Innovation Beyond the Boundaries of the Firm – Essays on the Performance Implications of Interorganizational Innovation Strategies

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Abstract

Innovation Beyond the Boundaries of the Firm – Essays on the Performance Implications of Interorganizational Innovation Strategies

Christopher Kulins

Innovation constitutes one of the essential means by which firms outperform their competitors and contribute to economic welfare. As a result, substantial research has been conducted on how innovation can be managed. Thereby, in essence the purpose of innovation research is to enhance our understanding of the determinants, nature, locus, outcomes and sources of innovation and the particular environment in which it occurs. However, as a field that is significantly influenced by research observing past practices, it is often the case that research on innovation lags behind in explaining recent phenomena in today's organizations. Advances in communication technologies, for instance, led more and more organizations to experiment with new business model designs that span the boundaries of the firm, outsource R&D activities to loosely structured innovation communities via the web, or tap in to new technologies through direct equity investments in entrepreneurial ventures. Yet while these topics of business model innovation, corporate venture capital, and collaboration with innovation communities in the world of practice have great momentum, academic understanding of these phenomena is quite limited. The impact of these means of innovation on firm performance, and how organizations can effectively incorporate them into their innovation strategies, have only scarcely been investigated. Against this background, the purpose of this dissertation is to provide a more detailed analysis of these three fields and to deliver a deeper understanding of three of the most popular concepts within corporate innovation practice today.

In this context, the first article investigates the performance implications of business model designs. While the business model has long been conceptualized as a way to commercialize new products, it is increasingly perceived as a source of innovation and value creation in itself. Thereby, the seminal work of Amit & Zott from 2001 who suggest four interdependent value drivers on the business model level of analysis constitutes one pillar of this paradigm shift. However, the interdependencies between these drivers neither have been fully understood nor been tested empirically. Results from a qualitative comparative analysis of all e-businesses that went public on the NASDAQ or NYSE between 2009 and 2012 demonstrate that performance benefits hinge among the configuration of various value drivers. With these findings, we enhance the understanding of value creation on the business model level of analysis by proving the interrelatedness suggested by Amit & Zott and by showing distinct configurations of business model elements that form successful business models. Additionally, we further establish business model innovations as a promising alternative to product-, process- and service innovation.

In line with the observation that many of today's thriving business models incorporate an increasing number of partners, suppliers and other institutions outside the boundaries of the firm, the firms' innovation funnel is also characterized by increased permeability and engagement with external parties. While these collaborations in the past largely centered on collaborations with universities and think tanks, or the engagement in interorganizational R&D labs, organizations increasingly incorporate end-user input into the innovation process. To do so, they actively engage in innovation communities where users center around certain products or technologies. Thereby, the engagement in crowdfunding platforms especially as one type of an innovation community is currently gaining a lot of attention. Despite the ever-increasing number of members and transaction volumes the question of how innovations that have been co-developed within these communities perform in terms of product success has not been previously been answered. Thus, the second article provides first insights into this question. Investigating the whole population of video games of the most popular crowdfunding platform – Kickstarter – I demonstrate that products developed within innovation communities, indeed achieve above market performance. This performance increase is partly attributed to complementary product extensions provided by innovative users. With these results, I not only provide legitimacy to the emerging body of literature around innovation communities but also sound guidance to practitioners on how to benefit from these emerging communities.

While in the previous example of innovation communities the firm relies on the end-user to stimulate innovation, large industrial organizations across industries increasingly get in touch with startups to get access to new technologies. As one manifestation of this trend recent years saw a sharp incline of equity investments by established firms in entrepreneurial ventures. Research on these corporate venture capital investments has been conducted since the 1980's, whereat the existing studies rarely build on each other. Drawing on a comprehensive literature review on the most important articles and books on the topic that were published between 1984 and 2016, the last chapter of this thesis aggregates the existing literature enhance a more all-encompassing understanding. The resulting frameworks should allow for more cumulative progress in the field and provide managers with a practical foundation for structuring their corporate venture capital endeavors.

Content

Abbreviations

BA	Business angel
BM	Business model
BMI	Business model innovation
CEM	Coarsened exact matching
CVC	Corporate venture capital
fsQCA	Fuzzy-set qualitative comparative analysis
IVC	Independent venture capital
NASDAQ	National Association of Securities Dealers Automated Quotations
NYSE	New York Stock Exchange
OLS	Ordinary least squares
QCA	Qualitative comparative analysis
SDK	Software development kit
SEC	U.S. Securities and Exchange Commission
SUIN	Sufficient, but unnecessary part of a factor that is insufficient but necessary for the result
VC	Venture capital

1. Introduction

Some of the arguments and thoughts of this introduction stem from other research conducted by the author during his doctorate but which is not included in the main body of this dissertation.

I. *Trade-offs and Complementarities between Business Model Innovation and Product Innovation – A Qualitative Comparative Analysis*

Co-authored with: *Kai Hoth (first author)*[*]

Paper presented at the *7th Global Innovation and Knowledge Academy,* June 28 – 30, 2017 at the School of Economics and Management, Universidade de Lisboa, Lisbon, Portugal. This paper has further been submitted to the Journal of Business Research Special Issue on Quantitative Comparative (Impact Factor: 2.129, ISI Journal Citation Reports © Ranking: 2015: 40/120 (Business), VHB-JOURQUAL 3: B).

II. *Towards a Best Practice Framework in Business Model Innovation*

Co-authored with: *Annika Wittig (first author)*[*]

Paper presented at the 1st IEEE TEMSCON, June 8 – 10, 2017 in Silicon Valley, USA.

III. *Towards a Best Practice Framework in Business Model Design*

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[*] The entitlement of Christiana Weber on co-authorship was not entirely clear at the date of submitting the dissertation.

Paper presented at the 20th G-Forum, October 5 – 6, 2017 in Leipzig, Germany.

IV. *The Process of Business Model Innovation in New Ventures*

Co-authored with: *Christiana Weber (second author)*

Paper presented at the 34th Strategic Management Society Annual Conference, September 20 – 23, 2014 in Madrid, Spain; the 30th EGOS Colloquium, July 3 – 5, 2014 in Rotterdam, Netherlands and the Strategic Management Society Special Conference, March 9 – 11, 2014 in Tel Aviv, Israel.

1.1. Understanding the development of innovation management research

There is widespread agreement that for organizations to improve their financial performance it is important to innovate (DeCarolis & Deeds, 1999; Guo, Lev, & Zhou, 2005; Li & Atuahene-Gima, 2001; Porter, 1980; Schumpeter, 1934). Thereby, for the most part of the 20th century, innovation has mainly been conceptualized within the boundaries of the firm (e.g. Chandler, 1977; Cooper, 1990; Shrivastava & Souder, 1987). Accordingly, a large body of research on innovation has centered on internal design issues like culture (e.g. Amabile, 1998; Pinto & Prescott, 1988; West, 1990), process models (e.g. Cooper, 1990; Wheelwright & Clark, 1992), overcoming resistance (e.g. Gemünden & Walter, 1996; Hauschildt & Kirchmann, 2001; Witte, 1973) or structural anchoring within the organization (e.g. Brandenburg, Brödner, Hetzler, & Schienstock, 1975; Souder, 1987). The main reasons given for this have been largely framed in terms of transaction cost theory (Coase, 1937). Many innovation-related activities such as the exchange of intangible assets (Pisano, 1990) or the production of new goods have been challenging to contract on the open market (Tushman, Lakhani, & Lifshitz-Assaf, 2012). Focusing on cost savings it is efficient for the focal firm to internalize activities whenever transaction costs are higher in the market than within the boundaries of the firm (Williamson, 1975, 1981). Given the high costs of information gathering, processing and storing, and the substantial costs of coordinating other market participants in pre-Internet times, innovation was largely conducted in-house (Altman, Nagle, & Tushman, 2016).

However, the world of organizations has changed significantly since these first Chandlerian approaches (Altman et al., 2016) to improve management processes and structures supporting innovation (Dodgson, Gann, & Phillips, 2015). Recent progress in communication and information technologies greatly reduced coordination costs and certain transaction costs (Anderson, 2010). In this new environment,

institutional logics (Friedland & Alford, 1991; Glynn & Lounsbury, 2005; Thornton & Ocasio, 1999; Thornton, Ocasio, & Lounsbury, 2012) based on Chandler's control and hierarchy based management paradigm, are increasingly being challenged by the notion of collaboration, openness and sharing (Benkler, 2006). Recognizing this paradigm shift, established organizations are in the process of incurring these new institutional logics. Thus, the traditional boundaries of the firm (Foss, 2002) and with it the traditional forms and sources of innovation are more and more questioned. This development lead corporations and academia alike to try to find new answers for the ever-present questions of "What are we innovating?" and "With whom are we innovating?"

In answering the first question, companies and researchers have long focused on product-, process- and service innovation. Since the rapid diffusion of the Internet and other information technologies, scholars and practitioners, however, increasingly focus on the business model (Hoth & Kulins, 2017; Kulins, 2016; Kulins & Weber, 2014; Massa, Tucci, & Afuah, 2017; Schneider & Spieth, 2013; Wittig & Kulins, 2017; Zott, Amit, & Massa, 2011) as the locus of innovation. Based on a comprehensive literature review, Zott et al. (2011, p. 1022) conclude that "interest in the concept virtually exploded in the 15-year period between 1995 and 2010". Several special issues (International Journal of Innovation Management, 2013, Vol. 17, Issue 1; Long Range Planning, 2010, Vol. 43, Issues 2-3; Long Range Planning, 2013, Vol. 46, Issue 6; R&D Management, 2014, Vol. 44, Issue 3; Strategic Entrepreneurship Journal, 2015, Vol. 9, Issue 1) and literature reviews (George & Bock, 2011; Massa et al., 2017; Schneider & Spieth, 2013; Wittig & Kulins, 2017; Zott et al., 2011) reinforce the impression that business models and business model innovation are "hot topics" within innovation management research today.

Also, the spectrum of answers regarding the second question changed substantially in recent years. While collaboration in innovation projects in the past mainly comprised consumers, suppliers or universities, organizations increasingly open up their innovation funnels and collaborate with loosely structured innovation communities or entrepreneurial ventures (Chesbrough, 2003, 2007). Transaction volumes of crowdfunding platforms as one popular type of innovation communities grew from $2.7bn in 2012 to over $30bn in 2015. Following this strong growth academic interest in the topic increased with growing number of contributions published in top journals. As 2014 only saw two top tier publications (Belleflamme, Lambert, & Schwienbacher, 2014; Mollick, 2014) in the first quarter of 2017 alone, at least nine crowdfunding papers appeared (Butticè, Colombo, & Wright, 2017; Chan & Parhankangas, 2017;

Courtney, Dutta, & Li, 2017; Davis, Hmieleski, Webb, & Coombs, 2017; Drover et al., 2017; Josefy, Dean, Albert, & Fitza, 2017; McKenny, Allison, Ketchen, Short, & Ireland, 2017; Short, Ketchen, McKenny, Allison, & Ireland, 2017; Skirnevskiy, Bendig, & Brettel, 2017). The citations of these articles also back the impression that crowdfunding is an "emerging trend" (Drover et al., 2017, p. 2). Within three years of its first publication Mollick's (2014) explanatory study on "the dynamics of crowdfunding" was cited more than one thousand times and was by the time of writing the most cited paper in the Journal of Business Venturing (Impact Factor: 4.204, ISI Journal Citation Reports © Ranking: 2015: 6/120 (Business), VHB-JOURQUAL 3: A). The article is closely followed by Belleflamme et al. (2014) - another crowdfunding paper.

Besides crowdfunding, where the focal firm collaborates with end-users without legal contracts, intra-firm collaborations between industrial organizations and entrepreneurial ventures are also more and more in the focus. One vehicle to incorporate the ventures knowledge stock is corporate venture capital (CVC) – direct equity investments made by established companies in privately held entrepreneurial ventures (Maula, 2007). Between 2012 and 2015, the number of CVC units doubled, making 2015 another record year with corporate investments amounting to $28.4 billion (CB Insights, 2016). A level that could be maintained throughout 2016 (CB Insights, 2017). In parallel to this increasing volume of investment, academic interest in this "emerging space" (Drover et al., 2017, p. 15) increased again (Basu, Wadhwa, & Kotha, 2016; Dushnitsky, 2012). This trend again becomes obvious with regard to top-tier publications where over half of all published articles have appeared since 2010.

Against this background, I conclude that business model design, corporate venture capital and innovation communities are "hot topics" in innovation research today and that a profound understanding of these topics is of equal importance for practitioners and scholars alike.

1.2. Research gaps in innovation management research

As with other fields within general business or management research, innovation management started off with the aim to help organizations to improve the efficiency and effectiveness of their management practices and processes during innovation projects (Dodgson et al., 2015). Accordingly, one cornerstone of innovation management research links innovation practices with firm performance to address

whether and how certain practices and processes create value (Crossan & Apaydin, 2010). However, recent calls for future research suggest that our understanding of the performance implications of intraorganizational innovation strategies is still limited and little. This is especially true for the previously identified topics of business model design, the incorporation of end-users into the innovation funnel, and corporate venture capital investments, which form important parts of these intraorganizational innovation strategies, but remain under-researched so far.

Business Model Design and Performance

Since the first literature reviews on business models Zott et al. (2011) and business model innovation Schneider and Spieth (2013), scholars ask "What are the relevant performance outcomes?" and "How do different business models compete?" (Demil, Lecocq, Ricart, & Zott, 2015, p. 9). In the first attempts to answer these questions, scholars began to classify firms' business models into sub-dimensions that make business models easier to describe. Amit and Zott (2001) in their seminal paper set forth four design themes that explain organizational performance: lock-in, complementarities, novelty and efficiency. Based on this classification researchers could establish a positive relationship between efficiency- and novelty-centered business model designs and financial performance (Zott & Amit, 2007, 2008). Given that in these two studies complementarities-centered and lock-in-centered business models were not related with firms' market value, they were excluded in subsequent studies (Brettel, Strese, & Flatten, 2012; Kraus, Brem, Schuessler, Schuessler, & Niemand, 2017; Mathar & Brettel, 2014; Wei, Yang, Sun, & Gu, 2014). However, if the Amit and Zott (2001) framework is meant to adequately explain performance implications of the business model concept, it either has to be rearranged due to the fact that half of the concept did not show significant impact on firm's performance, or to be understood differently; rather in a configurational and interrelated way, as proposed in the original work of Amit and Zott (2001). Recent examples of highly successful businesses support this rather configurational understanding as their business model is frequently composed of various design themes. Amazon, for example, disrupted the publishing industry through the introduction of the Kindle eBook reader, the corresponding Kindle Direct Publishing Platform and the Kindle Shop. Allowing authors to publish without costly intermediaries through self-publishing, Amazon established a novel linkage between writers and consumers, relying on strong complementarities with the Kindle eBook reader. Thereby, the associated Kindle store has been an efficient way for consumers to buy books, despite them experiencing a high lock-in, as purchased books cannot be transferred to other

devices. However, the strong synergies between various business model components led Amazon to dominate the eBook market with a market share of almost 75% in 2015 (Author Earnings, 2015). Therefore, if business models are understood as a highly interrelated concept, this interrelatedness should be considered in empirical studies. In this regard, chapter 2 provides a first study.

With its high dynamic and its strong interrelatedness with practice, innovation management is especially prone to management fads, that is, "widely accepted innovative interventions into the organization's practices designed to improve some aspect of performance" (Gibson & Tesone, 2001, pp. 122–123). Thereby, fads either evolve into new management practices and robust objects of research or disappear over time. A crucial point in this regard is to provide evidence that the assumed qualities materialize. Even though first conceptual work claimed that innovation at the business model level of analysis can be a source of competitive advantage (Afuah, 2004; Amit & Zott, 2001; Chesbrough & Rosenbloom, 2002), the business model for long was not fully accepted as an object of research. Instead, established scholars assert that the business model construct is "an invitation to faulty thinking and self-delusion" (Porter, 2001, p. 73) or "a buzzword" (Arend, 2013, p. 392). Besides the development of a sound theoretical foundation of the construct (Amit & Zott, 2001; Zott & Amit, 2009) within transaction costs economics (Williamson, 1975), strategic network theory (Dyer & Singh, 1998), the value chain framework (Porter, 1985), Schumpeterian innovation (Schumpeter, 1942) and the resource-based view of the firm (Amit & Schoemaker, 1993; Barney, 1991; Penrose, 1959; Peteraf, 1993; Wernerfelt, 1984), or its precise distinction from well-established constructs like strategy (Zott & Amit, 2008), the field in particular gained legitimacy through the first empirical studies that proofed the supposed performance implications of business model innovation (Pohle & Chapman, 2006; Zott & Amit, 2007, 2008). We further add to this legitimacy by proving the framework of Amit and Zott (2001) to be fully relevant to performance outcomes of firms when investigated with a method that incorporates more of the concept's configurational complexity.

