Jacobides et al., 2018). As explained above, we can expect the level of co-specialization to play a significant role in this regard: The higher the co-specialization of a partner's module, the higher and the more specific the investments for the partner, and the higher the resulting risks (Jacobides et al., 2018). On the other hand, the level of market uncertainty will make it more or less difficult to depict the market potential of the future value proposition. Thus, both factors can be expected to be important in the initial phase of designing the value proposition.

We can also expect that, after an initial idea for a new value proposition and the definition of a rough ecosystem blueprint, the process of bringing that value proposition to the market will not be a linear and straight-forward one. The definition of innovative and complex solutions is usually taking place in an iterative and customer-oriented setting with lots of learnings and adaptions (Brown, 2008; Micheli et al., 2019). But this is particularly challenging in an ecosystem since the actors are all dependent on each other and need to be incentivised to contribute to the joint value proposition, even if it has to be changed in the course of iterations. Given the setting of mutual dependency and strong coordination efforts, orchestrators need to find a way of reducing complexity and governance effort througout that process (Adner, 2017; Dattée et al., 2018; Jacobides et al., 2018).

On top of this, we can expect another challenge to occur: Given the lack of literature we do not know for sure, but at least we can expect, that an ecosystem's specific setting somethere between hierarchy and free market co-operation plays a role in how the value proposition will be definied. This setting forces the orchestrator to respect both the customers' and the partners' interests when adapting the value proposition (Dateé et al., 2018; Jacobides et al., 2018). The simultanous partner and customer focus cannot be de-coupled, since product development usually takes place in an agile setting with iterative cycles of defining value propositions, testing them, and improving the value proposition based on that. If, for instance, the value proposition changes due to customer testing, so might change the incentives for and contributions of the partners. And if that happens, whom to optimise for -– The customer or the partners? And what happens if a partner is no longer suitable given a change of value proposition? In this regard, we

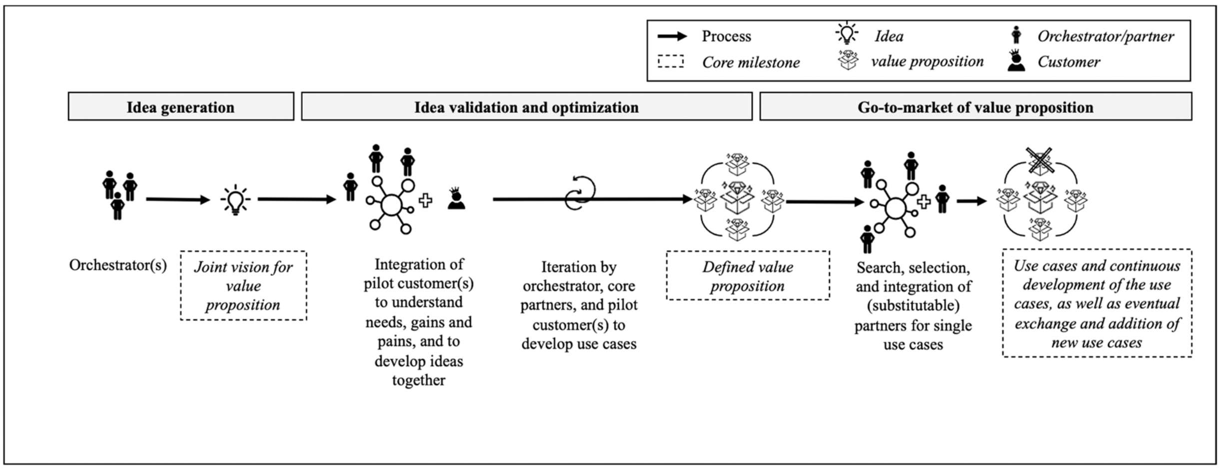

Fig. 4. Value proposition definition process: Car datalytics, Mobile payment.

