Understanding the Crowd –
How to Construct the Crowd and Manage Participants in Customer Co-Creation

Von der Fakultät für Wirtschaftswissenschaften der
Rheinisch-Westfälischen Technischen Hochschule Aachen
zur Erlangung des akademischen Grades eines Doktors der
Wirtschafts- und Sozialwissenschaften genehmigte Dissertation

vorgelegt von

Dipl.-jur. oec. Univ. Volker Bilgram

Berichter: Univ.-Prof. Dr. rer. pol. Frank Thomas Piller
           Univ.-Prof. Dr. rer. soc. oec. Johann Rupert Füller – Universität Innsbruck/Österreich

Tag der mündlichen Prüfung: 16.02.2017

"Diese Dissertation ist auf den Internetseiten der Universitätsbibliothek online verfügbar."
Acknowledgement

The past few years I spent writing my thesis have been enriched by a number of people who supported and encouraged me in various ways. I owe them a debt of gratitude.

Foremost, I would like to thank my mentor and friend Johann Füller for his guidance and continuous support over the last few years. I also want to thank my main advisor Prof. Frank Piller for the opportunity to work with him at the Technology and Innovation Management Group at RWTH Aachen University and to complete the thesis as an external doctoral student.

I would like to express my special appreciation and thanks to Michael Bartl, Gregor Jawecki and Michael Schmidt at HYVE for giving me the freedom and support to pursue this research project. Moreover, I wish to thank my co-authors and fellow researchers for working with me, especially Katja Hutter, Julia Hautz, Kurt Matzler, Sabine Brunswicker, Alexander Brem and Dennis Hilgers.

A special thanks to my friends for their understanding, patience and distraction: Ingo Petereit, Nicki Arbeiter, Philipp Hofmann, Torsten Mayer and Udo Bauer.

Lastly, I would like to thank my family for their love and encouragement. Words cannot express how grateful I am to my mother, my father and my sister. I also want to thank my in-laws for their support and understanding throughout the years.

Most of all, I want to thank my wife Lena Bilgram. Without you I would have never accomplished this work. Thank you for everything.
# Table of content

## I. SYNOPSIS

1. INTRODUCTION
   1.1. RELEVANCE
   1.2. CURRENT RESEARCH AND IDENTIFIED RESEARCH GAPS
   1.3. STRUCTURE OF THE THESIS

2. THEORETICAL BACKGROUND
   2.1. CO-CREATION, CROWDSOURCING AND INNOVATION CONTESTS
   2.2. VALUE CO-CREATION AND SERVICE-DOMINANT LOGIC
   2.3. CONSUMER EMPOWERMENT
   2.4. CONSUMER-BRAND RELATIONSHIPS

3. RESEARCH APPROACH
   3.1. METHODOLOGY AND DATA COLLECTION
   3.2. RESEARCH FIELD

4. MAJOR FINDINGS AND CONTRIBUTIONS OF INDIVIDUAL PAPER PROJECTS
   4.1. PAPER 1: THE MODERATING EFFECT OF PERSONAL FEATURES ON THE CONSEQUENCES OF AN ENJOYABLE CO-CREATION EXPERIENCE
   4.2. PAPER 2: MACHIAVELLIANISM OR MORALITY: WHICH BEHAVIOR PAYS OFF IN ONLINE INNOVATION CONTESTS?
   4.3. PAPER 3: SHAPING INNOVATION IN SMART CITIES WITH THE CROWD
   4.4. PAPER 4: CONSUMER EMPOWERMENT IN CROWDSOURCING SYSTEMS: EFFECTS OF PERCEIVED EMPOWERMENT ON CONSUMERS’ INNOVATIVE BEHAVIOR AND CHANGE IN BRAND PASSION
5. DISCUSSION

   5.1. THEORETICAL IMPLICATIONS

   5.1.1. IMPLICATIONS FOR CO-CREATION AND CROWDSOURCING RESEARCH

   5.1.2. IMPLICATIONS FOR VALUE CO-CREATION RESEARCH

   5.1.3. IMPLICATIONS FOR CONSUMER EMPOWERMENT

   5.1.4. IMPLICATIONS FOR CONSUMER-BRAND RELATIONSHIPS

   5.2. MANAGERIAL IMPLICATIONS

   5.3. LIMITATIONS AND FUTURE RESEARCH

REFERENCES

II. APPENDICES

   APPENDIX A: PAPER 1

   APPENDIX B: PAPER 2

   APPENDIX C: PAPER 3

   APPENDIX D: PAPER 4

   APPENDIX E: OVERVIEW OF FURTHER PAPERS

EIDESSTATTLICHE ERKLÄRUNG
List of tables

Table 1: Overview of applied methodologies and data collection

Table 2: Overview of key parameters of investigated co-creation projects
I. Synopsis
1. Introduction

1.1. Relevance

Co-creation and crowdsourcing have officially come of age. According to a recent industry study\(^1\), 85% of the 2014 Best Global Brands have co-created with external participants (in the following also referred to as "the crowd") for innovation, marketing or other purposes underscoring that co-creation is a viable and substantial part of companies’ value creation processes (Nambisan and Nambisan, 2008; Gemser and Perks, 2015; Bogers et al., 2015; Schemmann et al., 2016; Roberts and Piller, 2016). In particular, the use of co-creation for new product development has been intensively studied and found to be a superior ‘modus innovandi’ for companies (Bogers et al., 2010; Füller, 2010; West and Bogers, 2014; Antons et al., 2016). Research provides significant evidence that co-creation processes bring about more novel and customer-oriented products (Lilien et al., 2002; Magnusson et al., 2003; Pötz and Schreier, 2012) which are commercially more successful than products solely developed by internal company resources (Nishikawa et al., 2013). Additionally, empowering consumers by means of co-creation has been found to have beneficial effects on consumers’ attitudes and relationship toward the host brand and its products (Nambisan and Baron, 2007; Fuchs et al., 2010; Hsieh and Chang, 2016).

In the context of my thesis, co-creation is understood as a firm-led creative and social process in which individuals co-create value together with a company. A particular mechanism of attracting individuals for co-creation, which has been applied for the studies reported in my thesis, is crowdsourcing. It is defined as the act of outsourcing a task to an external crowd, i.e. a large and usually undefined group of individuals in the periphery of a company, by employing an ‘open call’ format and leveraging the self-selection of suitable individuals. More details on the theoretical background and the definition of the terms co-creation and crowdsourcing are provided in chapter 2.1.

Soon after the concept of co-creation first emerged around the turn of the millennium (Normann and Ramirez, 1993; Wikström, 1996; Ramirez, 1999; Prahalad and Ramaswamy, 2004), social

technologies, the digital transformation and the open innovation paradigm led to a widespread adoption of co-creation practices by companies and further boosted scholars’ interest in the phenomenon (Chesbrough, 2003; Piller et al., 2012; Iansiti and Lakhani, 2014; Randhawa et al., 2016; Roberts and Piller, 2016). Likewise, consumers have heavily adopted new forms of participatory behavior in social media and increasingly engaged in content production heralding the transition from pure consumers to ‘prosumers’ (Toffler, 1980; Bernoff and Li, 2008). In the wake of these developments, co-creation is no longer a niche phenomenon that can only be observed among pioneering companies interacting with a few highly involved and innovative lead users (von Hippel, 1986) – rather, co-creation has matured and eventually reached mainstream.

Depending on the task to be tackled via co-creation, companies recruit and activate different user types (i.e. users ranging from customers and consumers to brand enthusiasts, lead users or opinion leaders) and attribute different roles to them in the innovation process (e.g. for idea generation or idea testing) (Prpic et al., 2015; Frow et al., 2015; Fuchs and Schreier, 2012; Nambisan and Nambisan, 2008). One of the striking advantages of harnessing the crowd, which makes it superior to traditional ways of innovating under certain circumstances, is the diversity of individuals (Boudreau, 2012; Boudreau and Lakhani, 2013; Terwiesch and Ulrich, 2009). In contrast to traditional market research, co-creation does not only focus companies’ existing target groups matching predefined socio-demographics. Instead, individuals in the periphery that distinguish themselves with high intrinsic motivation, special skills, extensive knowledge and capabilities conducive to the company’s goals become valuable partners in co-creation (von Hippel, 2005; Sawhney et al., 2005; Stock et al., 2014).

To recruit participants, co-creation initiatives often rely on the self-selection principle, also referred to as the self-identification of contributors (Benkler, 2002; Howe, 2009), i.e. they are open to anybody interested in participating in a certain challenge and do not require participants to meet specific pre-selection criteria (Piller and Walcher, 2006; Jeppesen and Lakhani, 2010). Once participants have been recruited, research also points to the importance of empowering these individuals by collaborating with them in a meaningful and self-determined way on equal terms (Fuchs et al., 2010; Füller et al.,
Putting participants in this state, they may provide better contributions or develop closer relationships with the brand. Due to the growing prevalence and reach of co-creation, managing the diversity of the crowd is of prime importance. The sheer plurality of participants regarding their personal features, expectations, motives, personality traits, backgrounds and origin has become a challenge for companies and requires a sophisticated recruitment and management of participants as well as a corresponding co-creation design and empowerment strategy (Füller, 2010; Fuchs and Schreier, 2011; Stock et al., 2014; Frow et al., 2015).

Nevertheless, research in this domain has rather neglected the role of participants’ personal features and its impact on the outcomes of co-creation generalizing effects as well as theoretical and managerial implications. In light of the increasing experience of participants with co-creation approaches, research on how to empower participants may elucidate how participants can be activated and managed in a sustainable way. This thesis intends to address these gaps by getting more granular on the diversity of the crowd and providing insights into the processes of constructing and empowering the crowd in co-creation initiatives.

### 1.2. Current research and identified research gaps

Throughout the last two decades, scholars have particularly concentrated on exploring how to design co-creation initiatives (Füller, 2010; Adamczyk et al., 2012; Frow et al., 2015; Gemser and Perks, 2015). For instance, research investigates incentive structures (Sisak, 2009; Morgan and Wang, 2010), tool and community support (Füller et al., 2010) as well as the role of fairness (Franke et al., 2013a; Gebauer et al., 2013) and co-creation experience (Nambisan and Baron, 2007; Kohler et al., 2011; Faullant et al., 2013). While the outcome of co-creation is often equated with the quality and quantity of participants’ contributions, research finds that the design of co-creation initiatives may also bear beneficial effects for participants’ relationship toward the brand and product (Nambisan and Nambisan, 2008; Fuchs et al., 2010; Kohler et al., 2011; Hsieh and Chang, 2016).
Research on the participants in co-creation themselves has been mostly focused on the motivational perspective (Jeppesen and Frederiksen, 2006; Frey et al., 2011; Afuah and Tucci, 2012; Stock et al., 2014). Extensive research has been conducted to find answers as to what motivates individuals to often freely reveal information (Harhoff et al., 2003), to persistently participate in co-creation (Füller, 2010) and even support efforts of rival individuals within the co-creation community (Franke and Shah, 2003; Hutter et al., 2011). Based on empirical analyses of several co-creation initiatives, Füller (2010) identifies four different types of participants ranging from reward oriented and need driven to curiosity driven and intrinsically interested participants. The study elaborates the user types also linking them to specific personal characteristics and interest, their expectations toward co-creation and their behavior. In their study on virtual product support communities, Nambisan and Baron (2007) investigate the moderating effect of customers’ product involvement on the relationship between the interaction experience and participants’ attitudes toward the company as well as between perceived interaction benefits and customers’ participation in the support community.

In an analysis of consumer innovators, Stock et al. (2016) find that personality traits are an important predictor of the successful accomplishment of essential tasks within the user innovation process (i.e. idea generation, prototyping and diffusion). Investigating the impact of the ‘Big Five’ personality traits, they demonstrate that high openness to experience leads to a higher probability to have new product ideas. For successful prototyping, Stock et al. (2016) find a positive impact of introverted and conscientious personal characteristics. Empirical proof is also provided for the positive relationship of consumers high in conscientiousness and the tasks related to the successful commercial diffusion of the innovation. However, high levels of conscientiousness were found to be detrimental to peer-to-peer diffusion.

Füller et al. (2014) find that components of participants’ creativity have different optimal levels to support task accomplishment. Besides these studies, so far, little is known about the role of participants’ personal features and how they affect the outcomes of co-creation initiatives. With few exceptions, the comprehensive research on co-creation has essentially investigated co-creation on the
whole without differentiating the findings on the basis of participants’ personal features. Thus, following Connelly et al. (2014) call for further research, I aim to explore the role of personal features in the context of co-creation. Thereby, both characteristics conducive to co-creation (e.g. characteristics inducing high quality submissions) as well as negative traits (e.g. traits leading to malicious, manipulative or antisocial behavior) appear to be worthwhile to direct attention to.

Co-creation challenges vary widely in terms of the phase within the innovation process and the corresponding task. Researchers have argued that individuals may play different roles in different phases of the innovation process (Nambisan and Nambisan, 2008; Bernoff and Li, 2008; Piller et al., 2012; Füller et al., 2014). For instance, the ideal profile of individuals invited to collaboratively generate ideas may be different from one tailored to finding specific solutions to a problem or promoting a new product (Stock et al., 2015). While generating ideas may require in-depth experiential knowledge of the product usage and consumer needs, advocating a product rather demands brand fans with a large network capable of reaching and influencing consumers in an authentic way. As companies’ challenges and corresponding requirements for co-creation participants vary widely, the ‘ideal’ members of the crowd need to be reached, attracted and activated (Prpic et al., 2015). Prpic et al. (2015) argue, the crowd needs to be carefully defined and recruited in light of the specific innovation challenge taking its size and diversity as well as its knowledge and experience. For instance, Frey et al. (2011) guide attention to the question as to how companies should compose the crowd from a motivation and knowledge perspective.

Prpic et al. (2015) provide a valuable conceptual framework for capturing value co-created with the crowd which highlights the importance of crowd construction to elicit relevant and high-quality contributions from participants. Yet, they also indicate that “crowd construction is absolutely non-trivial” (p. 81) (similar: Ebner et al., 2009). While studies often draw data from ‘real-world’ co-creation initiatives conducted by firms (Nambisan and Baron, 2007; Füller, 2010; Hutter et al., 2011; Kohler et al., 2011), research is relatively silent on the construction of the crowd, i.e. the act of reaching and mobilizing a subset of the crowd that is willing to participate.
Apart from the characteristics of participants in co-creation, I also want to guide attention to the participants’ relationship with the company hosting co-creation initiatives following the call for research on the intersection of co-creation and service-dominant logic (Randhawa et al., 2016). Over the last two decades, co-creation has matured as, correspondingly, the relationship between companies and participants has. While consumers may have originally been attracted to co-creation out of curiosity and the newness of the approach, I argue that consumers may increasingly crave for more meaningful and impactful relationships. A report of the state of the crowdsourcing industry indicates that 45% of all initiatives conducted by major brands in 2014 aimed at creating video content, followed by the generation of ideas for new product/service development (only 22%). While the shifting use of co-creation for marketing and relationship management is not to be denunciated per se, there is a growing concern that co-creation may serve as a disguise to lure consumers. By analogy with the term ‘greenwashing’ (describing companies’ attempts to create an ecofriendly public image which is apparently unfounded), bloggers have coined the notion ‘crowdwashing’. It refers to unsubstantial marketing stunts that apply crowdsourcing as a pretense to enhance the meaningfulness of the initiative.

In line with these observations, recent research suggests that empowering participants in co-creation initiatives is vital to create sustainable value (Fuchs et al., 2010; Fuchs and Schreier, 2011; Füller et al., 2010). Thereby, empowerment refers to a psychological state in which consumers feel they are capable of performing a meaningful task which serves a purpose they endorse and which has an impact on the brand’s innovation path. While there are important research findings regarding the role of task enjoyment and fairness (Füller et al., 2011; Franke and Schreier, 2010; Franke et al., 2013a), only few studies address consumer empowerment in a co-creation context. Moreover, research on consumer empowerment has largely been experimental in nature (Fuchs et al., 2010; Fuchs and Schreier, 2011), thus, this thesis extends current research by investigating the actual empowerment as perceived by participants in co-creation initiatives.

Overall, my thesis wants to provide a more granular perspective on the members of the crowd and investigate how the crowd can be constructed, managed, and empowered to accomplish favorable outcomes. In particular, the following detailed research questions shall be addressed:

1. Do participants’ personal features impact the consequences of an enjoyable co-creation experience and if so, how do they affect the outcomes?
2. Do negative, i.e. malicious, personal features influence participants’ submission behavior and activity within co-creation initiatives and if so, how do they impact them?
3. How should the crowd be constructed, guided and activated to acquire and assimilate knowledge?
4. Do actual participant empowerment and rewarding co-creation experience affect participants’ behavior, attitude and relationship to the brand, company and the product being co-created?

1.3. Structure of the thesis

Four research papers want to contribute to reach my objective of gaining a more granular understanding of how to harness the crowd as a partner in co-creation. My research centers on participants’ personal features, the phase of crowd construction and crowd empowerment. The findings of the four studies add to various streams of literature and theories. Examining the role of participants’ personal features, I extend current literature on co-creation and helps to reach an improved understanding of participants in co-creation initiatives. First, the moderating effect of personal features such as gender and novelty seeking on the relationship between co-creation experience and aspects of the participants’ relationship toward the company and the product is examined. Second, the thesis additionally explores the effect of more negative and antisocial traits that constitute Machiavellianism on several essential quantity and quality outcome variables. Third, I shed light on how companies currently proceed in constructing the crowd for co-creation initiatives in practice. Specifically, the study shows how they define and recruit participants and derives implications regarding the recruiting of a diverse crowd, the support of team formation and the framing of the problem communicated to the crowd. Fourth, the thesis adds to the
literature on consumer empowerment. The study provides insights into the impact of actual consumer empowerment by establishing meaningful and impactful co-creation tasks and interactions.

The remainder of this synopsis is divided into four more chapters and structured as follows. The following second chapter provides a review of the literature on co-creation and crowdsourcing as well as value co-creation, consumer empowerment and consumer-brand relationships. Third, the research approach and methodology is detailed. Chapter four presents major findings and contributions of the four research projects. In the last chapter, theoretical and managerial implications of the findings are discussed. Finally, limitations and future research directions are provided.

2. Theoretical background

2.1. Co-creation, crowdsourcing and innovation contests

Co-creation and related terms such as crowdsourcing and innovation contests aim to capitalize on the shared observation of open and user innovation research (von Hippel, 2005; Chesbrough, 2003) that relevant resources (e.g. knowledge or creativity) are widely distributed and often reside with individuals outside company boundaries (Piller and West, 2014). Despite different focal actors and principles, both research domains have in common that they guide attention to the importance of external actors – be they user, consumers, experts or companies – to increase effectiveness and efficiency of innovation processes (Harhoff and Lakhani, 2016).

While lead user research (Herstatt and von Hippel, 1992; von Hippel et al., 1999; Lilien et al., 2002) was an early attempt to explore companies’ opportunities of capitalizing on user innovation, the advent of the Internet provided a new unprecedented breeding ground for co-creation. Co-creation (Dahan and Hauser, 2002; Franke and Piller, 2004; Jeppesen and Frederiksen, 2006) as well as crowdsourcing and innovation contests (Howe, 2009; Terwiesch and Xu, 2008; Boudreau and Lakhani, 2013) have attracted researchers’ attention since the early, 2000s. The three terms are indistinct and overlap significantly as they relate to different aspects of distributed innovation.
Of the three terms, co-creation is the broadest concept representing the underlying philosophy of distributed innovation (Prahalad and Ramaswamy, 2000; 2004; Gemser and Perks, 2015). Hence, co-creation does not refer to one specific activity, but rather encompasses a wide array of purposes along companies’ value chains (e.g. idea generation, concept testing, problem solving and product support) (Payne et al., 2009) and corresponding methodologies (e.g. innovation contests, focus groups, co-creation workshops and toolkits) (Dahan and Hauser, 2002; Sawhney et al., 2005). Following the co-creation typology of Piller et al. (2012), co-creation methodologies among others vary on the basis of two dimensions: (1) the degree of collaboration, i.e. the intensity of interaction and sense of community among the participants and (2) the degrees of freedom, i.e. the level of specificity of the task assigned to the participants. In the frame of this thesis, co-creation refers to a purposive creative and social process initiated by a firm during which individuals from outside the organization take an active role and co-create value together with a company (Prahalad and Ramaswamy, 2004; Roser et al., 2009; Zwass, 2010). In contrast to the conventional human resources a company relies on, in particular its workforce, co-creation attempts to leverage individuals from outside the company boundaries. Hereby, the setting of the co-creation initiatives investigated in this thesis focuses on initiatives in the early phases of idea generation and evaluation. The initiatives can be characterized by (1) a medium level of collaboration (i.e. collaboration is encouraged and supported by social technologies to some extent, however, it is not mandatory) and (2) a high degree of freedom (i.e. the task is formulated rather broad and unstructured).

In contrast to the generic term co-creation, crowdsourcing describes a mechanism to tap dispersed and heterogeneous resources (e.g. knowledge, skills, creativity or time) of the crowd in the periphery of a company to efficiently fulfill tasks (Afuah and Tucci, 2012). In order to leverage these resources, crowdsourcing relies on self-selection mechanisms meaning that an open call is broadcasted to the crowd, i.e. a usually undefined large group of individuals. As opposed to targeted search strategies known from research on recruiting lead users (von Hippel et al., 1999; von Hippel et al., 2009), designated agents (Afuah and Tucci, 2012) or sampling methods in conventional market research (Ogawa and Piller, 2006), self-selection aims to overcome the predisposition and bounded rationality of the searching company (e.g. previous experience or well established solution principles) as well as the
informant (Pötz and Schreier, 2012; Jeppesen and Lakhani, 2010; Boudreau et al., 2011). Thus, crowdsourcing describes a different mechanism of recruiting and constructing a crowd for co-creation among other approaches such as screening or pyramiding (von Hippel et al., 2009). According to Afuah and Tucci (2012), search via crowdsourcing is particularly beneficial for tasks that can be easily delineated and broadcasted, that require knowledge beyond the company’s core know-how and that a large and accessible crowd is knowledgeable about (similar: Baldwin and von Hippel, 2011).

While outsourcing a task has been a popular approach for centuries, crowdsourcing has gained new momentum with the rise of the Internet and digital transformation. Due to the increased reach and efficiency of information technology, crowdsourcing is predominantly applied in online environments today (Majchrzak and Malhotra, 2013). Research on crowdsourcing furnishes evidence that a heterogeneous crowd with diversified knowledge, skills and interests is more efficient in tackling a problem (Boudreau, 2012; Brabham, 2013). Jeppesen and Lakhani (2010), for instance, find that 72.5% of the winning submissions in their sample were partially or fully based on existing solutions available to the external contributor. In addition, research points out that solutions from the periphery, i.e. analogous markets distant to the company, are more novel (Franke et al., 2013b).

Within this thesis, crowdsourcing is defined as the act of outsourcing a task to an external crowd by posting an open call (Howe, 2006). As crowdsourcing refers to the mere mechanism of outsourcing a task by posting a task openly and inviting potential participants to self-select whether they want to contribute or not, various more specific applications of crowdsourcing, including idea contests, collaborative communities, or labor markets, have been discussed for a wide variety of purposes (Boudreau and Lakhani, 2013).

In the center of my thesis are innovation contests as a specific application of crowdsourcing. They are one of the most commonly forms of co-creation with customers and users (Bullinger et al., 2010; Boudreau and Lakhani, 2013; Füller et al., 2014). Innovation or idea contests, also referred to as innovation tournaments (Morgan and Wang, 2010) or idea competitions (Piller and Walcher, 2006; Ebner et al., 2009), rely on crowdsourcing as a mechanism to utilize external resources to solve
innovation challenges ranging from generating creative ideas to solving specific problems. A sponsor (e.g. a company) launches a contest with a specified call for contributions and, in return, offers a prize for the best submission(s). Unlike conventional incentive systems (e.g. salaries for employees) which compensate any participating individual for the investment of resources (e.g. time and money), contests apply the ‘winner takes it all’ principle encouraging high quality submissions of superior solutions (Morgan and Wang, 2010). Hence, contests are the method of choice when it is unclear what combination of knowledge, skills and solution principles might be successful as several solution approaches are tried by contestants in parallel (Jeppesen and Lakhani, 2010; Boudreau and Lakhani, 2013).

Thus, the key characteristic of contests is the incentive structure. To attract potential solvers and contributors from the crowd, innovation contests are organized as competitions which do not compensate every contestant, but award a prize only to one or a few winner(s) (Piller and Walcher, 2006; Terwiesch and Xu, 2008; Jeppesen and Lakhani, 2010; Boudreau et al., 2011). In doing so, contests make use of the self-selection of participants with suitable solution information decreasing the risk of uncertainty regarding the outcome quality of preselected designated contractors (Afuah and Tucci, 2012).

2.2. Value co-creation and service-dominant logic

In postmodern marketing, the traditional goods-dominant logic claiming that value is created by the producer, then exchanged and eventually destroyed by consumers has been heavily challenged by researchers (Ramirez, 1999; Vargo and Lusch, 2004). In contrast to the traditional goods-dominant logic, service-dominant logic (Vargo and Lusch, 2004) and value co-creation (Prahalad and Ramaswamy, 2004) suggest that “value is always uniquely and phenomenologically determined by the beneficiary” (Vargo and Lusch, 2008, 7). Hence, consumers are always co-creators of value and goods do not possess inherent value-of-exchange. Value propositions are called ‘operand resources’, i.e. resources on which an operation or act is performed to produce an effect. Vice versa, the resources
employed to create and extract value from operand resources, i.e. knowledge and skills, are considered ‘operant resources’.

Researchers in the field of the service-dominant logic differentiate between co-production, i.e. “participation in the development of the core offering itself” (Lusch and Vargo, 2006, 284), and value co-creation, i.e. firms propose value through market offerings and customers continue the value creation process through use (Ballantyne and Varey, 2006; 2008; Lusch and Vargo, 2006; Vargo et al., 2008). In other words, co-production is considered a sub-category of co-creation of value (Lusch and Vargo, 2006). While the former refers to customer participation in the development of new products (Bendapudi and Leone, 2003; Wikström, 1996), i.e. prior to the existence of a product, the latter term is mostly used to delineate value co-creation of an existing offering “in the ‘consumption’ process” (Lusch and Vargo, 2006, 284). Payne et al. (2008), however, suggest that customers should be involved at every stage of product or service development including co-development of new offerings in the course of new product development. On the one hand, value is created by co-developing a new product. On the other hand, service-dominant logic also proposes that consumers’ interactions and experiences in co-creation themselves may create value and meaning (Prahalad and Ramaswamy, 2003; Kohler et al., 2011; Lusch and Nambisan, 2015). Thus, service-dominant logic serves as a broad marketing theory that provides a valuable basis for the understanding of co-creation within new product development and its value dimensions. In particular, the theory frames the new dynamics and understanding of roles highlighting how companies and consumers increasingly interact on equal terms to co-create value at various points in the value chain.