Innovation communities

As described above, a crucial point for new concepts that emerge in practice and academia is to prove their usefulness in explaining competitive advantage or product success. One new concept that is termed to be not fully legitimized through research is the impact of innovation communities on success. Innovation communities come in various forms (Nambisan & Sawhney, 2009) of which crowdfunding platforms in

particular attracted a lot of attention from researchers and practitioners alike (Drover et al., 2017; Short et al., 2017). Building on ideas from crowdsourcing concepts, the current interest in crowdfunding platforms is partly based on the implicit assumption that these platforms help firms to tap into a global network of inventors, other innovative firms, end-users, and scientists that contribute to development of the focal firms' innovation endeavours (Agrawal, Catalini, & Goldfarb, 2013; Colombo, Franzoni, & Rossi-Lamastra, 2015). Assuming that these benefits, despite any empirical evidence, will materialize, the current debate centers around factors and processes that allow a successful management of the campaign. Recent studies, for instance, established the linguistic style of the pitch (Parhankangas & Renko, 2017), the type of the rewards (Butticè et al., 2017; Colombo et al., 2015), the attraction of early contributions (Colombo et al., 2015), or social capital (Colombo et al., 2015; Mollick, 2014; Skirnevskiy et al., 2017) as key success factors. While these studies are valuable contributions to enhance our understanding of the crowdfunding phenomena, an even more pressing question remains open: do these crowdfunding activities lead to higher performance compared to traditional innovation practices? Without answering this question, the existing research runs on the risk of becoming obsolete. In turn, scholars are increasingly reminding the field to refocus on the bigger picture. In a very recent special issue in the *Entrepreneurship Theory & Practice* (Impact Factor: 3.414, ISI Journal Citation Reports © Ranking: 2015: 14/120 (Business), VHB-JOURQUAL 3: A) on crowdfunding from March 2017, McKenny et al. (2017), for instance, asked the journals' editorial board members "How should crowdfunding research evolve?" (p. 1). As a result, the board members established a better understanding of the performance implications of crowdfunding as "a key question within crowdfunding research to date". Chapter 3 of this dissertation provides a first answer to this question.

Corporate Venture Capital as driver of innovation

In contrast to the relatively recent discourse of business model innovation and innovation communities, corporate venture capital research is well established since the 1980's. Equity investments in entrepreneurial ventures are regarded as an "integral part of the firm's innovation toolkit" (Dushnitsky, 2012, p. 156). In the last decades, interest on this topic was characterized by strong fluctuations with peaks in the mid-1980s and early 2000s. The previously described tendencies of firms to "look outside" for innovation led to revived interest in the topic. However, the growing interest in the topic conceals important deficiencies in prior studies. The different operationalization of key variables among different studies, for example, makes it

difficult to compare findings across studies. Thus, cumulative progress is hampered. Additionally, a substantial number of studies lack a sound theoretical foundation and therefore do not enhance our understanding of organizational capability development that facilitates 'organizational evolution' (Simon, 1993). As with other forms of corporate venturing, "the absence of an organizing framework that maps out the various antecedents, processes and outcomes of CV activities further accentuates these problems and complicates the task researchers face when conducting their research or guiding practicing managers" (Narayanan, Yang, & Zahra, 2009, p. 58). Chapter 4 addresses these shortcomings and refers to an extensive review over the field of corporate venture capital.

1.3. Overriding research question and structure of the thesis

All outlined research gaps have in common that they depict innovation as an inter-organizational phenomenon and that findings may help organizations to improve the efficiency and effectiveness of their innovation management practices and processes. Thus, this doctoral thesis makes an attempt in giving answers to these interorganizational research questions. Moreover, these articles investigate the performance outcomes of boundary-spanning innovation efforts. Hence, the overriding research question that connects the articles in this thesis is as follows: "What are the performance implications of interorganizational innovation strategies and which mechanisms can explain potential performance differences?" Against this background, the first article investigates the role of business model design as a locus of innovation; the second article focuses on the influence of innovation communities on product success; and the third article analyzes CVC as a mean to stimulate innovation. I proceed with an overview of each article in the following chapters 1.3.1, 1.3.2. and 1.3.3.

1.3.1. Chapter 2: The performance implications of business model design

In this chapter, we test the postulated interdependencies of the seminal NICE-framework suggested by Amit and Zott (2001) and investigate the underlying mechanisms between certain business model design elements and their impact on financial performance. In order to do so, we apply a fuzzy-set qualitative comparative analysis (fsQCA) to a unique dataset of all 41 e-businesses that went public between 2009 and 2012 on the NASDAQ and NYSE. In a configurational theory context, the fsQCA approach seems especially suitable as it bases upon the notion that a phenomenon can be explained by set-theoretic relations, i.e., different combinations

of causal conditions can equifinally lead to an outcome (Fiss, 2007). Doing so, we follow the recommendations by Fiss (2007) and avoid the various shortcomings of different analytical methods like cluster analysis, interaction effects and deviation scores. In line with Zott and Amit (2007) we used firms' stock market values in various points in time as a measure for financial performance. The independent variables, or conditions, of complementarities-, efficiency-, novelty- and lock-in-centered business model design themes were each measured by two independent raters – to ensure intercoder reliability – with the four scales adapted from Amit and Zott (2001).

Our results reveal that the influence of business model design themes on financial performance cannot only be explained by one dimension in isolation, but rather with a combinatorial approach. First, we find a positive influence of the simultaneous incorporation of novelty- and efficiency-centered design elements, confirming the presumption of complementarity between reliability and distinctiveness proposed by Lounsbury and Glynn (2001). Second, mechanisms that impose a lock-in effect can lead to higher performance if complemented with novelty. Third, the absence of novelty can be substituted by a business model combining efficiency-, complementarities- and lock-in design elements.

With these findings, our study provides several contributions to the vivid discourse on business models and business model innovation. First, we contribute to the emerging body of literature that connects novel business models and performance (Brettel et al., 2012; Kraus et al., 2017; Wei et al., 2014; Zott & Amit, 2007, 2008) with particular reference to the seminal work of Amit and Zott (2001). While these studies focus on the isolated impact of efficiency- and novelty-centered business models, our study demonstrates equifinality in business model design. In particular, we show that these previous studies (Brettel et al., 2012; Wei et al., 2014; Zott & Amit, 2008) do not fully grasp the complexity of the business model construct as they exclude complementarity- and lock-in centered design elements and combinations among different elements. With these findings, we further connect to the discussion on business model patterns and typologies (Baden-Fuller & Mangematin, 2013; Baden-Fuller & Morgan, 2010; Casadesus-Masanell & Tarzijan, 2012; Markides & Charitou, 2004; Sabatier, Mangematin, & Rousselle, 2010), where existing studies mostly focus on descriptive contributions without causal explanations and empirical testing (Zott et al., 2011). Second, we demonstrate that the commonly accepted theory about the four designs themes (Amit & Zott, 2001) and their implication on firm performance can only explain success but not failure. This result might stimulate researchers to reinvestigate the seminal work of Amit and Zott (2001) in order to increase the

explanatory power of the original framework. Third, we complement literature on configurational approach by empirically demonstrating its applicability in the context of business model design. In this context, we further highlight the value qualitative comparative analysis (QCA) can provide when investigating configurations of variables.

A similar version of the article is published in the Journal of Business Research (JBR), volume 69, issue 4, pages 1437 – 1441. According to the Thomson Reuters InCites™ Journal Citation Reports® 2015, the JBR has an impact factor of 2.129 and is ranked 40th out of 120 journals in the category of 'business'. On the actual JOURQUAL rating the VHB classified the JBR as 'B' (see https://jcr.incites.thomso nreuters.com and http://vhbonline.org/vhb4you/jourqual/vhb-jourqual-3).

Previously, this article has been presented at several scientific conferences, such as the 31th EGOS Colloquium 2015 in Athens, Greece and the 35th Babson College Entrepreneurship Research Conference in Natick, USA. This article has further been honored with the *Best Paper Award* at the 5th Global Innovation and Knowledge Academy, July 14 – 16, 2015, Valencia, Spain.

1.3.2. Chapter 3: The role of innovation communities in product success

In this chapter, I investigate the research questions of "How do successfully funded crowdfunding projects perform in terms of product success in comparison to their non-crowdfunded counterparts?" and "Which mechanisms explain potential performance differences?". To answer these questions, I rely on a unique data-set of all videogames that secured funding through Kickstarter – the world's largest reward based crowdfunding platform. I matched these 368 crowdfunded video games with 368 non-crowdfunded games relying on coarsened exact matching (Iacus, King, & Porro, 2012). Relying on various OLS regressions, I provide strong empirical evidence that products backed by the crowd are more successful than their non-crowdfunded counterparts. Thereby, crowdfunded products profit from product extensions developed by the crowd that greatly enhance the functionality of the original product and drove performance along various different models.

These empirical findings offer several contributions that have been repeatedly asked for in recent publications within the domain of crowdfunding and entrepreneurial finance. As the main contribution, I am the first to operationalize, measure, and test the performance consequences of reward-based crowdfunding. I therefore contribute to one of the "cornerstones" of strategic entrepreneurship and innovation literature

(McKenny et al., 2017) and establish crowdfunding as another competitive funding source just like business angel investments or corporate and independent venture capital. Second, this article advances the vivid discussion on the applicability of signaling theory within the context of crowdfunding (Ahlers, Cumming, Günther, & Schweizer, 2015; Courtney et al., 2017). More specifically, I establish successful crowdfunding as a signal of quality in itself that helps customers in their buying decision. Third, I am the first to empirically conceptualize crowdfunding as an innovation community and take into account the special characteristics of its members. By doing so, I show that the crowd can be investigated from a lead-user theory perspective and provide one of the largest empirical studies in this area of research (Bogers, Afuah, & Bastian, 2010).

This article was under review in Entrepreneurship Theory and Practice (Impact Factor: 3.414, ISI Journal Citation Reports © Ranking: 2015: 14/120 (Business), VHB-JOURQUAL 3: A). Previously, it has been presented at the the 11th ACERE Conference in Melbourne. In the context of this event this article has been selected for a special paper development session with the appointed field editor of the Journal of Business Venturing (Impact Factor: 4.204, ISI Journal Citation Reports © Ranking: 2015: 6/120 (Business), VHB-JOURQUAL 3: A) – Per Davidsson. Further, I presented the paper at the 16th FRAP Conference in September at the University of Cambridge.

1.3.3.   Chapter 4: The effectiveness of CVC as a mean to tab into innovation

In this chapter, I refer to an article in which my co-authors and I develop a multidimensional framework to improve our understanding on how CVC can be a means for large industrial organizations and startups to mutually commercialize innovations.

To do so, we conducted a systematic literature review of all the articles on CVC published between April 1984 and August 2016 in academic journals with an impact factor > 1 and books, resulting in a final sample of 72 sources. In a next step, we categorized this literature according to the unit of analysis (parent company, entrepreneurial venture, CVC unit) and analyzed each article in terms of various categories. In line with previous literature reviews (e.g. Crossan & Apaydin, 2010), these categories included the nature of the data set, the issuing journal, the methodology applied, the theoretical foundation and its empirical findings. During this qualitative procedure three major content clusters within the literature became

evident. The three clusters - antecedents, practices and performance implications – form the foundation of our article.

Our intended contributions to academia with this article are threefold. As the main contribution of this paper we consolidate the extensive stock of knowledge on CVC into an integrative framework. This organizing framework not only helps researchers to close the seemingly wide gaps between different studies but to foster cumulative progress in the field. Second, we contribute with the careful application of a systematic literature review. Despite the fact that non-systematic reviews are prone to biases (e.g. Newbert, 2007), according to Crossan and Apaydin (2010) systematic approaches are still comparatively rare. This is especially visible in the CVC context were most previous reviews (e.g. Basu, Wadhwa et al., 2016; Dushnitsky, 2006, 2012; Maula, 2007) do not follow systematic processes. Thus, promoting the Tranfield, Denyer, and Smart (2003) approach helps to raise the standard for academic accuracy. Third, we provide a detailed agenda for future research.

In addition to contributing to the vivid discussion on CVC from an academic perspective, this study also has contributions for practitioners. While articles and practitioner-oriented literature often focus on one particular aspect of CVC, we provide a more holistic overview. Aggregating all empirical findings in the field, our framework provides sound theoretical guidance for pressing questions such as "Which business processes distinguish high- from low-performing CVC units?", "What are the antecedents of CVC?", and "What are its performance implications?".

This article was under review at the Journal of Management Studies (Impact Factor: 4.131; ISI Journal Citation Reports © Ranking: 2015: 8/120 (Business); VHB-JOURQUAL 3: A).

The article has further been accepted for presentation at the 77th Annual Meeting of the Academy of Management, August 4 – 8, 2017, Atlanta, USA.

An earlier version of the article has been accepted for presentation at the Strategic Management Society Special Conference on "Strategy Challenges in the 21st Century: Innovation, Entrepreneurship and Coopetition, June 5 – 7, 2016, Rome, Italy.

2. A Configurational Approach in Business Model Design

Co-authored with: *Hannes Leonardy (second author)* and *Christiana Weber (third author)*

2.1. Introduction

"If you just focus on the smallest details, you never get the big picture right." (Leroy Hood)

The study of organizations always suffers from interrelatedness. Other than in physics or biology there are no fundamental laws that explain how and why things are. Thus, scholars often have no choice but focusing at a particular fraction of the whole reality, ignoring the rest and assuming the results would be true enough to be relevant. Hence, it is the focus that decides about the included complexity of the study on the one hand

and the tangibility of the data on the other. To tackle this task, different approaches emerged in the field of organizational research all of which have their advantages and disadvantages. However, especially the incorporation of configurational theory into management studies has proven to be helpful in narrowing down an overwhelming mass of data into tangible theory. Taking a step back, the idea behind configurations is "that the whole is best understood from a systemic perspective and should be viewed as a constellation of interconnected elements" (Fiss, Marx, & Cambré, 2013, p. 2). Also, configurations allow to picture equifinality in the theory, that is the possibility for several ways to lead to the same outcome.

Following this notion, configurational works such as Mintzberg's (1979) theory of organizational structure or Miles and Snow's (1978) strategy typologies had remarkable influence on the field of strategic management. Since, the field moved on by advancing the configurational theory (e.g. Doty, Glick, & Huber, 1993; Ketchen, Thomas, & Snow, 1993; Meyer, Gaba, & Colwell, 2005; Meyer, Tsui, & Hinings, 1993), developing and promoting methods that build upon the theory (Fiss, 2007; Ragin, 1987), or using such methods for testing theoretical frameworks (Fiss, 2011). Summed up, scholars in strategy and organizational theory benefited a lot from choosing a holistic view over a narrow focus with increased attention to detail.

While strategy scholars seem to have solved the issue of finding the right lens to use an appropriate focus for studying, the ongoing debate about the definition of business models (e.g. Amit & Zott, 2001; Casadesus-Masanell & Ricart, 2010; Magretta, 2002; Teece, 2010) and the distinctiveness of the concept (Arend, 2013; Casadesus-Masanell & Ricart, 2010) shows that the field of business models is now where strategy has been years ago. On this basis, we suggest that applying a configurational perspective to business model research can be fruitful to understand more of the complexity and interrelatedness that is said to be the foundation of business models (Amit & Zott, 2001; Chesbrough & Rosenbloom, 2002; Morris, Schindehutte, & Allen, 2005)

An often cited framework for explaining performance implications of business models is the NICE-framework originally introduced by Amit and Zott (2001) that connects the four dimensions complementarities, efficiency, lock-in and novelty as value drivers for business model design. However, only two out of the four proposed design themes of business models have later been proven to be related to firms' market value (Zott & Amit, 2007) and thus used for further studies (Brettel et al., 2012; Mathar & Brettel, 2014; Wei et al., 2014; Zott & Amit, 2008). This leads us to argue that, if the NICE-framework is meant to adequately explain performance implications of the

business model concept, it either has to be rearranged due to the fact that half of the concept did not show significant impact on firms' performance or it has to be understood differently, that is rather in a configurational and interrelated way as proposed in the original work of Amit and Zott (2001). Current examples of highly successful companies underline a rather configurational view as they do rely on business models composed of various dimensions of the original concept. Apple, for instance, disrupted the music industry through its Itunes-store. It introduced a distribution channel that linked the music industry and customers in novel ways, relying on strong complementarities with the Ipod music player. For customers, the Itunes-store has been an efficient way to order music although they experienced a high lock-in due to the incompatibility with other devices. In any case, the complementary connection between physical products and digital content distributed directly through the Apple system led the company to realize much higher margins than any competitor. Therefore, if business models are to be understood as a concept based on interrelatedness, their implication on entrepreneurial performance then also has to be tested using a method that includes and accounts for configurational and equifinal thinking.

