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Business Model Innovation through Open Innovation: Empirical Evidence from the Automotive Industry

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Abstract

Although open innovation (OI) has been characterized as one key driver for business model innovation (BMI), the literature lacks an in-depth understanding of how OI influences the business models (BM) of new ventures. However, such an understanding is crucial for improving the value creation and value capture for technological innovations in inbound OI settings. Based upon a unique data set of 19 new ventures from 7 countries, which participated in Europe's largest OI platform, this study finds that OI leads to an expansion in the customer segment, a greater focus in the value proposition, a shorter (but deeper) value chain, and challenges to the revenue model. The paper highlights important theoretical contributions for the BMI and OI literature, and derives tangible managerial guidance for entering OI partnerships.

Keywords

Business model innovation, Open innovation, Automotive industry, New ventures

1. Introduction

Business model innovation (BMI), defined by Casadesus-Masanell and Zhu (2013, p. 464) as "the search for new logics of the firm and new ways to create and capture value," has become increasingly decisive for commercializing technologies, gaining sustainable competitive advantages, shaping industries, and increasing firm performance (Seiferlein et al., 2023). The elaboration of these new value creation and value capture logics into a consistent business model (BM), in which the customer segment, value proposition, value chain, and revenue model are coherently defined, is thereby of key strategic importance to entrepreneurs and a source for innovation in and of itself (Zott & Amit, 2010). However, despite two decades of research, the academic understanding of how BMI is achieved, and how this affects the elements of a BM, remains limited—particularly for new ventures (Foss & Saebi, 2017).

One of the foremost suggestions for purposefully enabling BMI can be found in the open innovation (OI) literature, which argues that BMI is facilitated by deliberately integrating external partners into the development of new BMs (Foss & Saebi, 2017). Following this reasoning, companies

should use OI to validate assumptions about the customer segment, value proposition, value chain, and revenue model and innovate these BM elements based on feedback from external partners (Ibarra et al., 2020). However, thus far, this recommendation has been primarily derived from anecdotal evidence or purely conceptual works (e.g., Chesbrough & Rosenbloom, 2002; Saebi & Foss, 2015). Accordingly, Foss and Saebi (2018) concluded that the impact of OI on BMI requires further academic scrutiny.

We argue that the need to understand the consequences of OI on BMI is especially critical for new ventures due to the increased flexibility of their BMs, smaller companies' greater reliance on OI to overcome their liabilities of size, the fact that new ventures' perspectives on OI are underresearched, and the collaboration between incumbents as stimuli for new ventures' BMI needs further scholarly attention (Albats et al., 2021; Spithoven et al., 2013; Urbaniec & Żur, 2021). Given this starting point, new ventures might particularly benefit from previously identified benefits of OI, such as increased creativity, more successful technology exploitation, and improved market access, to advance their BMI (Chesbrough & Appleyard, 2007; Chesbrough & Schwartz, 2007; Marullo et al., 2018).

Therefore, we ask the research question: How does OI influence BMI in new ventures? We answer this by applying a qualitative research approach, based on a sample of new ventures that participated in Europe's largest OI platform between 2016—2022. Building upon a rich and unique data set, including interviews with founders, CEOs, and key personnel of 19 new ventures from 7 countries, we provide empirical evidence of how OI impacts BMI alongside the BM components customer segment, value proposition, value chain, and revenue model.

In so doing, we provide three main contributions: First, we heighten the understanding of how BMI is fostered—which is among the most frequently-cited gaps in the BMI literature (Seiferlein et al., 2023).

Second, by studying how OI influences BMI as a context-specific factor, we answer the requests for further research on an issue expressed in recent BMI and OI literature reviews (e.g., Foss & Saebi, 2017; Spender et al., 2017).

Third, we provide valuable managerial lessons for entrepreneurs and corporate managers engaging in OI, especially since BMI and strategic management are inherently linked (Casadesus-Masanell & Ricart, 2010).

The remainder of the paper is structured as follows. Section 2 provides the theoretical background on BM and BMI, OI and open BM, and the connections between them. Once done, we introduce our methodological approach, before presenting our findings and integrating them into the ongoing academic and managerial discussion.

2. Theoretical Background

Business Models and Business Model Innovation

BMs have been defined as "management's hypothesis about what customers want, how they want it, and how the enterprise can organize to best meet those needs, get paid for doing so, and make a profit" (Teece, 2010, p. 172). Hence, they serve to define the economic boundaries for converting technological inventions into viable innovations, and link the company-internal technological sphere with the market (Chesbrough & Rosenbloom, 2002).

With this architecture of operations, BMs influence the diffusion of novel technologies and speed of market penetration, for which an innovative BM itself could well be a decisive factor (Urbinati et al., 2019). Moreover, BMI represents an additional opportunity to differentiate from the competition (Chesbrough, 2007a).