2.3. Consumer empowerment

Since the 1980s, the construct of empowerment has significantly influenced organizational and management science as a widely applied leadership style and employee initiative (Kanter, 1979; Bennis and Nanmus, 1985). Research suggests that empowerment practices are conducive to managerial and organizational effectiveness and innovation behavior (Thomas and Velthouse, 1990). Two different
perspectives on empowerment are taken in research: (1) empowerment as a relational construct is applied to describe the process of sharing power or control with subordinates, delegation of decision making and practices of participative management (Kanter, 1979; Blau and Alba, 1982; Bennis and Nanus, 1985); (2) empowerment as a motivational construct describes an individual’s psychological state of increased intrinsic task motivation (Thomas and Velthouse, 1990; Conger and Kanungo, 1988; Spreitzer, 1995). Thomas and Velthouse (1990) argued that empowerment is multifaceted and manifested in four cognitions: meaningfulness, competence, self-determination and impact (similar: Seibert et al., 2011).

From a consumer science perspective, consumption as the “end and aim of all economic action” (Dixon, 1992 reflecting Smith, 1937) inevitably empowers consumers as “everyone who goes into a shop and chooses one article over another is casting a vote in the economic ballot box” (Powell, 1969, 33). However, for long, companies have inflicted a set of options on consumers, e.g. predefined products, brands or sales channels (Wathieu et al., 2002). Thus, the research field of consumer empowerment has originally been conceived as a power struggle between consumers and companies at and around the point of exchange, i.e. the purchase. Four major sources of power are discussed in literature. First and foremost, consumers have power due to the “aggregated impact of consumption and purchase behaviors” (Labrecque et al., 2013, 259).

Additionally, power results from the access to information regarding products, prices and distribution and consumers’ opportunity to generate and disseminate information themselves. More recently, power resulting from consumers’ networks and the crowd has gained relevance (Labrecque et al., 2013). It was not before the rise and wide diffusion of the Internet that empowerment in the context of consumption gained new impetus. Not only has the internet facilitated the access to information and thereby balanced information asymmetry between companies and consumers, it also enabled consumers to connect and exchange with others and ultimately join forces to carry on a dialogue with companies on equal terms (Levine, 2000; Pitt et al., 2002; Pires et al., 2006; Rust and Oliver, 1994; Labrecque et
al., 2013). Instead of solely allowing consumers to make informed choices, companies increasingly use the internet to involve consumers in pre-consumption phases of value creation.

According to Fuchs and Schreier (2011), consumers may experience empowerment in two major dimensions. Firstly, consumers may be engaged in the creation of new product ideas (empowerment to create) and, secondly, consumers may feel empowered when they have a say in the selection of the products to be eventually marketed (empowerment to select). Füller et al. (2010) introduced the concept of empowerment to the domain of virtual co-creation. Empowerment, defined as “raising peoples’ experience of self-determination and efficacy” (Füller et al., 2010, 75), was found to be a useful theoretical basis for designing effective and efficient co-creation tools. Along with the empowerment of consumers, feelings of doing something meaningful and having an impact occur and thus may have desirable attitudinal and behavioral effects on the consumer-brand relationship.

2.4. Consumer-brand relationships

In postmodernism, consumption behavior has shifted from considering the mere utilitarian benefits of goods to an extended more affective meaning of consumer goods and brands (McCracken, 1988; Firat and Venkatesh, 1995; Batra et al., 2012): “People buy things not only for what they can do, but also for what they mean” (Levy, 1959, 118). In consumer research, substantial evidence is provided demonstrating the emotional and even love-like relationships between consumers and brands such as Apple Newton (Muniz and Schau, 2005), Star Trek (Kozinets, 2001), Lego (Moon and Sproull, 2001), the VW Beetle (Brown et al., 2003; Aggarwal, 2004) or the widely investigated Harley-Davidson brand (Berry, 1995; Schouten and McAlexander, 1995; Whang et al., 2004).

Many concepts in consumer research build on these intimate bonds between consumers and objects or brands (Howard, 1977) such as Aaker’s (1997) brand personality and Fournier’s (1998) consumer-brand relationship framework, the extension of self by means of objects and possessions (Belk, 1988; Tuan, 1980; Wallendorf and Arnould, 1988) or consumer-company identification (Bhattacharya and Sen, 2003). All these concepts on emotional consumer-object relationships borrow
from the theory of person-person relationships and interpersonal love theory (Shimp and Madden, 1988). In consumer research, the “brand-as-a-person metaphor” (Aaker and Fournier, 1995) has proved to be useful in many cases to investigate and better understand consumer-object or consumer-brand relationships (Aggarwal, 2004; Fournier, 1998). Evidence was found that consumers foster feelings such as love and passion in relation with objects and brands (Richins, 1997; Schultz et al., 1989; Fournier, 1998; Ahuvia, 2005) and ascribe human-like characteristics to their favorite brands (Belk, 2004; Aggarwal, 2004; Batra et al., 2012). Shimp and Madden (1988) close the gap between person-person relationship and consumer-object relationship and gave rise to brand love as a new marketing concept (Carroll and Ahuvia, 2006).

In light of the favorable consequences of consumer-brand relationships, an obvious question is how viable antecedents may look like. Keller and Lehmann (2006) consider the research on how to foster a desired customer relationship a high priority in the branding domain. Bauer et al. (2007) point to emotionally-laden advertising messages such as McDonalds’s ‘I’m loving it’ as a possible instrument. In contrast to this firm-led marketing initiatives, the stream of literature on co-creation (Prahalad and Ramaswamy, 2000; 2004; Payne et al., 2009; Cova and White, 2010) also offers the ideological foundation for a new approach of branding. Consumers themselves are considered co-creators of value and are involved in processes formerly solely in the hands of companies. It is already a widely known practice that companies collaboratively create new products with brand enthusiasts (Sawhney et al., 2005; Füller, 2010). Füller and colleagues find that users even create their own brands, i.e. logos and slogans, independently of companies (Füller et al., 2013). According to Belk (1988) co-creating brands may be a promising way of generating passion for a brand and extend one’s identity.

In sum, the review of literature on co-creation reveals a wide array of approaches that are subsumed under the notion of co-creation, which emphasize different aspects of distributed innovation. The central approach within my thesis – so called innovation contests – builds on the well-established premise that knowledge and skills (i.e. suitable resources in general) are widely dispersed among
heterogeneous individuals. Employing open call formats and radical incentive systems, self-selection of participants helps to attract and motivate individuals capable of creating value for companies.

The outline of different theoretical lenses furnishes three important research streams, which are connected to the field of co-creation and may help to capture the bigger picture of co-creation. First, the intersection of co-creation with value co-creation literature suggests that the new service-dominant marketing paradigm may provide a fruitful theoretical breeding ground for co-creation research. While value co-creation research has focused the marketing interface between companies and consumer (i.e. the point of purchase and adjacent phases consumer-company interaction), it may be worthwhile to “incorporate the concept of co-creation and the emerging service-dominant logic” (Randhawa et al., 2016, 18). Similarly, research on consumer empowerment highlighted that the new role of consumers as ‘prosumers’ may offer new avenues of exploring the next level of consumer emancipation that goes beyond the power inherent in consumption choices. The research field of consumer-brand relationships points to effects of co-creation on relationship aspects which occur in addition to the innovation outcomes. In particular, this research domain proposes that a better understanding of the attitudes, feelings and relationships participants form during co-creation may encourage more sustainable and holistic co-creation initiatives and use co-creation to its full extent.

3. **Research approach**

3.1. **Methodology and data collection**

To capture various facets of co-creation, quantitative and qualitative research approaches were employed (see Table 1). In total, four different sets of data were collected – three stemming from single co-creation projects, one data set collected from a meta-analysis of ten co-creation projects. To avoid common method bias, several measures were taken (Conway and Lance, 2010; Podsakoff et al., 2012). Multiple sources such as survey data, expert evaluations and behavioral data from log files (e.g. participants’ comments, contributions and ratings) were tapped to collect data on co-creation initiatives. In particular, independent and dependent variables were collected from different sources applying
multiple methods and at different points in time to obviate false conclusions due to common method variance (Podsakoff et al., 2003; Malhotra et al., 2006; Chang et al., 2010). For each individual research project, an online survey was conducted among participants before (paper 4) or/and after the co-creation initiative (papers 1, 2 and 4) to capture participants’ attitudes, experiences and behavioral intentions and demographic backgrounds. Existing scales were adopted from literature to take the specific context into consideration. In addition, logfile data was retrieved from the server databases of the co-creation initiatives. Based on a unique identifier individuals receive when registering on the platform, participants’ activities and behaviors within the platform (e.g. visits, submissions, comments, votings) are tracked and can be linked to the data from the online surveys on an aggregated level (Nicholas et al., 1999). To ensure an objective evaluation of the participants’ submissions, juries consisting of external experts as well as experienced company representatives rated the submissions along a guided multi-dimensional evaluation procedure (Füller et al., 2011). Studies 2 and 3 additionally relied on content analysis (Merriam, 2009; Saldana, 2012). Following established coding procedures, two researchers separately coded participants’ comments (paper 2) and ideas (paper 3) along a coding scheme in iterative steps.

<table>
<thead>
<tr>
<th>Papers</th>
<th>Methodology and data collection</th>
</tr>
</thead>
</table>
| Paper 1    | • Data was collected via online survey among consumers who had previously participated in ten different co-creation initiatives.  
• A pre-test was conducted followed by interviews with 25 selected participants.  
• Items were derived from existent scales (e.g. website diagnosticity scale, exploratory behavior) and slightly modified.  
• Different item formats and scale types were used to avoid common method bias.  
• Data were analyzed using structural equation modeling. |
| Paper 2    | • Individual-level data was collected from multiple sources (online survey, log files, expert evaluation, interpretative content analysis).  
• Data for independent variables were collected through self-reports via online survey while for the dependent variables participation behavior was captured (server log files) and expert evaluation.  
• Two independent researchers applied interpretative content analysis to investigate the nature of participants’ comments. |
- Items were derived from existent scales (e.g. Machiavellianism, theory of mind, lead user) and slightly modified.
- Multiple regression analysis was applied.

**Paper 3**
- A two-stage case study research was applied to investigate the process and the outcomes of a unique civic innovation crowdsourcing initiative.
- The process perspective was investigated collecting archival data from multiple sources such as unstructured text from participants’ submissions, log files and project documentation.
- The content of participants’ submissions were coded separately by two researchers applying a combination of descriptive and open coding.
- Descriptive statistical analysis was performed.

**Paper 4**
- Individual-level data was collected from multiple sources (online survey, log files, expert evaluation).
- Data was collected at different points in time, before and after the co-creation initiative.
- Items were derived from existent scales (e.g. empowerment, brand passion, fairness) and slightly modified.
- Multiple regression analysis was applied.

### Table 1: Overview of applied methodologies and data collection

Quantitative and qualitative data analyses have been applied depending on the respective research question. Multivariate analysis procedures were performed, i.e. multiple regressions (studies 2 and 4) and structural equation modeling (paper 1) (Fornell and Larcker, 1981; Bentler and Bonnett, 1980), to test hypotheses previously developed. To provide insights into current practices of crowd construction among companies, a single case study was conducted investigating the process of a unique global co-creation project (Eisenhardt, 1989).

### 3.2. Research field

In general, firm-led co-creation initiatives conducted in digital environments constitute the research field for this thesis. As defined before, co-creation is a purposive creative and social process initiated by a firm during which individuals take an active role and co-create value together with a company (Prahalad...
This thesis draws data from 13 co-creation initiatives chosen for the following reasons:

(1) they are comparable in terms of design parameters (e.g. tool support, incentive mechanisms, duration), (2) they center on innovation tasks (e.g. idea generation and evaluation), (3) the initiatives comprise a wide array of industries and (4) they rely on diverse crowds depending on the topic and framing of the innovation challenge.

Specifically, the co-creation projects providing the data source of my thesis primarily focus on generating ideas, however, also include need identification and concept evaluation to some extent (e.g. through discussions among participants and online surveys). Crowdsourcing mechanisms were applied that broadcast an open ‘call for ideas’ to an (un)defined crowd and recruit participants (Terwiesch and Xu, 2008; Boudreau and Lakhani, 2013). To stimulate participation and compensate participants for their efforts and contributions, the majority of co-creation projects (study 2, 3 and 4) were organized as contests (also known as tournaments) that awarded a prize to the individual(s) with the best submission(s) (Morgan and Wang, 2010). In the various projects investigated in study 1, participants could take part in a lottery for a prize or received small incentives. The crowd engaged in these projects was rather heterogeneous consisting of different user types: customers and interested consumers (study 1, 2 and 4), brand fans (particularly study 1 and 4), hobby designers (study 2 and 4) and (semi-) professional urban planners, engineers and citizens (study 3) to enumerate just a few of the participants’ backgrounds. Moreover, the companies initiating the co-creation projects stemmed from industries as diverse as automotive, sports, interior, electronics (study 1), transportation (study 2), transportation (study 3), jewelry (study 4). Table 2 provides an overview of co-creation projects, from which data was collected for the four papers.
<table>
<thead>
<tr>
<th>Industry</th>
<th>Broadcasted task</th>
<th>Addressed individuals</th>
<th>Incentive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper 1</td>
<td>Automotive Designing the interface of a car’s infotainment system</td>
<td>Brand fans, customers, car enthusiasts</td>
<td>Monetary and non-monetary prizes</td>
</tr>
<tr>
<td>Sports</td>
<td>Developing a soccer and basketball shoe concept</td>
<td>Sports enthusiasts and community members of running and basketball communities</td>
<td>Non-monetary prizes</td>
</tr>
<tr>
<td>Interior</td>
<td>Designing a modular furniture system</td>
<td>Design enthusiasts and readers of online interior design and lifestyle magazines like Wallpaper</td>
<td>Non-monetary prizes</td>
</tr>
<tr>
<td>Electronics</td>
<td>Creating ideas for mobile phones for kids</td>
<td>Parents, customers</td>
<td>Non-monetary prizes</td>
</tr>
<tr>
<td>Toys</td>
<td>Submitting needs and ideas for model railroading products</td>
<td>Model railroading enthusiasts and members of railroading communities</td>
<td>Non-monetary prizes</td>
</tr>
<tr>
<td>Public sector</td>
<td>Providing design ideas for city lighting system</td>
<td>Citizens and urban dwellers</td>
<td>Non-monetary prizes</td>
</tr>
<tr>
<td>Baby accessories</td>
<td>Creating ideas for a multifunctional baby carriage</td>
<td>Parents and members of parenting communities</td>
<td>Non-monetary prizes</td>
</tr>
<tr>
<td>Textile</td>
<td>Testing designs of towels and creating ideas for bedclothes</td>
<td>Customers</td>
<td>Non-monetary prizes</td>
</tr>
<tr>
<td>Jewelry</td>
<td>Creating tattoos made of crystals</td>
<td>Brand fans and visitors of fashion-related websites</td>
<td>Non-monetary prizes</td>
</tr>
<tr>
<td>Outdoor</td>
<td>Developing a snowboard backpack</td>
<td>Outdoor enthusiasts and members of outdoor communities</td>
<td>Non-monetary prizes</td>
</tr>
<tr>
<td>Paper 2</td>
<td>Transportation Train interior</td>
<td>Customers, hobby designers, design students</td>
<td>Monetary and non-monetary prizes</td>
</tr>
<tr>
<td>Paper 3</td>
<td>Transportation Urban mobility</td>
<td>Citizens, urban planners, engineers</td>
<td>Monetary and non-monetary prizes</td>
</tr>
<tr>
<td>Paper 4</td>
<td>Jewelry Gem stones applied to electronic goods</td>
<td>Customers, brand fans, hobby designers, design students</td>
<td>Monetary and non-monetary prizes</td>
</tr>
</tbody>
</table>

Table 2: Overview of key parameters of investigated co-creation projects
Thus, despite their similar design allowing for comparison, the researched co-creation projects varied somewhat, for instance, with regard to the size and composition of the crowd, the specific task broadcasted, the project duration or the incentive system. On account of these differences and in order to highlight important aspects and particularities of the co-creation initiative under investigation, the co-creation projects are referred to with slightly different terms in each of the four research projects: virtual co-creation (study 1), innovation contest (paper 2), civic innovation crowdsourcing (paper 3) and idea contest (paper 4). Still, throughout this synopsis, the generic term ‘co-creation’ is used to refer to any of the four research projects mentioned before.

4. Major findings and contributions of individual paper projects

My thesis project comprises of four papers which will be briefly outlined in the following chapters. The full papers can be found in the appendices A-D. The four papers are:
<table>
<thead>
<tr>
<th>Title</th>
<th>Authors</th>
<th>Status of publication</th>
<th>Research question</th>
<th>Sample</th>
<th>Method</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper 1 The moderating effect of personal features on the consequences of an enjoyable co-creation experience</td>
<td>Füller, J., Bilgram, V.</td>
<td>Submitted to the <em>Journal of Product and Brand Management</em> (status: revise and resubmit)</td>
<td>Do participants’ personal features impact the consequences of an enjoyable co-creation experience and if so, how do they affect the outcomes? Does a rewarding co-creation experience affect participants’ behavior, attitude and relationship to the brand, company and the product being co-created?</td>
<td>Participants in ten virtual co-creation initiatives in various industries (see table 2 for details); N=727</td>
<td>Structural equation modeling</td>
<td>Findings provide proof for various consequences of enjoyable co-creation experiences such as brand image, trust, word of mouth and evoked interest. Certain effects of an enjoyable co-creation experience are moderated by participants’ personal features. For instance, novelty seeking moderates the impact on trust, word of mouth and brand image and dissatisfaction moderates the effect of both enjoyment and product involvement on evoked interest. Consumers may build relationships with a merely ‘virtual’ product concept, i.e. the mental concept of a future product currently co-created.</td>
</tr>
<tr>
<td>Paper 2 Machiavellianism or morality: Which behavior pays off in online innovation contests?</td>
<td>Hutter, K.; Füller, J.; Hautz, J.; Bilgram, V.; Matzler, K.</td>
<td>Published 2015 in the <em>Journal of Management Information Systems</em>, Vol. 32 No. 3, pp. 197-228</td>
<td>Do negative, i.e. malicious, personal features influence participants’ submission behavior and activity within co-creation initiatives and if so, how do they impact them? How should the crowd be constructed, guided and activated to acquire and assimilate knowledge?</td>
<td>Participants in an innovation contest hosted by an international transportation company; N=107 Comments submitted by participants; N=2,233</td>
<td>Multiple regression analysis</td>
<td>Participants’ negative personality affects participation behavior, the quality of submissions and the kind of contributions. The three dimensions of Machiavellianism – distrust of others, amorality and desire for status – show oppositional effects. Amorality and desire for status lead to fewer idea and comment submissions. Distrust of others has a positive effect on the number of ideas and comments submitted as well as on the quality of contributions. Distrust is shown to have a negative influence on the probability of submitting both encouraging and constructive comments. Amorality impacts the probability of writing encouraging comments.</td>
</tr>
<tr>
<td>Paper 3</td>
<td>Shaping innovation in smart cities with the crowd</td>
<td>Bilgram, V.; Brunswicker, S.; Füller, J.</td>
<td>Accepted for publication in <em>Business Horizon</em></td>
<td>How should the crowd be constructed, guided and activated to acquire and assimilate knowledge?</td>
<td>Ideas submitted by participants in a civic innovation crowdsourcing initiative sponsored by an international transportation company in the field of urban mobility; N=90</td>
<td>Descriptive statistical analysis</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Paper 4</td>
<td>Consumer empowerment in crowdsourcing systems: Effects of perceived empowerment on consumers’ innovative behavior and change in brand passion</td>
<td>Bilgram, V.; Füller, J.; Piller, F.</td>
<td>To be submitted to <em>R&amp;D Management</em></td>
<td>Does actual participant empowerment affect the quality of participants’ submissions and emotive relationship to the host brand?</td>
<td>Participants in an idea contest hosted by an international jewelry brand; N=121</td>
<td>Multiple regression analysis</td>
</tr>
</tbody>
</table>
My further academic work during the time of my PhD studies included a number of additional papers, which resulted in publications in the context of this thesis. They are documented in Appendix E.

4.1. Paper 1: The moderating effect of personal features on the consequences of an enjoyable co-creation experience

The first paper quantitatively investigates the role of participants’ personal features in co-creation initiatives, a previously under-researched yet important factor. The paramount goal of this paper is to provide a better understanding of the widely heterogeneous and diverse crowd and to draw a more nuanced picture of how personal features influence the outcomes of co-creation with regard to participants’ relationship toward the company and product. Building on the theoretical foundation of value co-creation (Prahalad and Ramaswamy, 2004; Vargo and Lusch, 2008), the paper highlights that effects of an enjoyable co-creation experience cannot be generalized and need to take participants’ personal features into consideration. Additionally, the paper sheds light on how co-creation may already nourish a relationship between participants and the later product in an early phase of new product development. Thereby, paper 1 increases our understanding of how co-creation experiences affect different crowd members and addresses research questions 1 and 4 (see chapter 1.2).

While confirming and enriching previous research findings on the consequences of enjoyable co-creation experiences (Nambisan and Baron, 2007; Franke and Schreier, 2010; Kohler et al., 2011; Füller et al., 2011), the paper introduces various personal features to the theoretical model: gender, novelty seeking, exploratory behavior, web usage and dissatisfaction with existing products. In general, except for gender, personal features are found to moderate the relationship between co-creation experience and its effect on participants’ relationships toward the company and product. First, for participants high in novelty seeking the effect of enjoyable co-creation experience on all aspects of consumer-company relationships is significantly stronger while no differences have been ascertained regarding the effect on the consumer-product relationship. Second, the impact of enjoyable co-creation experience on word of mouth (WOM) is significantly stronger for participants showing high exploratory behavior. Third, in
line with theory, web usage positively moderates the relationship between enjoyable co-creation experience and WOM as well as brand image. Fourth, the results show that the effects of enjoyable co-creation experience and product involvement on evoked product interest are significantly weaker for participants dissatisfied with current product offerings. Thus, in all, paper 1 indicates that it is necessary to take a differentiated perspective on the basis of personal features is necessary in order not to overstate or underrate certain effects in the research on co-creation.

Last, besides the investigation of the effect of personal features, the study confirms and adds to previous findings regarding the consequences of rewarding co-creation experiences. Empirical evidence is furnished that consumers may build relationships with a merely ‘virtual’ product concept, i.e. the mental concept of a future product currently under development via co-creation. Hence, paper 1 enriches the literature on the “empowerment-product demand” effect co-creation has been shown to bring about (Fuchs et al., 2010, 76; similar: Franke and Piller, 2004; Franke et al., 2010) by shedding initial light on the beneficial consequences of consumers’ interactions with distant product concepts in virtual co-creation.

**Paper 2: Machiavellianism or morality: Which behavior pays off in online innovation contests?**

While paper 1 mostly focuses on personal features, which are neutral or rather positively connoted, paper 2 addresses Machiavellianism, which is one of the traits that constitute the ‘dark triad of personality’ (Paulhus and Williams, 2002). The paper explores the relationship between Machiavellian characteristics and participants’ contribution behavior in co-creation. More precisely, it is shown how the three dimensions of Machiavellianism – distrust of others, amorality and desire for status – influence individuals’ contribution intensity, communication and interaction behavior among participants as well as the quality and kind of their contributions. Highlighting the very distinct – and in parts oppositional – behavioral consequences of negative personality traits, paper 2 contributes to the literature on the
First, paper 2 introduces a more negative perspective on potentially influential personality traits to the field of co-creation and shows that participants in co-creation at some level may be prone to distrust others, manipulate or strive for status. This finding thus adds to previous research focusing pro-social behavior in co-creation communities (Wasko and Faraj, 2005).

Second, the research finds that participants’ negative personality indeed affects participation behavior, the quality of submissions and the kind of contributions. Notably, paper 2 indicates that aspects of Machiavellianism may even have a stronger impact on submission quality than other innovation-related characteristics such as being ahead of the trend, a key lead user characteristic. Thereby, the three dimensions of Machiavellianism – distrust of others, amorality and desire for status – show oppositional effects. On the one hand, in line with theory, the dimensions amorality and desire for status led individuals to focus their effort on fewer ideas and submit fewer comments. On the other hand, distrust of others has been shown to have a positive effect on the number of ideas and comments submitted as well as on the quality of contributions measured through both community and expert evaluation. Thus, the research reveals that Machiavellianism in a digital, competitive and anonymous co-creation environment may yield counterintuitive effects and requires differentiation on the level of its three constituting dimensions.

Third, the study also enriches the understanding of cooperative and competitive behavior within co-creation settings in the presence of Machiavellian characteristics. Again, findings show a highly differentiated impact of the three Machiavellian dimensions. While distrust has a significant negative influence on both the probability of submitting an encouraging comment and posting a constructive comment, amorality, in contrast, has no significant impact on the probability of writing constructive comments. However, we find that higher levels of amorality significantly increase the probability of writing encouraging comments. Based on these empirical findings on the impact of Machiavellianism, managerial implications are derived providing recommendations as to how to construct and activate the
diversity of the crowd and allows conclusions about how to construct the crowd. Thus, paper 2 provides results and implications referring to research questions 2 and 3.
crowd. While amoral and status-oriented behavior may be avoided through more rigorous recruiting procedures and selection criteria, companies may particularly counter manipulative behavior by Machiavellian participants by clearly communicating and reinforcing co-creation rules and by pursuing an intensive community management through trained moderators. Additionally, recommendations also highlight the incentive system as a design parameter to curtail detrimental effects of Machiavellianism. For instance, a higher visibility of community-oriented rankings for ‘fair behavior’ or ‘helpfulness of comments’ may be implemented in the co-creation platform. Finally, the role of evaluations by external experts rather than other participants in co-creation is emphasized in a competitive co-creation environment as a means to obviate manipulative tactics.