Building on this argument, we adopt the NICE-framework and apply a fuzzy-set qualitative comparative analysis to a unique data-set of 41 entrepreneurial firms that went public on the NASDAQ and NYSE between 2009 and 2012. The QCA-technique as a set-theoretic approach that tries to find different sets of independent variables, or conditions, is perfectly capable of testing configurational theories. Unlike the linearity-assumption regression methods rely on, QCA is able to consider equifinality and interrelatedness of variables and to deliver results that stem from a broader focus of research.

We demonstrate that the framework's implications on performance, indeed, heavily depend on interrelated design themes and that viewing them alone biases findings as the focus is too narrow. Thus, lock-in and complementarities as performance drivers within business models are validated by the QCA when set in relation to all elements of the framework. The results point at three different configurations of design themes that rely on different logics discussed below. On top, this study shows that while the NICE-framework is suitable for explaining high market value of entrepreneurial firms it is not for low market value. With this study, we are among the first who introduce the QCA technique into business model research and build upon theoretical works that promote configurational research to enhance the understanding of the field (Baden-Fuller & Morgan, 2010).

2.2. Theory

The business model construct is under research for more than two decades (Ghaziani & Ventresca, 2005; Zott et al., 2011). Notwithstanding, a common understanding, a sound theoretical foundation and a clear separation from related constructs like strategy is still lacking and has yet to be established (Zott et al., 2011). Against the background of the limited theoretical foundation of most definitions (Arend, 2013) and the call for cumulative progress in the field (Zott et al., 2011), we employed the definition provided by Amit and Zott (2001) ensuring the comparability of our results with other studies, especially with the work of Zott and Amit (2007). Based on the resource-based-view (Barney, 1991), the relational view (Dyer & Singh, 1998), transaction cost theory (Williamson, 1975), the theory of creative destruction (Schumpeter, 1942) and Porter's value chain framework (Porter, 1985), Amit and Zott (2001) define business models as „the content, structure, and governance of transactions designed so as to create value through the exploitation of business opportunities" (p. 501). Thereby, content refers to the goods exchanged and the key resources necessary in order to enable transactions. Structure encompasses the parties involved in the transactions, their linkages and sequencing same as the adopted exchange mechanisms. Governance refers to the monitoring of the transactions and the incentives of the participants to engage with different stakeholders (Amit & Zott, 2001). While these three elements can be understood as basic building blocks suitable to describe a business model's architecture (Zott & Amit, 2010), they do not explain how the architecture must be designed in order to create and capture value. In this context Amit and Zott (2001) suggested four themes orchestrating business model designs: complementarities, efficiency, lock-in and novelty. In the following section, we outline how these design themes in isolation create value and elaborate on the interconnectivity of the different dimensions.

2.2.1. Novelty

Often referred to as business model innovation (Casadesus-Masanell & Zhu, 2013; Mathar & Brettel, 2014), novelty in essence refers to new ways of conducting economic exchanges by altering content, governance or structure of transactions (Amit & Zott, 2001). Frequent examples in this context are the connection of previously unconnected parties (e.g. Alibaba.com that connects Chinese manufacturers with overseas buyers online); the replacement of intermediaries (e.g. Uber relies on a smartphone application to forward ride request directly to free drivers close to the location of the customer and therefore to replace the classic taxi business);

the introduction of innovative transaction mechanisms (e.g. Google's auction-based pay-per-click advertising); the introduction of a fundamentally new value proposition (e.g. Twitch's live broadcasting of online games) or the creation of an entirely new market (e.g. Airbnb that created a market for customer-to-customer home rentals).

2.2.2. Efficiency

Efficiency-based business models are orchestrated around the minimization of transaction costs among all stakeholder groups (Amit & Zott, 2001). Thereby, direct transaction costs refer to the readily perceptible and quantifiable "costs of running the economic system" (Arrow, 1969, p. 48), whereat indirect costs arise through uncertainties surrounding the transactions like moral hazard, adverse selection or hold up (Klein, Crawford, & Alchian, 1978). In this context, Zott and Amit (2002) propose several different elements, helping to achieve efficiency gains on the business model level of analysis. Increasing the speed of transactions reduces direct transaction costs due to time-savings of the participants. In the e-business context these reductions are often enabled by a higher degree of automation further decreasing transaction errors and costs associated with order taking and processing. The provision of information to stakeholders reduces information asymmetries helping them to make informed decisions and alleviate opportunistic behaviour for all business model stakeholders.

2.2.3. Lock-in

Business model designs relying on a lock-in effect impose switching costs on certain stakeholder groups that provide strong incentives for further transactions. As a result, transaction volume increases and the potential for value appropriation by the focal firm augments. Manifested in transaction cost economics (Williamson, 1975), network theory (e.g. Dyer & Singh, 1998; Katz & Shapiro, 1985; Saloner & Shepard, 1995; Shapiro & Varian, 1999) and the resource based view (e.g. Amit & Schoemaker, 1993; Barney, 1991), four different sub dimensions within the lock-in theme can be distinguished. Firstly, network externalities which are core to recent internet conglomerates like Facebook, eBay or Twitter are based on tying together two distinct groups of users in a network or multi-sided platform where same-side and/or cross-side network effects might prevent important stakeholder groups from switching to competitive offerings (Eisenmann, Parker, & van Alstyne, 2006). Secondly, switching costs can arise from sunk costs or required up-front investments embedded in the business model design. For instance, media or software purchases through Apple's

App Store or the Google Play Store are increasingly popular. Thereby each purchase imposes more and more switching costs on the customer since purchased content for a device provided by Apple is not transferable to Google devices and vice versa. As the consumers would devaluate all their past purchases with a switch from one company to the other they are locked-in and have a strong incentive to stick with one of the respective companies. Sunk costs in this context further arise in the form of time invested to gain a certain status or to customize and learn about certain aspects of the product or service. For, instance, building up a significant audience on Twitter or customizing online user profiles on Instagram takes month to build up, influencing the attractiveness of alternative offerings as the users "brand" as a broadcaster is only valuable within the boundaries of the provider of the offering.[1]

In connection with the bargaining position of the focal firm, we follow the argumentation of Zott and Amit (2002) who postulate a possible aversion of stakeholders to get locked in into a firm's ecosystem as the future decisions might be influenced. In order to overcome the reluctance the focal firm has to compensate the customer early in the customer lifecycle. The bargaining power of the focal firm ex-ante therefore might be reduced, whereat considerable ex-post barriers relief the situation later. We will further elaborate on this line of thought in the discussion of various business model configurations.

2.2.4. Complementarities

According to Milgrom and Roberts J. (1995) complementarities exist "when doing more of one thing increases the returns to doing more of another" (p. 181) which at the business model level of analysis translates into synergies between different business model components. Thereby, complementarities can arise in bundles of complementary inputs (resources and capabilities) and outputs (products and services), whereat both can be highly interconnected and dependent on interfirm linkages (Dyer & Singh, 1998). Amazon, for instance, bundles its superb fulfilment capabilities and IT infrastructure in order to provide external sellers with the option to outsource the whole administration of their web shop to Amazon. In turn, the

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[1] Zott and Amit (2002) further transfer established direct incentive schemes like loyalty programs, warranties, extended service and return agreements from the more mature industry to the e-business context aiming to increase the transaction volume. However, we only consider them a valid option for creating a lock-in on the business model level of analysis when they do significantly influence the overall gestalt of the business model from a holistic perspective and thus influence the content, structure or governance of transactions. In the same way we proceed with the fourth sub dimension, referring to the firm's strategic assets like reputation, trust or brand recognition.

merchant's goods appear in the Amazon marketplace, constituting a massive internet mall for consumers to obtain complementary goods.

2.3.   Business model design as configurational approach

The seminal framework of Amit and Zott (2001) has been tested empirically, showing that novelty- and efficiency-centered business model designs can be established as a driver of financial performance. For the remaining two dimensions no significant relationship could be established (Zott & Amit, 2007). Building on this findings, all recent studies (Brettel et al., 2012; Mathar & Brettel, 2014; Wei et al., 2014; Zott & Amit, 2008) did not further investigate complementary and lock-in-based design elements. Further, the discussion shifted away from a holistic viewpoint on value creation toward a more specific perspective on how certain business model designs relate to other constructs of strategic management and to other activities of the organization. Wei et al. (2014), for instance, analyse the relationship between technological innovation, business model design and firm performance pointing out the need for different business model designs in order to best leverage different innovation strategies. Furthermore, they find that efficiency-centered business models can both support and corrupt a firm's innovation efforts, depending on its general nature. In terms of exploitative innovation, understood as a merely incremental innovation strategy, novelty is expected to weaken the firm's performance. While this study did not test for correlations between different configurations and technological innovation strategies, it complements their findings by showing different design patterns that occurred for companies operating in similar markets. Likewise, Zott and Amit (2008) recognize a contingent effect of business model design mediating the relationship between product market strategy and financial performance. Thereby, the combination of novelty-centered business models with a differentiation or cost leadership strategy (Porter, 1985) can augment firm performance. Brettel et al. (2012) link business model design to relationship marketing efforts, taking into account the organizational life cycle stage of entrepreneurial ventures. Thereby, their findings indicate temporal dependencies of certain business model designs. While novelty had a stable influence on financial performance regardless of the life cycle stage of the firm, efficiency-centered models did not have an impact in the earliest stages of an organization. Brettel et al. (2012) attest an impact of business model innovation on value creation even strong enough to erase the need for additional relationship marketing efforts. They, in this context "might even be counterproductive" (Brettel et al., 2012, p. 94).

While these studies contribute to the understanding of the isolated impact of efficiency-centered and novelty-centered designs, they do not take into consideration the interdependencies between the different dimensions postulated by Amit and Zott (2001). This neglects the possibility that "the presence of each value driver can enhance the effectiveness of any other driver" (Amit & Zott, 2001, p. 509) or that many successful organizations incorporate more than one business model design at the same time. Google's success can be traced to its novel business model, tying its search technology to an innovative advertising model by which search terms get distributed in auctions (Anthony, 2013). However, they further reinforce their advertising business with various offerings like email services, data storage or navigation. Zott and Amit (2007), as the only study available which partly recognizes these interdependencies, rely on interaction effects which implies various limitations. Even though interactions are frequently used in the context of organizational configurations (Baker & Cullen, 1993; Dess, Lumpkin, & Covin, 1997), "interactions that go beyond two-way effects are exceedingly difficult to interpret" (Fiss, 2007, p. 1182). Theoretically, there is no reason why business model configurations should be limited to the combination of two design elements. Further, interaction effects are based on the assumption that the relationships between variables exist for all observed cases, whereat in the context of business model design themes that found to be causally related in "one configuration may be unrelated or even inversely related in another" (Meyer et al., 1993, p. 1178). As previous studies de facto tried to gain theoretical insights by decreasing complexity, we believe that the complexity of the business model construct itself and the understanding of the interconnectivity between different design elements are core to the locus of the business model as a value driver.

A good example to transfer this line of thought to the context of business models might be the lock-in dimension. Since this dimension is the only one which is not necessarily beneficiary to customers/users it might have to be combined with others to foster adoption and be a significant value driver. Consequently, Zott and Amit (2007) could not find any statistically significant impact, testing lock-in-centered business model designs in isolation. However, an investigation in combination with other design themes might be fruitful. The next chapters provide this investigation

2.4. Data and method

Employing a fuzzy-set qualitative comparative analysis, a method that is based on the assumption of a configurational impact of variables on an outcome rather than standalone influences (Rihoux & Ragin, 2009; Schneider & Wagemann, 2012), we follow recommendations by Fiss (2007; 2011) and avoid the various shortcomings of different analytical methods like cluster analysis, interaction effects and deviation scores (Fiss, 2007; Fiss et al., 2013). Doing so, we are able to show equifinality of certain combinations taking into account the configurational and complex understanding of business model design within the literature (Amit & Zott, 2001; Baden-Fuller & Mangematin, 2013). Thus, unlike regression analysis, QCA provides a concept that not only delivers several solutions (i.e. different paths that lead to an intended outcome) but also implies a different general logic of how single conditions, or independent variables, contribute to a certain outcome. While a condition, in one configuration, might have a positive influence, it might, in another, have a contradicting impact. We expect this to be especially fruitful for the analysis of performance implications of business model design themes, as, for example, some design themes might unroll their potential only in combination with others while they, when being employed as the only factor, lead to failure or at least do not have a significant influence on success. Thus, the core logic of QCA with its "view that generally assumes interaction between elements" (Fiss et al., 2013, p. 10) fits to the complex concept of business models where single correlations might not have an explanatory power as high as of relations of configurations to an outcome.

2.4.1. Data collection

We collected every firm that had its initial public offering (IPO) between 2009 and 2012. By narrowing down the timespan for firms to be included we intended to increase the comparability of the cases in terms of their stock market experience. Also, we only included firms being listed on the NASDAQ or the NYSE as we expect the inclusion of too many different markets to bias the results. After identifying every firm operating as an e-business, 41 cases remained in the set which can be considered a sample size suitable for robust results in a qualitative comparative analysis (Fiss, 2011; Muñoz & Dimov, 2015). We adopted Zott and Amit's (2007) definition of e-businesses meaning we included firms in the set that "derived all or part of their revenues from transactions conducted over the Internet" (p. 186). Additionally, we excluded those firms whose Internet-related businesses were just a minor part in the overall logic of the firm's business models. For example, a modern low-cost aircraft

carrier such as Ryanair would not have been considered an e-business even though its website offers tickets over the Internet. Considering the overall business logic of Ryanair, the e-business seems to be merely a necessary part to compete with its rivals rather than a particular focus within the business model.

For the four conditions we adopted scales derived by (Amit & Zott, 2001; Zott & Amit, 2002). To ensure consistency in the ratings, we wrote a detailed guideline for the definition and rating of each item. Both of the authors independently went through databases such as Hoovers or the SEC filings of each firm to gather as much detailed information possible. The rating for each scale then has been done independently by two raters. Afterwards, a pairwise comparison of the ratings was conducted and discussed to agree on one evaluation. The whole rating process has been done over a period of six months.

2.4.2. Measures

2.4.2.1.   Causal conditions

We included four conditions into our analysis: design novelty, design efficiency, complementarities and lock-in. To measure the degree to which a focal firm's business model relies on each of these measures we adopted scales delivered in earlier works of Zott and Amit (2002; 2007). They built the scales using several items for each measure that are to be rated on Likert scales. The overall score is then to be computed as the average of all items in one measure. Going in line with Zott and Amit (2008), we further excluded two items from the efficiency scale in order to "purify" the measure and improve its reliability. Also, due to the difficult process to apply for a patent on business models (Wagner, 2008), we dropped one item regarding patents from the novelty-scale. We expect this to increase the comparability of the novelty of different firm's business models as including it would increase likelihood for novelty for firms that operate in countries where patenting is made easier. Additionally, we were forced to drop three measures from the lock-in scale as they were built up with check-boxes not being reported in the works of Zott and Amit (2002; 2007; 2008). We kindly asked the authors for access to the original scales but did not get an answer to date.