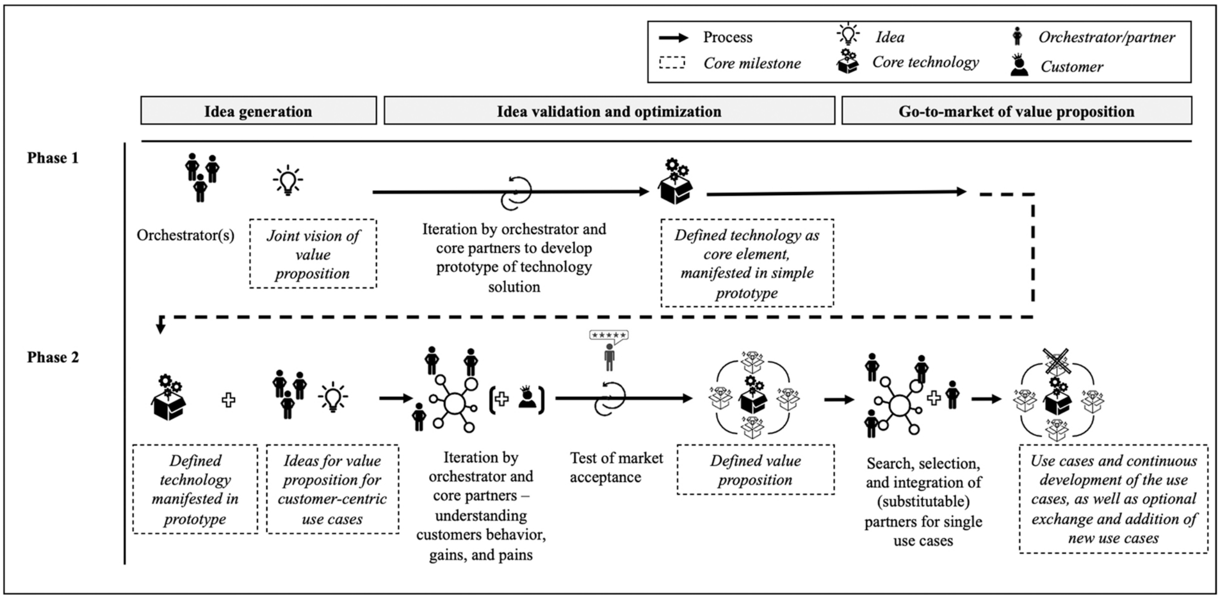

Fig. 5. Value proposition definition process: Car sharing case.

can also expect the coordination efforts to factor in. Given the lack of clear hierarchy, the orchestrator needs to use "smart power" and clever negotiations to align the partners instead of merely relying on hard contracts (Brusoni and Prencipe, 2013; Gulati et al., 2012). Since all modules are complementary to each other, ecosystems are characterized by multilateral links and connections amongst the partners involved. And both aspects are the reason why alignment in ecosystems causes higher coordination costs in product development than traditional supply chain settings with their bilateral and hierarchical connections (Adner, 2017). This raises the question of how orchestrators are dealing with those efforts and complexity during a value proposition definition process. Thus, in the process of value proposition testing and adoption, we need to understand how orchestrators can make sure that the value proposition creates sufficient value for both the customer and partners and what are the influencing factors to be resepected when doing so.

Taken together, we are looking at three key aspects in order to answer our overarching research question: First, how to come up with an initial idea for a value proposition and convince partners to commit to it and how do aspects such as uncertainty, incentives, and levels of co-specialization affect that process? Second, how to set-up the iterative process of value proposition adaption? And, third, how to find a way to align both customer and partner interests along that process? But before we can investigate on those questions, we first need to look at answers being provided by existing literature.

2.3. What do we know already about the definition of new value propositions in the context of emerging ecosystems and what is the resulting gap in literature?

The question of how value propositions are being created has always been very prominent within ecosystem research (Adner, 2017; Jacobides et al., 2018). Thus, we might expect to find answers on our above-mentioned questions very easily. However, as mentioned in the introduction, most of this literature is focusing on established ecosystems and value propositions emerging out of the interplay of existing partners. For instance, some works are focusing on value co-creation in ecosystems around the aspects of competition, cooperation, and value capturing (e.g., Adner and Kapoor, 2010, 2016; Brusoni and Prencipe, 2013; Clarysse et al., 2014; Hannah and Eisenhardt, 2018; Hoffmann et al., 2018; Khademi, 2020; Letaifa, 2014; Lingens et al., 2021a). Others are studying co-evolution, mutual learning, and knowledge sharing amongst partners and how this affects the value proposition (e.g., Adner and Kapoor, 2010; Alexy et al., 2013; Brusoni and Prencipe, 2013; De Meyer and Williamson, 2020; Frankort, 2013; Ritala et al., 2020).

These aspects are certainly of interest in the context of emerging ecosystems, too. But. logically, studies on already existing ecosystems with existing partners do not provide answers to the question of how to define an initial value proposition for a future ecosystem and how to create incentives for future partners. In regard to the other two key questions mentioned above, which are related to the adaption of value propositions in between partner and customer interests, we are facing another major gap in research: Ecosystem literature has largely ignored those aspects since it has not yet moved towards analysing dynamic processes of value co-creation that go beyond the implementation of pre-defined blueprints (Thomas and Autio, 2020). Also, existing works are largely ignoring the role of the customer, as Thomas and Autio (2020:13) pointed out, based on their review of recent literature: "the end user is generally reduced to that of a more or less passive recipient buying the system-level orchestrated offering". Thus, the process of value proposition adaption and iteration in an ecosystem setting is still largely unknown. The same is true for the question of how and why orchestrators are optimising the value proposition in favour of partners or customers (Aversa et al., 2020; Thomas and Autio, 2020; Jacobides et al., 2018). Thus, our research question in general and the more specific aspects as depicted in the literature review are still unanswered yet higly relevant, which strongly calls for initial research on those aspects. In the following section, we will explain the methods having been used for that purpose.