4.2. Paper 3: Shaping innovation in smart cities with the crowd

Building on papers 1 and 2, both quantitative in nature, paper 3 applies qualitative case study methodology to research the process of utilizing a diverse crowd. In particular, the paper addresses the vital phases of crowd construction and knowledge acquisition from the firm perspective (Prpic et al., 2015). Current research has tacitly taken crowd construction as a given prerequisite and remained comparatively silent about the underlying activities necessary to build a crowd. The study focuses the unique case of a global crowdsourcing initiative aiming to tame the wicked problem of urban mobility (Rittel and Webber, 1973). The study derives design principles related to the recruiting and managing of participants and thereby adds detailed insights into the practice of constructing a diverse crowd, while at the same time ensuring integrated and contextualized solutions. The results of paper 3 provide implications for constructing the crowd shedding light on research question 3 (see chapter 1.2).

Paper 3 takes two different perspectives to provide insights into how to manage a crowd. On the one hand, the crowdsourcing process is explored highlighting how the crowd is constructed, how knowledge is then acquired and eventually assimilated by the hosting company. On the other hand, the contributions of the crowd are analyzed and differentiated based on two important boundaries, the mode of problem solving (i.e. individuals vs. teams) and the problem framing (i.e. context-specific vs. global).
The findings of the study are three-fold. First, a detailed analyses of the crowd construction process scrutinizes the definition of the crowd profile, and the various recruiting strategies applied to ensure diverse participants and relevant knowledge backgrounds, skills and experiences. For instance, the case study describes the two-layered process of seeding information in relevant online and offline sources as well as through hand-selected multipliers; in a subsequent step, viral user-driven dissemination and self-selection are employed as mechanisms to reach even beyond the anticipated target groups. Thus, adding to previous research on design parameters (Adamczyk et al., 2012), the paper gets granular on the actual recruiting activities required to construct the crowd. Second, two important boundaries are outlined by analyzing their impact on the contributions (i.e. the submitted ideas). In detail, the study indicates that team-based submissions may particularly stimulate submissions characterized by multimodal mobility and integrative solutions considering various stakeholders.

In terms of problem framing, the study reveals that a contextualized problem framing encourages solutions that consider the local city government as an important stakeholder. On the contrary, a call for ‘greenfield’ ideas (i.e. with no specific city focus) supported submissions involving emerging (as opposed to mature) smart city technologies. Based on the detailed analysis of the case, design principles are derived to provide managerial implications. Third, the case study also addresses the phase of knowledge assimilation showing how companies may ensure that solutions are tailored to the innovation strategy and capabilities of the organization. It is described how subsequent face-to-face co-creation sessions help to absorb and elaborate the solutions so they can be integrated and utilized by the company.

4.3. Paper 4: Consumer empowerment in crowdsourcing systems: Effects of perceived empowerment on consumers’ innovative behavior and change in brand passion

While papers 1, 2 and 3 investigated the role of personal features of a diverse crowd as well as current practices of constructing and utilizing the crowd, paper 4 aims to take a closer look at the act of co-creating per se. The paper explores how the crowd may be empowered by actively engaging participants in a meaningful, self-determined and impactful way. In particular, the effects of actual empowerment
on important outcome variables – submission quality and passion toward the host brand – are examined differentiating between first time and experienced participants. Therefore, paper 4 provides some answers to research question 4 and has implications for activating the crowd as referred to in research question 3.

The findings of paper 4 are three-divided. First, on a more general level, the study provides support that empowerment is an important predictor of beneficial outcomes of co-creation and may have an even stronger effect on submission behavior and attitudinal changes than fairness perceptions (Franke et al., 2013a). The paper argues that meaningful interactions that actually have an impact may help to mobilize the crowd in co-creation initiatives and are a crucial differentiator in comparison with marketing campaigns and ‘crowdwashing’ initiatives. Second and more specifically, participant empowerment is found to positively affect the quality of submissions as measured by experts. In particular, this effect of empowerment is stronger for first-time participants than for consumers with previous co-creation experience. Thus, the study adds to the literature on empowerment in traditional organizations by extending the concept of empowerment to the domain of distributive innovation systems. Third, besides the impact on participants’ innovative behavior, empowerment has a positive effect on emotive consumer-brand relationships. In particular, participants who feel empowered show a significantly higher change in passion for the host brand relative to the level of passion before participation. This finding extends previous, mostly experimental research on empowerment (Fuchs et al., 2010; Fuchs and Schreier, 2011) by showing the effect in a real-world co-creation setting. Paper 4 also allows conclusions about the design of the co-creation task and thereby adds to paper 1 that focused the enjoyment of the co-creation experience. The findings show that, ultimately, consumers do not only want to be entertained and enjoy a compelling experience; rather, they want to be assured that the task is credible and meaningful, that it lives up to their ideals and that their contribution will eventually make a difference.
5. Discussion

Co-creation has become a widely used approach to empower consumers and to create value in various phases of the value chain. While research has investigated in great depth the reasons why individuals participate in co-creation and how design parameters impact their activities and contributions, very little attention has been put on the particularities of the crowd, in particular, personal features of participants. Moreover, the specific strategies and activities companies embrace to construct the crowd and collaborate with the co-creators on equal terms have been widely under-researched. The goal of my thesis is to gain a more granular understanding of the crowd, the impact of both positively and more negatively connotated personal features as well as insights into the practice of crowd construction and crowd empowerment. This chapter integrates findings from both the quantitative and qualitative investigations and discusses theoretical as well as managerial implications. In addition, limitations and trajectories for future research are presented.

5.1. Theoretical implications

To outline the theoretical implications of this thesis, I delineate four different domains which have originated from or have been significantly shaped by the open and user innovation paradigm (von Hippel, 1988; Chesbrough, 2003). Specifically, all four of these research domains have redefined the role of users and consumers and their relation to companies in the wider innovation ecosystem, however, from different angles and with distinct focuses. The first domain, co-creation and the related concept of crowdsourcing, concentrates on the collaboration between companies and users in distributed innovation systems. Moreover, co-creation research revolves around the new role of users in new product development and other stages of value creation and investigates how companies can make use of users and consumers.

Second, value co-creation has triggered an intensive conversation and rethinking within the marketing discipline. This stream of literature has mainly investigated the interplay of companies and consumers from a value- and resource-based perspective and argued in favor of a more service-dominant
logic as opposed to the traditional goods-dominant perspective. Third, the domain of consumer empowerment is considered since it guides attention to the evolving role of consumers as emancipated actors in the market place and describes the balance of power between consumers and companies. Fourth, the literature on consumer-brand relationships sheds light on the interactions and corresponding relationships between brands and consumers and resulting consequences for branding and relationship management.

In addition to the theoretical implications, I will also outline some directions for future research, which appear to be worth studying to me. In contrast to chapter 5.3, in which I will point out research gaps referring to the limitations of my work, the directions in chapter 5.1 rather build on my contributions to theory and how these may be amplified in future research.

5.1.1. Implications for co-creation and crowdsourcing research

In the first instance, my thesis contributes to current research on co-creation and crowdsourcing (Franke and Piller, 2004; Nambisan and Baron, 2007; Leimeister et al., 2009; Füller, 2010; Pötz and Schreier, 2012) by providing insights into (1) the impact of participants’ personal features and behaviors on consequences and outcomes of co-creation, (2) the activities revolving around crowd construction and crowd management and (3) the consequences of consumer empowerment and co-creation experiences.

(1) Role of participants’ personal features – Extant literature is comparatively silent about personal features of participants and mainly provides brief descriptive information regarding participants’ demographics and their role within the community, or investigates co-creators’ motivation for and expectations toward participation (Jeppesen and Frederiksen, 2006; Füller, 2010; Frey et al., 2012; Zheng et al., 2011; Füller et al., 2012; Füller et al., 2014). A key strength of utilizing the crowd is the diversity of individuals and the corresponding heterogeneous skill set and knowledge (Afuah and Tucci, 2012). Surprisingly, the personal features of co-creators are remarkably under-researched in co-
creation literature thus far. A notable exception is the research on user innovation which reveals the importance of lead user characteristics for the success of new product development (von Hippel et al., 1999; Lilien et al., 2002; Lüthje, 2004; Schreier and Prügl, 2008). Stock et al. (2016) research the ideal personality profile of consumer innovators increasing the success throughout the phases of the innovation process. While insightful, the stream of user innovation is distinct from co-creation literature as it concentrates on user innovators who do not necessarily participate in firm-led co-creation initiatives (Baldwin et al., 2006).

Paper 1 and 2 of my thesis intend to provide a first look inside this ‘black box’ and create a better and more differentiated understanding of the diversity of co-creators and how personal features impact outcomes of co-creation. Paper 1 indicates that participants’ personal features influence the impact of co-creation experience on participants’ relationship toward the brand and product. Apparently, the experience during co-creation does not affect all individuals in the same way and, thus, personal features are crucial to construct the crowd for specific purposes of co-creation initiatives. For instance, paper 1 demonstrates that the effect of enjoyment of co-creation experience on word of mouth may be stronger for individuals characterized by high exploratory behavior. Consequently, participants with high exploratory behavior may be more apt to function as promoters of the co-creation initiative or as multipliers of the co-created product concept. On the other hand, the impact of enjoyable co-creation experience on evoked product interest was significantly weaker for participants characterized by dissatisfaction with existing product offerings. Arguably, these individuals may be predominantly interested in solving their needs, rather than in a compelling experience during co-creation. Thus, these individuals in the crowd may be immune to efforts of branding through the experience design of the co-creation initiative, but be highly committed to help solve the task that corresponds with their need.

Paper 2 additionally sheds initial light on the consequences of negatively connoted personal characteristics on participants’ submissions and collaborative activity. The results reveal that the three aspects of Machiavellianism have oppositional and, in the case of the dimension distrust of others, even partly positive effects in terms of submission quality and quantity. While research on user innovation
has mostly emphasized the role of lead user characteristics for the success of new product development (von Hippel et al., 1999; Lilien et al., 2002), paper 2 reveals that aspects of Machiavellianism may be an even stronger predictor of submission quality. Consequently, this thesis points out that excluding or evicting individuals with negative personal characteristics may not be the only option to deal with anti-social behavior. Rather, managing these individuals and confining their behavior to certain boundaries may help to increase crowd diversity and to profit from these individuals’ skills. By investigating anti-social behavior, paper 2 also extends the current understanding of participants’ behavior in co-creation communities showing both competitive and collaborative facets (Bullinger et al., 2010; Hutter et al., 2011; Kathan et al., 2015). Paper 2 demonstrates that distrust of others, for instance, negatively effects both encouraging and constructive behavior in relation to other contestants. Amorality, on the other hand, predicts encouraging behavior. This counterintuitive finding may be explained by manipulative behavior participants employ to ‘sweet talk’ to fellow contestants to gain the edge over them. While previous research has focused the almost idealistic sense of community and collaboration, paper 2 adds a special type of amoral co-creator to the equation who states that she acts in a status-oriented way and even would intentionally manipulate others.

Overall, papers 1 and 2 intend to guide attention to the role of personal features in co-creation research and suggests to differentiate effects in the research on co-creation on the basis of personal features in order not to overstate or underrate certain effects. The thesis also provides initial evidence that a closer investigation of the personal features of co-creators may help to identify important predictors of beneficial consequences and pave the way for a more personality-sensitive recruiting for co-creation.

The findings imply that personal features do have an impact on certain relationships between variables in co-creation as well as the outcomes of co-creation. In addition, results indicate that the role of personal features may vary depending on the respective task participants are to fulfill (e.g. submitting ideas, promoting the brand or becoming interested in buying the product). As a consequence, there may be certain ‘pairs’ of tasks and personal features that are particularly fruitful combinations to accomplish.
the overall direct and indirect goals of a co-creation initiative. Similar to the research on personality traits in user innovation by Stock et al. (2016), future research on firm-led co-creation may examine the ideal bundle of personal features with regard to specific co-creation goals. In particular, it might be worth investigating key tasks and roles within the innovation process and match these with profiles consisting of personal features.

To add to current research on recruiting individuals for co-creation focused on the phases of idea generation and concept development (Lilien et al., 2002; Schweisfurth and Raasch, 2015), future research may put emphasis on the personal characteristics of co-creators suited to contribute to previous phases of the innovation process (e.g. need identification) and subsequent phases (e.g. concept testing). Apparently, these tasks have been primarily tackled with more conventional market research methods so far. Still, concepts like crowd voting (Pricic et al., 2015) and services like crowdsourced forecasting⁴ suggest that co-creation may be an expedient tool for some of these challenges as well. Specifically, some of the downsides of co-creation may be diminished by the mechanisms of co-creation (Ogawa and Piller, 2006). The findings of my thesis are especially relevant to these market research related challenges as participants provide subjective feedback (e.g. votings, opinions, insights) rather than objective solutions to a problem (i.e. with objectively determinable correctness). With regard to these tasks, the quality of the outcomes (e.g. consumer needs or forecasts) is difficult to assess by the company. Hence, it is even more critical to understand the impact of personal features and construct a crowd capable of expressing and predicting relevant needs correctly and identifying promising new product concepts. While self-selection and contest-based incentive systems have been viable mechanisms to crowdsource ideas, concepts or solutions, a more personality-sensitive recruiting approach may be a promising avenue for research on crowdsourced foresight, need identification and evaluation tasks.

(2) Crowd construction and management – While many studies have focused design parameters such as tool support and incentives, the construction of the crowd along a defined process has been

neglected. A plethora of co-creation projects investigated and reported in academia build their research on ‘preexistent’ samples of co-creation participants or experimental set-ups and do not specify in greater detail how participants were recruited by the host company (Fuchs and Schreier, 2011; Füller et al., 2011; Hutter et al., 2011).

Partly, the negligence of crowd construction and participants’ personal features may be due to the self-selection mechanism used in many co-creation initiatives. The mechanism to some extent may imply an automatism of crowd construction limiting company action to the framing of the problem and the technical broadcasting of the ‘call for contributions’. In the domain of distributed problem solving, for instance, solvers who are part of an existent pool of solvers (e.g. established and administrated by an intermediary such as Innocentive) are recruited via self-selection mechanisms (Jeppesen and Lakhani, 2010). Through crowdsourcing and the inherent self-selection mechanism, an originally distant search for a company may be transformed into a local and therefore more efficient search for an outside actor (Afuah and Tucci, 2012). Thus, self-selection may help overcome the limitations of previous experiences and knowledge by reaching out to individuals in the periphery (Howe, 2006; Jeppesen and Lakhani, 2010).

Contrarily, research on co-creation with lead users outlines rather active and targeted search strategies such as pyramiding to identify valuable participants for co-creation (von Hippel et al., 1999; von Hippel et al., 2009). Aspects of both search principles are part of the recruiting process for co-creation initiatives and have been investigated in this thesis.

Paper 3 contributes to the literature on crowd construction by depicting the efforts and processes for defining, recruiting and managing the crowd. In particular, insights are provided into the layered approach of constructing the crowd pointing out that the process consists of two major steps, seeding and self-selection. Calling attention to this combination of targeted seeding and self-selection principles is already a contribution in itself. Self-selection can only take place once the ‘call for contribution’ has been seeded and received or accessed by a potential participant. Thus, seeding is a ‘sine-qua-non’ for self-selection. Yet, at the same time, it may undermine the very advantage of self-selection to some
extent as it confines the ‘broadcasting space’ to the sender’s previous knowledge and assumptions. In contrast to tapping existing finite pools of co-creators with a specific ‘call for contributions’ (Jeppesen and Lakhani, 2010), the case study describes the activities underlying an open recruiting of participants meaning that there are various, not previously defined ‘broadcasting spaces’.

The case study presented in my thesis indicates that more deliberate seeding efforts, i.e. a purposive definition of participant profiles and corresponding broadcasting in selected places (online and offline) as well as among different potential promoters, is an important step prior to self-selection, unless co-creation is to be limited to the boundaries of a given pool of co-creators (e.g. the established pool of co-creators of an intermediary). Hence, the thesis adds to previous research on recruiting for co-creation by highlighting that constructing a crowd is not just a process of passively waiting for co-creators to self-select, but requires an active constructing effort, i.e. a directed seeding of a ‘call for contributions’. To elucidate the activities revolving around crowd construction, paper 3 builds on the findings on personal features from papers 1 and 2 indicating that personal features may present important levers influencing the outcomes of co-creation and the integration of external resources relevant to the tasks to be addressed.

As the purposes of co-creation initiatives may vary widely ranging from problem solving to idea generation and brand building (Jeppesen and Lakhani, 2010; Kohler et al., 2011; Füller et al., 2013; Hsieh and Chang, 2016), personality-sensitive recruiting may play an essential role in matching the crowd with the task to be tackled. In an era, in which attention is a scarce resource (Davenport and Beck, 2001; Crawford, 2015), the accessibility of a diverse crowd will be increasingly relevant to understand in order to find the right partners in co-creation. While both recruiting mechanisms are advocated in different research streams – targeted approaches in lead user research and self-selection in crowdsourcing – the crucial question arises as to the ideal balance of combined targeted seeding and self-selection recruiting strategies in co-creation. In light of more and more ‘panel-like’ standardized pools of co-creators built to efficiently serve ‘crowdsourced’ tasks, targeted and costly recruiting efforts tailored to one specific co-creation project may be on the wane. While striving for efficiency is a
legitimate goal and may even further propel co-creation as a ‘modus innovandi’, the repeated activation of a given pool of co-creators may undermine the central vantage of co-creation and eventually foil the effectiveness of this approach.

Participants’ personal features may thus play a vital role in designing continuous co-creation initiatives to serve as an ongoing direct link to consumers. A crowd designated to serve as a permanent advisory board needs to be carefully constructed in order not to overstrain participants and compromise the quality of participants’ contributions. Previous research has predominantly focused single and temporary co-creation cases to collect data and thus neglects the effect of repeated co-creation activities and experienced participants. Future research may investigate the role of personal features in repeated co-creation activities and provide insights into strategies of recruiting, activating and potentially refreshing pools of co-creators.

(3) Antecedents and consequences in co-creation – The thesis also contributes to research on the consequences of psychological states experienced by participants in co-creation (Nambisan and Baron, 2007; Fuchs et al., 2010; Kohler et al., 2011; Füller et al., 2011). Previous research among others highlights the impact of co-creation experience on favorable outcomes such as evangelism, attitude toward the firm and further interest in the setting of product support communities (Nambisan and Baron, 2007) and the virtual environment ‘Second Life’ (Kohler et al., 2011). In addition, Füller et al. (2011) find that a positive experience also impacts the quantity and quality of submissions. Apparently, the act of engaging in co-creation itself may influence participants’ attitudes and behavioral intentions. Thus, staging an enjoyable and compelling experience for participants in co-creation may pay off for companies both with regard to innovation-related effects (e.g. quality of participants’ submissions) and relationship-related consequences (e.g. attitude toward the brand).

Papers 1 and 4 confirm previous research findings regarding the effect of co-creation experience and empowerment on an innovative and customer-oriented brand image, trust and word of mouth as well as the quality of submissions. Additional insights are presented regarding the relationship
participates nourish with the merely mental concept of a future product currently under development in a co-creation initiative. Moreover, study 4 has investigated the impact of participants’ actual perceived empowerment in co-creation adding to mostly experimental research on consumer empowerment. Increased feelings of empowerment are found to positively affect the quality of submissions and a change in brand passion in comparison to the attitude prior to the empowerment. More detailed theoretical implications of the consequences of enjoyable co-creation experience and empowerment for the domains of value co-creation, consumer empowerment and consumer-brand relationships will be introduced in more depth in the following chapters.

5.1.2. Implications for value co-creation research

In addition to the theoretical implications for the literature on co-creation and crowdsourcing, the findings of the thesis also contribute to the literature on value co-creation and service-dominant logic. According to Vargo and Lusch (2004; 2008; 2016), value is co-created by consumers and therefore determined in use by applying resources in a specific context (Vargo et al., 2008). As a consequence, the consumer has been viewed “not as a target for products, but as a producer of experiences” (Firat et al., 1995, 52; similar: Prahalad and Ramaswamy, 2003). In the literature on value co-creation these experiences have predominantly referred to the extended consumption process, i.e. the period around and after the purchase, and are delineated from previous co-production experiences. For instance, research has investigated mass customization as a form of co-creation during the consumptive experience (Franke et al., 2010).

In contrast to this, the thesis at hand sheds light on value co-creation processes within new product development, in particular, the generation of ideas which takes place significantly prior to the consumption process. Thereby, consumers apply operant resources such as creative skills and knowledge to a ‘call for ideas’ which represents the operand resource provided by the company. The results of paper 1 highlight that the co-creation experience is indeed capable of evoking a relationship between the consumer and the ‘early’ form of a product which is currently under development. This is
particularly notable as the concepts at this stage are purely imaginative and elusive and provides empirical evidence that the value consumers co-create may not directly emanate from the use of the related offering (Lusch and Nambisan, 2015). Thus, this thesis adds an empirical basis to Payne et al. (2008), who proclaim that consumers should be involved at every stage of product or service development including co-production of new offerings in the course of new product development.

In so doing, my results also provide some initial insights into Randhawa’s et al. (2016) call to enhance the focus on customer co-creation and open service innovation in particular. The results of my thesis further suggest that consumers’ co-creation experiences during new product development (e.g. idea generation), during co-creation around the consumption process (e.g. customization of the product) and the production of an offering (e.g. self-service technologies) may increasingly merge. Thus, papers 1 and 4 attempt to collocate the two streams of co-creation and service-dominant logic as suggested by Randhawa et al. (2016). This may be particularly true in light of the burgeoning ‘maker economy’ and technologies such as 3D printing (de Jong and de Bruijn, 2013; Rayna et al., 2015; Kortmann and Piller, 2015). In our time, development and production have lost their privileged status in culture (Firat et al., 1995), and opened up new spheres of value co-creation for consumers besides the consumption process.

In the field of digital innovation, start-ups and, more recently, mature companies pursue so called ‘lean’ strategies in new product development (Ries, 2011; Hienerth et al., 2014). By developing a ‘minimum viable product’ and sharing it with the community for further joint development and refinement, new product development becomes an offering itself that invites consumers to co-create experiences. Following the development process and being a co-creator of a product has become a popular and value adding dimension of the product leading to considerable ‘pull effects’. For instance, some artists already experiment with ‘minimum viable products’, for instance, when new albums are prematurely shared with the crowd to involve them in the co-creation process of song texts, covers etc.\(^5\) Unifying creation and offering of a product may become a prevalent approach in industries that have successfully shifted from goods-focused (e.g. selling a physical sound carrier or digital file) to service-

dominant business models (e.g. selling permanent access to and streaming capabilities of a large music portfolio of music). The experiences co-created throughout the refinement of ‘minimum viable products’ indicate that it is increasingly difficult to distinguish between developmental stages of a product and the final product as the transition blurs and significant value is co-created before official completion.

The time-logic of exchange may not only be open ended from pre-sale to post-sale as suggested by Ballantyne et al. (2008), but even extend to phases prior to the existence of the product. What still appears to be distinct phases in value creation today may possibly become one integral and interrelated experience that consumers co-create. Hence, in order to understand customers’ additive value-in-use, research on value co-creation may need to comprehend and rigorously encompass consumer experiences throughout the entire value chain and a “time-series of value propositions, negotiated agreements and value-in-use determinations by various resources providers and integrators” (Ballantyne et al., 2008, 45).

5.1.3. Implications for consumer empowerment

While consumer empowerment research has long been tantamount to understanding the power balance and struggle between consumers and companies in the consumption process (Firat and Dholakia, 2006; Cova and Dalli, 2009), this dominant view of consumer empowerment has been on the decline with the emergence of the service-dominant logic and co-creation thinking. More recent research has started focusing on the opportunities of co-creation as an empowerment strategy (Füller et al., 2010; Fuchs and Schreier, 2011). Indeed, co-creation has heralded a new level of consumer emancipation as it shifts the process of empowering consumers away from the point of consumption to earlier phases in value creation such as the generation of ideas via co-creation or the financing of innovation endeavors via crowdfunding. This thesis amplifies existent research by investigating empowerment strategies that are characterized by a deeper level of consumer interference in the fundamental design of a product.
The results of paper 4 highlight that an increased feeling of empowerment during the generation of new product ideas may explain favorable consequences – both regarding the quality of submissions and the passion toward the host brand. This is particularly noteworthy as consumers in the given empirical setting cannot directly ascertain the impact of their work as opposed to empowerment to select strategies (e.g. when consumer have a ‘binding vote’ to select the products to be offered for sale). Due to the time lag between idea generation and a significantly later and only potential realization, the link between the product and their own contribution is rather indirect and at best vague. While the visible impact of their contribution may be indistinct, the meaningfulness dimension of empowerment arguably may be more pronounced the earlier consumers are involved. As consumers’ contribution to the offering is very close to the core of value creation, the ideas resulting from co-creation may be constitutive of the final offering and therefore the act of co-creating itself may arouse increased feelings of meaningfulness among consumers.

The thesis further adds to consumer empowerment literature as it investigates the consequences of actual empowerment, i.e. as experienced and perceived by consumers who participated in a co-creation initiative. While insightful, previous research has been mostly experimental in nature and exposed consumers to an empowerment treatment (Fuchs and Schreier, 2011). In my thesis empowerment is conceptualized as a second order construct consisting of four dimensions – meaning, self-determination, competence and impact – and thus adds to current research that focuses only one or two of the dimensions (Füller et al., 2010; Fuchs and Schreier, 2011). The four-dimensional concept of empowerment may be a valuable construct to capture facets of the psychological state of empowerment, in particular, in early phases of value creation with a greater distance to the actual point of consumption. Although enjoyment has been found to play an important role in motivating participants, this work argues that empowerment may be a valuable antecedent of sustainable consumer-brand relationships and permanent co-creation efforts.

For future research, the empowerment concept may offer a particularly relevant frame for the investigation of continuous co-creation initiatives, where participants serve as permanent advisors and
repeatedly join tasks in multiple phases of value creation. I argue that special emphasis of empowerment is required to motivate participants over longer periods and create sustainable co-creation experiences that are worthwhile for participants to make significant investments. Research may, for instance, systematically vary the amount of previous experience when investigating the consequences of empowerment. Additionally, examining the four dimensions of empowerment separately, i.e. self-determination, competence, meaning and impact, may also be insightful to determine different effects in the diverse contexts of co-creation (e.g. idea generation, concept testing, marketing).