2.4.2.2. Outcome

In line with Zott and Amit (2007) we used the firm's stock market values in the year 2013 as a measure for financial performance. This was the most recent data available for a whole year. The market value is to be computed as the number of shares outstanding times the prize per share at a time. We derived information about shares outstanding from the Orbis database by Bureau Van Dijk. The average for the year has been calculated as well as the average for the fourth quarter and the value for the last day of trading in 2013 to test for variance in the results and therefore robustness over time. Also, for the firms that went public not later than 2011, we calculated the market value for the whole year 2012 to have another measure on hand in order to test for robustness over time. As the firms in the sample have relatively short experience on stock markets, the sample for 2012 consists of only 34 observations. This, however, can also be expected to deliver robust results in a QCA (Fiss, 2011).

2.4.2.3. Calibration

After collecting measures for the conditions and the outcome, all values have to be calibrated in order to be computable in a fsQCA (Schneider & Wagemann, 2012). Due to the fact that the conditions have been rated on Likert scales, their raw values are fuzzy by nature. However, we recalibrated them to make sure the values represent the theory behind QCA neatly (see e.g. Rihoux and Ragin (2009) or Schneider and Wagemann (2012) for more detailed insight into theory about calibration). We set the threshold for the zero-value at 0.1 while the one-value has been given for values higher than or equal to 0.8. In between we chose a linear gradation that has been calculated as $y = (x - 0.1) / 0.7$ where y was the calibrated value and x was the raw value. Doing so, we made sure, we used the full range of values between zero and one. We believe this to be an important step as the scales for the conditions before did not cover the possibility for business models to get a full score due to a high dissimilarity between the items. Vice versa, the same holds for the zero-value.

The outcome was computed as a monetary value and therefore had to be calibrated. We again chose to only set thresholds for the non-membership (0) and the full membership (1) and then used linear gradation for the range in between. The zero-threshold has been chosen as what the U.S. Securities and Exchange Commission (2013) rates "nano-cap" (i.e. the smallest group of publicly listed firm regarding their market value). According to them, it lies at 50 million dollars. The threshold for the upper bound, the one, has been set at 1,7 billion dollars, which indicates firms that

belong to the "mid-cap" (Carrion, 2013) (i.e. firms with average market value compared to other publicly listed companies regardless their age and market). Doing so, any company that belongs to the upper half of the most valuable firms on the stock markets is considered having a "very high market value" and thus gets a fuzzy-score of one. This makes sure, firms with short experience on stock markets do not get compared to highly valuable firms with long business history such as IBM or Apple. Thus, with the entrepreneurial background as benchmark, very successful companies do only get rated as very successful, without increments.

2.4.3. Configuration analysis

After having all measures calibrated, a truth table has been created. It lists every possible combination of conditions, in this case 16 with 4 being the number of conditions (Schneider & Wagemann, 2012). We decided to set the consistency threshold at 0.8 which is a value expected to create robust results (Fiss, 2011; Rihoux & Ragin, 2009; Schneider & Wagemann, 2012). Also, the 0.8 value is set with regard to the biggest gap in between the different scores going in line with recommendations in the literature on QCA (Schneider & Wagemann, 2012). We decided to set the frequency threshold at one, which is common for this sample size (Muñoz & Dimov, 2014) and also suggested by scholars in the field (Rihoux & Ragin, 2009; Schneider & Wagemann, 2012). The truth table is shown in Table 1.

Table 1: Truth table for the outcome high market value using the average of 2013 (non-observed terms have been excluded from the graphic)

Efficiency	Novelty	Comple-mentarities	Lock-in	Incl.
1	1	0	0	0.89
0	1	0	1	0.87
1	1	0	1	0.87
1	1	1	0	0.85
1	0	1	1	0.83
0	1	1	1	0.81
1	1	1	1	0.80
0	0	1	1	0.77
1	0	0	0	0.76
1	0	1	0	0.75
0	0	0	0	0.74
0	0	0	1	0.73

After deciding about the thresholds the solution table has been created by using Boolean minimization. It shows different combinations of conditions that equally are sufficient to obtain the outcome.

2.5.   Results

We processed two basic QCA procedures. First, we used the "high market value" as outcome testing for certain combinations of design themes that lead to success. Second, we used "low market value" as outcome to test for configurations that might show to better be avoided – for example with "diseconomies of scope" as Zott and Amit (2007) presume in their work. As first preceding result, no single design theme revealed to be necessary for the outcomes. Moreover, no relevant SUIN (see e.g. Schneider and Wagemann, 2012 for further explanation) conditions could be found. Therefore, we included all four design themes into the test for sufficiency of both analyses (high market value and low market value).

2.5.1. High market value as outcome

Although we decided to set the frequency threshold to the minimum of one case, the QCA only revealed three different solution terms (shown in Table 2). We consider our solution particularly promising as finding configurations that help "identifying what really matters" and sorting out "trivial elements" (Fiss et al., 2013) is the intention of this work. The intermediate solution which included the results of Zott and Amit (2007) as simplifying assumptions (i.e. we expected novelty and efficiency to be present for the outcome while we did not have certain expectations about complementarities and lock-in) did not differ from the conservative solution. We did not compute the most parsimonious solution as we did not consider including all logical remainders into the solutions as fruitful for our approach.

Table 2: Solution terms for the conservative solution

Solution Term	Consistency	Coverage (raw)	Coverage (unique)
Efficiency · Novelty	0.82	0.4	0.08
Novelty · Lock-in	0.8	0.36	0.05
Efficiency · Complementarities · Lock-in	0.77	0.36	0.07
Overall Solution	0.8	0.51	

The QCA procedure simplified Amit and Zott's (2001) rather complex theoretical model and revealed three different combinations of design themes that explain high market value for the firms in the sample.[2] Different to Zott and Amit (2007) who do not find empirical evidence for lock-in and complementarities to be related to performance, in our results all four design themes are included in at least one solution term. Thus, our results demonstrate the interrelatedness of the design themes and their implication for market value. By doing so they support Amit and Zott's (2001) original theoretical model as well as its presumed complexity. In addition, there is no evidence for design themes to hinder certain configurations as no solution term includes absent conditions.

The truth table presented in Table 1 shows that novelty remained an elementary design theme for consistently successful companies. Having in mind that novelty was

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[2] We also ran a QCA using the outcome values of 2012 to test for variance over time. The results showed to be stable using a slightly lower consistency threshold of 0.77 – again using the biggest gap between the inclusion scores to decide about the threshold.

not found to be a necessary condition, our results underline the positive contribution QCA can make to the study of business model design. Although novelty is present for most of the included configurations, it does not seem to be the lever for all of the configurations that decides about success. Therefore, our results partly resonate with Zott and Amit's (2007) previous results. Moreover, they further extend their findings by showing the complexity and interrelatedness of the business model concept.

2.5.1.1.   *Efficiency · novelty*

The first solution term presuming the presence of novelty and efficiency can be seen twofold: it supports Zott and Amit's (2007) findings about the relation of novelty as well as of efficiency to high market value. However, the results contradict the "diseconomies of scope" preliminarily supposed by Zott and Amit (2007) for the two dimensions when jointly included in a business model. Hence, innovation in business models reveals to be a driver for success when connected with another value driver, in this case efficiency. Efficiency is described by Amit and Zott (2001) as reduction of transaction costs including costs occurring for customers. Thus, it creates value directly for customers and can serve as incentive. While there might be some difficulties in implementing these two design themes in parallel (Zott & Amit, 2007), their successful employment seems to create complementarities which subsequently increase chances for achieving high market value. This finding is in line with Zott and Amit's (2002) predictions about the influence of novelty on other design themes. Especially for a rather incremental approach to innovate elements in a firm's business model, they suggest novelty to be the antecedent for "finding new ways" to bring in design themes such as efficiency in order to appropriate more of the value created.

An example from the sample for the solution above would be Zillow Inc., an online real estate database. By providing information about real estates (including estimated values for properties that are currently off the market or historic purchasing prices of houses), Zillow offers a wide range of information to its customers and thereby decreases asymmetric information between buyers and sellers. In addition to this efficiency-driven business model it also includes novel factors such as an "unprecedented variety" (Amit & Zott, 2001) of different offerings or its self-developed estimation mechanism for real-time market prizes for houses and flats. The value offered to customers lies within the immense effectiveness of Zillow's database. However, given the fact that Zillow does not create the data but rather assembles and distributes it, one could argue that, employing efficiency alone, they would not be able

to protect their market share. Being the first-mover with the novel business model thus helps to build a "fence" by gathering a customer base big enough to be prepared for rivalry with new market entrants.

2.5.1.2.   *Novelty · lock-in*

The second configuration in our solution was the combination of a novel business model and elements that help locking customers in. The notion of the lock-in as Amit and Zott (2001) describe it is basically integrated into the business model to increase switching costs for customers and other stakeholders. For this particular business model configuration, one causal relation is arguably the buildup of switching costs through business model innovation, that is the simple impossibility for customers and partners to switch to offerings of rivals due to the fact that there is no competitor being able to offer the very same combination of products or services and the particular business model. Thus, the combination of novel elements with lock-in factors might not only be a strategic choice ex ante following the assumption that this certain combination could lead to a high outcome. It might merely be the novel business model itself that imposes high switching costs by creating value. Thus, this solution term connects directly to the findings of Zott and Amit (2007) who empirically prove the potential for novelty to create value and helps to further understand a broader part of the whole canvas.

Other firms might establish their lock-in not through the business model itself, but in a more classic way such as network effects, trust, the need for up-front investments for stakeholder, or direct incentives such as loyalty programs (Amit & Zott, 2001; 2002; 2007). However, as argued above and following Zott and Amit (2002), the customers' (or partners') perception of a lock-in, when realized ex-ante, is rather negative. Thus, if the focal firm does not succeed in overcoming the problem of high switching costs for customers and partners when deciding to switch toward the focal firm, the lock-in works as a hindering component against rather than a driver for value creation and/or capture. Following this argumentation, a firm that decides to create a business model relying on lock-in is more likely to succeed when introducing an entirely novel business model that on its own delivers a unique value proposition for customers.

A good example, arguably for both of the above stated mechanisms, is LinkedIn, the world's biggest platform for professional social networking. A core logic of its business model is the lock-in through network externalities (i.e. the more people use the

platform for job search, the more firms use it as a recruiting tool and vice versa) or the concept of "virtual community" (Zott & Amit, 2002). LinkedIn has maintained its success over the years making it more and more difficult for potential competitors to enter the market. This holds because of the switching costs both, the potential rival and LinkedIn itself, impose on their customers. The rival would not only have to overcome its own problem of customers' switching costs toward the own firm, but he would have to face the switching costs LinkedIn imposes on its existing customers. LinkedIn did not face any of these issues as it entered the market as first-mover with a novel business model. Consequently, potential customers were only confronted with the need to decide whether or not to use such a solution instead of which solution to use.

2.5.1.3.   *Efficiency · complementarities · lock-in*

Our third solution contains the presence of three out of the four design themes. This rather complex configuration again underlines the power of novel business models. Keeping novelty out of the equation and still creating and capturing value through the design of a business model requires attention to the whole range of remaining business model design elements. However, it shows that novelty is not a necessary antecedent for business model design to create value. Having in mind that the novelty of a business model is a relational score (being the innovator always requires others to be less innovative), this triadic configuration seems to be potentially easier to defend over time. A firm's ability to efficiently manufacture a product does not decrease with the improvement of competitors' abilities in production whereas being the only one to offer a product requires massive effort and patenting to keep others out of the market. Analogously, protecting a novel business model, especially when patenting is not made possible (Wagner, 2008), is not only dependent on the efforts of the focal firm but also on its competitors' strategic choices and innovativeness. Conversely, the results also lead to the assumption that the omission of novelty requires rather complex business models that build upon a series of design elements when intended to create and capture value ceteris paribus, that is without changes in for example the product or service offered.

An example from our data is OpenTable, a provider of online reservations for restaurants. Set in relation to today's market situation, OpenTable's business model is not remarkably novel anymore. However, it offers a website through which customers can easily book tables in a restaurant while restaurants get help in

effectively use their capacity. This highly efficient business model gets complemented by for example terminals offered by OpenTable which can be used by restaurants to handle their bookings and accounting in the day-to-day operations of the restaurant business. Also, customers that decide to use OpenTable as booking service get points for each booking which they can use to pay for their meals. This way, both sides (end-customers and restaurants) are locked in into the solution of OpenTable through network externalities and specialized assets restaurants use. As shown, the different elements of OpenTable's business model are highly interrelated so that no single design theme stands out or seems to be replaceable. It is indeed the complex configuration of the business model that drives value creation and value capturing, even with the business model losing its novelty as the market evolves.

2.5.2. Excluded configurations

When discussing configurations that proved to be related to market value, the absence of some possible configurations from the solution is also of particular interest for research on business model design. A rather obvious question arises when putting the first two findings together: why are novelty with efficiency and novelty with lock-in promising configurations while their aggregation (novelty · efficiency · lock-in) is not? First, this phenomenon is not caused by the simple absence of cases within the dataset. In fact, five cases did employ this configuration, with different manifestations within the themes. However, of these five only one, LinkedIn, covered in the third solution, lies considerably above the 0.5-line indicating high market value. Thus, one possible argumentation could be what Zott and Amit (2007) call "diseconomies of scope" adding lock-in to their preliminary results about the influence of the simultaneous use of a novel and an efficient business model. This suggestion could explain both why (1) Zott and Amit (2007) find the combination of novelty and efficiency to not be related to high market value while we find support for the opposite and why (2) their results do not show to be statistically significant at a satisfying level.

Consequently and because novelty receives particular attention in this work and in recent literature (e.g. Chesbrough, 2010; Wei et al., 2014), one might ask why the combination of novelty and complementarities in a business model does not appear in our solution. Is it due to the fact that a novel business model simply is not often combined with complementary elements? One could assume, novelty might often be a phenomenon arising for relatively young businesses and their business models so that complementarities are often not yet implemented into the business model. However, the data does not support this assumption as six out of the 41 firms (14.6

percent) belong to this configuration. Thus, the data simply gives evidence for the fact that the employment of novelty benefits from the simultaneous implementation of efficient factors or a high lock-in for participants *but not* from the combination with bundled resources, capabilities or offerings. The same holds vice versa with the exception that complementarities need to be complemented itself with efficiency *and* lock-in.

The most frequently used configuration (11 cases with use of efficiency and complementarities but no use of lock-in and novelty) was left out of the solution as it belonged in fact to the least consistent terms. Thus, many firms seem to employ this particular business model configuration while it does not consistently point to a high market value. However, if lock-in is added to this term, consistency increases. Thus, we conclude that while this configuration seems common it is not *enough* to explain success or high market value. Therefore, different value drivers such as the product seem to be more important. Adding lock-in, arguably as the value capturing element in the business model, increases the explanatory power of this configuration.

Lastly, we did not find any solution term including the negation of one of the conditions indicating that none of the design themes is potentially hindering certain configurations. In some circumstances, some conditions might not have an additional impact on the market value of the focal firm. This goes in line with expectations illustrated before. All four design themes include elements that deliver or display direct value propositions for customers and/or partners. The only exception is the lock-in that ex ante might scare-off potential participants (Zott & Amit, 2002) and thus also has the potential to impair the value of the business model. However, avoidance of lock-in did not show to be a significant value driver in any consistent configuration.

2.5.3.   Low market value as outcome

Searching for configurations of conditions that lead to a *low market value*, we used the negation of the afore-mentioned outcome high market value. As the highest consistency score was 0.59, no single configuration term was included into the solution.[3] Thus, according to our analysis, no configuration of design themes explains

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[3] We ran the same analysis for the above introduced set of firms with an available market value for 2012. Doing so, we found one solution term with a consistency score (0.756) only slightly above the minimum of acceptable consistency scores of 0.75 (Schneider & Wagemann, 2012; Rihoux & Ragin, 2009). However, the solution that would have had to be included also came up in the truth table for high market value having a similar consistency score (0.659 for 2012, 0.756 for 2013). Thus, we do not see this as relevant configuration to be included into a solution.

the failure of e-businesses. While, to our best knowledge, no prior study explicitly tested for the implications of business model design themes on failure, these results lead to two main assumptions: first, Amit and Zott's (2001) business model design themes seem suitable for explaining success of entrepreneurial firms but not for the opposite. Second, the linearity assumption that forms the basis of a linear regression analysis seems to be misleading in this particular case as our results uncover an "asymmetric causation" (Fiss et al., 2013) in the core logic of the concept of business model design themes. While implementing novel factors in the business model is related to high market value (Zott & Amit, 2007), it would be wrong to assume that ignoring this dimension, other things being equal, would cause failure. This result connects to the findings of our first QCA using high market value as outcome. Neither the negation of any condition leads to a *high market value*, regardless of the configuration, nor does any configuration of design themes consistently lead to a *low market value*.