3. Methods

There is almost no research that has studied how new value propositions are being defined in the context of de-novo ecosystems and this process can be expected to be a complex and iterative endeavor with many different activities and boundary conditions. Qualitative case studies are an appropriate method to address such research questions and especially novel and under-researched topics with complex patterns, trajectories, and mechanisms (Eisenhardt, 1989, 1991; Yin, 2014). Thus, we view a case-study a suitable methodology. Our goal is to study different combinations of co-specialization and complementarity as well as different levels of uncertainty since, based on our literature review, we expect those to have a strong influence. This calls for a multi-case study instead of merely relying on a single case, since a multi-case study is particularly beneficial to yield rich insights and to create results with better generalizability (Eisenhardt, 1991; Ozcan and Eisenhardt, 2009; Yin, 2014).

3.1. Case selection

Our case selection was guided by several criteria: First and foremost, we only selected cases that can be seen as ecosystems according to the conceptual foundations being used for this paper (Adner, 2017; Jacobides et al., 2018; Thomas and Autio, 2020). Accordingly, all cases needed to show some level of complementarity (either unique or supermodular) in both consumption and production (Please, see Table 1 for an overview). Second, the respective value propositions had to be brought to the market to display the full value proposition development process and needed to enjoy some commercial success since we wanted to focus on cases that represent successful approaches. Third, since we wanted to yield generalizable insights and understand how different types of complementarities and co-specialization influence the value proposition definition process, we tried to get cases that represent all types of complementarities, different degrees of co-specialization, and with higher or lower uncertainty. Also, we studied ecosystems with orchestrators that were established firms and spin-offs/ joint ventures as well as start-ups. Such diverse sample of cases makes it certainly more difficult to yield particularly deep findings. But this is not our intention since, given the lack of insights on our research question, we aim to be amongst the first to develop an initial set of findings, which will hopefully spark future research on individual findings. And for such goal, using a very diverse sample of cases is beneficial because it usually allows for better pattern recognition and comparison of cases (Eisenhardt, 1991; Eisenhardt and Graebner, 2007). In general, firms in an ecosystem are usually from very different industries (Moore, 1993). Thus, similar types of partners (e.g., software company, service company, hardware partner etc.) occur in almost all our cases, which allows for comparability amongst the cases as well (Eisenhardt and Graebner, 2007).

3.2. Data collection

The data collection took place in several iterative steps. We conducted interview rounds with the orchestrator, to explore the basic structure of the ecosystem. In later rounds, we did so to understand in detail how the value proposition and partner structure changed over time and to learn about the partners, their respective inputs, dependencies, and the value proposition in detail. We started with the orchestrator because that firm is usually driving the ecosystem development, sketching the blueprint of the ecosystem, and is involving the partners (Datée et al., 2018; Hannah and Eisenhardt, 2018). Afterwards, we conducted further semi-structured interviews with other ecosystem partners to increase the validity of our findings (Gibbert et al., 2008). Interviews lasted between 30 and 100 min and were recorded and promptly transcribed; notes were taken during the interviews and, together with the interview partner, sketches of the ecosystem mechanisms and of the interactions amongst the partners were drawn. In parallel and after the interviews with the orchestrator and other ecosystem partners, we used complementary sources for triangulation to validate the findings and avoid biases (Jick, 1979). These included both internal firm sources and publicly accessible sources. It was particularly easy to get insights into the value proposition via external documents since the firms were selling them to their customers. This, also, allowed for external triangulation based on sales brochures, product information, and so forth. Additionally, we extensively used follow-up emails and calls with the interview partners. We studied the ecosystem development over a time of several years until they seemed to be in a stable condition without projected major changes. We do not know whether the ecosystems will change again in the future. But we view this limitation as acceptable given the focus on emerging ecosystems. Since all ecosystems brought their value propositions to the market and adopted them to the challenges they were facing, we assume that all ecosystems finished the "emerging" and were entering the "expansion" or even "leadership" phase according to Moore (1993). This hints towards them becoming established ecosystems. Thus, we believe this is the right moment to stop the analysis (please, also see Dateé et al., 2018). Table 2 summarizes our data sources.

3.3. Data analysis

Our data analysis looked at the full process of how the value proposition came into being – From the initial idea all the way to market introduction and scaling. Two of the authors individually mapped out the full process for each individual case in detail and compared the cases afterwards. Every single step of that process, including eventual changes of partners, were backed up with quotes and evidence in the coding process. For a deeper understanding of our coding approach, please, study the exemplary coding scheme displayed by Fig. 1. In a further step, we paired the cases to identify differences and similarities in the development process of the focal offer, in order to build patterns in an iterative manner (Eisenhardt1989; Ozcan and Eisenhardt, 2009). As a result, we found four different processes that are displayed by Figs. 2–5 in the appendix. Thus grounded, we specifically looked at the changes and iterations of the value proposition and the "why" behind those changes and tried to identify the root causes and barriers. Our data analysis showed some similarities in the overall process of value proposition definition but significant differences within the individual process steps, which we were able to trace-back to deferring levels of co-specialization, complementarity, and uncertainty – the aspects we expected to find based on our literature studies. These findings serve as the foundation for our findings, which we will present in the following section.