Another interesting research direction in the field of continuous co-creation platforms lies in the empowerment of participants in crowdsourcing-based business models like Uber or Airbnb. This form of co-creation has led to some of the highest valuations of startups and the widespread use of the term ‘unicorn’ referring to startups with a valuation of $1 billion and more. Unlike the project-based co-creation initiatives in the center of my thesis, these platform-based businesses describe two-sided markets that bring together end-consumers and consumers who want to become (part-time) entrepreneurs. The role of companies in this co-creation context is limited to being a provider of a digital marketplace and infrastructure. Hereby, the platforms empower both stakeholder groups to create value serving as both an operand and operant resource (Lusch and Nambisan, 2015). As the typical consumer role has softened in these environments and converged the entrepreneurial role, researchers may provide valuable insights by investigating how feelings of empowerment may affect end-consumers and the new hybrid type of ‘consumer entrepreneurs’. In particular, the higher degree of professionalism and business-orientation of these ‘consumer entrepreneurs’ may make for an interesting phenomenon within the realm of empowerment to explore.

---

5.1.4. Implications for consumer-brand relationships

The findings of my thesis also hold implications for the literature on consumer-brand relationships (Fournier, 1998; Muniz and O’Guinn, 2001; Aggarwal, 2004; Atakan et al., 2014; Hsieh and Chang, 2016; Kristal et al., 2016). Fournier (1998, 365) argues that brands “serve as powerful repositories of meaning, purposively and differentially employed in the substantiation, creation, and (re)production of concepts of self”. Today, the consumer is considered an important actor in the branding process who contributes to the construction, modification and diffusion of meanings (Muniz and Schau, 2007; Schau et al., 2009; Füller et al., 2013; Ramaswamy and Ozcan, 2015). Building on Belk’s (1988) line of reasoning that, besides controlling and knowing the object, creating an object may lead to powerful associations and extend one’s identity, this thesis provides insights into how the act of co-creating a product in a brand-hosted initiative may elicit passion for the brand, impact the brand’s image and develop trust. In detail, enjoyable co-creation experience and empowerment are identified as important antecedents of building consumer-brand relationships.

Hence, the thesis argues that the brand as a repository of meaning may not only provide ‘readymade’ messages, stories or products, but may also include offers for consumers to co-create these. In this sense, the concept of value co-creation (Vargo and Lusch, 2004) is extended to the branding domain by offering operand resources (i.e. a meaningful task embedded in the co-creation initiative) and inviting consumers to act upon these with their operant resources (i.e. their creativity, skills and knowledge) to produce their self-images.

Atakan et al. (2014) differentiate between the design task (i.e. specification of parameters of a product) and the realization task (i.e. manufacturing of a product) as two distinct phases in co-creation. The setting of my thesis extends the co-creation task, which is to be fulfilled by consumers, to an even earlier stage in product development. This means, consumers participated in the conceptualization and creative phase of new product development, however, did not ascertain the direct impact of their work on the later product. Notably, the results indicate that affective relationships with brands may be co-created significantly prior to the realization and use of the end product. Moreover, paper 4 provides
proof that empowering consumers through co-creation may result in an actual increase of brand passion compared to the state measured before empowerment. Thus, even rather short (8 weeks in the case of this study) meaningful interactions with a brand may have a significant impact on the consumer-brand relationship.

While co-creation utilized for marketing purposes is already a reality, I suggest future research to correspond to this development. In particular, researchers may direct attention to the personal features of participants in co-creation initiatives that are tailored to marketing purposes. Involving authentic user testimonials and influencers as well as opinion leaders on social media like Instagram, Snapchat and Youtube has become an increasingly popular marketing vehicle. The findings reported in this thesis provide an initial starting point emphasizing that personal features do influence certain consequences of co-creation in an innovation context. Future research may thus explore the impact of personal characteristics of co-creators in marketing and relationship management contexts as these co-creation initiatives put particular attention to participants’ capacity to reach individuals, create their own authentic brand-related content and credibly advocate their messages (Hautz et al., 2014).

5.2. Managerial implications

The crowd is an alternative human resource that companies may tap to supplement internal resources in value creation. In practice, key challenges of co-creation involve the construction and management of the crowd (Prpic et al., 2015). In this regard, the findings I present in my thesis bear several implications for practitioners – both managers within companies and consultants within intermediaries.

First, the thesis provides a better understanding of the diverse personalities within the crowd. In co-creation projects, the notion ‘crowd’ is often referred to as a rather obscure single entity ignoring the huge variety of individuals it consists of, their manifold characteristics and the consequences for co-creation. Moreover, it is oftentimes not clear how exactly this ‘crowd’ has been constructed and who it consists of. Having demonstrated the relevance of personal features in co-creation, practitioners may direct their attention toward the individuals who are part of the crowd. While ample research shows that
there are different tasks and corresponding roles within value creation that require different types of participants (Nambisan and Nambisan, 2008; Füller, 2010; Prpic et al., 2015), there is a dearth of knowledge about the impact of participants’ personal features.

Thus, the findings of my thesis may encourage practitioners to construct crowds tailored more carefully and purposively toward the specific task and purpose. It is also shown that participants may take different roles (e.g. user, planner, supplier, operator) within the same co-creation initiatives to complement one another. While recruiting would still rely on self-selection in a second step, practitioners may want to explore new opportunities of seeding the ‘call for contributions’ beyond commonly used channels such as the company websites (Pötz and Schreier, 2012) or newsletters (Ebner et al., 2009). For instance, crowd construction for co-creation initiatives designed to build consumer-brand relationships should differ from recruiting efforts for co-creation initiatives aiming at idea generation.

Consequently, practitioners also have to become clear regarding the hierarchy of their goals to tailor crowd construction to one particular purpose or a combination of purposes (Bilgram, 2012). Moreover, practitioners gain insights into the effect of negatively connoted personality traits in co-creation environments and learn about possible countermeasures to avoid and cope with amoral behavior that may thwart co-creation initiatives. Overall, it is the intention of this research to trigger practitioners’ awareness of the diversity of crowd members and establish a new way of embracing ‘target group thinking’ matching the respective goals of co-creation initiatives. Practitioners may be advised to utilize personality-based recruiting to target apt individuals with a purposive seeding of the ‘call for contributions’ and start building more sustainable networks of co-creators.

Second, besides initial insights into the effect of personal features, the research at hand also depicts the process of crowd construction, i.e. how to find and recruit participants appropriate for a specific task. So far, the underlying activities practitioners have to undergo to source the right crowd have been only sparsely described. On the one hand, this may be partly due to the widely used self-selection mechanism that serves as an alleged ‘magic formula’ to build the crowd. On the other hand,
the absence of ‘target group thinking’ may account for the limited interest in detailed recruiting activities. As a benchmark, the market research industry has focused ‘target group thinking’ as it has always been primarily interested in what markets would look like in the future in terms of consumers’ needs and wishes. Therefore, by applying sampling mechanisms based on the principle of representativeness, market research gains aggregated feedback reflecting the preferences of a population (i.e. a company’s customers).

Co-creation approaches work quite differently. As a means for creating ideas or solving problems – tasks that do not require representative contributions – co-creation purposively seeks outlier ideas and solutions that explicitly need not represent the mass market. Although recruiting for co-creation initiatives may significantly differ from traditional sampling methods in market research, the thesis reveals that crowd construction requires deliberate activities. In particular, this work indicates that purposive crowd construction procedures are a requirement to attract the crowd’s attention and ensure the right composition of the crowd. Despite the oftentimes implied automatism underlying the self-selection of participants, the present work points out that a coordinated initial seeding is crucial to attract the attention of potential participants before relying on self-selection mechanisms. Based on a defined profile detailing contexts, skills and roles conducive to the co-creation task at hand, a two-layered recruiting approach combining targeted seeding with self-selection and word-of-mouth recommendations may serve as a guideline for managers. Applying more personality-sensitive seeding strategies may help practitioners to direct recruiting efforts and increase both effectiveness and efficiency of co-creation. In light of the ever increasing challenge of attracting consumers’ attention, my findings provide guidance for how to define, seed and recruit the right crowd.

Third, with increasing maturity of co-creation as an important ‘modus innovandi’, companies and intermediaries alike have taken efforts to establish communities or panels of potential co-creators they can easily tap for a particular initiative. Certain parallels may be drawn again with regard to the market research industry which can be considered the primal, rudimentary form of co-creation purely focused on collecting need information. Similar to the developments within the market research industry, co-
creation has been tremendously professionalized and undergone significant improvements in terms of efficiency both by designing processes and by creating easily accessible resources (e.g. panels of co-creators). Essentially, intermediaries and companies decided to invest in building panels of co-creators to reduce the efforts and costs for repeated crowd construction. The thesis at hand may provide insights particularly relevant to permanent co-creation panels as (1) they are designed to build ongoing deeper relationships with individuals across single co-creation initiatives, (2) they need to consist of a certain heterogeneous crowd to be capable of tackling diverse tasks and (3) they may justify the extra effort necessary to collect the relevant personal characteristics allowing for targeted crowd construction in specific projects. It is argued that a better knowledge of the crowd may help to recruit participants for specific tasks and help improve the outcome of co-creation.

Fourth, the findings on the consequences of empowerment emphasize the importance of designing co-creation tasks that are meaningful and allow participants to act in a self-determined fashion according to their own competence level to accomplish tasks that make a difference. Permanent co-creation panels constitute co-creation ecosystems that aim to foster sustainable and ongoing relationships and thus focus on experiences rather than transactions. To avoid ‘wear-out’ effects and co-creation fatigue, empowerment appears to be a valuable guiding principle for practitioners to create long-lasting co-creation environments beyond the initial excitement and curiosity. A clear vision for the role of co-creation within the organization as well as the establishment of rigorous and transparent post-processing may help to underscore the meaning and impact of co-creation initiatives. Thus, the thesis also argues that co-creation initiatives should be embedded in an overall framing serving as a repository of meaning.

Last, the thesis also provides practitioners with ideas how co-creation may be utilized for branding. The evidence of brand-relevant consequences of co-creation experience rendered in papers 1 and 4 may serve as a starting point to orchestrate innovation and branding goals within co-creation initiatives. The results I report, for instance, show that interacting with consumers in enjoyable and meaningful co-creation initiatives may help build strong brands that are perceived as innovative, customer-oriented and trustworthy. While industry studies already point to the growing importance of
co-creation initiatives used for marketing purposes, I argue that creating meaningful tasks is key to beneficial branding effects. For instance, even temporary co-creation initiatives which consumers consider empowering are capable of sparking a positive change in brand passion. Notably, a state of empowering has even been found to be a stronger predictor of a change in brand passion than perceived fairness. Furthermore, new co-creation contexts such as crowdfunding (Mollick, 2014; Belleflamme et al., 2014; Thürridl and Kamleitner, 2016) may provide a context for meaningful relationships. In contrast to the co-creation tasks referred to in this thesis which focus on idea generation, crowdfunding participants adopt another important task: they become investors who fund the ideas. Although a few examples of business models combining co-creation and crowdfunding, such as the prominent example of Quirky, have not prevailed, entrepreneurs should not be discouraged to further experiment in this domain. In particular, the combination of creative work (e.g. experiencing one’s own competence and acting autonomously) and funding activities (e.g. feelings of doing something meaningful that has an impact) appears to provide breeding grounds for sustainable consumer empowerment (Kohler, 2015).

5.3. Limitations and future research

My thesis has a number of limitations which need to be taken into consideration. From these limitations, opportunities and directions for future research are derived. Obviously, the studies I reported in my thesis only investigate a few personal features such as novelty seeking, web usage, gender or amorality. Future research may systematically analyze a wider set of personal features to draw conclusions regarding purposive recruiting efforts. Additionally, it may also be worthwhile to understand the role of personal features in the context of further antecedents and consequences. From a managerial perspective, additional research is needed to realize the full potential of personality-sensitive crowd construction and

management. In particular, the most suitable pairing of personal features and purpose of co-creation seems to be a promising research area.

With regard to the crowd construction process, the thesis highlights that a plethora of recruiting processes are applied in the field of co-creation and crowdsourcing. Examples for recruiting procedures range from signaling the ‘call for contribution’ within a closed community of co-creators (Jeppesen and Lakhani 2010), communicating via e-mail and newsletter (Ebner et al., 2009), seeding on social media sites (Bilgram et al., 2008) or on the company’s website (Pötz and Schreier, 2012) or in brick and mortar stores (Piller and Walcher, 2006). While this thesis draws on case study research to provide qualitative insights into the activities of crowd construction, a more systematic analysis of the search and recruiting processes is required to understand the interplay of manual seeding activities (i.e. the specificities of signaling) and self-selection. In particular, systematic comparisons of different recruiting strategies (i.e. with a different share of targeted recruiting and self-selection principles) may be particularly relevant to managers to understand the different alternatives of crowd construction and their benefits (e.g. speed, reach, diversity, quality, costs). Moreover, differentiating crowd construction strategies based on the purpose and task to be addressed may be worthwhile to get a more nuanced picture. Due to the extensive experience of the advertising industry in reaching and mobilizing people to consume products, future research may also want to more closely examine the potential and adaptability of advertising techniques for the recruiting of participants in co-creation. For instance, experiments with targeting technologies applied in online advertising could be a promising approach to use existing infrastructure, knowledge about users, data science and reach to scale recruiting efforts for co-creation.

Further, my thesis only demonstrates the overall conducive side-effects of co-creation for branding. While insightful, researchers may be encouraged to examine the effects of co-creation in comparison to more conventional marketing and relationship-building initiatives and campaigns in future research efforts. Aside from the well-established vantages of co-creation in the field of innovation (e.g. Poetz and Schreier, 2012), comparative research may be desirable to understand to what extent co-creation may also serve as a means in the marketing and relationship management domain. Specifically,
future research may uncover how effective and efficient co-creation can really be and provide sound recommendations for marketing theory and practice. For instance, future research may address the alleged meaningfulness and authenticity of co-creation tasks as an antecedent of branding effects. Following the suggestion for further research by Randhawa et al. (2016), co-creation may be the predestined research realm to eventually intertwine innovation and marketing theory more deeply.

One major limitation of the thesis at hand is the focus on one particular form of co-creation, i.e. company-led temporary contests conducted in the idea generation phase. To gain a more comprehensive understanding of the role of personal features, crowd construction and management as well as the empowerment effect, further types of co-creation initiatives such as permanent co-creation initiatives or initiatives in other phases of value creation (e.g. funding vs. problem solving vs. selection of offering) should be explored. Specifically, crowdsourcing-based business models such as Airbnb, Uber or Amazon Studios may be a highly relevant type of co-creation worth exploring. These platform businesses may be particularly interesting for research as they represent permanent co-creation activities and put the crowd members at the very heart of their business models as opposed to the ideation phase. Additionally, they have established solid models to monetarily incentivize the crowd and recompense the value they co-created. Therefore, the crowd is more deeply incorporated in the business of these companies by default. Moreover, crowdsourcing-based business models provide insights into three sides of the market – the seller, the buyer and the platform provider (i.e. the company), who jointly co-create value within the platform infrastructure in the sense of service-dominant logic. Aligning these perspectives within co-creation ecosystems may provide an even better understanding of the diversity of the crowd and the various roles taken by certain crowd members.

Pointing out a more radical research direction in the domain of co-creation, the dynamic nature and technology-savviness of digital businesses such as Uber and Amazon Studios offer a unique research field to investigate the increasing role of artificial intelligence and the potential clash of man and machine in co-creation (i.e. the crowd vs. artificial intelligence). “You can kill it with labor, or you can
“kill it with technology”\textsuperscript{9} may become the crucial decision in value co-creation. Should companies rely on crowds or on machines or on a combination of both for certain kinds of value creation tasks? While crowdsourcing has revolutionized the concept of labor in the last decade, the looming power of artificial intelligence already foreshadows the tremendous impact on current crowdsourcing-based business models. Autonomous driving and delivery technology, machine learning algorithms solving micro-tasks or artificial intelligence accomplishing even creative work such as producing music or stories may induce an unprecedented leap in efficiency and eventually make the crowd dispensable to some extent. A deep understanding of the crowd may thus be key to leverage its diversity, the inherent empowerment effect and the ‘human factor’ in value creation and synergize crowd- and machine-based value co-creation.

References


Howe, J. (2009), Crowdsourcing: Why the power of the crowd is driving the future of business, Crown Publishing Group, New York, New York.


II. Appendices
Appendix A: Paper 1

The moderating effect of personal features on the consequences of an enjoyable co-creation experience

Füller, J.; Bilgram, V.

Submitted to the Journal of Product and Brand Management (status: revise and resubmit)
The moderating effect of personal features on the consequences of an enjoyable co-creation experience

Virtual co-creation is considered a sound strategy to successfully develop new consumer-centered products in the digital era. As an additional effect, research on co-creation highlighted that co-creation experiences may establish and intensify beneficial consumer-company as well as consumer-product relationships. Based on data stemming from surveying 727 consumers who virtually engaged in new product development projects, we substantiate previous findings on the relationship-effects of co-creation and particularly focus the potential of co-creation experiences for nurturing ‘imaginary’ relationships with the product being co-created, i.e. with the idea of a product significantly prior to market launch. In this study we draw a more nuanced picture of the impact of co-creation experience shedding light on the moderating role of consumers’ personal features. We argue that the consequences of an enjoyable co-creation experience systematically vary on the basis of consumers’ personal features and thus do not unconditionally lead to positive consequences. Rather, the results of this study show that consumers’ personal features such as novelty seeking and dissatisfaction with existing products moderate the impact of an enjoyable experience on aspects of the consumer-company relationship. Consumers’ dissatisfaction with current product solutions is also found to moderate the relationship between an enjoyable co-creation experience and evoked product interest as well as between product involvement and evoked product interest. The results contribute to a better understanding of the diversity of the crowd in virtual co-creation and advance the theory of value creation as a new marketing paradigm.
**Introduction**

In the era of digital transformation and social media, consumers who actively engage in previously firm-dominated domains of value creation has become a reality (Lakhani et al., 2014; Hutter et al., 2013; Schreier et al., 2012; Nambisan and Baron, 2007). Nowadays, companies use crowdsourcing systems (Kohler, 2015; Boudreau and Lakhani, 2013; Afuah and Tucci, 2012; Terwiesch and Xu, 2008) and build online brand communities (Schau et al., 2009; Muniz and O’Guinn, 2001) in order to develop new products in collaboration with the crowd. While virtual co-creation during new product development offers new possibilities to improve a company’s innovation process and to develop customer centered, successful new products (Lakhani et al., 2014; Nishikawa et al., 2013; Pötz and Schreier, 2012; Toubia, 2006), it may also serve as a means of establishing valuable relationships with existing or potential customers (Verhoef et al., 2010). As fruitful relationships require regular and meaningful interactions, companies are constantly looking for opportunities to get in touch with customers and provide valuable experiences (Chattopadhyay and Laborie, 2005; Pentina et al., 2008; Fournier et al., 1998; Pine and Gilmore, 1998). Due to consumers’ natural interest in innovation and creative activities (Csikszentmihalyi, 2002; Moreau and Dahl, 2005), virtual co-creation offers a new opportunity to provide enjoyable experiences and interactions. From a relationship perspective, an enjoyable virtual co-creation experience may therefore lead to increased trust and commitment towards the company and product (Geyskens et al., 1998; Moorman et al., 1993; Morgan and Hunt, 1994; Veloutsou and Moutinho, 2009; Füller et al., 2011).

Existing research on virtual co-creation lends support that the experience participants perceive is crucial to the success of co-creation initiatives. For instance, Füller et al. (2011) show that an enjoyable co-creation experience has a positive impact on participants’ actual contribution behavior, i.e. the quality and quantity of the crowd’s submissions. In addition to the positive effects of a compelling co-creation experience on users’ submissions, Nambisan and colleagues (2007; 2008) show that carefully designed virtual customer environments also encourage favorable general attitudes towards the host company and foster valuable relationships between consumers and brands (similar: Kohler et al., 2011; Faullant et al.,
Despite the surging interest in the impact of co-creation on consumer-brand relationships, little is known about the moderating role of participants’ personal features on the relationship between co-creation experience and favorable consequences such as positive attitudes, intentions and behaviors. While initial research has been done investigating how personal features affect consumers’ participation motives and contribution behavior in virtual co-creation (Füller 2010; Hutter et al., 2015), Connelly et al. (2014) and Bogers et al. (forthcoming) encourage research to further explore the role of personal features. Moreover, research so far has focused on interactions revolving around a brand’s existing products, for instance, within brand communities and social media sites (Muniz and O’Guinn, 2001; Hutter et al., 2013) or product support communities (Nambisan and Baron, 2007; 2009).

This study aims to close this gap by investigating how personal features such as gender, novelty seeking and exploratory behavior affect the relationship between participants’ experience and their attitudes and intentions towards the company and the product. Participants in co-creation have diverse personal features and expectations towards the relationship with the brand. Thus, generalizing conclusions regarding correlations can be erroneous as these groups differ substantially in the way they interact and form relationships with brands. Specifically, we expect that gender, novelty seeking, exploratory behavior, web usage and dissatisfaction with existing products moderate the effects of an enjoyable co-creation experience on company-related relationship aspects (i.e. brand image, trust and word of mouth). Additionally, we discuss how co-creation experiences perceived by consumers affect product-related relationships (i.e. evoked product interest) and introduce the concept of ‘imaginary’ consumer-product relationships. We argue that co-creating new products with consumers evokes interest in the product prior to the existence and marketing of the product.

To test the hypotheses, we draw on survey data from 727 consumers who engaged in co-creation projects in a variety of industries such as sports equipment, furniture, consumer electronics and automotive. Consistent with previous studies, our results substantiate that enjoyable experience positively affects brand image, trust, word of mouth (WOM) and even evokes interest in the product being co-created. Further, product involvement positively affects evoked product interest. Results on
the moderating role of personal features show that novelty seeking and dissatisfaction with existing products moderate the relationship between enjoyable experience and brand image, trust and word of mouth (WOM), while gender does not. Contrary to our expectations, the impact of enjoyable experience on evoked product interest is only moderated by dissatisfaction with existing products.

**Theoretical Framework**

Drawing on the rich body of literature on theory of flow (e.g. Csikszentmihalyi, 1990; Csikszentmihalyi, 2002; Novak et al., 2000; Hoffman and Novak, 2009), experience management (e.g. Prahalad and Ramaswamy, 2004; Meyer and Schwager, 2007; Payne et al., 2008; Pine and Gilmore, 1998; Schouten et al., 2007) and relationship management (e.g. Anderson and Srinivasan, 2003; Fournier, 1998; Reinartz et al., 2004), the framework shown in Figure 1 has been conceptualized to investigate the role of personal features as moderators of the impact of a virtual co-creation experience on aspects of consumer-company and consumer-product relationships.
Antecedents of an enjoyable co-creation experience

Consumers engage in virtual co-creation activities because they expect doing so will be rewarding. It is either the outcome linked to the engagement such as a better product or receipt of an incentive, or it is the task or process itself which consumers derive value from (Vargo and Lusch, 2004; Füller 2010; Raasch and von Hippel 2013).

Tool Support: Consumers’ ability to successfully accomplish an activity during virtual new product development to a large extend depends on their understanding of the new product and their ability to come up with unique but useful ideas (Amabile, 1996; von Hippel and Katz, 2002). Following
Füller et al. (2010), we introduce tool support – the extent to which the virtual environment and tools provided enable the user to accomplish the associated co-creation activity.

Before consumers can make competent contributions, they need a sound understanding of the innovation. Then, consumers have to be given the means to share their creative ideas and knowledge which are often hard to articulate and difficult to transfer (von Hippel, 2005). Interactive and vivid product environments support perceived as well as actual product understanding and enhance consumers’ knowledge of products (Jiang and Benbasat, 2007; Suh and Lee, 2005). Given the high degree of interrelationship between getting a realistic product understanding and articulating one’s ideas, we assume that tool support underlies these two facets as a common second-order factor (Kim and Stoel, 2004; Füller et al., 2010).

An interactive environment which supports product understanding positively affects perceived usefulness and enjoyment of a website (Jiang and Benbasat, 2004). Jiang and Benbasat (2007) suggest that perceived support of a website may lead to a more enjoyable experience. Analogous, perceived tool support may contribute to an enjoyable co-creation experience during new product development.

**H1:** Perceived tool support has a positive effect on enjoyable experience.

According to Csikszentmihalyi (1990), individuals consider activities as highly rewarding and gratifying when experiencing flow. Flow refers to a highly enjoyable and intrinsically rewarding ‘optimal’ experience during which consumers get totally absorbed by the activity and lose any sense of time and space. Creative tasks like painting a picture, solving a problem, or composing a song (Csikszentmihalyi, 2002; Dahl and Moreau, 2007) as well as online activities like surfing on the web or engrossing in chat rooms (Novak et al., 2000) give rise to such enjoyable flow experiences. Similarly, consumers may totally immerse in and derive pleasure from co-creation activities such as generating new ideas, evaluating product concepts, improving possible solutions, or testing new product features when experiencing flow. Consumers experience flow if an activity which draws their attention is neither
too easy nor too difficult, gives them the feeling of volitional control, and is considered as interesting per se (Csikszentmihalyi, 1990).

**Attention:** Attention refers to consumers’ concentrated dedication to an activity. Consumers enjoy their experience and lose their sense of time and space if they concentrate on the performed activity and are not disturbed by thoughts about other things or being interrupted by others (Hoffman and Novak, 1996; Novak et al., 2000).

**Control:** Consumers feel competent when they control and determine what they do or do not do. While perception of choice provides decisional control, perceived ease of performing an action under consideration provides behavioral control (Mathwick and Rigdon, 2004; Hui and Bateson, 1991). Control increases a persons’ self-efficacy and perceived enjoyment while its absence leads to the feeling of powerlessness and discomfort (Bandura, 1997; Seibert et al., 2011).

**Challenge:** Challenge gives consumers the opportunity to prove their self-efficacy and experience a feeling of mastery and accomplishment. This drives consumers to innovate in a virtual environment. A task which is too easy causes boredom and one that is overly complex creates anxiety and frustration. The difficulty-level of a challenging task has to match the participants skills (Hoffman and Novak, 1996). In empirical studies, flow is often equated with an enjoyable and intrinsically rewarding experience (Hoffman and Novak, 2009).