2.6.   Discussion and conclusion

Our analysis demonstrates that incorporating a set-theoretic view into the discussion about business model design and business model innovation can be, indeed, very fruitful. By building on the well-cited works of Amit and Zott (2001; 2007), we were able to prove the value added a QCA analysis can provide even to fields that have been studied extensively before. Our work could confirm the results of Zott and Amit (2007) regarding the importance of novelty and efficiency in business model designs. We have been able to put these findings in a context of interrelated design themes and also to prove that business models that are not novelty-driven can be related to success as well. Thus, we added complexity to the important findings of Zott and Amit (2007) and demonstrated the significance of the interrelatedness that was incorporated in the original framework (Amit & Zott, 2001). More precisely, our analysis revealed that all four design themes originally introduced by Amit and Zott (2001) have a considerable influence on market value when used in a fitting configuration. These results go beyond Zott and Amit's (2007) findings and demonstrate the particular power of the QCA technique. By leaving space for the whole complexity in the framework we have been able to generate even more detailed and fine-grained insights into the relation of business model design with the market value of a focal firm and to prove Amit and Zott's (2001) own suggestion that the four design themes might be interrelated. In addition, by showing that no possible configuration consistently points at a low market value or failure, we demonstrated

that Amit and Zott's (2001) framework of business model design themes is able to explain success but not failure. While at least three out of the four design themes theoretically build on creating value for other participants than the firm itself, this might not be surprising. However, it is an important step toward developing a deeper understanding of the nature and power of business model design (themes) and gives room for further theoretical and empirical research.

Our study leaves room for building up theories about the "evolution" of a business model within a focal firm and its adaption on different influences over time. Hence, a fruitful and important further research topic could address the question whether the whole range of theoretically possible configurations is available for every firm in every industry at any time. Finding answers to this issue and giving insights into time relatedness of business model designs might add important knowledge to the field. Moreover, our study narrowed down the sample to only e-businesses. However, business model design and business model innovation is a central topic in management nearly regardless of the industry (Pohle & Chapman, 2006). Thus, moving on to a more diverse set of industries and testing the theory in different circumstances could be fruitful not only for research but also for practitioners willing to create value through business model design changes.

When comparing the QCA technique to regression analyses that include many control variables to increase their explanatory power one could argue that a configurational approach by only including the independent variables as conditions might be too narrow in its overall theoretical view. Rihoux and Ragin (2009) call this a "black box problem" that relies upon the fact that the conditions themselves might be further interrelated with other (control) variables that are taken out of the equation. However, with this being non-deniable it is merely something that QCA researchers should be aware of so that they keep the right focus in their work rather than a weakness of the method. "QCA by design does not describe a process; it describes the conditions that are present or absent when an outcome of interest is observed or not observed" (Rihoux & Ragin, 2009, p. 160). Thus, deep understanding and knowledge about the cases is critical for developing theories about underlying processes. We consider this a characteristic of the method one should be aware of and adapt to rather than as general limitation for research. It is simply not the goal of research employing the QCA method to generate statistically independent variables as QCA merely tries to simplify one particular section of the whole reality to find parsimonious configurations that occur when an outcome occurs too. This holds regardless of

control variables even if the underlying logic is interrelated with them. This then is what makes discussion of the results so important.

3. The Performance Implications of Crowdfunding

Co-authored with: /

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Previously, it has been presented at the 11th ACERE Conference in Melbourne. In the context of this event this article has been selected for a **special paper development session** with the appointed field editor of the Journal of Business Venturing (Impact Factor: 4.204, ISI Journal Citation Reports © Ranking: 2015: 6/120 (Business), VHB-JOURQUAL 3: A) – Per Davidsson.

Further, I presented this article at the 16th FRAP Conference, September 25 - 27, 2017 at Hughes Hall College, **University of Cambridge,** Cambridge, England.

3.1. Introduction

New ventures face an increasingly diverse set of funding sources. Although they have traditionally relied on bank loans, business angel investments, corporate and independent venture capital as a major funding source, a growing number of them have considered crowdfunding. According to the last Crowdfunding Industry Report, the total funding volume saw a sharp incline from $2,7bn dollars in 2012 to $34,4bn dollars in 2015. As crowdfunding activity has grown steadily, so has academic interest in the phenomena (Short et al., 2017). Thereby, empirical studies mainly analyze the dynamics of successful crowdfunding campaigns. Recent publications, for instance identified the experience (Skirnevskiy et al., 2017) and passion (Davis et al., 2017) of

the project creator, the perceived product creativity (Davis et al., 2017) and product innovativeness (Chan & Parhankangas, 2017), external and internal social capital (Butticè et al., 2017; Colombo et al., 2015; Mollick, 2014), independent signals of quality (Mollick, 2014), the linguistic style of the crowdfunding pitch (Parhankangas & Renko, 2017) or the type of the rewards (Butticè et al., 2017; Colombo et al., 2015) as key factors for successful fundraising. While these studies are valuable contributions to enhance our understanding of the crowdfunding phenomena on the campaign level, little is known about the outcomes of successfully funded campaigns on actual product success. Thereby, some theoretical arguments suggest a positive relationship between successful crowdfunding and product success, while others postulate a negative relationship (Agrawal et al., 2013; Lehner, 2013).

Drawing on literature from the micro-finance and crowdsourcing concepts, the current interest in crowdfunding is partly based on the implicit assumption that crowdfunding is not only about raising funds, but to benefit from several types of non-financial support other sources of funding hardly can provide (Mollick & Kuppuswamy, 2014). By looking at popular crowdfunding platforms such as Indiegogo or Kickstarter it becomes evident that a large number of projects makes use of crowdfunding early in their product development cycle and is thus open to incorporate feedback. Inspired by the open source software development context, Colombo et al. (2015) postulate that successful crowdfunding potentially means "more feedback, more debugging, and more opportunities to fine-tune a product" (p. 79), which might improve the chances of commercial success for a product when introduced to the market. Furthermore, it is assumed that crowdfunding communities attract users that possess 'lead user' characteristics (Mollick, 2016). These users are said to be ahead of product, service and technological trends and often modify existing products to fit their own unserved needs (Hippel, 1986). Given that lead users usually share their modifications and product extensions for free (Franke & Shah, 2003), crowdfunded projects may profit from the development of an ecosystem of complementary offerings around the product that in turn greatly enhances the value of the original product. Further, the crowd might even play a positive role in the products' advertisement later on. In this context, Colombo et al. (2015) suggest that the community aspect in crowdfunding fosters the creation of word-of-mouth (Arndt, 1967) or social media marketing (Kozinets, Valck, Wojnicki, & Wilner, 2010) which is particularly powerful in online communities. While anecdotal evidence of exceptionally successful campaigns (Agrawal et al., 2013; Pape & Imbesi, 2014) provides important insights into these dynamics described above, existing research

tends to neglect the negative influences when tapping into crowdfunding (Agrawal et al., 2013; Lehner, 2013) and fails to compare it to the long-term success of products which have not been commercialized through the crowd. Against the background that long-term performance implications of crowdfunding are still underexplored and that theoretical arguments for positive and negative performance implications exist, I focus on the following research questions: How do successfully funded crowdfunding projects perform in terms of product success in comparison to their non-crowdfunded counterparts? Which mechanisms explain potential performance differences?

While the performance implications of important phenomena on organizations are at the core of entrepreneurship and management research (Ireland & Webb, 2007; Ketchen, Ireland, & Snow, 2007; Short, McKelvie, Ketchen, & Chandler, 2009) they are especially difficult to operationalize in the crowdfunding context. That is because of the great heterogeneity of products on the platforms even within most categories. For instance, the category "technology" on Kickstarter, the biggest platform in the field, includes projects such as 9$ Computers, 3D-printers, earphones, ebikes or even a solar sailing space craft. A comparison between these different crowdfunding projects remains difficult. The little barriers to entry and the global nature of Internet-based funding platforms further attract highly diverse projects in terms of firm level characteristics which further imposes great difficulties in constructing a control group. Additional difficulties arise due to the typically limited data access on the product level of analysis. I believe that I solved all these issues with a unique, hand-collected dataset of all video games that secured funding through Kickstarter between its foundation in 2009 until July 2016. In line with recent studies in the domain of entrepreneurial finance (Hallen, Bingham, & Cohen, 2014; Pahnke, Katila, & Eisenhardt, 2015), I matched these 368 crowdfunded video games with 368 non-crowdfunded games relying on coarsened exact matching (Iacus et al., 2012).

By employing linear regression, I find strong evidence for the hypothesis that products backed through the crowd are more successful than their non-crowdfunded counterparts. The use of multiple measures of the dependent variable at various points in time proves my results to be robust. Thereby, successful crowdfunding is perceived as a signal of quality (Spence, 1973) that helps potential buyers to ascertain the true quality of the product and helps customers in their buying decision. Moreover, crowdfunded products profited from complementary extensions developed and distributed through the crowd. With these results my study attempts to make three contributions to the crowdfunding, innovation communities and signaling literature streams. First, drawing on a large and unique data set about the long-term

trajectory of successful crowdfunding campaigns, I am the first to test and prove the link between crowdfunding and (product) performance. I thereby answer one of the most frequently mentioned calls from scholars (Allison, Davis, Short, & Webb, 2015; Calic & Mosakowski, 2016; Chan & Parhankangas, 2017; Josefy et al., 2017; Mollick, 2014; Moss, Neubaum, & Meyskens, 2015) who recently judged the performance implications of crowdfunding as a "key question within crowdfunding research to date" (McKenny et al., 2017, p. 298). Second, I prove lead-user theory (Hippel, 1986) to be in effect and bring further the corresponding discussion on innovation communities (Faraj, Jarvenpaa, & Majchrzak, 2011; Franke & Shah, 2003; Mahr & Lievens, 2012; Mollick, 2016) to enhance our understanding of crowdfunding. While the actual discourse on crowdfunding is dominated by signaling theory (Ahlers et al., 2015; Drover, Wood, & Zacharakis, 2015; Kuppuswamy & Bayus, 2015; Mollick, 2014) and social network theory (Butticè et al., 2017; Colombo et al., 2015; Skirnevskiy et al., 2017), my study shows that the special characteristics of the crowd can be investigated from a lead-user theory perspective. Third, I advance the application of signaling theory (Spence, 1973) by establishing crowdfunding as another form of third-party endorsement that helps to reduce information asymmetries between vendors and buyers.

3.2. Conceptual background

3.2.1. Crowdfunding as a new source of funding

Due to its strong growth in transaction volume, crowdfunding grows to be a funding source comparable to the more established forms such as business angel (BA) investments, corporate and independent venture capital (IVC), incubators, or scholarships provided by government agencies (Barnett, 2016). One of the core questions for both entrepreneurial finance scholars as well as practitioners is whether and how these different funding sources effect the financial and strategic performance of entrepreneurial ventures. Typically, BAs are wealthy individuals who, in contrast to CVCs or IVCs, invest their own capital. Thus, angel investors have more flexible investment cycles and are more committed to conduct mentoring and monitoring activities (Politis, 2008). BA investments further function as early endorsement of quality reducing uncertainties surrounding new technologies (Elitzur & Gavious, 2003) and positively influence financial performance (Bruton, Filatotchev, Chahine, & Wright, 2010), innovativeness (Dutta & Folta, 2016) and survival (Kerr, Lerner, & Schoar, 2014). In contrast to BAs, IVCs do not invest their own resources but collect

financial means from other parties and administer them through a dedicated fund with limited liability for the investment managers. These managers are given five to seven years after which the fund is dissolved and distributed among the initial investors. As these VC funds have no other business or operations, they are entirely dedicated to their portfolio companies. Accordingly, these funds are highly specialized in providing various value-added services to their investments (Sapienza, 1992) that enhance financial performance (Baum & Silverman, 2004). In recent years, CVC or equity investments made by established companies in privately held ventures experienced a strong increase (CB Insights, 2016). While CVCs share many similarities with their independent counterparts, corporate investors have access to a broad range of complementary assets from the corporate mother such as manufacturing capacities or marketing channels that IVCs lack. These assets in turn are proven to positively influence ventures performance (Alvarez-Garrido & Dushnitsky, 2016). Related studies have been conducted analyzing the performance implications of incubators (Hallen, Bingham et al., 2014) and government grants (Pahnke et al., 2015). What is lacking, however, is an investigation of the performance implications of successful crowdfunding. Important differentiators of crowdfunding, as compared to the funding sources mentioned above, are that the funds are provided by a large community of users and that the whole process is highly transparent. Thereby, the publicly accessible information of other users' buying decisions might entail information that attracts further customers and potentially drives product performance: a mechanism that is unique to crowdfunding. However, while crowdfunding, through above described characteristics, is unique, research is lacking a clear understanding of the implications of these characteristics on new ventures' firm and product performance.

The purchase of a new product is typically associated with information asymmetries between the transacting parties (Kirmani & Rao, 2000). Buyers usually have little information about the underlying quality of new products and sellers have incentives to promote their products in a more favorable light in order to drive sales (Akerlof, 1970). In order to alleviate this information gap within transactions, Spence (1973) suggests that the informed agent (e.g. seller) can provide signals to less informed agents (e.g. buyers). Efficacious signals in this context include advertising expenditure, brand equity, external certification, price or warranty (Kirmani & Rao, 2000). For a signal to be effective, it needs to be *reliable*, easily *observable* to the receiver and *costly* for low-quality agents to emit (Connelly, Certo, Ireland, & Reutzel, 2011). Against this background, I believe that successful crowdfunding itself can be

seen as an effective signaling device. As crowdfunded products are not available at the time they are promoted on the platforms, backers can be seen as the earliest adopters of a new product, service or technology (Moore, 1991). These early adopters often know their needs better than mainstream customers or producers (Hippel, 2005), which *reliably* reduces uncertainty for subsequent adopters. The information that a product was financed through the crowd is further highly *observable* and often provided through the vendor itself. As endorsements from informed parties such as early customers help potential buyers to make purchasing decisions (e.g. Zhu & Zhang, 2010), vendors often explicitly state they were backed by the crowd. For this purpose, the Kickstarter platform issued a special icon stating "funded with Kickstarter" that is frequently used on firms' websites and advertising material. Further, the world's biggest online retailer Amazon recently introduced a special category to easily identify products that were funded through Kickstarter. Low-quality products, however, bear *substantial costs* of conducting a successful crowdfunding campaign. This not only includes disproportional costs upfront such as the production of a convincing product video, the employment of additional staff for stakeholder management, or marketing activities to attract potential backers, but further also produces indirect costs that arise after the campaign. As low-quality goods are more likely to suffer from deviations from the product description and technical defects backers might use the public crowdfunding site to provide bad product reviews. Given the strong influence of product reviews (Zhu & Zhang, 2010), bad sentiment of these customers might hamper future sales and reputation of the offering firm.

However, against these arguments, I postulate that successful crowdfunding is an effective signal to positively reduce the noise associated with assessing the quality of a new product. As effective signals are shown to positively influence performance outcomes in various other contexts (Connelly et al., 2011), I thus hypothesize:

Hypothesis 1: Crowdfunded products are more successful than their non-crowdfunded counterparts.

3.2.2.   Potential benefits through user innovators

Like markets and hierarchies, innovation communities are an increasingly important source of knowledge (e.g. Faraj et al., 2011) in fields ranging from open source software development (Mollick, 2016), or science (Franzoni & Sauermann, 2014) to new product development (Afuah & Tucci, 2012; Poetz & Schreier, 2012). Several studies have reported that important innovations in industries such as automobiles,

home crafts, software, and sporting goods (Allen, 1983; Franke & Shah, 2003; Franz, 2005; Kline & Pinch, 1996; Lüthje, Herstatt, & Hippel, 2005; Shah & Tripsas, 2007) frequently stem from such communities. Thereby, the term community, rather than social network, is used to describe these groups, as they typically possess a distinct social structure by which identification with the group, rather than ties to specific individuals, tends to motivate cooperation and sharing of ideas and resources (Ashforth & Mael, 1989; Hertel, Niedner, & Herrmann, 2003; Shah & Tripsas, 2007). Recent studies suggest that also reward-based crowdfunding platforms can be understood as innovation communities (Mollick, 2016). Interviewing founders and employees of various crowdfunding platforms Ordanini, Miceli, Pizzetti, and Parasuraman (2011) show that backers are typically characterized by their innovation-orientation, interest in the collaboration and interaction with a greater community, as well as a strong identification with supported products. These motives were later confirmed by Gerber, Julie, and Pei-Yi (2012). Similarly, crowdfunding provides a way for creators to become part of the community of like-minded people and for sharing their knowledge and potential business ideas as well to profit from the development input (Gerber et al., 2012; Mollick & Kuppuswamy, 2014). I split my argumentation about the relationship between user innovation and performance in two parts: complementary product extensions and product adaption.