However, conducting BMI is often characterized as a challenging, multifaceted, and interwoven strategic activity, for which new ventures routinely lack the requisite knowledge (García-Gutiérrez & Martínez-Borreguero, 2016; Kraus et al., 2022). Moreover, the existing literature offers new ventures only limited empirical guidance (Snihur & Zott, 2020). Indeed, it tends to only offer instruction on conducting experiments with BM configurations and integrating company-external feedback to reduce a BM's technological and market

uncertainties (Micheli et al., 2020).

Similarly, Trimi and Berbegal-Mirabent (2012) and Ibarra et al. (2020) have advocated for integrating customers for pursuing BMI to validate hypotheses and achieve consistency between a new venture's offerings and customer expectations. However, Hossain (2017) concluded in his BMI literature review that there is still a significant scarcity of knowledge on customer integration for BMI. Among those gaps is how customers influence the outcome of BMI in detail (Micheli et al., 2020).

From a theoretical lens, these recommendations resonate with OI, which is frequently-mentioned in the BMI context, but rarely explicitly discussed (Saebi & Foss, 2015). Thus, recent BMI literature reviews call for more empirical studies on the intersection of BMI and OI (e.g., Foss & Saebi, 2017).

Open Innovation

Chesbrough and Bogers (2014, p. 3) defined OI as a "distributed innovation process based on purposively managed knowledge flows across organizational boundaries, using pecuniary and non-pecuniary mechanisms in line with the organization's BM." The literature differentiates between inbound OI, which is concerned with creating value through integrating external inputs (e.g., ideas, know-how), and outbound OI, which uses external paths to a market for commercializing excess assets (e.g., patents). OI is thus a potential strategy with which to increase firms' creativity, gain access to new markets, reduce costs and risks, and ultimately improve profitability (Chesbrough & Appleyard, 2007; Chesbrough & Schwartz, 2007).

In a recent study of 251 European companies, Teplov et al. (2019, p. 26) found that inbound OI is more prevalent than outbound OI, while highlighting that only "free revealing, scanning for external technologies, subcontracting R&D, customer co-creation in R&D projects, and idea and start-up competitions" were commonly acknowledged as OI practices by the participants. Their results accorded with Spieth and Meissner's (2018) observation that the academic discussion of OI is primarily concerned with advancing technological innovations from an R&D perspective.

However, in environments with increasing R&D costs and shrinking product life cycles, Chesbrough (2007b) proposed applying OI not only in R&D, but also following an open business models logic.

Open Business Models

According to Weiblen (2014, p. 57), "an open business model describes the design or architecture of the value creation and value capturing of a focal firm, in which collaborative relationships with the ecosystem are central to explaining the overall logic". Hence, the interactions between customers and suppliers in an open BM transcend straightforward selling and sourcing transactions in that they also involve a deeper integration of value creation and capture (Weiblen, 2014). For instance, this is typically the case for car manufacturers, where suppliers account for approximately 75% of the created value and profoundly influence their partners (Seiferlein et al., 2023).

Frankenberger et al. (2014) argued that inconsistencies in a BM, the pressure to find a new BM for value creation and value capture, collaboration experience, imitation of open BM patterns, and the blurring of industry boundaries are conducive for open BMs.

However, empirical evidence still lacks details on how this openness influences BMs (Holm et al., 2013). Saebi and Foss (2015) argued that the economic benefits of OI for BMI are determined by BM configuration, as well as the breadth and depth of the applied OI strategy. Their purely conceptual work suggested that new ventures with radical innovations should design their BM through intensive collaboration with key partners, which is also in line with Pynnönen et al.'s (2012, p. 11) recommendation to integrate customers into the BMI "from the very beginning".

In the same vein, Marullo et al.'s (2018) cross-sectional study of start-ups identified a positive correlation between the integration of external knowledge and successful technology exploitation. However, neither of these studies have provided empirical insights into exactly how firms do this, nor how this affects the BM in detail. This disparity is in line with the knowledge gap on

how BMI arises in new ventures, as well as which role the integration of customers or other firm-external actors play in BMI (Andreini et al., 2021; Hossain, 2017; Snihur & Zott, 2020).

Consequently, Spender et al.'s (2017) literature review on startups and OI concluded with a call to investigate new ventures' BMI using qualitative research methods based upon original data. Accordingly, we seek to narrow this research gap with the present study.

3. Methodology

Research Design

Case-based research is particularly well-suited to studying the dynamics of complex processes with limited pre-existing theoretical foundations, exploring relationships between interrelated concepts, and advancing theory building based on the examined cases (Gehman et al., 2018). Since all of these aspects apply to our research question, we opted to apply a qualitative research approach (Andreini et al., 2021).

Next, we chose a research context likely to allow for replication between the studied new ventures (Eisenhardt, 1989). Thus, we focused our attention on the automotive industry, which is especially appropriate for studying the effects of OI on BMI for four reasons:

First, the industry is traditionally highly collaborative with long-standing experience in co-developing innovations in a tier structure of manufacturers (Jacobides et al., 2016). These structures include: Tier 1, system suppliers; Tier 2, parts suppliers; and Tier 3, raw material suppliers.