4. Findings

4.1. Different types of value propositions require different approaches in convincing partners to initially commit to the ecosystem

Previous literature suggests that a typical approach in newly emerging ecosystems is for orchestrators to come up with an idea for an innovative value proposition and to use the resulting prospect on future returns to convince partners to join (Dateé et al., 2018; Lingens et al., 2021b). This is necessary to compensate for the significant risks created by the co-specialization of partners' modules (Jacobides et al., 2018). We could observe the same in our cases, however, with some differences across the cases. First, we could observe that some ecosystems' value propositions are about solving a multitude of different customer needs, others just one.

Regarding the latter, in some cases (e.g., 3D-ƒprinted ski boot, digital-car-key-on-smartphone, digital factoring, and autonomous bus case), the value proposition was a new and very innovative product or service. For instance, for the 3D-printed ski boot, a company had to develop a new hardware and software device that allows sales associates to scan the customers' foot as a foundation for the 3D-printed ski boot. Or the autonomous bus required several partners to purposefully develop not just the bus but also the charging infrastructure and the traffic control systems. As a result, all cases were characterized by high degrees of co-specialization and relatively high complexity from a technological perspective, as the CEO of the 3D-printed ski boot company said:

> "We had technologies that didn't exist before and that no one has ever combined like that. There was a lot of uncertainty whether everything was technically feasible." (A1)

This makes it also quite difficult for the orchestrator to convince potential partners to commit to the ecosystem. From a market perspective, however, all these cases were addressing customer needs that have been well known and addressed by previous, yet less innovative or powerful, products. For instance, the 3D-printed ski boot is basically a ski boot but with a perfect fit. The innovative factoring solution is a standard financial loan for small-and-medium-sized firms but, due to an innovative insurance and software, also suitable for firms with poor credit ratings. The digital key is a direct substitute for a traditional key. Or the car sharing case was all about providing (rental) cars but with a different approach due to peer-to-peer car sharing. Accordingly, market uncertainty was relatively low as the CEO in the digital-car-key-on-smartphone case highlights:

> "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. We gathered evidence and briefly checked whether there is a market [.]but that just refined and essentially confirmed the picture." (B1)

But there are also ecosystems with value propositions addressing a variety of customer needs. For instance, in the car-datalytics and mobile-payment-solution cases, the purpose was not to create a product for the customer. Rather, to create a technological solution, on which a platform could be based upon in a second step that would address a variety of customer needs within a certain field. For instance, in the mobile-payment case, the solution is basically an answer to Apple Pay or Samsung Pay and allows payments in stores but also further use cases such as peer-to-peer payments via the app. Three initial partners, a bank, a software solution provider, and a leading national retailer, founded a joint venture acting as the orchestrator. They created the technological core of the payment solution together. Even though the business case was not very clear at the beginning, the three partners were bound together by the fear of losing ground due to technological disruption in their fields:

> "One trigger was that we said the mobile payment issue was coming up and we don't have anything like that in the pipeline." (G5)

Given the high market uncertainty, they were not entirely sure about the specific use cases at this stage. So, they started with a vision of how their solution would allow mobile payments in the stores of the retailer, with some additional, potential, use cases in mind. Initially, even though they were not able to specify the customer needs to focus on. But the three partners believed their combined market power and unique technology would allow them to develop a variety of different value propositions. This compensated for the high degree of co-specialization and resulting risks, whilst the difficulty to copy a solution based on the intense co-specialization of several strong partners created a decent USP as well. On the downside, compared to the single-need cases, the two-step approach of building a technological core first and then adding further solutions in a second step takes more time: Whilst the single-need cases arrived on the market within 1–1.5 years, these two multi-need cases with core technology took 3–5 years. This is particularly challenging since, given the uncertain value proposition, there was no clear initial business case beyond the vision for a future multi-need value proposition.

The situation in the mobility-provider case was a mix of both situations. The value proposition aggregates existing means of personal transportation on one platform. Potential customers are firms being interested in providing such mobility solution to their employees. After completion of a journey planned and booked via the platform, the costs are automatically charged via the customer's Enterprise Resource Planning (ERP) system. Again, the orchestrators did not start with a specific value proposition but with a vision that was strong enough to convince initial partners to commit to the ecosystem:

> "With our ecosystem, we want to offer mobility customers greater added value by combining core competencies from different industries and from different companies." (E1)

That vision involved several steps: First, building the mobility solution itself, which aggregates different means of transportation, intelligence, and ERP-system integration. This was not entirely new for the market since integration of employee benefits into an ERP system or the intelligent combination of different means of transportation on a single platform had been existing themes. However, combining those in one solution had some degree of novelty. And, as a future vision, the ecosystem was supposed to integrate solutions beyond mobility as well. For instance, in-app entertainment or news for those travelling. Accordingly, market uncertainty for the first step was in between of what was present in the ecosystems addressing single-needs and the other ones addressing multiple-needs. Initial market uncertainty for the future solutions was very high, but those were not targeted at that point and, thus, not problematic.