3.2.2.1.   *Complementary product extensions*

Innovation communities typically attract a large crowd of users that possess 'lead user' characteristics (Franke & Shah, 2003; Morrison, Roberts, & Hippel, 2000). These special kinds of users are ahead of product, service and technological trends and often modify existing products to fit their own unserved needs (Hippel, 1986). Given that lead users usually share their modifications and product extensions for free (Franke & Shah, 2003), crowdfunded projects may profit from the development of an ecosystem that greatly enhances the value of the original product. In line with the observation of earlier studies that 'lead users' can be integrated in the product development process with so called 'user toolkits' (Hippel, 2001; Hippel & Katz, 2002; Jeppesen, 2005), crowdfunding projects often entail rewards that allow for customization of the issued product. In the software context, for instance, crowdfunding projects frequently offer software development kits (SDK) – essentially a programming package that enables external programmers to develop extensions for the original product. I illustrate this line of thought along the frequently discussed example of the Pebble watch (Pape & Imbesi, 2014), a smartwatch that was

crowdfunded through the Kickstarter platform. The first of a total of three Pebble campaigns started on April 11,2012 and ended on May 18, 2012 raising $10,266,845 towards its $100,000 funding goal (Kickstarter, 2012). This makes it the fifth highest funded project of all time on the platform – just behind Pebble Technologies' follow up campaigns which raised $12,779,843 and $20,338,986, respectively (Kickstarter, 2017). Financing the watch reward-based, Pebble Technologies essentially offered two types of rewards tailored to different customer segments in exchange for financial resources. Starting at $99, casual consumers could get the Pebble smart watch (Kickstarter, 2012). The 'Hacker Special', however, was aimed very specifically to lead users. For $235, a limited number of supporters gained early access to the SDK month before the official shipment of the actual watch. The rationale of "distributing developmental materials in this fashion was to crowdsource the development of software to work with Pebble's hardware …, enabling and encouraging independent developers to start working prior to the product's release" (Pape & Imbesi, 2014, p. 109). Backers made great use of the opportunity and extended the functionality of the watch with user-written extensions like an application to track progress in running (Pebble Technology, 2013b), a software to measure the length of golf players' shots on the court (Pebble Technology, 2013a) or simple games (Pebble Technology, 2013a) which were available before Pebble's official market introduction. Pebble's developers have since continued to further cultivate the ecosystem of complementary software surrounding the watch. On Feburary, 4th 2014, for instance, Pebble Technologies announced the release of its own app store, a platform for individual developers to distribute software extensions to other Pebble users (Pebble Technology, 2014). This availability of complementary offerings is said to be a major driver of performance (Amit & Zott, 2001; Kulins, Leonardy, & Weber, 2016).

I therefore hypothesize that crowdfunding success will increase the number of complementary product extensions available, which in turn will positively influence product success. Therefore:

Hypothesis 2: The relationship between crowdfunding and performance is partially mediated by complementary products developed by the crowdfunding community.

3.2.2.2. *Product Adaptions*

Besides the development of complementary product extensions described in the paragraph above, project proponents and backers often collaborate during the product development itself and 'co-create' the product (O'Hern & Rindfleisch, 2010).

Investigating major reward-based crowdfunding platforms, it is apparent that the majority of the projects are at the early stages of product development with often little more than a first prototype (Colombo et al., 2015). Given that at this early stage important major design decisions are still to be taken (Ulrich & Eppinger, 2012), backers' engagement and feedback can significantly influence the product development. To stimulate the exchange between project proponents and interested users, most crowdfunding platforms embedded rich functionalities that facilitate efficient communication. Thereby, one of the main features is each project's own community page where backers engage in a kind of open exchange dedicated to the crowdfunding project. On this forum, backers not only receive all kinds of customer support, can discuss common problems or unexpected experiences, but frequently engage in conversations on how the development of the product should proceed. In the case of the Pebble watch, for instance, Agrawal et al. (2013) showed that backers frequently proposed new product features that have been taken into account by the developer and thus changed the final design of the watch. A slightly more active method to engage the crowd in the process of product development is the explicit solicitation for feedback either through a closed or open-call on the platform (Pape & Imbesi, 2014) which is well illustrated by the *Mighty No. 9* crowdfunding project. *Mighty No. 9* is a video game developed by Comcept and was featured on the Kickstarter platform between August and October 2013 where it raised approximately $3,850,000 USD. Depending on the amount of the pledge, backers could exclusively decide on various ways to contribute to the development of the game. For $80, backers were provided with "access to the beta version" and to provide feedback regarding this incomplete version of the game (Kickstarter, 2013). A pledge of $500 allowed backers to work with the "game designers to come up with a challenge for our own internal in-game achievement system that everyone can try to accomplish in the final game" while for $5,000 backers were invited "to collaborate on an enemy character based on your idea or design" (Kickstarter, 2013). Besides this more exclusive collaborative opportunities (Pape & Imbesi, 2014), Comcept relied on a public vote to elicit feedback concerning the characteristics and design of the game's main character. About 82,000 game enthusiasts took part in the poll (Comcept, 2013a). Following up the initial vote, Comcept conducted a follow-up pull limited to backers of the campaign to finally vote on the top results from the first round (Comcept, 2013b). The positive response to this votes let Comcept regularly share their prototypes with the community, who serve as beta testers and give iterative feedback that guides future product refinements (Franke & Shah, 2003). This is not

surprising as this joint innovation efforts are commonly associated with increased product performance later on (Afuah & Tucci, 2012; Bogers et al., 2010; Lilien, Morrison, Searls, Sonnack, & Hippel, 2002; Spaeth, Stuermer, & Krogh, 2010).

Therefore, product developers who participate in an innovation community like crowdfunding might benefit from this feedback in two significant ways. First, decision makers' limitations – cognitive, resource, information, and time – put boundaries on the agents' information process capacity, constraining the amount and types of product alternatives they can store and assess at a time (e.g. Cyert & March, 1963). Given this bounded rationality of key decision makers, their search for solutions to product related design problems will largely incorporate alternatives close to their existing knowledge and technology base (e.g. Katila, 2002). A strategy that is known as local search and usually does not lead to the best design solution due to its narrow focus (e.g. Levinthal & Warglien, 1999). When outsourcing a task to the crowd, decision makers in turn expose themselves to a wider set of alternatives that are more distant from the agents' core. Within the boundary conditions of crowdfunding, this *distant search* improves the chances for finding better solutions at lower transaction costs compared to internal development or assigning the problem to a designated contractor (Afuah & Tucci, 2012). Second, the product developer obtains first-hand information regarding the customer perception concerning the products' quality. This provides the advantage that consumers often know their individual needs better than producers and therefore can better evaluate consumer goods. In the context of crowdfunding, the same customers that back the project also buy the product and can tell the producer whether they like it: something that is challenging for the focal agent to determine internally (Afuah & Tucci, 2012). Against this background, I hypothesize that crowdfunded success will increase the number of product adaptions, which in turn will positively influence product success. Therefore:

Hypothesis 3: The relationship between crowdfunding and performance is partially mediated by early product adaptions.

3.3.   Data and method

3.3.1.   Sample

I test my hypotheses with a hand-collected, unique dataset of the whole population of video games that secured funding through Kickstarter – the largest reward-based crowdfunding platform in terms of revenues. Besides its size, the Kickstarter platform was chosen in order to ensure comparability with other studies (Butticè et al., 2017;

Colombo et al., 2015; Davis et al., 2017; Mollick, 2014; Skirnevskiy et al., 2017) as it is the most researched platform for empirical work on crowdfunding. I chose the video gaming context because of three main reasons: First, the great homogeneity of projects in this category made it easier to rule out industry and product specific influences. Second, since video games can often easily be adapted, the influence of innovative user input is comparatively easy to identify. Third, as the very large majority of commercial video games are released through one large online publishing service – Steam - I could monitor the projects in great detail after they left the crowdfunding platform. Data was collected from the foundation of Kickstarter on April 28th, 2009 and until July 20th, 2016. The initial pool consisted of all the 10,292 projects listed in the 'video game' category in the given time period. This initial set was then fixed as the basis for future analysis. Since the main objective of my research was to understand the performance implications of successful crowdfunding campaigns, I eliminated the 8,219 projects that did not reach their funding goals. From the remaining sample of 2,073 I further eliminated projects that relate to the video gaming context but are not a video game themselves such as related books, conferences, drawings, game consoles, or movies. For the remaining projects, I further checked whether a video game was released yet. To do so, I manually searched the Steam database for each of the remaining games. Launched by Valve Corporation, the Steam platform experienced a strong growth and is now regarded the largest digital distribution platform for PC video games. Whereas the platform began with seven games in 2004, as of March 2017 it now offers around 14,100 games (Steam, 2017) with over 4,200 added to Steam in 2016 alone (Sarkar, 2016). In October 2013 IHS Screen Digest estimated that 75% of PC video games bought online were purchased through Steam (Edwards, 2013). With an estimated revenue of $3,5 billion in 2015 (Galyonkin, 2016) the service constitutes one of America's largest private companies (Forbes, 2016). Given the long development time and the high average delivery delay (Table 3) of video games, the majority of the games have not been released at the time of data collection. I fixed the remaining 368 video games as my treatment group.

Table 3 provides an overview of the data set I assembled for the treatment group. Thereby, the descriptive statistics show strong overlap with the data collected in previous studies with an often broader set of categories (Colombo et al., 2015; Mollick, 2014) and thus ensures great comparability among other publications. The probability of success of 20.14%, for instance, strongly matches the 20.8% observed by Colombo et al. (2015) with a smaller dataset within the video game category. The

average campaign in our treatment group received \$193,038 from 4,305 backers. When looking at the dates of order fulfillment, the data backs arguments brought forward by popular business press and scholars alike (Mollick, 2014). While the average campaign had a delay of 337 days, 25% were delayed by more than 460 days.

Table 3: Descriptive statistics of the treatment group

Fundraising Goal	< \$1000	\$1 tsd. - \$10 tsd.	\$10 tsd - \$100 tsd.	\$100 tsd – \$1 Mio	> \$1 Mio	Total
Total Number of Projects	1,151	3,576	4,430	1,063	72	10,292
Funded	395	768	747	153	10	2,073
Funded %	34.31%	21.47%	16.86%	14.39%	13.8%	20.14%
Commercially Available	13	77	200	73	5	368
Proceeds*†	7053.76 (10784.83)	13434.85 (12056.10)	63169.85 (81511.61)	632775.62 (793405.71)	2217065.52 (1109945.04)	193038.31 (502017.79)
Backers†	329.53 (457.15)	580.54 (557.22)	2138.36 (3026.68)	12894.95 (14859.30)	33275.80 (22806.55)	4305.35 (9282.52)
Delay†	380.83 (307.75)	349.18 (252.82)	338.09 (262.84)	329.13 263.19	243.20 (148.43)	337.90 (260.50)

 * Figures in different currencies were converted at the exchange rate of the campaigns last day.
† The first value is the mean. Standard error in the parentheses.

For assembling my control group I followed Pahnke et al. (2015) and chose coarsened exact matching (CEM) as a matching method. Since CEM can be used for exact matching on wider ranges of variables including variable categories (Iacus et al., 2012) it is often preferred over propensity score matching for small- and medium size datasets (Rosenbaum & Rubin, 1985; Stuart, 2010). In my analyses, I matched video games on genre (Adventure, Action, Casual, Indie, Racing, RPG, Simulation, Sport, Strategy), price and release year. Given the immense amount of games, I was able to find an exact match for the majority of cases. If I could not identify an exact match on the Steam Database, I first released the release year to be within +/- one year range. If, after relaxing these criteria, there was still no match, in a last step I relaxed the price to be within x/- 10% range. Thus, I concluded that my selection strategy was successful and I proceeded with a final data set of 736 video games. Next, I give an overview of the variables used in the analysis, whereat further descriptive statistics of the full sample are provided in the results section.

3.3.2. Variables

3.3.2.1. *Dependent variables*

Even in the context of large publicly listed organizations that are subject to comprehensive disclosure obligations, the limited access to data regarding the success of singular products within a product portfolio imposes great difficulties for scholars to investigate performance implications on the product level of analysis. This problem is exacerbated in the context of my study as typically even less data is available for products commercialized by individuals and small firms that constitute the majority of the creators on crowdfunding platforms. I believe that I managed to solve this problem by relying on the video gaming context that provides three different measures of product success despite firm level characteristics. The use of these three different measures as the foundation of my study further ensures the robustness of my results. First, I used a data collector service that automatically gathers data directly from the original Steam platform using the Steam Web API. Thereby, the collector queries the amount of simultaneous players on an hourly interval for each game in the Steam catalog. Given the high degree of skewness I then calculated the logarithm of the average amount of players in order to comply with normality assumption in ordinary least squares (OLS) regression (Manning & Mullahy, 2001). This procedure complies with other studies conducted in the field (Calic & Mosakowski, 2016; Colombo et al., 2015; Mollick, 2014). To test my hypotheses, I used measurements of the dependent variable (*LN_Players*) at various points in time (after one, three, six, nine and 12 months after the official release of the game). As my second dependent variable I used the average number of sales (*LN_Sales)* between a game's release and the time of data collection. The data was pulled from the Steamspy database - a Steam statistic service that also relies on the Steam Web API and aggregates the data in a well-arranged manner. *D_Sequel* constitutes my third dependent variable, which took the value of one if the game was continued based on an earlier version of the same game within a series (for example, sports games are often published once a year) and zero otherwise. I believe this to be another adequate measure of product success, as a game series will only be continued if its predecessor was successful. I collected this data from the Steam database.

3.3.2.2.   Explanatory variables

D_Kickstarter took a value of one if the video game was successfully financed through the Kickstarter platform and zero when the video game was released without any financial support from a crowdfunding platform. To rule out that a game was funded through a different crowdfunding platform, I first manually searched Indiegogo and Patron - two other dominant platforms for crowdfunding video games. Further, I conducted a google search for all my observations using "the name of the game" and "crowdfunding" as a search string. In order to determine the extent to which early product adaption were conducted, I counted all software updates between the first test version and the full release. I retrieved this data by going through the development blog on the games' Steam websites. The first incomplete test versions of the game which are usually only available to a small subset of especially enthusiastic users often carry labels such as "alpha", "beta", "early access" or "version 0.X". Thereby, the variable *Product_Adaptions* contains the number of "fixes", "updates", "revisions" conducted of this game until its "full release", "official launch", or "version 1.0. To illustrate my procedure, I refer to the development blog of the game "Infested Planet" (Rocket Bear Games, 2017). Thereby, the entry on July 2, 2014 with the headline "Early Access Now Available" indicated that an early version was released on this date. I then analyzed all of the following press releases and counted each headline like "Update 1 is Out" (July 5, 2013) or "Infested Planet Quickfix" (July 19, 2013) as one update. I continued until the (March 6, 2014) as the developer announced "Now Available on Steam....after a successful early access development period, infested planet has moved to full release on Steam!" In order to measure the extent of which the community developed complementary *Product_Extensions*, I relied on a five-point Likert scale. A one indicated that the community has not developed any complementary extensions for the particular game. A five indicated that the community provided various different types of extensions such as additional maps or levels, customizations for in game characters ('skins') or objects ('weapon packs') and extensions that even extend the functionality of the game, for instance through the introduction of a new game mode.