Second, the industry is confronted with increasing cost pressure and shrinking product life cycles, as well as market pressure to develop more autonomous, connected, and sustainable mobility options, thereby further emphasizing the need for BMI and OI (Ili et al., 2010; Leemann et al., 2021; Seiferlein et al., 2022).

Third, the industry is increasingly following Chesbrough's (2007b) recommendations to use OI to create and capture value with BMI (Spieth & Meissner, 2018).

Fourth, the automotive industry commonly utilizes Startup Autobahn—Europe's largest OI platform as measured by the number of partners and implemented projects (Daimler AG, 2021; Startup Autobahn, 2020). Since its inception in July 2016, the platform has grown to include 29 corporate partners, and 289 new ventures from 43 countries have developed 380 prototypes, of which every fourth has achieved commercialization following the experimentation phase (Schwarze, 2021).

Drawing our sample from this well-established program allowed us to control for potential influencing factors, such as differences in program design, cross-check inferences between multiple participants of the same program, and benefit from a large variety of interview partners. Moreover, Startup Autobahn is a stage-agnostic program for new ventures, thereby enabling us to gain in-depth insights into OI's influence on BMI irrespective of the maturation of new ventures. Accordingly, this served to increase the generalizability of our findings.

Finally, the program connects new ventures with incumbents from the automotive industry, including such car manufacturers as Mercedes-Benz, Hyundai, and Porsche, and automotive suppliers like BASF, Bosch, Schaeffler, and ZF—who can become potential customers for a commercial pilot R&D project with the new venture. As such, these collaborations between new ventures and firmly-established corporates fit the OI archetype from a practitioners' perspective, thus increasing our study's practical relevance (Teplov et al., 2019).

Data Collection

Following Gioia et al. (2012), we collected extensive primary and secondary data through various means.

First, we conducted 19 semi-structured interviews with founders and C-level representatives of emerging firms headquartered in Austria, Bulgaria, Finland, Israel, Germany, Slovakia, and the United States, all of whom had participated in Startup Autobahn since its inception. The participants were randomly selected and approached either in-person, via social media, or through the snowballing technique (Biernacki & Waldorf, 1981). We conducted the interviews in either Ger-

man or English, and transcribed them within 48 hours of the interview. Our interviews included questions about the BM before their participation in Startup Autobahn, the introduction of changes during and due to the program, and the lessons they had drawn from their participation. Moreover, we also asked individual follow-up questions.

Second, we conducted in-person field visits to Startup Autobahn's OI events in Stuttgart, Germany, and attended virtual community meet ups to engage in an informal exchange with representatives of new ventures, such as CEOs, CFOs, and members of the founding team.

Third, we also attended IAA Mobility 2021 (the world's largest mobility fair) in Munich, Germany, in order to meet Startup Autobahn alumni in an industry-specific setting and learn more about the venture's development. Collectively, the field notes and meeting memos gathered for the primary data greatly enhanced our understanding.

Moreover, we extensively collected secondary data from such sources as podcasts, public interviews with the founders and collaboration partners of the new ventures, and Startup Autobahn's own publications (e.g., video recordings of pitches and community events). Additionally, we searched for academic and lay publications about the program with search engines, such as EBSCO Host, Google Search, and Google Scholar, to triangulate our findings.

Having completed the above steps, we collected and analyzed the data iteratively until we reached theoretical saturation, as suggested and defined by Thornberg and Charmaz (2014).

Data Analysis

We followed Gioia et al.'s (2012) guidelines for the data analysis, which included coding the transcribed primary and secondary data in MAXQDA, and built a data structure to categorize our findings. Hence, we formed informant-centric first-order concepts, data-driven conceptual second-order themes, and connected them with established aggregated dimensions in the BMI literature. Consequently, we related each of our twelve second-order themes to one of the four BM components customer segment, value proposition, value chain, and revenue model as found in Frankenberger et al. (2013). This final abductive aggregation enabled cross-fertilization within the BMI research domain, contributed to consolidation within the BMI literature, and allowed us to follow an approach applied in other BMI papers (e.g., Daood et al., 2021). The result of the data analysis is illustrated in Figure 1a and 1b, while additional supporting quotes can be found in Table 2 in the appendix.

4. Findings

Our findings indicate that OI influences every component of the BM in three distinctive aspects. We explain these results in the following section.

Customer Segment

A BM's customer segment defines the target group for a company's offering (Frankenberger et al., 2013). Our data reveals that OI is conducive for extending the customer base, regardless of whether a new venture has previously been exposed to the specific industry. As such, OI can pave the way for getting in contact with key decision-makers in potential clients and securing their commitments more rapidly than in more closed business settings, thus easing entry into a new industry. One interviewed partner put this rather succinctly:

From our point of view, they [Startup Autobahn] opened us a network in the automotive industry that otherwise would have taken me, as a business developer, a very long time to reach the right contact. The opportunity to talk to a Porsche innovation manager at Startup Autobahn that knows the exact relevant contact and can open that door or make that reference is really, really helpful.