In the multi-need cases with technological core, we can observe unique complementarity: The core does not add value to customers without the solutions and the solutions do not work without the core. This leads to high levels of co-specialization for the core but lower levels of co-specialization for the future, additional, services. In the mobility case, the different solutions (booking a journey and ERP integration) would work in isolation but they have greater value when being offered in combination, which points towards supermodularity. Again, the initial solution was based upon higher levels of co-specialization whilst all potential solutions that could be offered in the future would be integrated with lower level of co-specialization. This results in the following propositions on what we furtherly define as single-need vs. multi-need value propositions as well as the influence of market uncertainty on the desired level of co-specialization:

P1. : The greater the market uncertainty, the more beneficial a multi-need value proposition is to convince partners to join the ecosystem. The lower the market uncertainty, the more advantageous the implementation of single-need value propositions.

P2. : The more a value proposition or an element of the value proposition targets customer needs with greater market uncertainty, the more advantageous it is if the modules required to implement it are characterized by a lower degree of co-specialization.

So far, we were focusing on the value proposition, without referring much to the ecosystem partners. And there is a very simple reason for that: The partners were usually not present at this stage! At the beginning, the approach of defining the value proposition was mostly identical across all cases characterized by lower uncertainty/ higher level of co-specialization. The orchestrators had the initial idea for the value proposition and given the above-mentioned lower market uncertainty, they were able to validate the market potential within a few rounds of validations and optimizations with pilot customers. This typically led to minor changes of the value proposition or the related business model. For instance, in the 3D-printed ski boot case, the orchestrator realized that it is anatomically impossible one's own foot. This resulted in the idea of performing the scanning process in specialized stores instead of relying on online sales and caused the necessity to involve a sports retailer. In the car-sharing case, the orchestrator realized that users needed a specific car insurance to cover damages caused by tenants, which made the involvement of an insurance company a top priority. This is also why, at this stage, the orchestrators tried to avoid involving any further partners. As the CEO of the digital-car-key-on-smartphone case described that:

> "The effort can only be managed by keeping the number of partners low." (B1)

The CEO in the payment case equally confirmed how important it is to keep the number of partners low at this stage:

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

Thus, one reason was to reduce complexity. Another one was that it would have been difficult to convince partners to purposefully develop unique modules for a joint value proposition, if there is not even a validated business case:

> "We must first show that what we have here, as a vision, works." (B1)

Accordingly, all orchestrators in those cases that were able to create an initial prototype for testing and design-thinking (as in the 3D-printed ski boot and digital-car-key-on-smartphone cases) did not even involve any partners at this stage but did the testing all by themselves. In the cases digital-factoring and autonomous bus, this was not possible because of a lack of knowledge and/or resources. For instance, in the digital-factoring case, the insurance and the lender were the most important partners, so they had to be involved at this stage, as explained by the Chief Marketing Officer:

> "And what we realized together with the insurance company and the funding partner was that the portfolio of different types of credits was our sweet spot, we could claim [towards the customer] that we are always able to provide an attractive offer." (C1)

The same could be observed in the cases with value propositions addressing multiple needs: In the mobility-provider case, the three orchestrators created a joint vision for the value proposition based on their combined knowledge and experience: The car manufacturer was an expert on mobility, the software company on IT and software, and the consulting firm provided expertise on ERP-system integration. Since all these fields were relevant, the partners were essential co-orchestrators from the very beginning onwards and performed the iterative cycles of value proposition ideation and customer testing all together. However, similar to the cases above, only the essential partners were involved up-front, whilst the less significant ones or those contributing to further use cases joined later. This leads to the following proposition:

P3. : For the initial testing and optimization of value propositions, it is advantageous to involve as few partners as possible (in the best case, no partners at all) and to optimize the value proposition so that, above all, it meets customer needs as closely as possible.