**H2:** (a) Attention, (b) control and (c) challenge have a positive effect on enjoyable experience.

**Impact of an enjoyable co-creation experience on relationship aspects**

Besides the positive impact of an enjoyable experience on task persistence and creative performance (Csikszentmihalyi, 2002; Kohler et al., 2011), it positively affects consumers’ attitudes and behaviors (Hoffman and Novak, 1996, 2009; Nambisan and Baron 2007; Füller et al., 2011). In the following, we
derive hypotheses arguing that enjoyable co-creation experience positively affects three aspects of the consumer-company relationship: brand image, trust and word of mouth.

**Brand Image:** Brand image reflects how a brand is perceived in the eyes of consumers. Positive associations with the brand lead to increased commitment, buying decisions and loyalty to the brand (Chaudhuri and Holbrook, 2001; Keller and Lehmann, 2006). In the context of virtual co-creation, the effect of an enjoyable experience becomes visible on two image dimensions – customer orientation and innovativeness as perceived by participating consumers (Fuchs and Schreier, 2011; Stock and Hoyer, 2005). Hoch and Deighton (1989) note that vivid and personally controlled learning experiences leverage the building of favorable brand attitudes. Mathwick and Rigdon (2004) state a positive influence of an enjoyable experience on brand attitude. Similarly, Fuchs and Schreier (2011) find that co-creation leads to increased levels of perceived customer orientation and more favorable corporate attitudes. As virtual co-creation is supposed to lead to more innovative and customer centered new products, and is considered a new approach (Dahan and Hauser, 2002; Prahalad and Ramaswamy, 2004; Schreier et al., 2012), it may induce innovative and customer oriented company associations. We assume that a common second order factor called image is underlying the two dimensions customer orientation and innovativeness.

**Trust:** Effective and valuable relationships require trust (Morgan and Hunt, 1994; Sirdeshmukh et al., 2002). Trust may be conceptualized as someone’s confidence in a partner’s honest, fair, responsible, and benevolent behavior which leads to an increased willingness to rely on the partner (Morgan and Hunt, 1994; Moorman et al., 1992). In an online context, trustworthy relationships may be achieved through meaningful and information-rich interactions (McAlexander et al., 2002). Trust, for example, fosters online community members’ willingness to share personal information and cooperate in new product development (Porter and Donthu, 2008; Füller et al., 2010) and to establish positive community-company relationships (Bagozzi and Dholakia, 2006; Dholakia et al., 2004; McAlexander et al., 2002). As valuable and rewarding interactions positively relate to trust, we assume that an enjoyable co-creation experience will cultivate trust in the company consumers are interacting with.
Word of Mouth: Positive word of mouth (WOM) is described as the extent to which an individual says positive things about someone or something (Srinivasan et al., 2002). Consumers may recommend a product, a company, or an event if they associate enjoyable experiences with it (Porter and Donthu, 2008). Consumers engage in WOM communication on online opinion platforms such as TripAdvisor or Yelp because they care about other consumers, want to reciprocate and support good companies and like to express themselves. As co-creation may be considered a new and interesting form of interacting with other users and companies, consumers may derive such benefits from WOM. Consumers have been found to be more likely to spread positive WOM when they feel that a company empowers consumers, i.e. involves them in new product development processes (Fuchs an Schreier, 2011), or when they interact with brands in social media (Hutter et al., 2013). We argue that consumers may create a buzz not only about the co-creation project, but also about the product under development. Thus, we posit:

H3: An enjoyable co-creation experience may positively affect (a) the image of the company in terms of customer-orientation and innovativeness, (b) trust in the company consumers are interacting with and (c) consumers’ intention to engage in positive WOM.

Evoked Product Interest: Virtual co-creation may not only affect the consumer-company relationship but also the consumer-product relationship. Customer experiences emanate from interactions between a customer and a product or a company (Hoch 2002). Hoch and Ha (1986) differentiate between direct (i.e. resulting from physical interaction) and indirect product experience (i.e. when a product is presented virtually). In the context of virtual co-creation, product experiences are indirect in two respects: (1) products are not real, but rather notional concepts at an early development stage; (2) these product concepts are presented and interacted with only virtually. Similar to brand communities, virtual co-creation – as a means of collaborative new product development with consumers – may be a form of extended self-enabling consumers to build relationships on the basis of shared experiences and enthusiasm (Muniz and O’Guinn, 2001). As consumers who virtually co-create a new product become familiar with it, they may at the same time become interested in and attached to
the product (Belk, 1988). We argue that – despite the fact that consumers are not presented an actual product – sharing and discussing ideas for potential products within virtual new product development may build ‘imaginary’ relationships with the product prior to its existence. We define evoked product interest as the anticipated, ‘imaginary’ relationship with the product that occurs while co-creating it. Evoked product interest may refer to: information – e.g. about the whereabouts of the virtual product, its further development and market launch; the product itself – e.g. how the new product and its technology work and how it could be used; and the purchase of the product – consumers may not only be interested in information, but also in owning the product they co-created (Fuchs et al., 2010; Schreier et al., 2012).

We expect that the co-creation experience elicits interest in the product as participation in its development leads to increased product familiarity and product knowledge (von Hippel and Katz, 2002), which in turn affects consumers’ involvement (Rothschild and Houston, 1977) and commitment (Pritchard et al., 1999). By engaging in co-creation activities, consumers may initiate a relationship with ‘their’ new product even before it physically exists (Schlosser, 2003; Franke et al., 2010). Consumers’ interest in the new product may be high, when they associate an enjoyable experience with it. Literature on mass-customization, for instance, states that consumers will show high interest in and willingness to pay for their self-designed products if they enjoy the design process due to a flow experience (Franke et al., 2010; Franke and Piller, 2004). Besides the perceived superior value of the self-created product (Randall et al., 2007), it is an enjoyable co-creation experience which delivers value (Bendapudi and Leone, 2003; Prahalad and Rangaswamy, 2004; Franke and Piller, 2004). Under conditions of flow, the value derived from the process may even outweigh the benefits associated with the self-designed product outcome (Schreier, 2006). A close association with an enjoyable experience makes a product special (Schouten et al., 2007; Franke and Schreier, 2010). This may be especially the case if consumers associate an enjoyable experience while co-creating the product themselves. We state:

**H4:** An enjoyable co-creation experience has a positive effect on evoked interest in the new product.
Product Involvement: Product involvement refers to an individual’s interest in the product or product category (Bloch and Richins, 1983). It can be enduring or situational. The level of interest may depend on various conditions of the product itself: its general importance and emotional appeal, its continuous interest and its associated risks. Consumers interested in a certain product, identify with and pay attention to activities and information concerning the product. They tend to be information seekers (Bloch, 1986). As product involvement affects information processing and cognitive response generation, it may also affect the interest evoked in consumers in the product they contributed to. Consumers who were not previously interested in the product category, may neither show much interest in getting further information about the virtual product, nor in purchasing it once it becomes available on the market, even if they enjoyed their co-creation experience. We assume:

H5: Product involvement positively affects consumers’ evoked interest in the product.

Moderating effects of consumers’ personal features

Lately, moderating effects of personal features such as age, gender, need for cognition, and goal directed vs. experiential orientation have been in the focus of technology acceptance, web usage, and self-serving technologies (e.g. Sicilia et al., 2005; Dabholkar and Bagozzi, 2002; Venkatesh and Morris, 2000). Besides the moderating effect of product involvement of customers and their attitude towards the host firm (Nambisan and Baron, 2007), little is known how personal features moderate the impact of a compelling co-creation experience on relationship aspects such as trust, image, or evoked interest. Effects of personal features during co-creation remain largely unexplored to date. In the following, we hypothesize the moderating effects of gender, novelty seeking, exploratory behavior, web usage, and dissatisfaction with existing products on the consequences of enjoyable co-creation experience.

Gender: Females and males tend to differ in their information processing behavior (Meyers-Levy and Sternthal, 1991), anxiety about technology (Meuter et al., 2003) and social vs. achievement
orientation (Venkatesh and Morris, 2000). As these differences between males and females affect web usage and technology acceptance, they may also moderate the relationship between an enjoyable virtual co-creation experience and the stated relationship dimensions.

Generally, females tend to show higher levels of technological anxiety (Meuter et al., 2003). Female concerns about the risks associated with new technologies also affect their self-efficacy on the web (Sánchez-Franco, 2006), tending to be more risk averse and less self-confident. Consequently, they need more time before they decide to try something new (Sánchez-Franco, 2006). Further, females tend to be comprehensive processors while males are selective processors (Meyers-Levy and Sternthal, 1991), who tend to intrinsically enjoy technology such as the web for its own sake. Contrarily, females appraise technology regarding its social function, e.g. how web technology can help others. Further, males display more individualistic behavior and tend to be more achievement oriented than women (Venkatesh and Morris, 2000). They tend to execute certain tasks, considering them to be rewarding, even if they do not personally associate positive attitudes towards them.

As males are selective information processors who enjoy technology for its own sake, are more achievement oriented and show lower anxiety regarding risks, we assume that a compelling co-creation experience should have a stronger impact on males than females. Despite a positive experience, females may not build so much confidence in the company and product as males. Showing higher levels of self-efficacy on the web, we also assume that males consider themselves to be more competent and knowledgeable about co-creation than females. Consequently they more often engage in WOM to share their knowledge and express themselves. We posit the following hypotheses:

H6a: The effect of an enjoyable co-creation experience on trust, image, and WOM will be stronger for males than females.

H6b: The effect of an enjoyable co-creation experience on the evoked product interest will be stronger for males than females.
**Novelty Seeking and Exploratory Behavior:** People with a highly autotelic personality – the ability to enjoy an activity regardless of any external reward – are more likely to experience flow (Csikszentmihalyi, 1990). An autotelic personality tends to exhibit high levels of novelty-seeking as well as exploratory oriented behavior (Hoffman and Novak, 1996). We assume that an autotelic personality not only affects a consumer’s ability to experience flow but also the impact on the consequences associated with a compelling experience. An enjoyable co-creation experience should have a stronger impact on attitudes and interest in the company and product for consumers with a highly autotelic personality than for consumers with a low autotelic personality. The moderating effect of exploratory behavior and novelty seeking as two important personality traits linked to an autotelic personality are explored in this study.

**Novelty Seeking:** Novelty seeking is defined as a person’s desire to seek out new product information (Manning et al., 1995). Novelty seeking is considered as an inherent personality trait conceptualized as a consumer’s desire to obtain information about innovations (Hirschman, 1980). Self-preservation, accumulation of useful knowledge, and improvement of problem-solving skills are reasons for innate information search. From a conceptual perspective, the desire to seek new information is indistinguishable from the willingness to adopt new products because new products always contain new information (Hirschman, 1980). As novelty seekers show a high interest in new information, are curious, and willing to take risks, an enjoyable co-creation experience should lead to stronger positive brand associations and higher levels of trust for them. Further, they may engage more often in positive WOM communication sharing their insights and acquiring new information. In contrast, an enjoyable co-creation experience may have an even stronger impact on evoked product interest for non-novelty seekers than novelty seekers as they are interested in innovation related information per se.

**H7a:** The effect of an enjoyable co-creation experience on trust, image, and WOM will be stronger for novelty seekers than non-novelty seekers.

**H7b:** The effect of an enjoyable co-creation experience on evoked product interest will be stronger for non-novelty seekers than novelty seekers.
**Exploratory Behavior:** The desire for exploration can be noted in various behaviors e.g. in risk taking, in the adoption of new products, variety seeking in purchase behavior, browsing and looking in window displays, as well as curiosity-related information acquisition (Baumgartner and Steenkamp, 1996). Exploring offers a chance to escape from boredom and a change of pace. Further, it nourishes one's desire for knowledge and quenches one's curiosity. In our context, exploratory behavior relates to consumers’ specific desire to explore Internet sites. Exploratory oriented consumers are interested in an enjoyable experience rather than in Internet sites that allow them to accomplish their search or information goals (Hoffman and Novak, 1996). We assume that an enjoyable co-creation experience has a stronger impact on consumers’ attitudes and behavioral intentions towards the company and product for consumers interested in exploring Internet sites than non-exploratory oriented consumers. We state:

**H8a:** The effect of an enjoyable co-creation experience on trust, image, and WOM will be stronger for exploratory oriented consumers than non-exploratory oriented ones.

**H8b:** The effect of an enjoyable and compelling co-creation experience on evoked product interest will be stronger for exploratory oriented consumers than non-exploratory oriented ones.

**Web Usage:** Web usage deals with how many hours a consumer spends on the Internet. Consumers who spend more time on the web become more skilled and knowledgeable about the web (Hoffman and Novak, 2009). Their behaviors change from more exploratory oriented to more goal oriented ones. Research into virtual environments also shows that an interactive and supportive environment is more important for less knowledgeable consumers than for knowledgeable ones (cf. Jiang and Benbasat, 2007; Rodgers et al., 2005).

Hence, we expect that the effect of an enjoyable co-creation experience is weaker for consumers with high web usage than for those with low web usage. Even if high web usage consumers enjoy the
co-creation experience it may be nothing special for them as they have already explored many other compelling websites. In contrast, a compelling co-creation experience may be a quite unique event for consumers with low web usage. Consumers with high web usage may also have negative experiences from using the web. For them, one positive experience may not instantly result in higher trust in the company as they might already have been disappointed by websites which showed initial promise. Due to their lack of ability to compare the co-creation experience to other compelling experiences, low web usage consumers, may consider the co-creation experience as quite unique and a new topic. Hence, they may talk more about it with others and engage in positive WOM. Consumers with low web usage may not only consider the co-creation approach as quite unique, but also the product they contributed to. As they have less alternative content and activities they have to select from, for them it may be interesting to follow up on the further development of the new product. We state:

**H9a:** The effect of an enjoyable co-creation experience on trust, image, and WOM will be stronger for consumers with low levels of web usage than for those with high levels of web usage.

**H9b:** The effect of an enjoyable co-creation experience on evoked product interest will be stronger for consumers with low levels of web usage than for those with high levels of web usage.

*Dissatisfaction with Existing Products:* Often, consumers modify existing or even develop new products because they are unsatisfied with current products offered on the market (von Hippel, 2005). As consumers unsatisfied with existing solutions on the market look for a better solution to their problems and expect to derive higher benefits from a new product they should show high interest in the new product they contributed to. However, it is benefit they gain from using the superior product and not the co-creation experience which matters for them most. Hence, the product interest evoked for these consumers may depend on the functionality offered by the new product and how well it solves their
problems rather than the co-creation experience provided. The interest in the outcome should be the 
dominating factor for them, not the co-creation experience.

Further, consumers satisfied with existing solutions have no objective reason to switch products 
and take the risk of adopting the new product, unless they associate an enjoyable experience to it and 
become emotionally attached to it. Hence, a compelling co-creation experience should have a stronger 
impact on positive attitudes and interest in the product for consumers satisfied with their current products 
than dissatisfied ones.

Due to similar reasons, we expect that the impact of product involvement on evoked product 
interest will be lower for dissatisfied consumers’ than for satisfied consumers. Again, it is the product 
solution and its expected benefit which counts not the enduring involvement in the product category. 
We state:

**H10a:** The effect of an enjoyable co-creation experience on evoked product interest will be 
lower for consumers dissatisfied with existing products than these satisfied with existing 
products.

**H10b:** The effect of product involvement on evoked product interest will be stronger for 
consumers satisfied with existing products than dissatisfied ones.

**Empirical Study**

To examine the impact of consumers’ virtual co-creation experience on the consumer-company 
relationship and consumer-product relationship, consumers that previously participated in a virtual co- 
creation project were surveyed. The projects included the development of a multifunctional snowboard 
backpack, running shoes, a baby carriage, a mobile phone, and modular furniture.

An online survey was used for data collection. An extensive literature review, preliminary 
interviews with consumers that had previous experience in virtual new product development, as well as
discussions with five experts in the field of virtual consumer integration were carried out to develop the questionnaire. Following an online pre-test and subsequent telephone interviews with 25 participants, the questionnaire was revised and data collection commenced. Emails with a link to the online questionnaire were sent to 4,714 participants in previous virtual new product development initiatives, of which 1,390 emails were undeliverable. In total, 3,320 consumers were reached and 825 complete questionnaires returned. This corresponds with a response rate of 25%. As some new product development projects had been conducted more than one year earlier, the subjects were provided with a short visual and verbal overview of the project in which they participated to refresh their memory. The subsequent analysis was conducted on 727 consumers, as they stated that they were able to remember their participation in detail (value >= 3) based on a 5-point scale anchored by (1) “I cannot remember at all” and (5) “I can remember in great detail”. To test possible non-response effects as described by Armstrong and Overton (1977), two sub-group comparisons were made. First, early and late respondents (first third vs. last third) were compared; secondly, age, gender, and education measured at the previously conducted virtual new product development projects were compared between respondents and non-respondents. No significant differences were found in either comparison leading us to conclude that no significant non-response bias was present.

**Measures**

Three items adopted from Ghani and Desphande (1994) were used to measure enjoyable experience, attention, and control respectively. Three slightly modified items from (Novak et al., 2000) served to measure challenge. Provided tool support consisted of two sub dimensions: product understanding and creative articulation. The two items of product understanding resemble Kempf and Smith’s (1998) website diagnosticity scale. The two items to measure creative articulation were derived from interviews. Two items suggested by Srinivasan et al. (2002) were used to measure participants’ WOM. Two items from Chaudhuri and Holbrook (2001) served to measure trust. Perceived customer orientation as well as innovativeness as the two sub-dimensions of image were measured by using three items
derived from Deshpandé et al. (1993) in each case. Evoked product interest was conceptualized similarly to Anderson and Weitz’s (1992) commitment in further activities using two items. Kapferer and Laurent’s (1985) involvement items served to measure product involvement. Three items modified from Manning et al. (1995) were used to measure consumers’ desire for product-specific novelty seeking on the Internet. To measure consumers internet specific exploratory behavior, three items of Novak et al. (2000) were applied. Further, Novak et al.’s (2000) single item web usage scale was used to measure how many hours per week users spent on the Internet. Another single item measure was used to determine consumers’ dissatisfaction with existing products. Items were mixed to avoid potential bias in the self-report survey. To avoid potential common method bias due to acquiescence, we used different item formats, different scale types as well as counterbalancing of items (Podsakoff et al., 2003). The measurement items which remained after purification and were applied in our study are shown in Appendices 1 and 2.

**Results**

Data were analyzed using structural equation modeling (Amos 7.0). First, reliability and validity of the measures in the measurement model were tested to calculate the factor reliability (FR) of the constructs, the average variance extracted (AVE) (Fornell and Larcker, 1981), and the Fornell-Larcker-Ratio (FLR) (Fornell and Larcker, 1981) for discriminant validity. The results are displayed in Figure 2, showing good psychometric properties of the measures. As the study consists of 10 different new product development projects, leave-one-project-out analysis, for projects with n >= 40, was applied to investigate the potential bias of one particular project on the overall results (cf. Chakraborty et al., 2002). All models delivered basically the same pattern of results i.e. reliabilities, model fit, overall explained variance, direction as well as importance of main effects. During multi-group analysis, reliabilities of scales between groups have been checked. No significant differences were identified either.

Multiple fit indices were examined to evaluate the overall causal model, including the ratio of chi-square to degrees of freedom, the goodness-of-fit index (GFI), the adjusted goodness-of-fit index
(AGFI), the comparative fit index (CFI), the normed fit index (NFI) and the root mean squared error of approximation (RMSEA). Satisfactory fits are obtained when the GFI, AGFI, CFI, and NFI are greater than or equal to 0.9, and the RMSEA is less or equal to 0.08 (Bentler and Bonnett, 1980). Due to the expected effect of the large sample size on chi-square significance (Anderson and Gerbing, 1988), the ratio of chi-square to degrees of freedom was chosen as the preferred fit measure. This ratio should be less or equal to 5. The test statistics of the final second-order model provide the following results: $\chi^2/df = 2.391$, GFI = .930, AGFI = .911, CFI = .956, NFI = .927, RMSEA = .044 and RMR = .056. Overall, since all indices are met, the model indicates a good fit to the data.

Note: ***<0.000; **<0.05; *<0.1; Overall fit of the model: chi-square = 248.344; df = 132; NFI = .955; CFI = .978; GFI = .964; AGFI = .949; RMSEA = .035; RMR = .024

Figure 2: Main model
Second-order structure of tool support and image: To test tool support as a second-order factor of creative articulation and product understanding and image as a second-order factor of perceived customer orientation and innovativeness, we compared three models of our conceptual framework. One model consisting of first-order factors for product understanding, creative articulation, customer orientation and innovativeness, the other consisting of tool support as a second-order factor underlying product understanding and creative articulation, and a third model comprising brand image as a further second-order factor for customer orientation and innovativeness. Table 1 depicts the overall fit indices for the first- and second-order models. Following Burnhan and Anderson (2004), AIC, BCC, and BIC were used to compare the not nested models and to evaluate the second-order structure. The analysis provides strong evidence for the second-order structure as the difference measures AIC, BCC, and BIC are all > 10. Further, all paths from the second-order factor to the first-order factors satisfy all requirements. Based on this result, we conclude that tool support as a second-order factor represents creative articulation (68% of variance) and provided product understanding (56% of variance). Brand image as a second-order factor represents customer orientation (72% of variance) and innovativeness (47% of variance).

<table>
<thead>
<tr>
<th>Model</th>
<th>χ²/df</th>
<th>GFI</th>
<th>AGFI</th>
<th>CFI</th>
<th>NFI</th>
<th>RMSEA</th>
<th>AIC0</th>
<th>BIC0</th>
<th>BCC0</th>
</tr>
</thead>
<tbody>
<tr>
<td>First-order factor model</td>
<td>3.09</td>
<td>.905</td>
<td>.878</td>
<td>.934</td>
<td>.906</td>
<td>.054</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Second-order factor model tool support</td>
<td>3.02</td>
<td>.906</td>
<td>.881</td>
<td>.936</td>
<td>.907</td>
<td>.053</td>
<td>16.659</td>
<td>16.968</td>
<td>35.015</td>
</tr>
<tr>
<td>Second-order factor model tool support and image</td>
<td>2.39</td>
<td>.930</td>
<td>.911</td>
<td>.956</td>
<td>.927</td>
<td>.044</td>
<td>176.557</td>
<td>176.402</td>
<td>167.396</td>
</tr>
</tbody>
</table>

AIC0 = AICm1 – AICm2; BIC0 = BICm1 – BICm2; BCC0 = BCCm1 – BCCm2

Table 1: Model comparison

Main Effect: The results given in Figure 2 provide support for all main effect hypotheses tested. Tool support (γ=.61***), attention (γ=.14*), control (γ=.15*), and challenge (γ=.12****) have a positive impact on enjoyable experience, explaining 63% of variance in the enjoyable experience. These results
fully support hypotheses 1, 2a, 2b and 2c. Consistent with our expectations, enjoyable experience has a positive effect on perceived brand image ($\beta=.60^{***}$), trust ($\beta=.48^{***}$), WOM ($\beta=.68^{***}$), and evoked product interest ($\beta=.41^{***}$), fully supporting hypotheses 3a, 3b, 3c and 4. Further, as expected, product involvement positively affects consumers’ evoked interest in the product ($\gamma=.44^{***}$), fully supporting hypothesis 5. The model explains 36% of variance in brand image, 23% of variance in trust, 47% of variance in positive WOM, and 53% of variance in evoked interest.

**Moderating Effects:** Multigroup analysis was conducted to test the moderating effect of gender, exploratory behavior, novelty seeking, web usage, and dissatisfaction with existing products on the relationship between an enjoyable co-creation experience and the applied company and product relationship constructs.

To test the effect of moderators, models that differ only with respect to the effect of one dimension are compared. Two models were compared – one imposing equality constraints on all dimensions across the subgroups and a general model allowing all of the parameters to vary freely across the subgroups. As these are nested models with the general model having one degree of freedom less than the restricted model, the $\chi^2$ value will always be lower for the general model than for the restricted model. If $\chi^2$ improves significantly when moving from the restricted to the more general model, the dimension has a differential effect on the overall model and can be seen as a moderator. Significance is assessed on the basis of the $\chi^2$ difference between the models with the use of a $\chi^2$ -distribution with one degree of freedom.

Besides gender ($\Delta \chi^2 =14.41; p =.211$), the chi-square difference tests for exploratory behavior ($\Delta \chi^2 =23.146; p =.017$), novelty seeking ($\Delta \chi^2 =31.265; p =.001$), web usage ($\Delta \chi^2 =20.361; p =.041$), and dissatisfaction with existing products ($\Delta \chi^2 = 28.892; p =.002$) provide significant chi-square difference effects, suggesting the null hypothesis can be rejected and personal features indeed moderate the relationship between an enjoyable experience and its impact on aspects of the company and product-relationships.
**Gender as Moderator:** Gender does not significantly moderate the impact of an enjoyable experience on relationship aspects, rejecting Hypothesis 6a and 6b, Table 2. However, the results show consistent tendencies. Overall, an enjoyable experience tends to have a stronger effect on consumer-company relationship aspects for males than females.

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th>Chi-square difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enjoyment→Trust</td>
<td>0.597 (t=9.808)***</td>
<td>0.461 (t=7.402)***</td>
<td>( \Delta \chi^2 = 3.177 (.075) )</td>
</tr>
<tr>
<td>Enjoyment→WOM</td>
<td>0.760 (t=12.430)***</td>
<td>0.660 (t=10.411)***</td>
<td>( \Delta \chi^2 = 2.469 (.116) )</td>
</tr>
<tr>
<td>Enjoyment→Image</td>
<td>0.699 (t=10.672)***</td>
<td>0.618 (t=7.737)***</td>
<td>( \Delta \chi^2 = 2.841 (.092) )</td>
</tr>
<tr>
<td>Enjoyment→Evoked Int.</td>
<td>0.435 (t=7.992)***</td>
<td>0.465 (t=7.186)***</td>
<td>( \Delta \chi^2 = .498 )</td>
</tr>
</tbody>
</table>

\( \Delta \chi^2 \) for all parameters set equal across subgroups (\( \Delta DF = 11 \)): 11.41 (.211)

* p < .05; ** p < .01; *** p < .001

**Table 2: Moderating effect of gender on relationship outcomes of co-creation**

**Novelty Seeking as Moderator:** The results show novelty seeking moderates the relationship between enjoyment and trust (\( \Delta \chi^2 = 10.165*** \)), enjoyment and WOM (\( \Delta \chi^2 = 10.945*** \)), and enjoyment and image (\( \Delta \chi^2 = 4.876* \)) fully supporting Hypothesis 7a, Table 3. The impact of an enjoyable experience on trust is stronger for consumers high in novelty seeking. Further, an enjoyable experience leads to more WOM and a stronger customer oriented and innovative image for novelty seekers than non novelty seekers. No differences have been found for the impact of an enjoyable experience on the product interest evoked, rejecting Hypothesis 7b.
Table 3: Moderating effect of novelty seeking on relationship outcomes of co-creation

Exploratory Behavior as Moderator: Exploratory behavior significantly moderates the relationship between enjoyment and WOM ($\Delta \chi^2 = 4.552^*$). It also tends to moderate the relationship between enjoyment and image ($\Delta \chi^2 = 3.403^{(.065)}$) and enjoyment and evoked product interest ($\Delta \chi^2 = 2.511^{(.113)}$), Table 4. The impact of an enjoyable experience on these aspects is stronger for consumers high in exploratory behavior than consumers low in exploratory behavior. The results partially support Hypothesis 8a and reject Hypothesis 8b.