Interestingly, many of our interview partners—who strategically used OI to enter the automotive industry—strongly discouraged other new ventures from engaging in OI as early as possible, regardless of whether they may have been accepted to an OI program. Instead, they shared their experiences that being close to having a product ready, and reaching the tipping point between an explorative and exploitative mode, is

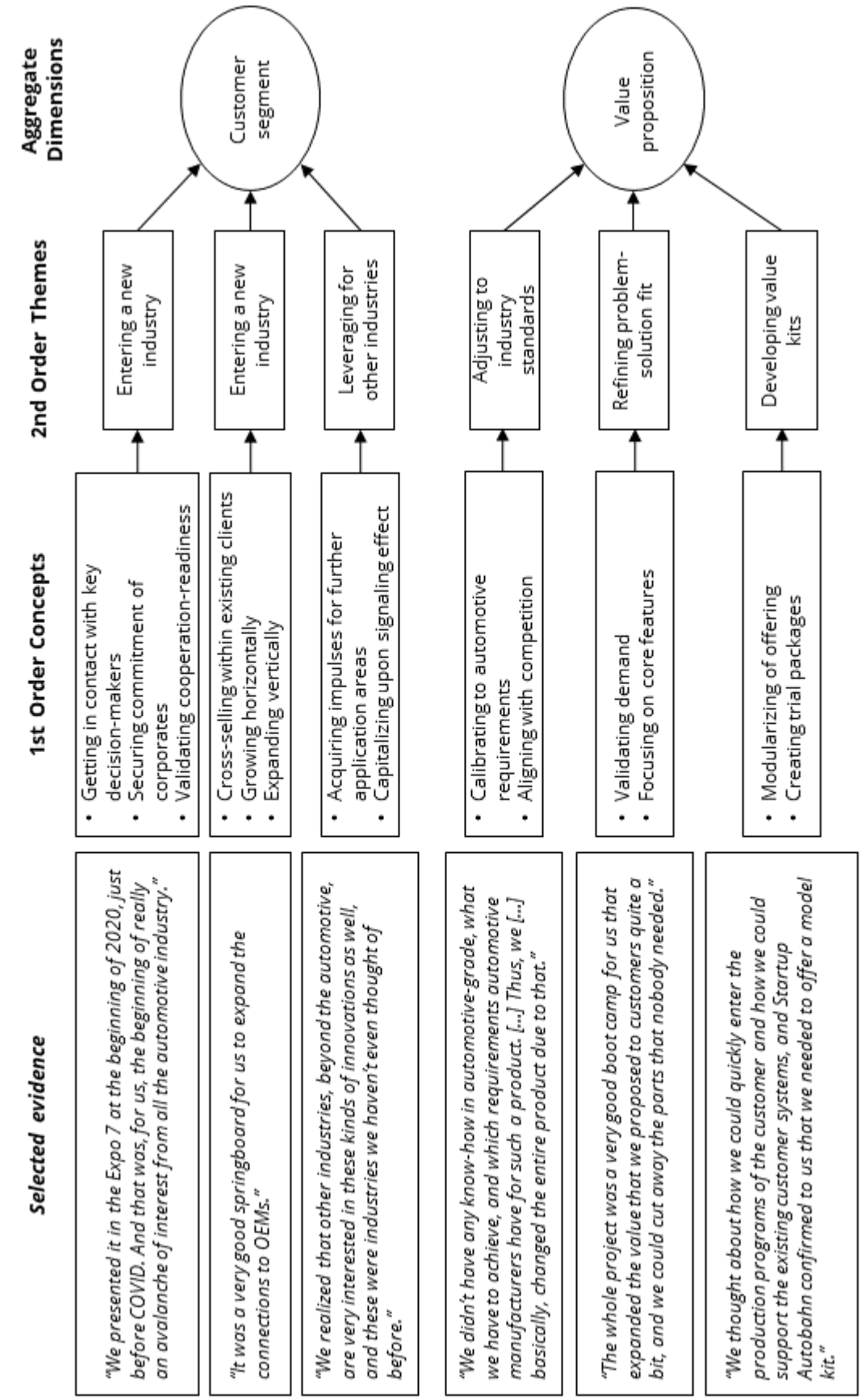


Figure 1a: Data Structure

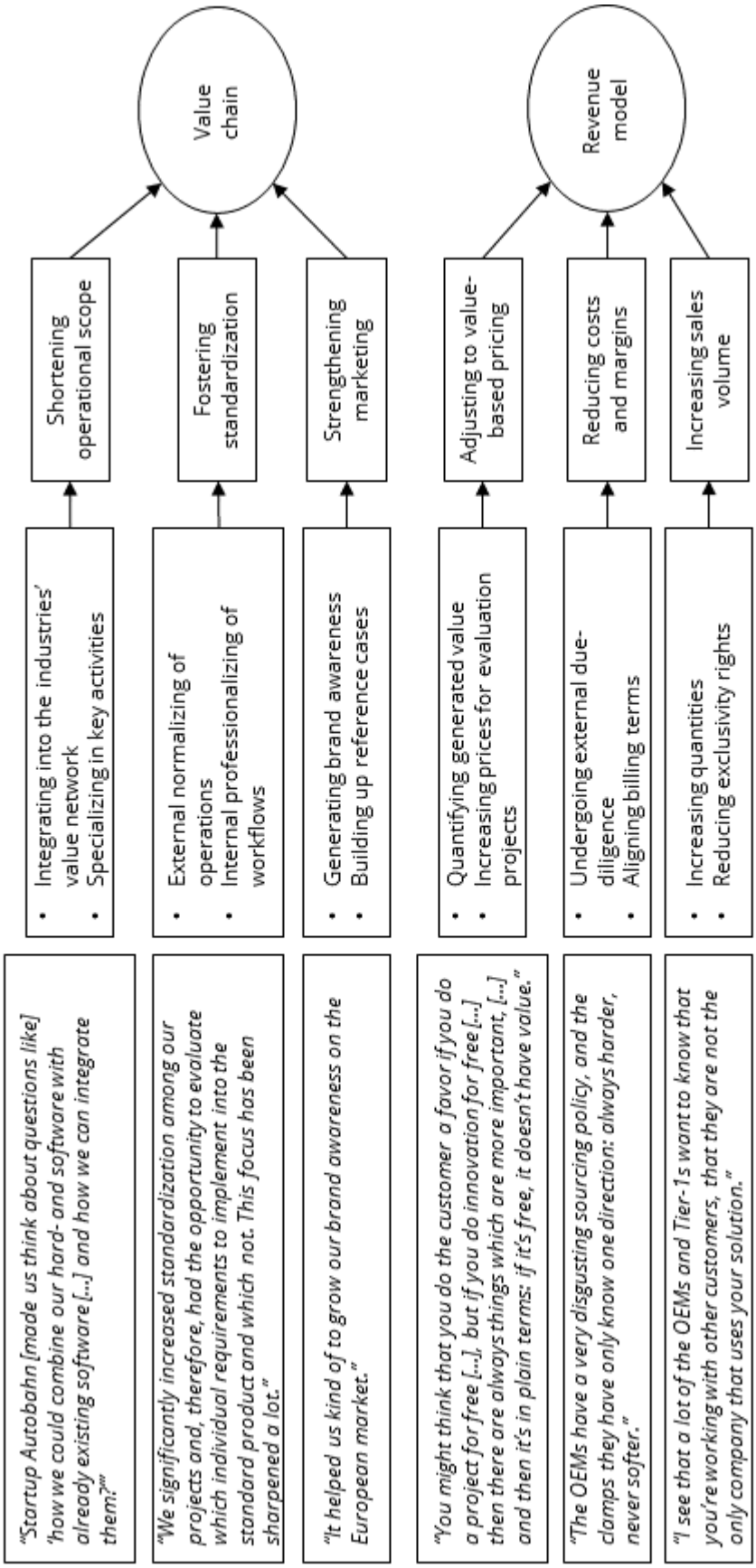


Figure 1b: Data Structure

Table 1: Interview List

#	Position	Country of ventures' headquarters
1	CEO & Co-founder	Austria
2	CEO & Co-founder	Bulgaria
3	Sales Director	Finland
4	CEO & Co-founder	Finland
5	CEO	Finland
6	CEO & Co-founder	Germany
7	Head of Business Development	Germany
8	Head of Marketing	Germany
9	CEO & Co-founder	Germany
10	CEO & Co-founder	Germany
11	CEO & Co-founder	Germany
12	CEO & Co-founder	Germany
13	CEO	Germany
14	General Manager	Israel
15	General Manager	Israel
16	Vice President	Israel
17	Head of Business Development	Slovakia
18	Sales Director	United States
19	Head of Business Development	United States

the optimal moment to use OI. Indeed, the CEO of a new venture explained:

It is crazy and not recommended to participate [in OI] at the beginning of the company, but at that point when you have a product, once you have market maturity, once you want to communicate directly and everything is scalable for the OEM, once you know what the customers want, and you know "we just have to make some little adjustments and then let's go." That's the moment when such a program makes sense.

An executive of another new venture similarly argued that detailed preparation is pivotal before OI makes sense, due to the thorough checks that even stage-agnostic programs entail for the BMs of new ventures:

My advice to startups coming to Startup Autobahn is don't come before you don't have all your answers ready. You really need to invest time, effort, and money in building that information brief that has all the answers that the industry is going to require. [...] You need to understand that you will be asked a lot of hard questions, and the answer cannot be, "We don't know," or, "We need to check." You really need to be ready.

For companies with a prior initial track record in the industry, OI influences the customer segment by significantly easing expansion within the industry. This is initiated by intentionally making the collaboration visible to the public and the collaboration partner's organization. One interviewee explained:

We produced one video for Mercedes and one for Porsche, wrote an article, and, of course, did several posts on LinkedIn. [...] This helped us get a good level of positive internal communication within the respective firms [...]. What we achieved, thanks to this, is that our product is currently rolled out to further Mercedes-Benz plants, and we're in talks with Porsche on further expanding there, too.