4.2. Different approaches are needed to adapt value propositions for the customers whilst simultaneously addressing partner interests

After the initial validation of the value proposition, the orchestrators selected further partners for its implementation. Again, our cases revealed significant differences in how those partners and the ones having been involved previously influenced the value proposition. It appeared that any changes of the value proposition were strongly affected by the degree of its co-specialization. In the digital factoring case, the insurance and the lending company expressed that they were unwilling to insure individual invoices but insisted to insure entire portfolios only to achieve higher financial returns. Given the high levels of co-specialization, it would have been very difficult to exchange those partners. The result was a change of the value proposition instead, as explained by the CMO:

> "How much of the change was driven by our partners? Certainly 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)

And this case also shows another aspect: In case of higher levels of co-specialization, the value proposition needs to be quite innovative and better than existing solutions on the market: Adaptions of the value proposition in favor of partner instead of customer demands can only work if the value proposition is still competitive, even after such changes. The CMO of the digital factoring case confirms that:

> "This [the value proposition] has certainly been driven by the founders of the ecosystem, who defined the solution [i.e., value proposition]. We knew that the customers would certainly demand the solution." (C1)

However, in the very same case, another partner was integrated into the ecosystem that did not need to co-specialize the respective module. Later, the orchestrator found out that the partner did not fully meet customer expectations, which led to its instant replacement. In other words: The same orchestrator who was willing to even adapt the initial value proposition and change the target customers because of the demands of the bank and insurance (both partners had to co-specialize their modules significantly) was very quick in exchanging a partner whose module did not require much co-specialization.

Same in the car sharing case, which is interesting because the value proposition is based on both supermodular and unique modules. The first needed lower levels and the latter higher levels of co-specialization. The CEO confirmed that the focus was on the partners providing the unique modules with high levels of co-specialization:

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

Thus, the value proposition was developed with a focus on the partners providing the unique modules, following a market check with the customers:

> "It was only when the prototype was ready and the value proposition was clearly defined, that we presented it [to the customer]." (H1)

In the cases with multi-need value propositions, this process was more complex but showed the same mechanisms. All value propositions were based upon a technological core (consisting of modules with high co-specialization) and further supermodular modules with lower co-specialization delivering the actual value for the customer. The idea was to create the technological core first and find specific customer needs and use cases in the field of payment in a second step, as the CEO of the orchestrator points out:

> "It was very atypical. We knew that it would be a big deal if we bring that to the market. For sure, we [the initial partners] said that we first build the system that works for us. […] The customer as such? In the beginning? I'd say he was unimportant, because we knew we had to focus on the system [payment solution] first." (G5)

And this led to a challenge: The value proposition is a mere recombination of existing solutions the customer could buy from other sources as well. The necessary supermodularity implied that exactly the right modules had to be combined for the customer. For instance, the most desirable means of transportation or IT-based solutions that offered the best benefit for the user. Thus, based on the vision mentioned above, the modules chosen for the value proposition and the way how they were combined via the app was strictly defined based on customer needs and feedbacks in several iterative design-thinking circles, as the head of the automotive division pointed out:

> "We said we need to have a pilot client, with whom we could sketch out the value proposition of this first MVP. [.]. We have only one single truth in the universe, and that is the customer, the customer's opinion is the absolutely most important." (E1)

This is also nicely shown by the mobility case: The initial key partners were involved early on because, given their higher levels of co-specialization, it would have been difficult to exchange them. But the further partners that had been involved after the initial definition of the value proposition did not need to significantly adapt their modules, resulting in lower co-specialization. Thus, it was easy to exchange them if required by the customers and the orchestrator was willing to do so:

> "There are categories of partners, such as a providers of e-scooters, [.] that will be exchanged if their services do not meet the customers' needs." (E1)

The same is true for the car-datalytics case, which is based upon a technological core with specific use cases to be implemented later. In both cases, the firms were tackling the high market uncertainty by starting with a technological core, based on unique complementarity and higher co-specialization, in order to create a strong USP. In a second step, they intended to build a platform on top of that core, based on supermodularity, to potentially address a multitude of customer needs. Thus, in both cases, the initial technological solution was optimized primarily for the partners but once they started to implement use cases, they shifted entirely to a customer focus as the CEO of the car-datalytics orchestrator said:

> “We were very confident, inside-out driven, to get something exciting. Now, the company is becoming more and more like an outside-in company. [.]. We did surveys with more than 500 customers to define the value proposition” (F1)

And a fellow board member adds:

> "The customer chooses the services" (F3)

This reasoning leads to the following propositions:

P4. : For value propositions with a higher degree of co-specialization, further adjustments and optimizations of this value proposition are made with a focus on the requirements of the partners but not of the customers. With lower levels of co-specialization, this process is characterized by a continuous customer focus.

P5. : The higher the degree of co-specialization of a partner’s modules, the more the value proposition is aligned with that partner’s interests to maintain its commitment to the ecosystem. The lower the degree of co-specialization of a partner’s modules, the more likely that partner is to drop out in the event of divergent interests or performance issues.