3.3.2.3.   Control variables

I include further factors that might influence the success of a video game as control variables in the analysis. As sequels of existing products such as movie sequels (Chang & Ki, 2005; Ravid, 1999) are often more successful than completely new releases, I

included *D_Followup* as a dummy variable, which is equal to one if the game is a continuation of an existing game series. An illustrative example from our sample would be "Leisure Suit Larry: Reloaded" which is by now the eighths part of the video game series "Leisure Suit Larry" which started in 1987 and therefore could draw on an existing fan base new releases lack. *Number_of_Game_Modes* measures the number of different gaming modes (e.g. single player, multiplayer, or coop), as a more multifaceted nature might influence the longevity. Similarly, the number of available languages (*Language_Interface)* for the interface as well as the amount of translations for in-game audio (*Language_Sound*) upon release date might influence product success as a larger number of players can be addressed. *Price* indicates the selling price at the time of data collection. On the firm level I include the experience of the developer (*Developer_Experience*) and publisher (*Publisher_Experience*) into my analysis. I used the number of games that the developer/publisher released previously to the investigated game on the Steam platform. As my data covers a seven-year period, I follow previous studies (Calic & Mosakowski, 2016; Courtney et al., 2017) and control for unobservable time-varying effects by including the difference to my baseline year, 2016, and the year of the games' official release (*Age)*. All data was collected through the Steam digital distribution platform. The inclusion of these variables strengthens the claim that my analysis captures the influence of crowdfunding on performances as opposed to the effects of game or firm characteristics. The definitions and summary statistics of the variables are presented in Table 4.

3.3.3. Analysis of direct and indirect effects

In order to ensure the comprehensibility of my calculations I follow common practice (Calic & Mosakowski, 2016; Hayes, 2013) when reporting mediation effects and document my findings along Figure 1. This chart depicts the postulated relationship between crowdfunding funding success and product performance. Thereby, path *c* describes the direct relationship between crowdfunding and performance (Hypothesis 1). Should this path *c* not show to be significant, there would have no evidence for a relationship – neither direct nor indirect – between successful crowdfunding and product performance. The paths a_1 and a_2 represent the effects of crowdfunding success on the availability of complementary product extension and product adaptions, respectively, while paths b_1 and b_2 represent the effects of complementary product extensions and product adaptions, respectively, on product performance. To support the postulated mediated relationships between

crowdfunding success and product performance, paths a_1 and b_1 (H2: complementary product extensions as a mediator) and paths a_2 and b_2 (H3: product adaptions as a mediator) should be statistically significant. In line with recent publications in crowdfunding research (Butticè et al., 2017; Calic & Mosakowski, 2016), I rely on Baron and Kenny's (1986) approach and test for mediation based on a two-stage regression. The first step begins with an OLS regression to estimate the regression coefficients on the independent variable to the dependent variable (direct path c; models I-V; Table 5). I further calculate the regression coefficients on the independent variable to the mediator variables (indirect path a_1 and a_2; models VII/IX in Table 6), and the coefficients of both the independent and mediator variables to the dependent variable (path b_1 and b_2; models VIII/X in Table 6). In a second step, I compare the estimated coefficients between the direct and indirect path. I do this to estimate the degree to which the mediating variable explains the relationship between explanatory and dependent variable. I perform this operations using the well-known Process plugin for SPSS (Hayes, 2013). Following the recommendations of Hayes (2013), I used a bias-corrected bootstrap confidence interval for the indirect effect of 95 percent and 5,000 bootstrap samples.
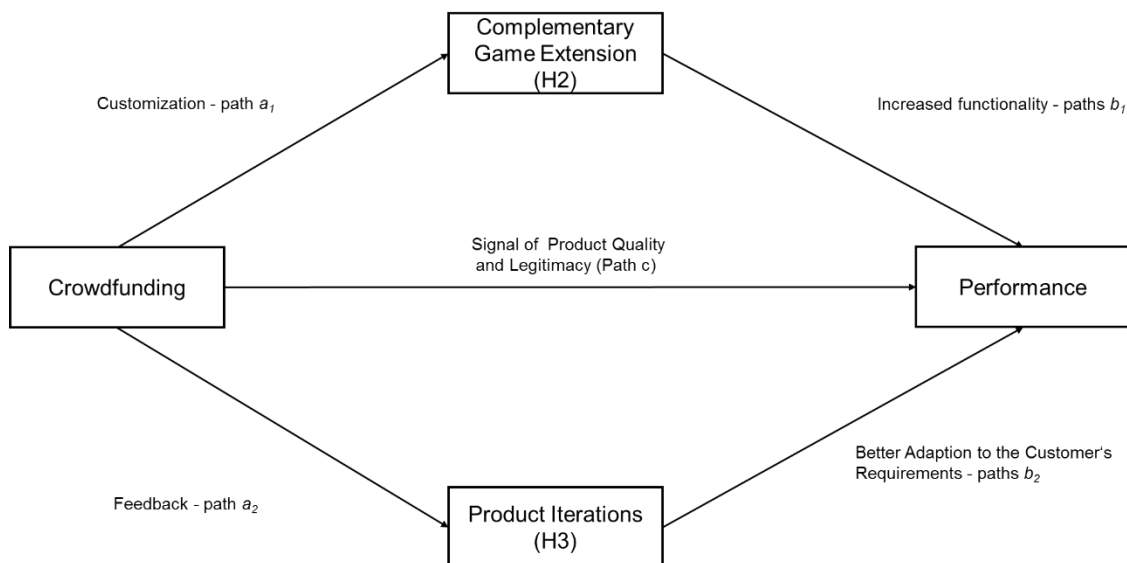

Figure 1: Mediating model and theory map of crowdfunding success on performance

3.4. Results

3.4.1. Descriptive statistics

Table 4 reports the descriptive statistics and the Pearson correlations among the right-hand side variables used in the regression analysis and the corresponding

variance inflation factors. Even though my total sample consists of 736 video games of which 368 (50%) raised money by crowdfunding, taking the logarithmic value of my dependent variable caused me to drop some cases for our primary calculation. This is because some of my games have not been played in the investigated time period and the corresponding logarithmic value of 0 is not defined. I do, however, perform additional robustness checks in order to rule out the possibility that the omission of these cases distorts my results. Further, some of the games have been released less than 12 months before my time of data collection and therefore dot not appear in later observation periods. Nevertheless, I believe my sample size between 580 (*Ln_Players_Month_12*) and 696 cases (*Ln_Players_Month_3*) to be still very satisfactory. Concerning the correlations, I notice that some among the explanatory variables are significant. However, since their average VIF was 1.171 (below the conventional threshold of 6), and the maximum VIF was 1.386 (again considerably below the conventional threshold of 10, McDonald & Moffit, 1980), I conclude that there is no multicollinearity problem in my estimates.

Table 4: Descriptive statistics and correlation

Panel A

	Obser-vations	Mean	Median	Standard-deviation	Min	Max	Variable Description
Dependent Variables							
(1) Ln_Players_1	693*	1.655	1.648	2.394	-2.30	10.59	Ln (the average amount of players in the first month after the release)
Ln_Players_3	696*	1.279	1.335	2.275	-2.30	9.45	Ln (the average amount of players in the third month after the release)
Ln_Players_6	686*	1.426	1.335	2.252	-2.30	8.44	Ln (the average amount of players in the sixth month after the release)
Ln_Players_9	637*	1.498	1.386	2.260	-2.30	8.70	Ln (the average amount of players in the ninth month after the release)
Ln_Players_12	580*	1.549	1.386	2.342	-2.30	9.96	Ln (the average amount of players in the twelfth month after the release)
Ln_ Sales	736	7.021	6.948	1.610	-.61	12.67	Ln (the average amount of sales per month)

D_Sequel	736	0.141	0	0.348	0.0	1.0	Dummy = 1 if a sequel of the game was published; 0 otherwise
Explanatory Variables							
(2) D_Kickstarter	736	0.50	0.50	0.50	1.0	1.0	Dummy = 1 if the game was successfully funded on Kickstarter; 0 otherwise
(3) Product_ Extensions	736	1.728	1.0	1.036	1.0	5.0	Likert scale from 1 to 5 were "1" indicates that no complementary game extensions exist and "5" that the community provided all types of different extensions available in the gaming context
(4) Product_ Adaptions	736	6.141	0	14.468	0.0	147.0	Number of software updates between alpha/beta version and final release
Control Variables							
(5) Age	736	2.347	2	1.082	1.0	6.0	Number of years since the first release on the Steam platform
(6) Number_of_Game_ Modes	736	1.572	1	1.229	1.0	9.0	Number of different game modes such as singleplayer or multiplayer
(7) D_Followup	736	0.141	0	0.348	0.0	1.0	Dummy = 1 if the game was the continuation an existing video game series
(8) Price	736	14.262	13.990	7.702	0.90	45.99	Price of the game without discount campaign at the time of data collection in Euro
(9) Language_ Interface	736	3.510	1	4.052	1.0	27.0	Number of languages in which the games' interface is available
(10) Language_ Sound	736	0.995	1	2.116	0.0	27.0	Number of languages in which the games' audio is available
(11) Developer_ Experience	736	1.330	0	3.966	0.0	58.0	Number of games published before by the developing firm
(12) Pulisher_ Experience	736	10.925	0.0	31.220	0.0	291.0	Number of games published before by the publishing firm

Panel B

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	VIF
1.	1												
2.	.104*	1											1.055
3.	.095*	.161*	1										1.424
4.	.176*	.090*	.486*	1									1.386
5.	.318*	-.060	-087*	-.052	1								1.063

													VIF
6.	.140*	-.023	.235*	.193	.032	1							1.097
7.	.171*	-086*	-.064	-086*	.151*	-.011	1						1.128
8.	.252*	.062	.203*	.222*	-121*	.107*	.164*	1					1.220
9.	.080*	-.011	.023	.005	.017	.028	.052	.165*	1				1.138
10.	-.051	-.079	-.084	-.077	-.019	.031	.065	.022	.308*	1			1.126
11.	.066	-.127	-.056	-.034	.061	.070	.232*	.170*	.083*	.033	1		1.136
12.	.074	-.049	-106*	-.091	-.016	.006	.119*	.200*	.151*	.131*	.201*	1	1.109

p ≤ .05; VIF = Variance Inflation Factor

3.4.2. Hypothesis tested

In order to test how crowdfunded products perform in comparison to their non-crowdfunded counterparts (Hypothesis 1), I conducted OLS regressions. Table 5 shows the results for regressions in which the dependent variable is the logarithm of the average amount of players after one, three, six, nine, and twelve month (models I/II/III/IV/V). Hypothesis 1 regarding the positive performance implications of crowdfunding on product success is supported. As depicted by Table 5, the coeffecient on the Kickstarter dummy variable (*D_Kickstarter*) is positive and in all cases it is significant. Comparing the models I-V, I note that the coefficient on *D_Kickstarter* is significant at $p < 0.01$ when looking at the performance implications in the first month compared to a significance level of $p < 0.001$ when taking into consideration a longer time span. Also, the net value of the regression coefficient of the Kickstarter dummy increased over the first nine month. This might suggest that crowdfunding not only helps to improve short-term product success but more importantly has a positive impact in the long run. In line with this argumentation, the model fit also increased from an adjusted R^2 of 0.211 (model I) to 0.279 (model V).

Table 5: Results of the direct effect of successful crowdfunding on performance (OLS regression)

Dependent Variable	*LN_Players_1*	*LN_Players_3*	*LN_Players_6*	*LN_Players_9*	*LN_Players_12*
RHS variables	Model I Value (std. err.)	Model II Value (std. err.)	Model III Value (std. err.)	Model IV Value (std. err.)	Model V Value (std. err.)
Constant	-1.934***	-2.170***	-2.248***	-2.139***	-2.503***
	(.289)	(.276)	(.268)	(.285)	(.321)
D_Kickstarter	.509**	.579***	.609***	.778***	.668***
	(.165)	(.155)	(.149)	(.156)	(.168)
Age	.755***	.524***	.470***	.410***	.463***
	(.077)	(.073)	(.070)	(.075)	(.083)
Number_of_ Game_Modes	.211**	.204**	.221***	.239***	.317***
	(.066)	(.062)	(.060)	(.063)	(.069)
D_FollowUP	.634*	.596**	.801***	.768**	.724**
	(.245)	(.228)	(.217)	(.227)	(.234)
Price	.077***	.096***	.111***	.109***	.114***
	(.011)	(.010)	(.010)	(.011)	(.011)
Languages_ Interface	.027	.072***	.075***	.077***	.087***
	(.021)	(.020)	(.019)	(.020)	(.022)
Languages_ Sound	-.063	-.091	-0.096**	-.084	-.063
	(.040)	(.038)	(.036)	(.048)	(.050)
Developer_ Experience	-.013	-.018	-.002	-.013	-.019
	(.022)	(.020)	(.019)	(.020)	(.021)
Publisher_ Experience	.004	-.001	.001	-.001	0.002
	(.003)	(.003)	(0.002)	(.003)	(.003)
Durbon-Watson	1.856	1.727	1.611	1.623	1.548
R²	.221	.235	.290	.271	.290
Adjusted R²	.211	.225	.281	.261	.279
F	21.586	23.364	30.689	25.933	25.858
N	693	696	686	637	580

*0.01 ≤ p < 0.05, ** p < 0.01, *** p < 0.001

Table 6: Results of the indirect effects of successful crowdfunding on performance (Confidence interval .95 percent and 5,000 bootstrap samples)

Dependent Variable	LN_Players_6	Product Extensions	LN_Players_6	Product Adaptions	LN_Players_6
Path	c	a_1	b_1	a_2	b_2
RHS variables	Model VI Value (std. err.)	Model VII Value (std. err.)	Model VIII Value (std. err.)	Model IX Value (std. err.)	Model X Value (std. err.)
Constant	-2.2484*** (.268)	1.1632*** (.137)	-2.608*** (.279)	-1.901 (1.948)	-2.215*** (.266)
D_Kickstarter	.608*** (.1486)	.2413** (.075)	.534*** (.148)	1.879 (1.078)	.575*** (.147)
Product_Extensions	-	-	.309*** (.074)	-	-
Product_Adaptions	-	-	-	-	.017*** (.005)
Age	.469*** (.069)	-.063 (.035)	.489*** (.069)	-.474 (.506)	.478*** (.069)
Number_of_Game_Modes	.220*** (.060)	.201*** (0.030)	.158** (.061)	2.263*** (.435)	.181** (.060)
D_Followup	.801*** (.010)	-.132 (.110)	.842*** (.215)	-3.654* (1.576)	.865*** (.216)
Price	.110*** (.010)	.026*** (.005)	.102*** (.010)	.457*** (.074)	.102*** (.010)
Languages_Interface	.075*** (.018)	.008 (.009)	.072*** (.018)	-.004 (.136)	.075*** (.018)
Languages_Sound	-.095** (.035)	-.039* (.018)	-.083* (.035)	-.407 (.258)	-.088* (.035)
Developer_Experience	-.001 (.019)	-.012 (.009)	.002 (0.019)	-.095 (.140)	.000 (.019)
Publisher_Experience	.001 (.002)	-.003 (.001)	.002 (.002)	-.052** (.017)	.002 (.002)
R²	.290	.145	.307	.124	.301
F	30.689	12.832	30.012	10.696	29.149
N	686	686	686	686	686

*$0.01 \leq p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The remaining two hypotheses indicate a partial mediation model, where crowdfunding indirectly increase product performance through complementary game extensions (Hypothesis 2) and more development cycles (Hypothesis 3). Given that model III in Table 5 has the highest model fit (adj. R^2 = 0.281), I decided to first test the proposed mediation effects using the average number of players in month 6 (*Ln_Players_6*) as the dependent variable. Though, my results are robust against different dependent variables as I point out in the next section.

To test hypothesis 2, I introduce the amount of *Product_Extensions* besides all the control variables used in the previous regression into my analysis. On model VII the

D_Kickstarter coefficient is positive and significant (p < 0.01), implying that successful crowdfunding increases the amount of product extensions (path a_1). The positive and signficiant (p < 0.001) coefficient on the *Product_Extensions* variable in model VIII further shows that these extensions drive performance (path b_1). In a next step, I estimated the significance of this indirect effect in order to test for mediation (Hayes, 2013). To do so, I investigated the bootstrap confidence intervals and implemented Sobel's (1982) test. Given that the confidence interval (BootLLCI = 0.028, BootULCI = 0.152) does not cross zero and the Sobel (1982) test is significant (Z = 2.481, p < 0.05), I find that complementary game extensions partly mediate the relationship between crowdfunding and performance. 12.27 percent of the total effect of successful crowdfunding is mediated by complementary product extensions. Thus, hypothesis 2 is supported.[4] In order to test hypothesis 3 that postulates that the amount of product adaptions mediates the relationship between crowdfunding and performance, I introduce the variable *Product_ Adaptions* into my model. In line with my preceding analyses, I again include the control variables used before. The insignificant coefficient (p = 0.081) on the Kickstarter variable in model IX shows that in contrast to our results above no indirect effect (path a_2) could be observed. As these findings violate one of the preconditions for mediation to occur, I reject hypothesis 3. Even though, crowdfunded prodcuts do not undergo more product adaptions in comparision to their non-crowdfunded counterparts, frequent iterations between the first test version and the final release drove performance for both types (model X). Figure 2 summarizes the findings of the relationship investigated in my analysis.