Table 4: Moderating effect of exploratory behavior on relationship outcomes of co-creation

<table>
<thead>
<tr>
<th>Low</th>
<th>High</th>
<th>Chi-square difference (ΔDF = 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enjoyment → Trust</td>
<td>= .542 (t=9.152)**</td>
<td>= .534 (t=8.358)**</td>
</tr>
<tr>
<td>Enjoyment → WOM</td>
<td>= .687 (t=11.451)**</td>
<td>= .733 (t=11.134)**</td>
</tr>
<tr>
<td>Enjoyment → Image</td>
<td>= .595 (t=9.044)**</td>
<td>= .748 (t=9.448)**</td>
</tr>
<tr>
<td>Enjoyment → Evoked Int.</td>
<td>= .387 (t=6.663)**</td>
<td>= .472 (t=7.640)**</td>
</tr>
</tbody>
</table>

$\Delta \chi^2$ for all parameters set equal across subgroups (ΔDF = 11): 23.146* (.017)

* p < .05; ** p < .01; *** p < .001
**Web Usage as Moderator:** Web usage significantly affects the impact of an enjoyable experience on WOM ($\Delta \chi^2 = 5.203^*$) and on image ($\Delta \chi^2 = 7.487^{**}$), Table 5. In tendency, it also affects the influence on trust ($\Delta \chi^2 = 2.831^{(092)}$). These results partially support Hypothesis 9a. Hypothesis 9b must be rejected as no significant differences are shown.

<table>
<thead>
<tr>
<th>Low</th>
<th>High</th>
<th>Chi-square difference ((\Delta \text{DF} = 1))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enjoyment $\rightarrow$ Trust</td>
<td>= .581 (t=8.977)^{***}</td>
<td>$\Delta \chi^2 = 2.831^{(092)}$</td>
</tr>
<tr>
<td>Enjoyment $\rightarrow$ WOM</td>
<td>= .754 (t=10.458)^{***}</td>
<td>$\Delta \chi^2 = 5.203^*$</td>
</tr>
<tr>
<td>Enjoyment $\rightarrow$ Image</td>
<td>= .752 (t=9.758)^{***}</td>
<td>$\Delta \chi^2 = 7.487^{**}$</td>
</tr>
<tr>
<td>Enjoyment $\rightarrow$ Evoked Int.</td>
<td>= .466 (t=7.899)^{***}</td>
<td>$\Delta \chi^2 = 1.094$</td>
</tr>
</tbody>
</table>

$\Delta \chi^2$ for all parameters set equal across subgroups ($\Delta \text{DF} = 11$): 20.361* (.041)

* $p < .05$; ** $p < .01$; *** $p < .001$

**Table 5: Moderating effect of web usage on relationship outcomes of co-creation**

**Dissatisfaction with Existing Products as Moderator:** Dissatisfaction significantly moderates the impact of an enjoyable experience on evoked product interest ($\Delta \chi^2 = 3.580^*$), supporting Hypothesis 10a. Dissatisfaction also moderates the relationship between product involvement and evoked product interest ($\Delta \chi^2 = 6.058^{**}$), supporting Hypothesis 10b. For dissatisfied consumers, the co-creation experience and involvement in the product are less important in becoming interested in the new product than for consumers satisfied with existing products, Table 6.
Dissatisfied | Satisfied | Chi-square difference (ΔDF = 1)
--- | --- | ---
Enjoyment → Evoked Int. | = .372 (t=5.307)** | = .464 (t=8.767)*** | Δχ² = 3.580*
Product Inv. → Evoked Int. | = .443 (t=6.415)*** | = .513 (t=9.293)*** | Δχ² = 6.058**

Δχ² for all parameters set equal across subgroups (ΔDF = 11): 28.892** (.002)
* p < .05; ** p < .01; *** p < .001

Table 6: Moderating effect of dissatisfaction with existing products on relationship outcomes of co-creation

Discussion and Implications

Overview of main contributions: In this study, we analyzed the moderating effect of consumers’ personal features on the relationship between an enjoyable co-creation experience and aspects of the relationship consumers have with the product and the host company. While substantiating previous findings on the consequences of co-creation experiences, our key findings demonstrate that consumers’ personal features indeed moderate the relationship-related consequences of an enjoyable co-creation experience suggesting that a more nuanced picture should be taken when exploring the effects of co-creation experiences. Hence, our main contribution refers to the differentiation of the effects of co-creation experience on the basis of participants’ personal features. In other words, some of the effects of co-creation experience found in previous research (e.g. Füller et al., 2011; Kohler et al., 2011; Fuchs and Schreier, 2011) may be rather overstated for certain participants, while other effects may be underrated for others. Our results, for example, revealed a stronger impact of an enjoyable co-creation experience on aspects of the relationship with the company (trust, WOM, image) for participants high in novelty seeking and for individuals with low web usage. Further, we found a stronger effect of a co-creation experience on evoked interest in the new product for participants dissatisfied with current product offerings. The impact of an enjoyable experience on WOM was also stronger for participants showing extensive inquisitive behavior surfing the Internet than non-exploratory oriented individuals. Last, an enjoyable experience tended to lead to stronger relationship-related consequences among men than...
women. Thus, our study points out the diverse effects of moderators in terms of both relationship-related consequences and behavioral intentions. In the following, we discuss the theoretical contribution of our findings in more detail and also derive implications for companies.

**The moderating effects of personal features:** In line with theory, novelty seekers were found to react more strongly on an enjoyable experience in terms of attitudes and behaviors. Participants who are eager to actively inform themselves about products and innovations apparently seem to be more susceptible to an enjoyable experience of co-creation initiatives leading to higher levels of trust, a positive brand image and behavioral intentions to spread positive information about the brand. While those findings seem to be obvious, to the authors’ knowledge no study has actually provided empirical evidence in the context of co-creation. Companies hosting co-creation initiatives to build relationships may be advised to recruit novelty seeking and ‘early adopting’ participants in their target groups to best leverage the effects of an enjoyable experience for their brands.

The related concept of exploratory behavior, which in our study referred to the investigatory habits and tendencies individuals show when browsing the internet, only moderated the relationship between enjoyable experience and WOM, while the moderating effect was not significant for the consequences brand trust and image. Individuals high in Internet-specific exploratory behavior are driven and activated to seek, visit and use new websites and tools. An enjoyable experience may induce them to advocate the brand more heavily, however, the distinctly web-related inquisitive mind of participants (as opposed to product-specific information seeking) tends not to affect whether participants build trust in the brand and consider it innovative and customer-oriented. A possible explanation may be that individuals curious about new web-formats may already be used to compelling and pleasing experiences. Thus, it may take more than mere enjoyment to induce trust among these individuals. While an explorative mind and eagerness to learn and experiment may be conducive to the effects of an enjoyable experience, we argue that the tie to the company’s value proposition (i.e. a product or service) may be a prerequisite of the moderating effect.
Consistent with previous findings in e-commerce environments (Hoffman and Novak, 2009), we show that consumers who use the Internet more heavily seem to be less impressed by an enjoyable experience and more interested in the outcomes. Consumers using the web less often show higher levels of trust (in tendency), WOM and more favorable associations with the company. Similar to repeated advertising and branding (Batra and Ray, 1986; Bhattacherjee and Premkumar, 2004), these findings imply that the effect of enjoyable co-creation experiences might ‘wear out’ the more consumers are used to certain digital interaction formats. With increasing prevalence of virtual co-creation and in relationships with Internet-savvy individuals, a positive co-creation experience may become a minimum requirement for consumers rather than something differentiating or exciting that serves as a novel stimulation. Therefore, in the future the effect of an enjoyable experience on the consumer-company relationship may be rather marginal in comparison to the perceived utility of the outcomes, participants’ learnings, monetary rewards or new connections to like-minded consumers or company representatives. As a consequence, we suggest that new co-creation formats and technologies need to be explored to avoid a declining effect of co-creation experience. For instance, new formats such as avatar-based interaction (Kohler et al., 2011), serious games (Cooper et al., 2010), 3D printing (de Jong and de Brujin, 2013) or crowdfunding (Belleflamme et al., 2014) might be promising opportunities to invigorate consumers’ experience.

While some personal features moderate the relationship between enjoyable co-creation experiences and relationship-related consequences, other characteristics do not. In tendency, the impact of enjoyable co-creation experience seems to be stronger among men than women, however, the moderating effect of gender is not significant. Besides the relationship-related effects, our study shows that co-creation may also lead to an increased interest in the product. This effect on evoked interest in the product is not moderated by the variables investigated in our study except for participants’ dissatisfaction with current products. If brands intend to stimulate interest and consumption by means of co-creation as suggested by Fuchs et al. (2010), the co-creation effect appears to be rather robust irrespective of personal features and may not require comprehensive targeting. In the case of satisfied consumers, however, an enjoyable experience as well as product involvement are more important in
becoming interested in the product under development. This finding corresponds with research on lead users showing that it is the solution (i.e. the answer to an unaddressed need) which counts for dissatisfied consumers rather than the experience (von Hippel, 2005). While overall co-creation experience matters, it may not be of high relevance for participants who are dissatisfied with current products in the market. These users are primarily driven to find a superior solution for their (extreme) needs and problems and are the partners of choice when companies aim to use co-creation for disruptive innovation. Companies that intend to build relationships with lead users may therefore be advised to center their efforts on designing compelling problem solving experiences rather than focusing mere enjoyment. As a consequence, creating compelling co-creation experiences may be particularly effective involving brand fans, i.e. consumers who already are loyal to and enthusiastic about a brand. These consumers tend to be comparatively satisfied with current products and rather seek to interact with their beloved brand in an enjoyable environment.

Overall, the outlined findings add to the theory of value co-creation (Prahalad and Ramaswamy 2004; Vargo and Lusch, 2004; Nambisan and Baron, 2007; Kohler et al., 2011) highlighting that the mere focus on individuals’ experience may lead to generalized findings. Our study indicates that personal features such as novelty seeking, web usage and dissatisfaction with current products are crucial to consider when theorizing on the effects of co-creation experiences as well as when designing valuable experiences to build strong relationships with consumers and market new products. In particular, the goals pursued by creating co-creation experiences and participants’ personal features need to harmonize. While co-creation efforts geared towards innovation purposes may achieve best results by involving dissatisfied (lead) users (von Hippel, 2005), novelty seekers and consumers with little web experience may be best suited to harness enjoyable experiences to build strong relationships. In order to translate enjoyable experiences into interest in the product, consumers satisfied with current products in the market such as brand fans may be adequate co-creators. In other words, our research points out that co-creation purposes and personal features of participants need to be considered as pairs and are central parameters to the design of valuable experiences.
As reasoned before, our findings bear several implications for companies. Today, companies utilize the diversity of the crowd to tackle a wide variety of tasks and problems related to innovation, marketing or other purposes within the organization. Therefore, constructing the crowd for the specific purpose is an essential process within any co-creation initiative (Prpic et al., 2015). Companies draw from a plethora of virtual and ‘real-world’ sources including social media sites, online communities of interest, universities, user panels or customer databases to name just a few. Since many virtual co-creation initiatives are open to the public and rely on self-selection mechanisms, participants in firm-led co-creation approaches are widely heterogeneous individuals ranging from Facebook fans (Lakhani and Tushman 2014), brand community members (Muniz and O’Guinn, 2001), customers (Fuchs et al., 2010) and innovative, enthusiastic users of products (von Hippel, 2005; Lakhani et al., 2014). While our study does confirm the overall positive effect of enjoyable co-creation experience, it implies that the impact of co-creation experience significantly depends on consumers’ personal features. Thereby, our findings may help companies to customize valuable co-creation experiences subject to the personal features of participating consumers or, vice versa, intentionally construct the crowd based on the goals they want to achieve.

Co-creation as a tool to kickstart and accelerate diffusion: Besides the findings regarding the moderating effects of personal features, the results also confirm and extend prior research on the antecedents and consequences of enjoyable and compelling co-creation experiences. While confirming well known consequences of a compelling co-creation experience (i.e. brand image, trust and WOM), we add evoked product interest to our model. Evoked product interest describes the entirely ‘virtual’ relationship between the consumer and the product she is co-creating which may arouse an interest in the product before its actual existence. We find support that enjoyable co-creation experience induces a relationship between consumers and the ‘virtual’ product concept (i.e. the mental concept of a future product currently under development via co-creation). This is particularly interesting as the context of co-creating products reflects the hypotheticality of the new product, i.e. an ‘imaginary’ product which is temporally distant to a market launch and which only has a certain probability to be realized (Trope and Liberman, 2010). The co-creation projects under investigation in this study refer to co-ideation and
evaluation tasks at an idea or concept stage which is significantly prior to customizable products in mass customization environments (Franke et al., 2010). Hence, we add to literature by shedding initial light on the beneficial consequences of consumers’ interactions with distant product concepts in virtual co-creation.

Adding to the work by Fuchs and colleagues (2010; 2011), our findings regarding the consequence of evoked interest in the product also imply that co-creation may be employed for marketing purposes even in very early phases of new product development. An intense relationship with the new product ultimately leads to collective commitment, where consumers are willing to order a product before it even exists (Ogawa and Piller, 2006; Belleflamme et al., 2014). Thereby, virtual co-creation may reduce the risk of market failure of new products, not only because it helps to better understand consumers’ needs, but also because it evokes interest and creates commitment. In particular, our study shows that co-creation may serve as a viable means of marketing and diffusion among consumers who enjoy the co-creation experience. The effect is even stronger for consumers who are satisfied with current products in the market as opposed to dissatisfied consumers. A faster and more effective diffusion of the product may be the consequence. Thus, consumers may not only co-create the new product but also co-finance, co-market and co-sell it.

Implications may also arise for entrepreneurs applying crowdfunding. While crowdfunding primarily serves as a means of external financing, Belleflamme et al. (2014) also point out that it comprises elements of co-creation. For example, individuals provide preference feedback and ideas on the product and play a significant role in promoting and marketing the product. For this comparatively new form of ‘co-creation’, our findings suggest that an enjoyable co-creation experience in a crowdfunding environment may boost the community’s support for the product and increase the likelihood to achieve the funding goal.
Limitations and future research directions

Our research bears several limitations and promising areas for future research. First, we do not differentiate between the forms of co-creation, i.e. whether consumers evaluate ideas, provide feedback or create their own ideas. Further research should investigate moderating effects taking the type of co-creation into consideration. For example, scholars could build on Fuchs and Schreier’s (2011) framework for co-creation strategies differentiating between activities of creation and selection. Based on the stage of the innovation process in which companies co-create with consumers, the object of co-creation (i.e. ideas, concepts, prototypes or actual products) varies. It would be valuable to understand how the ‘object of co-creation’ affects consumers’ evoked product interest. Second, it would be worthwhile to explore the moderating effect of personal features on attitudes and behavior of consumers in the periphery, i.e. consumers not directly co-creating but merely perceiving the co-creation initiative (Fuchs and Schreier, 2011). Third, in our study we concentrate on a selection of personal features which have been found to be of interest to the context of virtual co-creation and innovation (Hirschman, 1980; Novak et al., 2000; von Hippel, 2005; Füller, 2010): gender (sociodemographic characteristic), novelty seeking and dissatisfaction with current products (relevant for problem solving and product adoption among individuals in innovation research), web-related exploratory behavior and web usage (relevant to consider the digital environment of co-creation initiatives). A more comprehensive analysis of the moderating role of consumers’ personal features may significantly add to the understanding of how to harness the diversity of the crowd in virtual co-creation.
References


108
Appendix B: Paper 2

Machiavellianism or morality: Which behavior pays off in online innovation contests?


*Journal of Management Information Systems*, Vol. 32 No. 3, pp. 197-228
Machiavellianism or morality: Which behavior pays off in online innovation contests?

Prior research on user behavior in online innovation contests has mainly focused on factors that positively impact prosocial, collaborative behavior, which should ultimately lead to innovative outcomes. However, little is known about the effects of more negative personal characteristics that might result in more competitive, antisocial, and even unethical behavior. This paper considers Machiavellianism as one of the traits that constitute the ‘dark triad of personality’ and explores the relationship between Machiavellianism and participants’ contribution behavior in online innovation contests. Specifically, we investigate how Machiavellian characteristics influence individuals’ contribution intensity, communication, and interaction behavior within the contest community as well as the quality and kind of their contributions. This study relies on multisource individual-level data from a large innovation contest in the field of public transportation. We find that the three dimensions of Machiavellianism – distrust of others, amorality, and desire for status – have very distinct behavioral consequences in the context of online innovation contests. Specifically, the oppositional consequences of amoral manipulation and striving for status on the one hand and showing distrust of others on the other hand concerning contribution quantity and contribution quality are found. This study contributes to a deeper understanding of negative personality traits such as Machiavellianism as powerful predictors of behavior and of success within competitive innovation environments and leads to important managerial implications regarding the design and management of innovation contests.
Introduction

Online crowdsourcing contests have become a popular tool for companies when seeking out-of-the-box ideas, designs or future trends (Boudreau and Lakhani, 2013; Terwiesch and Ulrich, 2009; Zwass, 2003; Zwass, 2010). This approach has been found to outstrip solely firm-created ideas in terms of novelty and customer benefit (Poetz and Schreier, 2012) as well as in terms of financial success (Nishikawa et al., 2013). Innovation contests have a long history going back many hundreds of years and have been used to solve problems in diverse fields such as agriculture, aviation, mathematics, medicine, computers and information technologies (Adamczyk et al., 2012; Bullinger et al., 2010). While most historical contests were competitions among individuals, most modern online-based innovation contests include community functionality, integrating Web 2.0 applications that foster interaction, information exchange, discussions and peer evaluations (Adamczyk et al., 2012; Bullinger et al., 2010). Participants in collaborative communities have been found to cooperate and collaboratively develop ideas (Boudreau and Lakhani, 2013). At the same time participants compete against one another in a tournament for the best ideas. Thus, these coexisting behaviors give rise to user-user relationships that can be described as communitition, a combination of the concepts community and competition (Füller et al., 2014; Hutter et al., 2011). It is argued that interactive, cooperative behavior of participants is beneficial (Füller et al., 2014) and, in contrast to classical, non-interactive innovation contests, the study of factors that foster or hinder interaction and cooperation has become an important research topic.

Within innovation contests, usually only the winner (or a few winners) is (are) rewarded with a prize while all the other participants go away empty-handed (Morgan and Wang, 2010). While the collaboration among participants creates relationships of trust and reciprocity and establishes a sense of community and moral obligation (Bagozzi and Dholakia, 2006; Schau et al. 2009), the competitive situation in contest communities may lead to resistant user behavior such as non-disclosure of ideas and uncollaborative behavior in dealing with fellow participants. In the intensified competitive environment of online tournaments, the phenomenon of free revealing and symbiotic user relationships (Harhoff et al., 2003; von Hippel and von Krogh, 2003) may be thwarted. Ultimately, participants are not only able
to improve their chances in the competition by submitting high quality ideas, but also can impair their
contenders. Uncooperative and even amoral, manipulative, and unethical behavior may be found in
innovation contests among participants who are attempting to increase their chances of winning. While
prior research on innovation contests and crowdsourcing communities has focused mainly on examining
the factors that positively impact pro-social, collaborative behavior such as free revealing, knowledge
sharing and exchange, the establishment of social relationships and a sense of community that should
ultimately lead to innovative outcomes (Kratzer and Lettl, 2008; McLure Wasko and Faraj, 2000;
McLure Wasko and Faraj, 2005), little research thus far has focused on the personal characteristics that
result in more competitive, antisocial behavior. However, these characteristics exist and can also
influence individuals’ contribution behavior in innovation contests as well as the generation of high
quality ideas. In management and organizational literature such aversive personalities are referred to as
the ‘dark side’ (Griffin and O’Leary-Kelly, 2004) and include Machiavellianism, Narcissism, and
Psychopathy. Prior studies also point towards an association between individuals’ creativity and these
negative or dysfunctional personality traits (Runco, 2004; Zibarras et al., 2008). In our study, we focus
on Machiavellianism, which refers to a manipulative and amoral personality driven by distrust in others
and a desire for status and control (Dahling et al., 2009). As Machiavellianism is relevant to a variety of
organizational criteria (e.g. leadership behavior, counterproductive work behaviors, defection, job
satisfaction), it is of central interest for management studies (Dahling et al., 2009). Research has found
that Machiavellians’ behavior is, among other things, more successful in situations that offer substantial
rewards for winning (Robbins et al., 2010). Hence, as in innovation contests, where individuals compete
for a prize, such a context should provide fertile ground for this Machiavellian behavior. Thus far, no
research exists that studies the role of this central personality trait of the ‘dark triad’ in the context of an
innovation contest. While previous research on innovation contests has extensively investigated the
motivations of individuals (Füller, 2010; Zheng et al., 2011), the influence of incentives (Boudreau et
al., 2011) and individual differences as predictors of contribution behavior, we have little knowledge on
the role of personality variables that explain social interactions and contributions in online communities
(Pagani et al., 2011). In their literature review, Connelly et al. (2014) conclude that research should
explore a richer set of antecedents of behavior, such as personality characteristics of the participants. With this research, we contribute to a better understanding of how Machiavellianism may affect contribution behavior in online innovation contests. Machiavellianism has not been studied in the context of online innovation contests or in the larger context of crowdsourcing. We investigate how Machiavellian characteristics influence individuals’ contribution intensity, communication and interaction behavior within the contest community as well as the quality of their contributions.

**Literature review**

As the success of online initiatives critically depends on the contribution quality and quantity of its members, the antecedents and drivers of active participation in online social contexts have received considerable attention (Fang and Neufeld, 2009; Füller et al., 2014; Phang et al., 2014). Innovation contests thereby represent a specific online environment. They are temporary campaigns designed to reach a large number of individuals and collect innovative ideas. They often contain elements of collaboration among participants and foster social interaction between participants by community and communication features such as user profiles, message boards, comment function, voting mechanisms or integration with social networks like Facebook. While participants usually submit ideas independently of one another, a collaborative mode and sense of community has been observed in contests, for example, when participants enhance ideas by providing feedback and by encouraging others through comments (Bagozzi and Dholakia, 2006; Füller et al., 2011; Hutter et al., 2011). While the collaborative nature of innovation contests provide an environment for individuals looking for fun, kinship, learning, gaining insights, or career prospects, the competitive nature of innovation contests creates an environment in which individuals striving to win the reward are likely to focus on their own performance as well as on the behavior of others. The question that arises is how personal characteristics relating to interpersonal relationships influence participants’ submission and commenting behaviors and the quality of their contributions.
In innovation and creativity research, user characteristics have been investigated to identify creative individuals with a propensity to innovate (Amabile, 1997; Barron, 1955; Sternberg and Lubart, 1993). Research on personality characteristics of innovators has uncovered several traits that relate to innovative behavior. Among others, self-confidence, autonomy and toleration of ambiguity have been found to be dominant characteristics of innovators (Barron and Harrington, 1981; Sternberg and Lubart, 1993). In his work on lead users, von Hippel (2005) found that users with certain characteristics, that is, users who are ahead of market trends and benefit from a solution, tend to have outstanding and innovative ideas and are motivated to freely reveal them (Franke and Shah, 2003; Harhoff et al., 2003). Personality has also been found to affect individuals’ motivation (Deci and Ryan, 1985). Thus, Füller (2010) commenced research on the role of users’ personal characteristics in firm-led co-creation, investigating how novelty seeking, web exploration and innovation-related characteristics affect consumers’ participation motives. The notion of innovation is usually positively connoted, but the negative aspects have also received some attention. Sojer et al. (2014) have investigated why individuals would behave unethically in the creative act of programming. They show that consequentialist ethical judgments when carrying out creative tasks and ethical work climates influence programmers’ behavior. Some research indicated that negative personality traits may also be associated with creativity and innovative characteristics (Spain et al., 2014; Zibarras et al., 2008). Unconventional thinking that accompanies psychoticism (low agreeableness and low conscientiousness), and is associated with a tendency toward psychopathy (Heath and Martin, 1990), for example, has been positively associated with creative thinking and performance (Eysenck, 1993; Woody and Claridge, 1977). It has also been found that artists score higher on psychoticism (Gotz and Gotz, 1979) and some schizotypal measures (Burch et al., 2006). No relationship could be confirmed between narcissism and creative performance (Goncalo et al., 2010). However, narcissists think they are more creative, score higher on self-rated creativity, and – because of their high levels of enthusiasm – are also able to persuade others to agree with them (Goncalo et al., 2010). In management studies, Machiavellianism has been a personality trait of interest in domains like leadership, organizational politics and work behaviors, demonstrating multiple relations with important organizational criteria (Dahling et al., 2009). Accordingly, we want to
direct researchers’ attention to the ‘dark side’ of participants’ personalities in distributive innovation systems such as innovation contests in order to explore behavioral consequences.