But adaptions of the value proposition did not stop after successful go-to-market, at least in some cases. In all cases with value propositions being based on supermodularity and lower levels of co-specialization of those supermodular modules, the orchestrators strived to improve and extend the initial value proposition. This was possible since, given lower co-specialization and supermodularity, modules could be replaced, or further modules could be added rather easily as described by the CEO in the digital payment case:

> “Then we furtherly developed the product, adapted it, and brought it to the market, and regularly added new features. But we continue to develop, expand, improve, simplify. There is no freeze, the world does not stand still, and there are still many use cases that should be included. New use cases lead to more users.” (G5)

By contrast, in the cases characterized by unique complementarity and high levels of co-specialization, the value proposition remained largely unchanged over time. This is, since on the one hand, the effort of developing the initial value proposition is quite high. And once the value proposition is on the market, the firms are strongly interested in getting a return on their investments and use the window of opportunity in which the value proposition is still highly novel and competitive. On the other hand, it would be difficult to change the value proposition due to the high levels of co-specialization of its modules. The 3D-printed ski boot case is a nice example: Once the solution entered the market, the firm is focusing on scaling it by integrating further retail partners in the domestic market and abroad. Same for the digital factoring orchestrator, who involved several further sales partners into the ecosystem. This leads to another proposition:

P6. : The more the value proposition is based on supermodular modules with lower levels of co-specialization, the higher the likelihood that this value proposition can be adapted and extended over time.

5. Discussion and implications for theory as well as calls for research

Our findings provide theoretical contributions to the stream of literature related to ecosystems focusing on innovation (Adner, 2017; Jacobides et al., 2018; also, see Thomas and Autio, 2020). More specifically, on the question of how new value propositions are being defined in emerging ecosystems. Fig. 6, the summary of our findings, shows the key contributions that emerge out of this research.

Fig. 6 covers both the findings on the initial definition of value propositions at the beginning of an ecosystem initiative as well as the process of how this initial value proposition is being adapted to partner and customer demands. Regarding the first aspect, we show that orchestrators are trying to reduce market uncertainty as much as possible before involving any partners. However, this is only possible if they can do so in isolation without the need of involving further partners or co-orchestrators. Otherwise, they must respect both the interests of customers and co-orchestrators/ partners at the same time from the very beginning onwards. This adds another perspective on the finding of Lingens et al. (2021b), who claim that multi-orchestrator ecosystems have a less efficient governance structure compared to single-orchestrator ecosystems. We show that any setting that involves further ecosystem partners from the very beginning onwards is prone to creating value propositions with less value for the customer given the simultaneous partner focus. Future research might validate this finding by quantifying the effects of such differences in ecosystem governance.

Also, this adds to Dateé et al.’s (2018) finding regarding the ecosystem blueprint, i.e., the "protovision" of the future ecosystem. According to Datée et al., (2018), such blueprint is important to convince partners to commit to the ecosystem. Our findings hint towards that blueprint being particularly relevant for ecosystems driving a value proposition characterized by higher levels of co-specialization. In such case, the orchestrator is defining the initial value proposition in isolation or with just a few partners and needs to convince further partners based on the business case and blueprint that results from this value proposition. It needs to be very convincing given the higher risks for the partners resulting from higher levels of co-specialization. However, if the orchestrator cannot build the prototype for customer testing in isolation, the blueprint is less relevant at the beginning: Since key partners are involved from the very beginning onwards, they do shape the value proposition and the resulting blueprint of the ecosystem jointly with the initial orchestrator(s). Thus, a blueprint is mostly important for the further partners. These, however, are providing minor contributions with less risks involved, which might make it easier for the orchestrator to convince them. On the other hand, the blueprint is not the only means to convince partners in situations of higher uncertainty, as we point out: Multi-need value propositions are helpful in this regard as well. However, they are also more costly and take more time to be implemented. Consequently, we can argue that higher uncertainty leads to higher costs of ecosystem built-up! Again, this might be another interesting avenue for future research and validations.

This leads to another contribution to our understanding of ecosystems emergence, according to the call of Jacobides et al. (2018). Lingens et al. (2021b) show that the uncertainty of the environment influences the ecosystem's alignment structure and the expected strength and competitiveness of the value proposition, which makes ecosystems less favorable in situations of high uncertainty. We can offer a more fine-grained view on that finding. The higher the market uncertainty, the lower the level of co-specialization of the value proposition should be. As an implication, value propositions with lower levels of co-specialization seem to be more favorable under uncertain regimes, whilst lower market uncertainty makes it suitable to implement those with higher levels of co-specialization as well – Arguably, the latter might be more innovative. We hope that future research will focus on the question whether ecosystems are generally less favorable in situations of higher uncertainty and/ or how this affects the management of ecosystems in uncertain regimes.