This openness also smooths expansion into additional application areas. The new ventures can thus utilize their innovative achievements in one industry alongside their public exposure to venture into areas. One interviewee summarized this thusly:

One could see that we were able to expand the types of customers we are able to target [with our solution] since we moved from a pure sales and

automotive retail solution to one that's also suitable for automotive engineering applications.

Interestingly, the positive benefits of OI for advancing the customer segment are not limited to industry boundaries. Instead, they inspire new ventures to seek additional potential markets, and cross-fertilize business development in adjacent and distant industries, such as aerospace, architecture, pharmaceuticals, and system and machine construction. Additionally, according to our primary data, they provide a signaling effect to stakeholders beyond the initial industry. One interviewee exemplified this point:

Startup Autobahn has been a boost for the entire company, even for customers who have nothing to do with automotives. Also, the communication of our project has been a boost for investors and sales in the architecture area. It helped us unquestionably to elevate the entire company to a higher level.

These extensions in the customer segment ultimately also lead to significant changes in the value proposition.

Value Proposition

The value proposition of a BM specifies which value-adding products and services are offered to the customer segment (Frankenberger et al., 2013). We found empirical evidence that—thanks to OI—new ventures meticulously reflect on their value proposition, gain an increased level of focus, and ultimately calibrate their offerings to established industry requirements. An interviewee explained:

From the technological solution point of view, it also gives more understanding of what kind of physical interfaces we really need to create, meaning the hardware interfaces and software interfaces, and what kind of standards and certifications we need to take care of and study in the long run.

A Co-CEO and co-founder added:

What helped us was to get a sort of a benchmark of what other business models are out there for engineering tools [like ours and] learn from the customer first-hand: What gets billed? What are the specific collaboration modes? What are the service levels, etc.? This led to an itemization of requirements.

Furthermore, this mix of in-depth and informal exchanges with a variety of industry experts enables new ventures to validate the demand for their solutions, as well as to identify in which areas they have a competitive advantage that should become the focus for their future value proposition. An interview partner exemplified this by stating:

Eventually, we decided to focus only on providing the foil for our automotive segment by ourselves, and not the electric controller [. . .] We just had to realize: We cannot offer an entire system, but we have to specialize ourselves onto the core technology.

Finally, OI supports new ventures in transforming their value proposition into modular offerings, from which customers have higher sourcing flexibility. Furthermore, OI motivates them to proactively decrease evaluation barriers from a customer perspective so as to attract additional customers in the future. One interviewee illustrated:

We were confirmed through [our participation in] Startup Autobahn that it's important to offer components which you can bundle easily [. . .] If you have industry partners, which have different business models, products, etc., they ask, "What can this startup contribute?" And therefore, I have to make it easy for them and offer a box, where I can say: "This is a working system, just try it out, you can adapt it easily to your needs." [. . .] This offering approach is something which has been encouraged by Startup Autobahn, and which we now offer.

All of these value proposition changes also impact the value chain.

Value Chain

The value chain details how organizations create and deliver the value proposition through orchestrating activities and processes (Frankenberger et al., 2013). According to Porter (2004, p. 46), it consists of the primary activities "inbound and outbound logistics," "operations," "marketing and sales," and "service," as well as the support activities "procurement," "technology development," "human resources management," and such "firm

infrastructures" as finance and general management. Our data reveals that new ventures capitalize upon OI to integrate their activities in the industry's value network, which leads to a shorter and deeper value chain within the new ventures. One co-founder summarized this through stating:

On the value creation side, a change occurred in the way we develop, which led us to open our ecosystem and purposefully decide to locate parts of the value chain in a partner.

The increased concentration of the value chain along the specialization in key activities facilitates a standardization for all of its remaining parts. Accordingly, new ventures heavily engage in the implementation of industry-specific certifications, such as ISO and DIN-compliances, and manage the professionalization of internal workflows in such a way as to improve collaboration with clients and the manufacturability of their solution. An interviewee explained:

The tricky thing is to rig up the collaboration management from a startup perspective in such a way that innovation management, product management, etc., is professionalized very quickly. However, this is challenging for firms, because within the Startup Autobahn [program] it's hectic, much is done in an "on request" fashion, and all this has to be transferred into a standard operation mode.

Finally, new ventures take OI as a vehicle for making significant adjustments to their value chain in terms of strengthening their marketing presence. In particular, they generate brand awareness and build up reference cases so as to fuel further growth:

We're in an industry where you don't have to ask, "Is there a non-disclosure agreement?" but "how many non-disclosure agreements are there?" [...] Therefore, it's always difficult for startups to get visible, and what helps is that such open innovation projects are, by definition, made accessible to a closing panel, a community, or, in the best case, even the press. And that is always very good because then you do have a reference case.

All of these changes in customer segment, value proposition, and value chain also impact the revenue model.

Revenue Model

The revenue model outlines a BM's financial aspects, and details the cost and revenue mechanisms through which a company intends to generate profits (Frankenberger et al., 2013).