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[4] I intentionally do not calculate the widely used kappa-squared as an additional robustness check regarding the significance of the partial mediation as Wen and Fan (2015) showed that Preacher and Kelley 's (2011) well-cited paper contains a mathematical error, which disproved the significance of the test.
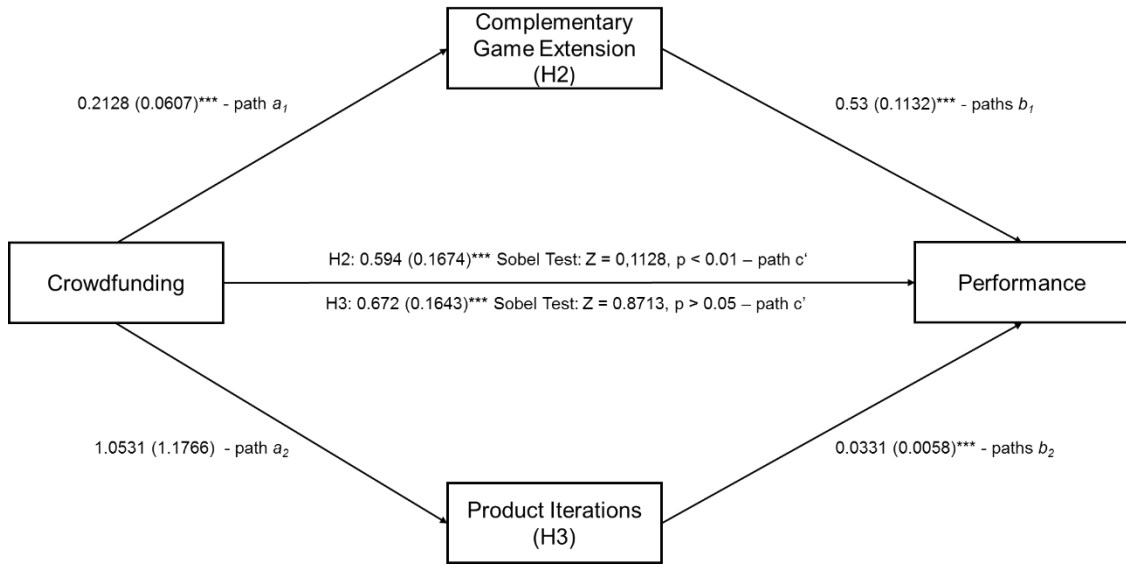
Figure 2: Summarized findings of the explored mediating relationships

3.4.3. Robustness checks

The use of different measures of the dependent variable constitutes as one robustness check for my results. Thereby, Table 7 depicts the main findings of this analyses. Holding all control variables constant, I conducted another regression using the logarithmic value of the monthly sales (*LN_ Sales*) as dependent variable. Although the fit of my model decreased (R^2 = 0.184) the results regarding the positive influence of crowfunding were qualitatively similar to my main results given a positive and significant coeffecient on the Kickstarter variable at $p < 0.001$ (model XI). Besides this additional evidence for hypothesis 1, model XII and model XIII provide further support for the confirmation of hypothesis 2. Concretely, I find that product extensions partially mediate the relationship between successful crowdfunding and the average monthy sales (BootLLCI = 0.026, BootULCI = 0.121; Z = 2.753, p < 0.01). Similar to my main results, the 13.61 percent of the total effect of successful crowdfunding was mediated by complementary product extensions. For an additional analysis, I used *D_Sequel* as dependent variable. Given the binary nature of this variable, I conducted a logit regression (model XIV). As the kickstarter dummy is again positive and significant ($p < 0.05$), I provide further evidence that crowdfunded products do indeed perform better than their non crowdfunded counterparts (hypothesis 1). Given the problems of testing for mediation with a dichotomous outcome variable (Mackinnon & Dwyer, 1993), I have not calculated any mediation effects using *D_Sequel* as dependent variable. In order to reinforce my primary results regarding hypothesis 2, I estimated the mediation effect using *Ln_Players_1, Ln_Players_3, Ln_Players_9 and Ln_Players_12* in addition to *Ln_Players_6*

(model VI-VIII in Table 6). In all models, I found support for hypothesis 2. Apart from different operationalizations of the performance variable, I followed common practice (Mollick, 2014; Skirnevskiy et al., 2017) and eliminated potential outliers (14 projects above a million dollars). Again, the results are consistent with my previous estimates.

Refering to my explanations above, I conclude that my original findings are highly robust.

Table 7: Additional regressions using the LN_ Sales and D_Sequel as performance measures

Dependent Variable	LN_Sales	Product_ Extensions	LN_Sales	D_Sequel
Path	c	a_1	b_1	
RHS variables	Model XI	Model XII	Model XIII	Model XIV
	Value (std. err.)	Value (std. err.)	Value (std. err.)	Value (std. err.)
Constant	4.934***	1.127***	4.663***	-3.868***
	(.192)	(.127)	(.200)	(.402)
D_Kickstarter	.533***	.265***	.469***	.493*
	(.109)	(.072)	(.109)	(.216)
Product_ Adaptions	-	-	.240***	-
			(.055)	
Age	.328***	-.053	.341***	.416***
	(.051)	(.033)	(.050)	(.094)
Number_of_ Game_Modes	.198***	.188***	.153	.207**
	(.044)	(.029)	(.045)	(.076)
D_FollowUP	.364*	-.135	.397*	1.297***
	(.163)	(.107)	(.161)	(.259)
Price	.030***	.027***	.023*	.022
	(.007)	(.005)	(.007)	(.014)
Languages_ Interface	.077***	.008	.075***	.024
	(.014)	(.009)	(.014)	(.027)
Languages_ Sound	-.045	-.037*	-.036	-.113
	(.027)	.017	(.026)	(.085)
Developer_ Experience	.006	-.013	.010	.002
	(.014)	(.009)	(.014)	(.025)
Publisher_ Experience	.002	-.004***	.003	.006
	(.001)	(.001)	(.001)	(.003)
R²	0.184	.144	.205	
F	18.272	13.639	18.714	
Nagelkerkes R²				.164
Hosmer-Lemeshow				.224
Chi-Quadrat				76.297
N	736	736	736	736

3.5.   Discussion and implications

In recent years, crowdfunding has received increasing attention from scholars and practitioners interested in explaining its role as a new funding source and drivers of campaign success (Short et al., 2017). Despite of its importance, the performance implications, however, have been neglected so far (McKenny et al., 2017). Against this background, I investigated whether crowdfunded products are more successful than their non-crowdfunded counterparts and what mechanisms drive differences in performance. My central insight is that reward-based crowdfunding has a strong impact on the overall success of the product and that this effect can partly be explained by complementary product extensions provided by innovative users. I believe that my results contribute to three major debates.

First, I contribute to the nascent discourse on crowdfunding. Now that crowdfunding is being blessed by popular business press and scholars alike, the whole field has to question itself: 'Is crowdfunding another fad?' That is to say, a concept that enjoys strong and widespread but short-term enthusiasm without any evidence of its assumed qualities. My study answers this important question as it proves that crowdfunding, indeed, influences performance. Moreover, it shows that crowdfunding is another competitive funding source just like business angel investments or corporate and independent venture capital. Further, I was able to test one of the most promising benefits which are associated with this new form of entrepreneurial finance and that differentiate it from other funding sources. Besides the mere collection of financial resources, entrepreneurs often seek crowdfunding to receive product development input from a community of interested users (Belleflamme, Lambert, & Schwienbacher, 2013; Gerber et al., 2012; Mollick & Kuppuswamy, 2014). In this context, I am the first to show that crowdfunding indeed attracts innovative users that actively engage in the development of the product and greatly extend its functionality. With this finding, I additionally show that crowdfunding platforms can be conceptualized as innovation communities that can be investigated from a lead-user perspective. I, thereby, extend the vivid discussion on social networks within crowdfunding research that so far merely focused on ties to specific individuals but little to the community aspect as a whole.

Second, this article advances signaling theory by discussing its applicability in the context of crowdfunding and by demonstrating that successful crowdfunding constitutes a signal of quality that drives product success. In the current debate, scholars mainly examined signals that induce backers to commit funds to a certain

crowdfunding project. Effective signals include the project proponents' personal characteristics (Ahlers et al., 2015; Courtney et al., 2017; Davis et al., 2017; Lin, Prabhala, & Viswanathan, 2013; Potzsch & Bohme, 2010), the use of media and level of preparedness (Butticè et al., 2017; Chan & Parhankangas, 2017; Colombo et al., 2015; Mollick, 2014), as well as third-party endorsement (Courtney et al., 2017; Mollick, 2014). The present paper extends this discussion and shows that signaling theory cannot only be applied to explain *funding* success, but also *product* success after the end of the campaign. This finding should be of interest to practitioners and scholars as crowdfunding turns out to be a real alternative in situations were more established signals of quality are hard to emit. Individuals and micro-enterprises constitute not only a large part of crowdfunding endeavors but of general economic activity (Moscarini & Postel-Vinay, 2012). Given their limited possibilities to establish a brand, to conduct extensive marketing activities, or to provide comprehensive warranties (Kirmani & Rao, 2000), they have to consider other effective means to signal product quality. My research establishes successful crowdfunding as one of them.

Third, this study contributes to the literature on innovation communities and user innovation. Innovation involves combining knowledge about customer preferences with technological know-how to create products the consumers want. Product designers, however, are confronted with the problem that information about user needs is ambiguous in nature. Consumers are not always able to articulate their needs before a product exists (Hippel, 1986) and their needs may have changed by the time they received the product (Rosenberg, 1982). To solve this problem, the literature on user innovation suggests to outsource need-related innovation tasks to customers at the very front of the adoption cycle (Hippel, 1988) and to jointly co-create the product with them (Hippel, 2005). Empirical evidence, however, that proves whether co-creation with these users indeed influences product performance is scarce. The only quantitative study available suggests that this joint innovation efforts lead to better performing products (Lilien et al., 2002). However, the explanatory power of this study might be diminished as the sample size of 47 cases could be of higher statistical significance. Further, the used survey data is more sensitive to biases than my primary data (Choi & Pak, 2005). Against this background, Bogers et al. (2010) in their literature review conclude that "the research stream on users as innovators will greatly benefit from empirically testing (on a larger scale) the ideas and propositions that it puts forward, ideally by linking them to existing theories and assumptions" (p. 871). With my dataset of more than 700 observations, I answer to that call. Particularly,

this paper confirms conceptual arguments (Hippel, 2005; Lüthje et al., 2005) and earlier empirical studies (Lilien et al., 2002) that attest co-creation with innovative users to positively influence product performance. Testing two different mechanisms that are said to drive this effect, I can further depict a more fine-grained picture of the relationship of user input and product performance in the context of innovation communities. Thereby, different types of user involvement have different impact on product performance. Involvement that is only based on the frequent adjustment of the product according to user feedback (path a2 and path b2) had a substantially smaller impact on performance than complementary extensions of the crowd (path a1 and path b1).

Beyond theory, my results also have important implications for the creators of crowdfunding projects and the platform operators. My results broadly confirm the view that successful crowdfunding not only provides ventures with financial resources but also with a signal of quality and the access to a contributing community. Most crowdfunded products are 'experience goods' (Nelson, 1970) which have to be purchased to discover their true quality. As in these settings signals of quality are especially important, I advise project proponents to broadly incorporate their successful crowdfunding endeavor when marketing their product. Additionally, crowdfunding seeking entrepreneurs might further think about strategies on how to effectively incorporate co-creating backers into the innovation process. Thereby, my findings suggest to treat backers as innovation partners (Nambisan & Baron, 2010) and to base the product on open, modular architecture (Baldwin & Clark, 2006) or to provide 'user toolkits' (Hippel, 2001; Hippel & Katz, 2002; Jeppesen, 2005). This would allow early adopters to customize essential parts of the product and to share these modifications with other customers. Besides project proponents also the platform operator may benefit from my study, as I provide first empirical evidence that they indeed provide effective, non-financial support for bringing new products to market.

3.6.   Limitations and avenues for future research

As with other studies that focus on one particular sub-category within crowdfunding (e.g. Josefy et al., 2017), the unique nature of my dataset makes it both an ideal setting for my analysis as well as the source of its main limitations. The video gaming context has many features such as the availability of data and the great homogeneity among the compared products that make it appropriate for studying the performance

implications of reward-based crowdfunding campaigns. However, it also has specific characteristics that might limit the generalizability of my findings. While user innovators can relatively easy extend the functionality of software products, this might not be the case for products in other popular categories. Nevertheless, I believe that my results make a significant contribution, drawing from the specific video gaming context while also contributing back to broader literature streams.

In order to ensure the comparability of my findings with recent publications (Butticè et al., 2017; Colombo et al., 2015; Davis et al., 2017; Mollick, 2014; Skirnevskiy et al., 2017) and to secure data access, the paper uses data from Kickstarter that hosts projects only from the US, Canada, Australia, New Zealand, Hong Kong, Singapore and large parts of the EU (Kickstarter, 2016) and adopted an "all-or-nothing" funding mechanism. Against this background, the same limitations as in the studies mentioned above in terms of generalization of the results to other countries and platforms apply. I therefore support the various calls for a more diverse dataset to examine possible contingencies (Colombo et al., 2015). The videogaming context again might serve as an interesting context as the major platforms Indiegogo, Kickstarter and Patreon all rely on different funding mechanisms and platform rules that possibly influence performance outcomes.

In addition to overcoming these limitations by investigating the performance implications of crowdfunding along different product categories and plattforms, there are other possibilities for extending this study. There is broad consenus among scholars (Colombo et al., 2015) and practitioners (Gerber et al., 2012; Mollick & Kuppuswamy, 2014) that crowdfunding is not merely a financial exercise but that crowdfunding is associated with non-financial beneftis that other sources of funding cannot provide. While the present study investigates two of these supposed benefits – complementary extensions and early product feedback – another alleged advantage has not been empirically studied. Initial findings suggest that entrepreneurs also seek crowdfunding to profit from word-of-mouth and an increased awareness through social media (Colombo et al., 2015; Gerber et al., 2012; Mollick & Kuppuswamy, 2014). Future research could investigate wether the postulated relationship between crowdfunding and increased marketing awareness materializes.

Given the diverse range of investors operating in the entrepreneurial finance landscape, scholars frequently compare the effectiveness of these different funding sources among one another (e.g. Dutta & Folta, 2016; Pahnke et al., 2015; Park & Steensma, 2012). Pahnke et al. (2015), for instance, found that ventures backed by

independent venture capitalists perform better than startups that received corporate venture capital or government funds. The question of 'How crowdfunded ventures perform in comparison to these traditional funding sources?' remains unanswered and constitutes a promising avenue for future research. Giving its rather low funding sums, crowdfunding is often seen as an investment vehicle to secure seed funding so that crowdfunded ventures potentially have to raise additional funds from other sources later on (Agrawal et al., 2013). On the one hand, successful crowdfunding is regarded as a proof-of-concept that might help to convince other investors. On the other hand, they might be reluctant as the public awareness surrounding a crowdfunding success attracts potential imitators (Agrawal et al., 2013). As there is no empirical evidence on this important issue, scholars might want to investigate the question of "How does successful crowdfunding influences subsequent fundraising?"

4. External Chapter

The chapter "Corporate Venture Capital – A Systematic Literature Review" is available upon request through the dean's office of the Faculty of Ecomics and Management.

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6. List of Figures

7. List of Tables

8. Declaration

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no materials previously published or written by another person nor material which to a substantial extent has been accepted for the award of any other degree of the university or other institute of higher education, except where due acknowledgment has been made in the text.

Hannover, August 28, 2018   _____