The right side of our framework and related propositions 4 and 5 show that the process of value proposition definition is decoupled, if higher levels of co-specialization are present: In the beginning, the orchestrator is focusing entirely on the customer, attracts potential partners with an interesting business case based on that value proposition, and, once the partners are committed to the ecosystem, switches focus and is optimizing the value proposition predominantly with partner interests in mind. As our cases show, the eventually resulting adaptions of the value proposition according to the partners' but not based on the customers' wishes require a very innovative value proposition: It needs to be still attractive for customers even in case of an eventual optimization away from their demands. As an implication, firms driving such type of value propositions via an ecosystem approach need to select ideas accordingly and search for those very innovative and very strong ideas. And it shows that the customer-orientation of a value proposition is strongly determined by the co-specialization of modules! This provides an extension to the findings of Shipilov and Gawer (2020) who state that ecosystems with stronger average complementarities are likely to create more value for the customers. Our findings hint towards the argument that value propositions are more customer oriented, and thus more likely to create greater customer value, if the degree of co-specialization is lower. On top of this, this offers a contribution to the findings of Kamalaldin et al. (2021) that customers are "active shapers" of ecosystems. According to our findings, we can confirm that statement, however, not in general: The lower the level of co-specialization, the more the customers are active shapers. The higher the co-specialization, the stronger the role of the partners compared to that of the customers!.

This finding provides another contribution to the calls of Jacobides et al. (2018) and Snihur et al. (2018), who claim that the ecosystem is characterized by a hierarchical setting somewhere between a strong hierarchy (e.g., as present in a supply chain) and a free market. However, they motivated research answering the question of what the drivers for different degrees of hierarchy are. Our propositions show that the degree of co-specialization is paramount in this regard: In case of lower degree of co-specialization, the orchestrator clearly is in a strong position, involving the partners based on their contributions to the value proposition and removes them from the ecosystem whenever needed. In such situation, we can expect a stronger hierarchy. In case of higher co-specialization, the orchestrator is initially driving the ecosystem initiative but, once the partners are on board, they have a strong influence on the definition of the value proposition and on the course of the ecosystem. And in case of higher levels of co-specialization, the key partner (s) are acting more like co-orchestrators, being on the same level as the initial orchestrator. Lingens et al. (2021b) showed that the initial orchestrator's network and knowledge are drivers for the hierarchical setting within an ecosystem. Our findings contribute to that by showing the additional relevance of the degree of co-specialization. And this shows a potential trade-off: Higher degrees of co-specialization might result in a stronger USP, since a value proposition based on intense collaboration is arguably more difficult to copy than one being based on a mere recombination of existing modules. However, such higher degrees of co-specialization would also result in a less customer-oriented value propositions. And such value proposition might be more difficult to be changed and adapted over time. We hope that future research will investigate on the question of whether there is an "optimal" degree of co-specialization from this perspective. And, given our paper being qualitative in nature and a pioneering work, we would like to encourage future studies in general that validate our findings and create further insights on the question of how value propositions are being defined in emerging ecosystems. In general, a quantitative validation would address the usual limitations that come with any qualitative study such as ours.

6. Implications for practice

Besides theoretical contributions, our findings yield important implications and recommendations for practitioners as well. We found that both the market uncertainty as well as the degree of co-specialization have major influences not just on the process of value proposition definition, but also on the structure and management of the emerging ecosystem. We believe that Fig. 6 shows a valuable framework for practitioners and provides them with hands-on recommendations on the most important aspects to be considered when coming-up with new value propositions in emerging ecosystems. Beyond these recommendations, we would like to highlight a few aspects in particular.

The degree of co-specialization is important for practitioners in several ways. First, the higher the degree of co-specialization, the stronger the initial value proposition needs to be since further adaptions of it are likely to be made in favor of the partners. We can expect that the degree of co-specialization of a future value proposition can be assessed already in the ideation phase. Thus, if managers involved in that process expect a higher degree of co-specialization, they need to evaluate whether this value proposition has the potential to create a particularly strong value for the customer! This is even more important since higher degrees of co-specialization make it more difficult to convince the future partners. Thus, without sufficient returns by the value proposition, the business case and incentive for the partners might not be sufficient.

In the same vein, they need to understand the consequences for ecosystem hierarchy: Higher degrees of co-specialization lead to a weaker hierarchical position of the orchestrator. Even more so if the value proposition can only be tested together with initial key partners. If a firm intends to have a strong position within the future ecosystem, it should, therefore, consider to de-prioritize value propositions with higher degrees of co-specialization!.

On top of this, managers need to keep in mind the influence of market uncertainty. The higher the uncertainty, the more multi-need value propositions might be favorable, leading to higher costs of ecosystem built-up and longer time needed as well. And, as pointed out in the discussion section, the higher the uncertainty, the lower the degree of co-specialization should be, which might lead to less innovative value propositions with lower USP. Thus, in situations of higher market uncertainty, or if the firm desires a particularly strong USP, or high degree of innovativeness, managers involved in ideation processes for future ecosystem value propositions might lean towards those value propositions that can be implemented with lower degrees of co-specialization.

Thus, we believe that our findings reveal very specific recommendations for practitioners and demonstrate that market uncertainty and the degree of co-specialization are very important aspects that should be considered when defining value propositions and building-up de-novo ecosystems in practice.

Declarations of interest

None.

Appendix

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