Our data suggest that new ventures strategically employ OI to evaluate how much value their innovative solutions generate for customers—which is essential information for improving their profitability and own value capturing mechanisms. For example, one interviewee characterized this as follows:

What we have learned through DXC was that we were able to quantify how much savings in terms of money we can bring the customer. [...] So we learned a bit about how we need to price one of our solutions.

Concerning the pricing of OI projects, multiple ventures also made the thought-provoking discovery that increasing the price for OI collaboration serves to heighten the chances of a successful collaboration, since a higher price increases the visibility of the project within the corporate and guarantees management attention. One CEO elaborated upon this in detail:

We have a higher probability that the customer supports and actively works with us whenever we charge a substantial amount for such [OI] projects. Indeed, the projects that performed worse were those we did for free. These projects go on and on, lack the management attention because the senior management doesn't know what the frontline employees do, and therefore, the vice president doesn't know what the team leader does with us, etc. It all boils down to the question of how high-level the project is anchored. And this correlates directly with the project price. That's a question of commitment and a question of "Who's authorized to approve budgets?" And the more we charge, the higher the project goes in the hierarchy, and the more closely the project gets monitored, and the better the work that gets done at the bottom of the organization.

However, according to our data, after establishing an initial OI collaboration between the new venture and a corporate partner, the latter may increase the pressure on the cost and margins of

the former. This is done through applying their market power and in-depth industry know-how in estimating prices through the entire value chain. Therefore, corporate partners may impose their billing terms on new ventures, for instance, for extending due dates, and undertake thorough due diligence to uncover any potential for decreasing the cost of the new venture's solution from a customer's perspective. One interviewee described it thusly:

We had to decrease our overall costs considerably and display the pricing structure for the product very, very transparently to the OEM, but also to the Tier-1, and as a result, our revenue per square meter shrunk substantially.

Based upon the shared understanding that the industry prefers lower unit prices over lasting exclusivity rights for commercializing the new venture's solution in their end product, OI leads to increased sales volumes, which is mutually beneficial for both parties. An interviewee explained:

The automotive industry is not so eager to have a kind of exclusivity because even Porsche said to us, "You can talk to Daimler, you can talk to other car makers," because they understood that if [our solution] comes exclusively, then the price point will jump. And I think they have learned these kinds of lessons that it's better to be able to scale it to the huge volumes because, at the end of the day, it comes cheaper to them as well. But obviously, they want to have a certain advantage, perhaps, let's say, one or two years in advance so that they can be the first company to launch it to the marketplace.

In conclusion, our findings underline that OI also influences the revenue model. In the following section, we summarize and discuss our findings in the light of the ongoing academic debate.

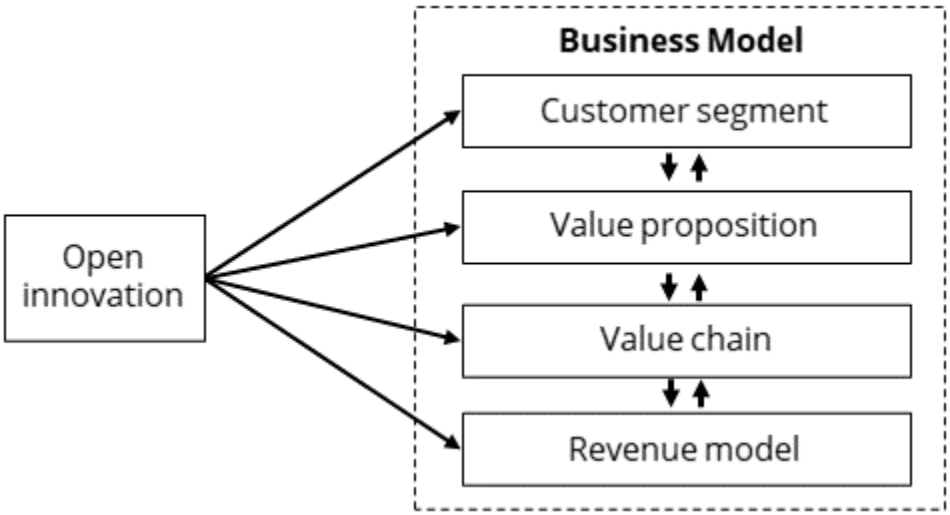
5. Discussion

This study examines how OI influences BMI in new ventures (Figure 2). To explore this issue, we applied a qualitative research approach based upon 19 new ventures which participated in Europe's largest OI platform. Through clustering our findings into customer segment, value proposition, value chain, and revenue model—as per Frankenberger et al.'s (2013) BM framework—we were able to empirically underline how new ventures achieve consistency within their BMs through pursuing OI with incumbents as their customers.