**Machiavellianism**

Machiavellianism is one of the three traits - along with narcissism and psychopathy – that constitute the ‘dark triad of personality’ (Griffin and O'Leary-Kelly, 2004; Paulhus and William, 2002). The concept of Machiavellianism emanates from the 16th-century work of Niccolo Machiavelli, which describes the principles of power and leadership by drawing a picture of the unscrupulous, hypocritical and manipulative behavior of power-seeking politicians of that time. Christie and Geis (1970) commenced the research stream on Machiavellianism as a personality trait by reviewing Machiavelli’s work to retrieve themes and classify them in three dimensions: interpersonal manipulative tactics, a cynical view of human nature, and amorality. Based on this initial work (Christie and Geis, 1970), psychological theory defines Machiavellianism as a complex set of personality characteristics including the tendency to distrust others, a willingness to engage in amoral manipulation, the desire to maintain interpersonal control over others, and behavior that includes mainly acting in a status-oriented manner and representing a cynical opinion about individuals (Dahling et al., 2009). Individuals who score high on Machiavellianism – Machiavellians or Machs10 – act opportunistically and amorally and manipulate information in order to maximize their personal gain, often against other parties’ self-interest (Jones and Kavanagh, 1996; Sakalaki et al., 2007; Wilson et al., 1996; Winter et al., 2004). They are known for their inconsiderate power politics. Machs tend to have a cynical view of human nature and are described as economically opportunistic individuals (Sakalaki et al., 2007). Machiavellianism should be regarded as a quantitative trait: “Everyone is capable of manipulative behavior to some degree, but some are more willing and more able than others” (Wilson et al., 1996, p. 285). Hence, when describing the personality trait of Machiavellianism in the next sections, we talk about the tendency of individuals to react and

10 In the following sections we use the abbreviation ‘Machs’ for individuals who score high on the personality trait of Machiavellianism. However, we do not consider Machiavellianism to be dichotomous; as with other personality traits, it is a continuum ranging from low to high.
interact with others in a specific way, depending on how they score on the Machiavellianism personality trait. In this paper we draw on Dahling et al.’s (2009) conceptualization of Machiavellianism as a base for our empirical study, which consists of four discrete dimensions: distrust of others, amoral manipulation, desire for status, and desire for control. This understanding treats Machiavellianism as a higher-order latent variable construct. The four dimensions are seen as manifestations of Machiavellianism. As such, they are highly correlated and share similar relationships with antecedents and consequences. Dahling et al. (2009) argue that the dimension originally described as cynicism should be extended to active distrust of others. Machiavellians are capable of employing manipulative tactics and willing to do so through “purposeful monitoring and impression management” (Dahling et al., 2009, p. 227). Due to their moral flexibility and absence of emotional involvement (Mudrack and Mason, 1996), individuals who score high on Machiavellianism are able to digress from moral standards to pursue their own benefits. In doing so, Machs employ influence tactics such as ingratiation and intimidation. Hence, although Machs are not immoral individuals per se, their flexible interpretation of moral standards is the key pre-condition for amoral manipulation in their interpersonal affairs. As McHoskey et al. (1998) point out, rather than pursuing intrinsic goals such as self-actualization or community and personal development, Machs are motivated by external goals such as wealth, power and status. As individuals high on Machiavellianism tend to believe that events are controlled by external factors, they have a strong desire for status, which is seen as a manifestation of those extrinsic measures of success (Dahling et al., 2009). Finally, Machiavellians have a desire for control, as they want to dominate interpersonal situations as a means of reducing others’ power (Dahling et al., 2009). However, in the online context of our study with no direct, face-to-face contact among individuals, we see the desire for control through exercising control in interpersonal relationships as not relevant to the context of our study. Therefore, in our reasoning we focus on the remaining three dimensions of Machiavellianism.

In organizational science, substantial research has been conducted on the consequences of Machiavellianism in the domain of leadership, work behaviors and ethical management (Fehr et al., 1992; Geis and Moon, 1981). In relation to others, Machs have been shown to be unsupportive and
inconsiderate, less likely to help others (Becker and O’Hair, 2007; Drory and Glusinkos, 1980), and less willing to share their knowledge (Liu, 2008). Thus, Machs tend not to reciprocate and cooperate with economic partners but are inclined to apply strategies of exploiting groups (Kessler et al., 2010). Summarizing their literature review, Dahling et al. (2009, p. 223) state that “high Mach employees are manipulative and economically opportunistic, dissatisfied with their work, prone to withdraw and defect from groups, and unlikely to be considerate of others in leadership positions”.

Machiavellian characteristics thus far have been neglected in the literature on distributed innovation systems and crowdsourcing in particular. Several specifics of innovation contests may explain why Machiavellianism might be a relevant and valuable theoretical basis contributing to a better understanding of participants’ behavior not only in conventional organizational settings but in distributed innovation systems. Machiavellianism should be seen as a context-specific behavior. Machiavellians use manipulative and deceitful strategies when it is advantageous to them and “are not necessarily heartless, nasty, or vindictive, but they can be genuinely accommodating and respectful, when it is in their best interest to do so” (Kessler et al., 2010, p. 1871). While innovation contests will not necessarily attract Machiavellians in particular, this idiosyncratic context will allow individuals who score high on Machiavellianism to act out their traits. First, the hybrid nature of innovation contests, which feature elements of both cooperation and competition (Bullinger et al., 2010; Hutter et al., 2011), appears to offer a breeding ground for Machs to pursue their opportunistic behavior. Depending on what strategy may induce the best outcomes for them, individuals who score high on Machiavellianism can opportunistically switch between cooperative or competitive strategies, as both are inherent to the system of innovation contests. Second, the loosely-coupled nature of innovation contests (Franke et al., 2013) as well as low entry barriers and easy exit strategies foster Machiavellian behavior. Machs have been found to exploit groups and defect from them afterwards to avoid retaliation (Gunnthorsdottir et al., 2002). In open innovation systems where users freely reveal their ideas, Machs may further be tempted to free-ride rather than reciprocate (Gulley and Lakhani, 2010). In contrast to long-term employee-employer relationships, temporary and more anonymous innovation contests appear to be custom designed for Machs. In this environment, they can manipulate others ‘incognito’ (i.e., without
necessarily revealing their true identity), realize personal gains and abandon the community. Third, the absence of a guaranteed income (as is common in these contests with most conventional organizations) exacerbates Machs’ manipulative behavior in their quest for status. Although mutually beneficial relationships may arise in contest settings with incentive structures that allow for more than one winner, innovation contests are usually designed as constant-sum games with regard to the monetary prizes. Participants who aim at winning the prize money are likely to regard fellow contestants as relevant direct competitors. After all, it is not solely about an individual’s absolute performance but about contributing the best idea of all participants. Fourth, participants in crowdsourcing systems have also been found to strive for recognition by firms (Jeppesen and Frederiksen, 2006). Based on their status-driven nature, individuals who score high on Machiavellianism may try to boost their visibility and reputation among firm representatives in several ways. For instance, they might make use of the commenting and rating functionalities in crowdsourcing systems either to shape the conversation around ideas or to urge other users to rate their own submissions positively. In doing so, Machs may hope to increase their status and thereby influence the company’s perception of their submissions.

In sum, we argue that Machiavellianism is a relevant personality trait that should be further investigated in the context of innovation contests. For companies, insights into Machiavellianism within crowdsourcing initiatives are of interest in order to avoid having Machs poison the sense of community and collaboration in these environments. As companies are increasingly trying to manage communities of users for various purposes (e.g., gaining consumer insights, creating product ideas or co-marketing new products), there is a widespread need to understand which strategies are most effective in dealing with Machiavellian users and maintaining a sound atmosphere within the community.

**Hypotheses development**

As highlighted above, in our theorizing we use Dahling et al.’s (2009) conceptualization of Machiavellianism as a higher-order latent variable construct, with a focus on the three relevant dimensions of distrust of others, amorality, and desire for status. These are seen as manifestations of
Machiavellianism and are therefore expected to have a similar impact on behavioral consequences. In the following sections, we develop hypotheses about the role of these three dimensions regarding the number of submitted ideas, contributed comments, kind of comments, and evaluations of submissions.

Machiavellians are known for their interest in maximizing their own benefits and power at the cost of others. They usually are very strategic in their way of thinking and try to navigate through power dynamics in handling structured as well as unstructured tasks (Gebauer et al., 2013). Machs refer to strategies and tactics that advocate deception or the manipulation of others as well as amoral behavior in order to achieve their goals and further their own self-interest (Sakalaki et al., 2007). Hence, individuals who score high on Machiavellianism may consider strategic options and behave in a way that maximizes their chances and minimizes the level of effort needed to achieve their goals. As such, high Machs deplore inefficiency rather than injustice and are perceived as having opportunistic traits (Christie and Geis, 1970). Thus, we assume Machs will behave strategically and tactically in innovation contests in order to accomplish their goals and to achieve powerful positions. For them, their interest may be in the personal gain they obtain through their participation by increasing the chances of winning, rather than intrinsic interest in the activity per se. While intrinsically motivated individuals experience fun and enjoyment in activities and generate large numbers of ideas (Füller, 2010), Machs have been found to invest their resources in a cognitive analysis of the situation and determine the best strategy to win the prize rather than creating many ideas (Sakalaki et al., 2007). Instead, they are likely to choose the means most conducive to winning the reward or recognition. Due to the tournament character of innovation contests, extrinsic rewards are only distributed to the submitters of the very best ideas. Because of their strategic behavior Machs familiarize themselves with the contest conditions and are aware that usually only one winner will be rewarded with prizes, while the rest of the participants will leave the contest empty-handed (Morgan and Wang, 2010). In order to enhance their chances of winning, Machs are likely to concentrate on one or a few excellent submissions instead of a large number of average, often similar submissions. This is in line with research showing that Machs are status-driven and focused on achieving external goals (Dahling et al., 2009; McHoskey et al., 1998). Furthermore, they show less willingness to share knowledge (Hegarty and Sims, 1978) and higher unwillingness to
self-disclose (Domelsmith and Dietch, 1978). In a contest setting, idea submission is also a form of knowledge sharing and every new submission can benefit from the exchange of knowledge with other participants, which helps individuals to generate various alternatives, revise their knowledge and refine their ideas (Osborn, 1953; Perry-Smith and Shalley, 2003; Perry-Smith, 2006), and therefore gain in quality and increase the attractiveness of their ideas and their chance of winning the contest (Berg-Jensen et al., 2014). Thus, contest participants may face a classical trade-off between the depth of work on a given design and the overall number, or breadth, of designs that can be generated (Berg-Jensen et al., 2014). Using this line of argument, we maintain that Machiavellian characteristics negatively affect the extent of idea submissions to innovation contests. Individuals who score high on Machiavellianism are not interested in wasting their time by spamming the contest and hoping for a lucky punch. Following this reasoning, we assume that Machiavellianism has a negative effect on the total number of submitted ideas. As the three dimensions of this personality trait used in this study (distrust of others, amoral manipulation, and desire for status) are reflective indicators of this construct, we expect a negative relationship between all three dimensions of Machiavellianism and the number of submitted ideas. Thus we posit:

**H1:** a) Distrust of others, b) amoral manipulation, c) desire for status have a negative effect on the number of submitted ideas.

In innovation contests, individuals show both cooperative and competitive behavior. Participants use the comment function to enter into a dialog with others revolving around the submitted ideas and to deepen relationships of trust and reciprocity (Bagozzi and Dholakia, 2006; Schau et al. 2009). Participants use comments to collaborate and to support each other. In addition, comments can also be used to foster social interactions, deepen participants’ ties to other like-minded users and nourish a sense of community (Füller et al., 2011; Füller et al., 2014). While user feedback may enrich others’ ideas, add insights from their own experiences or provide ideas for improvement (Hutter et al., 2011), the competitive nature of crowdsourcing contests can lead to non-disclosure as well as non-cooperative behavior among participants. Individuals who score high on Machiavellianism are driven to maximize
monetary gains and may tend to employ free-riding tactics, that is, using others’ suggestions and ideas for their own submissions without returning the favor. Irrespective of helping other participants to improve their ideas via comments, the mere act of commenting may already direct attention to a competitive idea and put it in the focus of the jury. Machs may thus reason that among hundreds of user submissions on a crowdsourcing platform any ‘publicity’ could be good publicity and could help another idea to have the edge over their own idea. Machiavellians’ coolheadedness and emotional detachedness may further prompt them to show non-reciprocal behavior (Mudrack and Mason, 1996; Sakalaki et al., 2007). In the setting of competition and specifically in the case of constant-sum games, Machs optimize their chances of winning by not helping the other party in the equation, for example, by refraining from commenting on their ideas. In terms of interpersonal behavior, we assume that Machiavellians interact less with other participants and contribute fewer comments. Therefore, we hypothesize that the three dimensions of Machiavellianism negatively relate to the number of contributed comments.

**H2:** a) Distrust of others, b) amoral manipulation, c) desire for status have a negative effect on the number of contributed comments.

High Machs might not only contribute fewer comments but the kind of comments they submit might also differ. They may decline to be constructive with their comments. In order to increase their own chances of winning in the competition, Machs may refrain from providing constructive comments and sharing knowledge that could help other contestants to improve their own submissions. Although constructive additions to others’ ideas are likely to increase Machs’ reputation and status in the community and among the jury, providing valuable help to others may have an even bigger impact on the ultimate selection of the winning concept. Any form of constructive help can undermine Machs’ efforts in the race for the contest prize because it might degrade their comparative advantage regarding the other contestants and thus decrease the probability of success. Rather, high Machs might tend to provide destructive comments with no usable feedback or ideas for improvement but the intention to demoralize other contestants. Hence, we argue that Machs are likely to provide more destructive and discouraging comments. Thus, we posit:
**H3:** a) Distrust of others, b) amoral manipulation, c) desire for status have a negative effect on the probability of submitting constructive comments.

Besides not supporting others, individuals who score high on Machiavellianism are also known for employing manipulative tactics (Dahling et al., 2009). In crowdsourcing settings, Machs might consider it a helpful tactic to try to stand out from the crowd and attract attention. Due to the vast number of submissions, which often number in the hundreds or even thousands, Machs might be willing to deploy any means to create awareness for their idea(s). In the absence of personal contact in digital crowdsourcing systems, participants have only limited possibilities of contacting and manipulating other users. Participants with Machiavellian traits may resort to the commenting function to draw attention to their ideas. It might seem only logical to Machs that ideas that are intensively discussed and rated by the other participants in the contest community tend to be closely investigated by the jury and company representatives even if the potential of the idea is only average. In an attempt to prompt other users to rate or comment on their ideas, Machs are likely to ingratiate themselves with other participants by complimenting and encouraging other users. In doing so, they may successfully fish for reciprocal compliments or encourage other users to rate their ideas in an attempt to increase the visibility of their submissions and attract the jury’s awareness. In order to avoid helping other users with their comments at the same time, Machs may thus limit their statements to mere pleasantries or straightforward requests for rating their ideas as opposed to constructive feedback. Therefore, we argue that individuals who score high on the Machiavellian dimensions are likely to encourage others and provide rather superficial polite comments to lull and manipulate other participants.

**H4:** a) Distrust of others, b) amoral manipulation, c) desire for status have a positive effect on the probability of submitting encouraging comments.

Christie and Geis (1970) observed that high Machs consistently outperform low Machs in short-term interactions in situations that require emotional detachment and resistance of social influence. On account of Machs’ overwhelming aspirations for economic benefits, they do not shrink from employing
influence tactics to achieve their goals (Dahling et al., 2009). In order to manipulate community ratings, that is, the rating of their own ideas by other participants, Machs may ingratiate themselves with other participants by using their charisma in interpersonal communication. In relation to community managers, that is, the professionals who moderate the community, individuals with high Machiavellian personality traits are likely to build a rapport. For instance, they may try to address community managers on a personal level and ask questions to position and market themselves and create awareness. Although the community management and the jury might consist of a different group of people, Machs may be able to give impulses, create awareness of their submissions and influence the jury decision in their favor. Drory and Glusinkos (1980) point out that Machs show remarkable flexibility in handling structured and unstructured tasks. Hence, Machiavellian personalities can be capable of generating ideas that are highly appreciated and voted for in the community. Because individuals who score high on Machiavellianism think and act strategically, they might also be able to generate ideas that fit nicely with the company’s contest briefings and answer needs and expectations outlined in the usually rather generic call for ideas. Furthermore, research on personal characteristics that can be described as ‘moving against people’ and that include manipulative qualities have been empirically found to positively correlate with innovative characteristics (Zibarras et al., 2008). In a similar vein, Eysenck (1993) points out that characteristics such as being uncooperative and rejecting the rules are positively associated with the creativity level of individuals. Deluga (2001) reveals that high Machiavellianism among leaders has a positive effect on rated performance (similar: Drory and Glusinkos, 1980). Thus, following Zibarras et al. (2008), these innovation-related associations with Machiavellianism may be the positive effects of an otherwise dysfunctional personality trait. Czibor and Bereczkei (2012) studied the decision-making processes of Machiavellians in a social dilemma situation and applied a competitive version of the public goods game in which individuals could choose between cooperation and competition. Referring to previous studies finding that Machiavellians are highly successful in competitive social environments (Czibor et al., 2014), the authors assumed that this success lies in the flexibility of Machs’ behavioral responses. The authors found that individuals who score high on Machiavellianism are more successful in the public goods game (i.e., they contribute less to the public good and gain more) because (1) they
monitor their partners constantly and respond accordingly (which makes their exploiting behavior very efficient), and (2) they also take into account the previous steps of their partners to a greater extent. Hence, in an innovation contest, where individuals can monitor the behavior of others (e.g., their submissions, comments, and evaluations), and can learn from previous submissions (e.g., through comments, evaluations, and submissions), Machiavellians’ submissions should get better evaluations from both the contest community and the official jury experts. Hence, we posit that the three dimensions of the Machiavellian personality should be positively related to their contribution quality:

**H5:** a) Distrust of others, b) amoral manipulation, c) desire for status have a positive effect on the received evaluations for submitted designs (evaluations received from experts and other community members).

**Empirical study**

Our study is based on data from a contest initiated by a leading company in the public transportation industry to generate new, innovative ideas on interior designs for trains. The innovation contest was open to professional industrial designers, design students, and hobby designers as well as interested consumers. The designs could be either freely created or constructed by using a configurator tool embedded on the website, facilitating the design process especially for non-designers. Embedded Web 2.0 technologies enabled participants to interactively and collaboratively discuss and evaluate ideas. Participants could create their own profile, write pin board messages on other users’ profiles, comment on the ideas of others, and vote on the submissions. Over the contest period of eleven weeks, more than 2,400 participants registered in the contest and contributed more than 4,200 very elaborate design concepts and 8,500 qualitative comments. An expert jury, including experts from both within and outside the company, discussed and assessed the quality of the submitted designs based on criteria such as applicability/usefulness, originality, design and aesthetics, professionalism and cleverness. While the top three winners received cash prizes ranging from €1,000 to €2,000, non-monetary prizes were given to the top 10 designs.
Method and data collection

To test our hypotheses we collected multisource individual-level data from the innovation contest community (Holmbeck et al., 2002; Rousseau, 1985). To avoid common-method bias the independent and dependent variables were collected from different sources and through different methods (Podsakoff et al., 2003). We captured the independent variables, including participants’ Machiavellian characteristics, through self-reports collected in a web-based survey. In contrast, the dependent variables regarding participants’ contribution quantity and contribution quality were operationalized through capturing actual participation behavior and community evaluation data and data on expert evaluations in the log-file of the platform server. The nature of comments was determined through interpretative content analysis conducted by two independent researchers.

This multi-method approach helps to offset the disadvantages that certain methods have by themselves and also helps to avoid common method and single source biases. It further yields the possibility for falsification (i.e., divergent findings) and stronger inferences (Podsakoff et al., 2003).

**Online survey:** We conducted an online survey in order to capture participants’ personal characteristics, such as their Machiavellian traits, as well as control variables, including participants’ Theory of Mind (ToM) skills and their lead user characteristics. E-mails with a link to the online questionnaire were sent to the registered participants of the contest platform. A total of 1,368 e-mails were delivered to valid e-mail addresses. To reduce social desirability bias, respondents were assured that the survey software prevented identification of individuals (Podsakoff et al., 2003). A total of 107 participants filled out the questionnaire, which resulted in a response rate of 7.82%. Due to missing data on certain variables and missing links to user IDs, 61 participants make up our final database for our estimations. Of these, 86.89% of the respondents were male, and 13.11% were female. Participants were on average 30 years old.

**Log-file data:** Since every participant is assigned a unique user ID and the server tracks the most important events, we were able to extract contribution data on the number of submitted comments and
the number of designs submitted, as well as data on the community evaluations and expert ranking of the submitted designs (Nicholas et al. 1999).

**Content analysis:** To determine the kind of comments the participants contributed, we conducted an interpretative content analysis (Merriam, 2009), coding any single comment with regard to its encouraging/discouraging and constructive/destructive nature (Krippendorf, 2004). The coding process started with the formulation of coding instructions and definitions of the content categories of ‘destructive/constructive’ and ‘discouraging/encouraging’. While constructive comments, for example, detailed suggestions for further improvement, encouraging comments just state a positive attitude towards the design without giving detailed suggestions for additional enhancement (see Table 1). The instructions provided detailed descriptions as well as examples of comments falling into the categories.

Next, a pre-test of the developed coding scheme was conducted, where the two coders of the research team independently categorized a randomly selected subset of 200 comments. Assignment differences were discussed and the coding scheme was revised accordingly. After this alignment the two coders analyzed a set of another 200 randomly selected comments and coded them independently according to the revised and updated coding scheme. Again the meanings and appropriateness of the categories were renegotiated and differences in coding were discussed. Cohen’s Kappa coefficient was calculated to test inter-coder reliability (Cohen, 1960). Given the satisfying values of a high inter-coder reliability above 0.80 (encouraging / discouraging classification \( \kappa = 0.91 \); constructive / destructive classification \( \kappa = 0.85 \)) indicating almost perfect agreement, the remaining comments were coded by only one of the two researchers (Landis and Koch, 1977). As reported in Table 1, out of the 2,233 comments, 1,332 were determined to be neutral and could not be designated as either destructive or constructive; and 440 could not be assigned as either encouraging or discouraging. This resulted in a database of 84 comments classified as destructive, and 817 comments classified as constructive. Concerning the categorization of discouragement or encouragement, 211 of the comments fell into the discouraging category, whereas 1,582 were classified as encouraging.
<table>
<thead>
<tr>
<th>comment type</th>
<th>no</th>
<th>%</th>
<th>comment type</th>
<th>no</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>constructive</td>
<td>817</td>
<td>36%</td>
<td>encouraging</td>
<td>1582</td>
<td>72%</td>
</tr>
<tr>
<td>destructive</td>
<td>84</td>
<td>4%</td>
<td>discouraging</td>
<td>211</td>
<td>9%</td>
</tr>
<tr>
<td>not applicable /neutral</td>
<td>1332</td>
<td>60%</td>
<td>not applicable /neutral</td>
<td>440</td>
<td>19%</td>
</tr>
<tr>
<td>total</td>
<td>2233</td>
<td>100%</td>
<td>total</td>
<td>2233</td>
<td>100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>comment type</th>
<th>example comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>constructive</td>
<td>A great idea. I especially like it for the centre of the car. It blocks a bit of passenger flow, but I think it could add a lot of passenger comfort. Maybe it could be used as a bike rack too? Think about using a single &quot;sawtooth&quot; bar up the middle of the car between stanchions (vertical posts). Great thinking!</td>
</tr>
<tr>
<td>destructive</td>
<td>not really good… i am sorry…</td>
</tr>
<tr>
<td>encouraging</td>
<td>Best one from you..so far … keep it going …very vibrant</td>
</tr>
<tr>
<td>discouraging</td>
<td>again! too simple one…and handrest bar could have been of better color…</td>
</tr>
</tbody>
</table>

Table 1: Comment type classification

This analysis revealed that the overwhelming majority of the comments in the contest community are encouraging in nature. In other words, a participant’s high number of submitted comments indicates that he/she is most likely engaging in higher levels of encouraging collaborative behavior.

Measures

Machiavellianism: The Machiavellian Personality Scale (MPS) of Dahling et al. (2009) was applied and slightly adapted to capture Machiavellianism. Three items served to measure distrust of others, amorality and desire for status (Dahling et al., 2009). Appendix 1 shows all constructs applied in the online survey. Seven-point Likert-type scales were applied for all measures anchored by (1) ‘strongly disagree’ and (7) ‘strongly agree’.
**Control variables:** To clarify the impact of Machiavellian characteristics on the dependent variables, we controlled for several personal characteristics. We included the Theory of Mind (ToM) skills of *rapport building* and *shaping the interaction* (Dietvorst et al., 2009) to control for individuals’ interpersonal mentalizing skills, and to account for their ability to ‘read other’s minds’ and understand their behaviors. Some studies claim that Machs are, for example, highly successful in economic games because they have the ability to adopt the perspective of others. Bagozzi et al. (2013) found that ToM skills and empathy support Machiavellianism. Machs connect with emotions of their counterparts better than non-Machs do, which helps Machs to manipulate others. We captured *shaping the interaction* and *rapport building* with two items adapted from Dietvorst et al. (2009). Further, we controlled for the individual lead user characteristics of *being ahead of the trend* and *role in the community* which have been found to capture an individual’s ability to come up with new radical ideas in an innovation context (Franke and Shah, 2003). *Being ahead of the trend* was captured by two items and the *role in the community* was captured by three items adopted from Franke and Shah (2003). In addition, we controlled for gender (0 = male, 1 = female) and age (in years) of participants.

**Contribution quantity:** Counting the number of submitted designs and comments, respectively, served as quantity measures. Both count variables were directly derived from the log-file data.

**Contribution quality:** The quality of contributed ideas was captured by (a) considering the assessment of company-appointed experts as well as (b) community design evaluations. *Community evaluation:* Community members could evaluate ideas submitted by peers on a five-point scale. For each individual idea, these peer evaluations were aggregated to an average community evaluation. For each participant we used the averaged evaluation score of the highest evaluated idea to avoid reduction in variability due to multiple aggregation levels. *Expert ranking:* In order to determine a list of finalists for an additional jury meeting decision, design submissions were evaluated by ten company experts. Based on these expert evaluations, an expert ranking was established, with the best idea ranking 1st.

**Kind of comment:** Based on the classification of the comments from the interpretative content analysis, we created two dummy variables – *constructive comment* and *encouraging comment* – to
facilitate a more detailed analysis. The variable of constructive comment was defined by destructive = 0; constructive = 1, whereas encouraging comment was defined as discouraging = 0; encouraging = 1. The dummy variables do not consider the neutral comments that could not be assigned but rather exclude these from the analysis.