We provide empirical evidence of how OI leads to an expansion in the customer segment and enables new ventures to enter new industries, accelerate growth in entered industries, and leverage their experience in one sector to prepare for an expansion into others. Thus, we confirm previous findings that OI can enable new ventures to identify industries where their solutions can create value (e.g., Chesbrough & Schwartz, 2007). However, our results contradict the preeminent notion in the BMI and OI literature that a very early engagement in OI is advantageous (e.g., Pynnönen et al., 2012). Indeed, the experts in our sample consistently stressed the importance of thoroughly preparing the engagement in an OI platform in order to be ready to capitalize on the momentum for scaling the BM. Thus, based on our data, we argue that, if new ventures wait to commence OI until they are abundantly prepared, it will increase the odds that OI becomes the tipping point for a new venture to shift from an explorative to an exploitative mode. Hence, our data suggest that the managerial recommendation for BMI should not be to integrate customers "from the very beginning" (Pynnönen et al., 2012, p. 11), but instead at a point where the new venture is prepared to engage in a meaningful exchange with potential partners.

For the value proposition, we confirm Moschner et al.'s (2019) finding that OI is conducive for developing a value proposition from a new venture's perspective, and extend the literature by detailing OI's impact on the value proposition. Moreover, we found evidence to suggest that OI might increase the creative potential of what is offered to the customer (cf. Chesbrough & Appleyard, 2007). However, we have also demonstrated that the market pressure to comply with, and adjust to, established industry practices works against the creative push often associated with OI when viewed from a new ventures' perspective. Therefore, we argue that, in order to maintain the initial creative momentum, new ventures must balance their de-

Figure 2: OI Influence on BM Components



sire to receive early market feedback with the benefits of developing a solution detached from the direct influence of conformity with the dominant design.

In line with Chesbrough and Appleyard (2007), we have demonstrated that new venture's value chains become complementary to those already present in the industry. Given the predominance of open BMs in the automotive sector, this leads to a comprehensive integration of the new ventures into a global value network. Consequently, their value chain becomes both shorter and deeper due to specialization and standardization, thus limiting the creative potential for applying unusual practices for value creation in a so highly-regulated and standardized domain as the automotive industry. Thus, our data again underline that a premature engagement in OI might hamper the development of unusual approaches to create value.

Finally, we have stressed OI's influence on the revenue model and confirmed previous research emphasizing the cost reductions which can be realized through OI (cf. Chesbrough & Schwartz, 2007). However, our data also accentuates that—contrary to previous understandings in the literature—this does not improve profitability per se (e.g., Ili et al., 2010). Instead, new ventures' margins are challenged in an OI partnership between new ventures and corporates, thereby reflecting the unevenly distributed market power of the partners. This flipside of OI has been underemphasized in the literature, which could possibly be correlated with the lack of research on new ventures' perspectives.

Thus, in light of these findings and the persistent need to improve the academic and managerial understanding of OI's influences on BMI, this study encourages a careful reflection on the two following aspects.

First, the findings underline the importance of identifying the optimal point in time to engage in OI. As demonstrated, this is vital to offset certain disadvantages of OI, such as pressure on margins or loss of creative potential due to premature OI engagement.

Second, we stress that the gains for one OI partner can come at a price for the other. Consequently, we argue that taking the firm's individual perspective into consideration—for instance, concerning experience with industry requirements—is a critical managerial task before pursuing BMI through OI.

6. Limitations and Future Research

We conducted our study with high theoretical and methodological rigor. Nevertheless, we acknowl-

edge that our research is not free from limitations, which themselves may inspire future research.

We studied the effects of OI on BMI in an inbound OI setting in one industry. Accordingly, we here acknowledge that the effects may well differ between inbound and outbound OI, as well between industries (Spender et al., 2017). However, we mitigated the potential disadvantages of this research setting by examining the most relevant form of OI from a practitioner's perspective (Teplov et al., 2019). Moreover, we focused on an industry for which research calls for OI have been expressed, the need for BMI is preeminent, and which hosts Europe's largest innovation platform (Ili et al., 2010; Seiferlein et al., 2022; Startup Autobahn, 2020).

Moreover, our application of a qualitative research method may have limited the generalizability of our findings compared to other methods. However, we would argue that our adoption of this research method is well-justified given the sparse existing theoretical underpinnings. Furthermore, by studying 19 new ventures from 7 countries which participated in Startup Autobahn at different points in time during the last 6 years—and by following Gioia et al.'s (2012) guidelines to yield empirical results based on rigor—we believe that our findings are valuable and transferable for entrepreneurs and executives in similar settings. Nonetheless, we would value additional quantitative studies to further deepen the understanding of how OI influences BMI. These studies could build upon the identified relationships, quantify the individual impact of the first-order and second-order themes, and test our hypothesis with a larger sample size. Moreover, further studies could measure the impact of potential mediators on the OI-BMI relationship, such as the absorptive capacity, dynamic capabilities, strategic agility or the previous OI and BMI experience of the studied new ventures, to name but a few (cf. Foss & Saebi, 2017; Zhang et al., 2021).

Finally, our explicit consideration of the perspective of new ventures for examining OI's effects on BMI was due to persistent calls in the literature. Notwithstanding, we acknowledge that future studies with an inverse corporate perspective could complement our research and draw useful comparisons with our findings, as suggested recently by Milei (2022).

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