**Analysis and results**

Table 2 shows the descriptive statistics of our dependent and independent variables. On average, more than eight designs and 36 comments were submitted by each survey participant. However, the high standard deviations of both measures show that a high level of heterogeneity was inherent in the contribution behavior among participants. As has also been observed in multiple types of online communities (Füller et al., 2014), in the contest community the majority of contributions come from a small, active core while the majority of participants are more passive, providing only a few contributions.
<table>
<thead>
<tr>
<th>Obs</th>
<th>Mean</th>
<th>Std.Dev</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
<th>(8)</th>
<th>(9)</th>
<th>(10)</th>
<th>(11)</th>
<th>(12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>No of Designs</td>
<td>61</td>
<td>8.656</td>
<td>23.012</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2)</td>
<td>No of Comments</td>
<td>61</td>
<td>36.246</td>
<td>181.695</td>
<td>0.8835*</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3)</td>
<td>Community evaluation</td>
<td>46</td>
<td>2.629</td>
<td>0.634</td>
<td>0.4847*</td>
<td>0.3819*</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(4)</td>
<td>Rank Expert</td>
<td>46</td>
<td>96.174</td>
<td>127.824</td>
<td>-0.0469</td>
<td>0.112</td>
<td>0.1245</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(5)</td>
<td>Amorality</td>
<td>61</td>
<td>2.399</td>
<td>1.661</td>
<td>-0.0795</td>
<td>-0.0989</td>
<td>-0.0794</td>
<td>-0.3207*</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(6)</td>
<td>Distrust of others</td>
<td>61</td>
<td>2.869</td>
<td>1.739</td>
<td>0.2767*</td>
<td>0.2082</td>
<td>0.1528</td>
<td>-0.4082*</td>
<td>0.7546*</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(7)</td>
<td>Desire of status</td>
<td>61</td>
<td>3.607</td>
<td>1.803</td>
<td>0.0608</td>
<td>0.0749</td>
<td>0.0718</td>
<td>0.0038</td>
<td>0.4664*</td>
<td>0.4647*</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(8)</td>
<td>Role in the community</td>
<td>61</td>
<td>3.437</td>
<td>1.652</td>
<td>0.2893*</td>
<td>0.2233</td>
<td>0.4138*</td>
<td>-0.0273</td>
<td>0.3654*</td>
<td>0.3137*</td>
<td>0.3087*</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(9)</td>
<td>Being ahead of the trend</td>
<td>61</td>
<td>4.320</td>
<td>1.862</td>
<td>0.2006</td>
<td>0.1981</td>
<td>0.1645</td>
<td>0.0028</td>
<td>0.3138*</td>
<td>0.3203*</td>
<td>0.4461*</td>
<td>0.5653*</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>(10)</td>
<td>Shaping the interaction</td>
<td>61</td>
<td>5.137</td>
<td>1.119</td>
<td>0.2626*</td>
<td>0.2848*</td>
<td>0.1929</td>
<td>0.0817</td>
<td>-0.1901</td>
<td>-0.0192</td>
<td>0.1509</td>
<td>0.2186</td>
<td>0.2306</td>
<td>1</td>
</tr>
<tr>
<td>(11)</td>
<td>Rapport Building</td>
<td>61</td>
<td>5.336</td>
<td>1.381</td>
<td>0.1939</td>
<td>0.1682</td>
<td>0.3511*</td>
<td>0.1196</td>
<td>-0.1939</td>
<td>-0.1156</td>
<td>0.1355</td>
<td>0.2537*</td>
<td>0.2622*</td>
<td>0.6492*</td>
</tr>
<tr>
<td>(12)</td>
<td>Gender</td>
<td>61</td>
<td>0.131</td>
<td>0.340</td>
<td>-0.0133</td>
<td>-0.0418</td>
<td>0.0196</td>
<td>-0.2012</td>
<td>-0.0449</td>
<td>0.0202</td>
<td>-0.168</td>
<td>0.0149</td>
<td>-0.1067</td>
<td>-0.0186</td>
</tr>
<tr>
<td>(13)</td>
<td>Age</td>
<td>61</td>
<td>30.885</td>
<td>8.620</td>
<td>0.0479</td>
<td>-0.007</td>
<td>-0.2687</td>
<td>-0.1696</td>
<td>-0.0115</td>
<td>-0.074</td>
<td>-0.1771</td>
<td>-0.0315</td>
<td>-0.1327</td>
<td>0.0212</td>
</tr>
</tbody>
</table>

Table 2: Descriptive statistics
On average, individuals received a community evaluation of 2.6 from other participants while an average participant was placed at rank 96 based on expert evaluation. In order to explore the impact of different levels of Machiavellianism on participants’ actual contribution behavior and the quality of their submissions, multiple regression analysis was applied. Before applying regression analysis, we employed confirmatory factor analysis (CFA) to validate the factor structure of the applied constructs. The overall fit measures of the CFA are within the required thresholds and suggest a satisfactory fit to the data. All indicators further show satisfactory factor loadings, and the factor reliabilities meet the necessary requirements (Bagozzi and Yi, 1988) (see Appendix 1). Convergent validity determined by the average variance extracted achieved acceptable levels (Hair et al., 2006). Discriminant validity was estimated by the Fornell-Larcker ratio (Fornell and Larcker, 1981) and achieved satisfactory levels as its values did not exceed or come close to 1.

All our regression estimates were performed using STATA 12.0. In the course of this analysis, the three Machiavellian factors confirmed in the confirmatory factor analysis served as focal independent variables. Robust standard errors were estimated in order to account and adjust for heterogeneity in the model. Table 3 summarizes the results of the regression analysis. Models 1a-4a provide the baseline results for the control variables. Models 1b-4b introduce the main hypothesized variables concerning Machiavellianism.

The contribution quantity variables – the number of designs and the number of comments – both represent count variables that show a distribution strongly skewed to the right. In addition, expert rank represents a variable which can only take positive integer values. Further descriptive analysis as displayed in Table 2 showed that the distributions of the count variables and expert rank display signs of over-dispersion, with their variance many times larger than their means. These characteristics make the application of nonlinear regression models, like Poisson or negative binomial models, more appropriate than ordinary least squares (OLS).

As over-dispersion is an indicator of a negative binomial distribution, we use negative binomial models to estimate the impact of our Machiavellian characteristics on actual contribution behavior. In
all negative binomial regressions (Model 1, Model 2, and Model 4), the likelihood test of the over-
dispersion parameter alpha is significantly different from zero ($p<0.001$), thereby approving our
assumption that the negative binomial model is more appropriate than the Poisson model. All three
regressions were alternatively estimated with a Poisson regression, which was followed by a test of the
Poisson goodness of fit. The large $\chi^2$ values in all three regressions further indicate that the Poisson
distribution is not an appropriate choice for our analysis. In the case of negative binomial regression,
the $R^2$ measure cannot be interpreted equivalent to its meaning in OLS regressions. Instead, the $\chi^2$
statistics have to be consulted, which have highly significant values ($p<0.001$) in all three regressions
and approve the joint significance of the included variables as well as the statistical significance of the
models as whole. The regressions on community evaluation (see Table 3 and Model 3) were estimated
following an OLS approach.
<table>
<thead>
<tr>
<th></th>
<th>Contribution Quantity</th>
<th>Contribution Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model 1a</td>
<td>Model 1b</td>
</tr>
<tr>
<td>No of Designs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>0.735</td>
<td>0.288</td>
</tr>
<tr>
<td>Age</td>
<td>0.020</td>
<td>0.045***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Theory of Mind</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rapport Building</td>
<td>0.162</td>
<td>0.148</td>
</tr>
<tr>
<td>Shaping the interaction</td>
<td>0.377</td>
<td>-0.286</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lead User Characteristics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Role in the community</td>
<td>0.534***</td>
<td>0.521***</td>
</tr>
<tr>
<td>Being ahead of the trend</td>
<td>-0.199</td>
<td>0.012</td>
</tr>
<tr>
<td>Machiavellianism</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distrust of other</td>
<td>0.728***</td>
<td>0.319*</td>
</tr>
<tr>
<td>Amorality</td>
<td>-0.640***</td>
<td>-0.857***</td>
</tr>
<tr>
<td>Desire for status</td>
<td>-0.356*</td>
<td>-0.138</td>
</tr>
<tr>
<td>Constant</td>
<td>-2.811*</td>
<td>-0.509</td>
</tr>
<tr>
<td>Ln alpha Constant</td>
<td>0745***</td>
<td>0.354</td>
</tr>
<tr>
<td>Observations</td>
<td>61</td>
<td>61</td>
</tr>
<tr>
<td>Chi² / R²</td>
<td>26.144***</td>
<td>76.246***</td>
</tr>
</tbody>
</table>

**p<0.10, *p<0.05, **p<0.01, ***p<0.001

**Table 3: Impact of Machiavellianism on contribution quantity and quality**

**11** Ranks are defined as rank 1 being the best rank. Hence, lower rank numbers indicate a better rank in our case. Therefore, signs of coefficients for expert ranks have to be interpreted in reverse to achieve comparability of results across models.
The findings on the control variables show that gender has a significant impact only on ranks based on expert evaluation. Participating women receive a lower, hence better, rank\textsuperscript{12} for their submitted designs than men. Older participants are found to submit significantly more comments and their designs receive a significantly lower evaluation by other community members. However, their designs are significantly better ranked by experts. Concerning personal characteristics, shaping the interaction has a significant positive impact on the number of submitted comments. Building rapport positively influences the number of comments written and the evaluation received from the community. Both ToM characteristics result in a higher –hence in our case worse – evaluation rank given by experts. Further, we find that playing an active role in the contest community has a significant positive impact on contribution quantity and community evaluation, while it also leads to worse ranks as determined by experts. Being ahead of the trend is negatively and significantly related to community evaluation but results in a significantly better expert ranking.

Concerning the three dimensions of Machiavellianism, our results in Models 1b–4b in Table 3 show that the three Mach characteristics vary in their impact on contribution quantity and quality. We find that participants signalizing higher levels of distrust of others lead to a significant increase in the number of their contributed designs and comments. Our results also show that distrust in others has a positive significant impact on evaluation scores received from other community members. Furthermore, the designs of participants showing higher levels of distrust are also significantly better ranked by experts. In contrast to the impact of distrust, our findings indicate that participants showing higher levels of amorality are significantly less active in design contest communities with regard to submitting designs, and significantly less active in providing comments to other users in general. As hypothesized, these participants may see no value in communicating with others. While participants showing amoral behavior are characterized by a limited number of submissions, their submissions also receive lower scores in terms of community evaluation. No significant impact of amorality could be found in terms of the expert ranking of submitted designs. Finally we find that desire for status has a significant negative impact on the number of submitted designs and leads to higher, hence worse, expert rankings. No

\textsuperscript{12} Lower rank numbers indicate a better rank in our case (1 = the best rank, a higher rank is worse). Therefore signs of coefficients have to be interpreted in reverse to achieve comparability of results across models.
significant impact can be found in terms of the number of contributed comments or community
evaluation.

We further shifted the analysis from the level of individual participants to the level of comments
and analyzed the influence of Machiavellian characteristics on the type of commenting behavior at the
comment level in order to get more detailed insights. As the two dependent variables capturing comment
type – constructive comments and encouraging comments – are dummy variables, we estimated two
logit regressions (see Table 4).

<table>
<thead>
<tr>
<th>Comment Type</th>
<th>Model 5a</th>
<th>Model 5b</th>
<th>Model 6a</th>
<th>Model 6b</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constructive Comment y/n</td>
<td>Constructive Comment y/n</td>
<td>Encouraging Comment y/n</td>
<td>Encouraging Comment y/n</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>1.022</td>
<td>1.158</td>
<td>3.534</td>
<td>5.553</td>
</tr>
<tr>
<td>Age</td>
<td>0.040</td>
<td>0.045</td>
<td>-0.052†</td>
<td>0.010</td>
</tr>
<tr>
<td>Theory of Mind</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rapport Building</td>
<td>0.653†</td>
<td>0.234</td>
<td>1.246***</td>
<td>-0.168</td>
</tr>
<tr>
<td>Shaping the interaction</td>
<td>-0.546</td>
<td>0.215</td>
<td>-1.247***</td>
<td>0.568</td>
</tr>
<tr>
<td>Lead User Characteristics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Role in the community</td>
<td>0.004</td>
<td>0.019</td>
<td>-0.606***</td>
<td>-0.583*</td>
</tr>
<tr>
<td>Being ahead of the trend</td>
<td>0.182</td>
<td>0.265</td>
<td>0.695***</td>
<td>0.938***</td>
</tr>
<tr>
<td>Machiavellianism</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distrust of other</td>
<td></td>
<td>-0.350*</td>
<td></td>
<td>-0.925***</td>
</tr>
<tr>
<td>Amorality</td>
<td>0.560</td>
<td></td>
<td>0.857*</td>
<td></td>
</tr>
<tr>
<td>Desire for status</td>
<td>-0.272</td>
<td></td>
<td>-0.285</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>-0.661†</td>
<td>-1.769</td>
<td>2.927†</td>
<td>0.780</td>
</tr>
<tr>
<td>Observations</td>
<td>901</td>
<td>901</td>
<td>1793</td>
<td>1793</td>
</tr>
<tr>
<td>Chi² / R²</td>
<td>6.427</td>
<td>16.611†</td>
<td>76.732***</td>
<td>117.322***</td>
</tr>
</tbody>
</table>

† p<0.10, * p<0.05, ** p<0.01, *** p<0.001

Table 4: Impact of Machiavellianism on comment type

These regressions investigate the impact of the three Machiavellian characteristics on the
probability of submitting a constructive comment or an encouraging comment, respectively. Models 5a
and 6a show the base models including only the control variables, while Models 5b and 6b add the Mach
characteristics. Again, in the case of logistic regressions the $R^2$ measure cannot be interpreted equivalent to its meaning in OLS regressions. The $\chi^2$ statistics – which have to be consulted instead – are significant in Models 5b and 6b and support the joint significance of the included variables and the statistical significance of the models as a whole.

The findings on the control variables in the base models show that a higher age increases the chance of contributing encouraging comments to the contest community. Further, rapport building has a positive highly significant impact on the probability of submitting both an encouraging comment and a constructive comment. The lead user characteristic being ahead of the trend significantly increases the likelihood of giving encouraging comments, while shaping the interaction and playing an active role in the community both negatively influence the probability of submitting an encouraging comment.

Concerning the Machiavellian characteristics, our findings show that distrust of others has a significant negative influence on both the probability of submitting an encouraging comment and the probability of posting a constructive comment. Amorality, in contrast, has no significant impact on the probability of writing constructive comments. However, we find that higher amorality levels significantly increase the probability of writing encouraging comments. No significant impact is found for desire for status with either type of comments.

Based on the established literature, we had hypothesized the same negative impact of all three Machiavellian dimensions on the number of submitted designs, the number of comments, and the probability of submitting constructive comments (H1a–c, H2a–c, H3a–c). In addition, we theorized a positive effect of the three Machiavellian characteristics on the probability of submitting encouraging comments and the evaluation of submitted designs (H4a–c, H5a–c) (see Table 5). However, as summarized in Table 5, in contrast to prior studies our analyses find a highly differentiated impact of the three Machiavellian dimensions on contribution behavior and quality in the context of crowd communities. Hence, our hypotheses can only be partially supported.
Hypotheses concerning the impact of Machiavellian dimensions on contribution quantity and quality

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Number of Designs</th>
<th>Number of Comments</th>
<th>Kind of Comments Probability to Submit: Constructive</th>
<th>Encouraging</th>
<th>Evaluation of Designs</th>
</tr>
</thead>
<tbody>
<tr>
<td>H 1a-1c</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(+)</td>
</tr>
<tr>
<td>H 2a-2c</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(+)</td>
</tr>
<tr>
<td>H 3a - 3c</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(+)</td>
</tr>
<tr>
<td>H 4a-4c</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(+)</td>
</tr>
<tr>
<td>H 5a - 5c</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(+)</td>
</tr>
</tbody>
</table>

Findings on the impact of Machiavellian dimensions on contribution quantity and quality

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Number of Designs</th>
<th>Number of Comments</th>
<th>Kind of Comments Probability to Submit: Constructive</th>
<th>Encouraging</th>
<th>Community Evaluation</th>
<th>Expert Evaluation (Rank)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Distrust of others</td>
<td>(+) ×</td>
<td>(+) ×</td>
<td>(-) ✓</td>
<td>(-) ×</td>
<td>(+) ✓</td>
<td>(+) ✓</td>
</tr>
<tr>
<td>b) Amorality</td>
<td>(-) ✓</td>
<td>(-) ✓</td>
<td>n.s. ×</td>
<td>(+) ✓</td>
<td>(-) ×</td>
<td>n.s. ×</td>
</tr>
<tr>
<td>c) Desire for status</td>
<td>(-) ✓</td>
<td>n.s. ×</td>
<td>n.s. ×</td>
<td>n.s. ×</td>
<td>n.s. ×</td>
<td>(-) ×</td>
</tr>
</tbody>
</table>

Table 5: Impact of Machiavellianism – hypotheses vs. finding
Hypotheses 1b and 1c, concerning a negative impact of Machiavellian personality traits on the number of submitted designs, can be supported in terms of amorality and desire for status. However, a positive impact was found for distrust of others, thereby rejecting H1a. H2a–c, suggesting Machiavellianism leads to lower commitment to communication in general, are only supported by the significant negative findings on the amorality dimension (H2b). Again, distrust positively influences the number of submitted comments, providing no support for H2a. No impact is found for desire for status (H2c). Concerning the probability of submitting constructive comments (H3a–c), only H3a is supported by our findings on distrust of others. Scoring high on this dimension decreases the probability of constructive comments, providing detailed feedback, and helping others to improve their submissions. We find no support for a negative influence of amorality (H3b) or desire for status (H3c) concerning constructive commenting behavior. Distrust of others also limits the probability of encouraging others, thereby rejecting H4a. In contrast, amorality positively influences the probability of submitting encouraging comments, thereby providing support for H4b. Again, no impact is found for desire for status (H4c). Concerning H5a–c regarding the quality of contributions submitted by individuals with Machiavellian personality characteristics, only H5a can be supported. Only distrust of others leads to both better community and expert evaluations. However, amoral behavior has a significant negative impact on the evaluation received by other community participants (rejecting H5b) while desire for status negatively influences the evaluation of experts (rejecting H5c).

**Discussion and implications**

The contributions of our research effort are as follows. First, we apply a more negative perspective on potentially influential personal characteristics to the crowdsourcing and distributive innovation field. We thereby refer to Machiavellianism as one of the three traits that constitute the ‘dark triad of personality’ (Deluga, 2001; Kessler et al., 2010). Second, our empirical study shows that contestants at some level are prone to distrust others, show amoral manipulative behavior, or have a desire for status. What is more, this Machiavellian personality trait indeed has some significant effects on participation
behavior, contribution quality and kinds of contributions. Finally, we show that the three dimensions of Machiavellianism may have very different and actually even opposite effects in the context of crowdsourcing contests. Our findings clearly show that a person’s Mach characteristics are relevant and play an important role regarding participants’ behavior in innovation contests. Hence, aspects of the ‘dark side’ of personality influence the number and quality of submissions, collaboration, or engagement in providing feedback and comments. Thereby, the three dimensions of Machiavellianism – distrust of others, amorality, and desire for status – proved to have very distinct behavioral consequences. Most notably, the oppositional consequences of individuals who employ amoral manipulation and strive for status on the one hand and participants showing distrust of others on the other hand are blatant.

As expected, the facets of amorality and desire for status led individuals to focus their effort on fewer ideas and submit fewer comments (Leimeister et al., 2009). Individuals scoring high on these two dimensions may not believe that generating a lot of variations and revisions of their designs increases the attractiveness of these designs or their chance of winning the contest. Further, this finding conforms to Machs’ antisocial and non-reciprocal behavior and their tendency to refrain from helping others (Pagani et al., 2011). However, while active manipulation and the pursuit of status have a negative impact on beneficial contest outcomes such as contribution quantity and the aspect of quality and thus seem to backfire, to a certain extent distrust may boost both activity and submission quality. Distrust of others has a positive effect on the number of ideas and comments submitted as well as on the quality of contributions measured through both community and expert evaluation. Hence, it seems that distrust in others may drive individuals to put in more effort to increase their chances to win the contest and be in control by submitting more designs and comments – and this behavior is successfully rewarded with high evaluations. While the dimensions of amoral manipulation and desire for status refer to characteristics that are likely to induce negative behavior directed against other participants, distrust is a facet of Machiavellianism that rather implies a protective behavior. This may indicate that the distrust dimension of Machiavellianism in an online environment leads to different consequences than in face-to-face settings, which have been the predominant subject of Mach research thus far. The high level of anonymity, as well as the computer-mediated impersonal communication style, may help to explain the
surprising results concerning distrust of others in the context of online crowdsourcing contests. Individuals may assess this new environment and embrace new and presumably more successful tactics that might be better suited to the specific peculiarities of an online crowd contest setting. Apparently, in the absence of rich personal face-to-face interactions some degree of mistrust may be useful in a contest environment to anticipate potential sources of harm, destructive behavior and manipulation by contenders. Mistrust may create a state of sensitivity and alert, constituting an early warning system. Distrustful participants’ propensity to submit a larger number of ideas reveals that these individuals may try to counteract possible actions by others by spreading out the risk. However, we also find that distrust of others seems to induce destructive and discouraging comments rather than constructive suggestions for improvement of an idea and encouraging statements. These findings underscore the assumptions derived from the theory of Machiavellianism that high Machs use interpersonal communication means to debase and demoralize others and, eventually, overpower them in the competition. While this behavior aims to corrupt the performance of other contestants either by limiting suggestions for improvement or by discouraging rivals, the amorality dimension of Machiavellianism suggests a different behavior. Users willing to employ amoral manipulation have been found to be more likely to encourage other participants. Although this may seem to be contradictory to our line of reasoning, it can be explained by the nature of manipulative individuals. To them, verbally encouraging others may appear to be more promising for achieving their own goals than bashing them. Following the advice ‘keep your friends close and your enemies closer’, the underlying reasoning might be that complimenting others can help to ingratiate oneself with other contestants and, thereby, manipulate them just enough to gently urge them to reciprocate. Machiavellians with distinct amoral personalities apparently try to create rapport with other participants in the contest in order to manipulate the contestants’ inclination to positively rate their ideas and thus create awareness that may be relevant to the jury’s decision. One might argue that it requires the amorality aspect of Machiavellianism for Machs to proactively simulate positive sentiments to manipulate others as opposed to frankly assailing them.

Looking more specifically at the quality of submitted contributions, we found that the designs of individuals who display a certain level of distrust are evaluated better both by the other community
members and by the experts. As highlighted above, apparently some degree of mistrust in the online contest environment is tightly linked to high quality designs with the potential to win the contest. While the other two Machiavellian personality dimensions, amorality and a desire for status, result in negative evaluations, they display different influences on community and expert evaluations. Amorality results in lower evaluation scores by other community members, while no significant impact is found for expert evaluation. Desire for status, in contrast, does not influence the evaluation given by other members in the contest community, but leads to significantly worse expert rankings. These differential findings might be due to the fact that other participants in the contest community might sense and directly experience amoral and manipulative behavior and punish it in the evaluation of submissions. As manipulative tactics are directly targeted at other participants and have negative consequences on a user’s own chances to win, the affected participants may respond with a low rating. However, they might not be able to perceive or may just not regard the desire to gain and increase status as hurtful enough to deserve punishment. Experts, by contrast, are often not involved in the process of a crowdsourcing contest and thus are not concerned with the nature and impact of social interactions and behavior within the community. Hence, amoral behavior has no impact on expert rankings. Experts only see the end results and evaluate ideas irrespective of previous occurrences within the community, whereas the desire to gain status with submitted designs is evaluated negatively. These findings may help to develop a better understanding of social bias in evaluation within peer-to-peer networks and communities – especially in contexts characterized by both competition and collaboration – and have implications for the evaluation and quality assessment of submissions. Astonishingly, our findings show that aspects of Machiavellianism may even have a stronger impact on idea quality than other personal innovation-related characteristics such as being ahead of the trend. This is particularly surprising because lead user characteristics were originally established in user innovation research to identify users leading in creativity and innovative behavior (von Hippel, 1988). However, in a competitive innovation contest environment, it may be not only creative skills and knowledge that count but also the willingness to manipulate others and the strategic ability to adjust one’s ideas to the expectations of others – company experts and community members alike.
In conclusion, our study contributes to the existing literature on Machiavellianism because our findings highlight the necessity of differentiating between the dimensions of Machiavellian personality traits. The three dimensions of Machiavellianism used in this study did not influence the outcome variables the way they were expected to based on prior literature. While all individual sub-dimensions, because they are latent manifestations of the same construct (Drory and Glusinkos, 1980), should significantly and uniformly (i.e., in the same direction) be related to the outcome variables, we observed that some of them were not significant or they even resulted in influence in the opposite direction. In particular, traits inducing negative outcomes for others (i.e., amorality and desire for status) may be opposed to those directed purely at protecting oneself (i.e., distrust of others). This is a surprising and unexpected finding and necessitates further research. In this study, Machiavellianism was studied in an online context without face-to-face contact with others. Christie and Geis (1970) argue that Machiavellians particularly flourish under three conditions: (1) when they interact directly, face-to-face, with others rather than when they interact indirectly; (2) when the situation allows for a lot of improvisation and has a very limited number of rules and regulations; and (3) when opponents who score low on Machiavellianism are distracted by emotional involvement in details that are not relevant to winning. As an online context is likely to differ from a social offline context with complex, direct and emotionally loaded interactions, the question arises as to whether Machiavellianism operates differently in an online environment. Hence, two important research questions arise from the unexpected findings of this study: First, does Machiavellianism work differently in an online context, and second, does a more nuanced view on the individual dimensions of the construct increase its predictive ability of behavior?

**Implications for practice**

Our study also has practical implications. Looking at the individual dimensions of Machiavellianism it becomes apparent that (1) amorality and desire for status should be avoided, while (2) distrust of others seems to be beneficial in terms of both the number and quality of contributions. This leads to important
managerial implications regarding the design and management of an innovation contest. Research has shown that Machiavellians flourish when “the situation has a minimal number of rules and regulations, thus allowing latitude of improvisation” (Christie and Geis, 1970, p. 89). Hence, by introducing and transparently and continuously communicating clear rules of behavior (e.g., through a code of conduct), Machiavellians will be limited in their manipulative, amoral behavior. Ongoing, active community management that actively pursues the reinforcement of and compliance with community rules and code of conduct is needed in order to avoid letting Machiavellian participants with manipulative personalities engage in unethical or exploitative behavior such as cheating, lying or stealing ideas. If detected and recognized, this behavior could be the source of severe conflict within the community and ultimately even result in escalation and failure of the initiative. In addition, the personality traits of participants may be considered more carefully during the recruiting process and for establishing appropriate incentive schemes for innovation contests. Machiavellians are generally motivated extrinsically rather than intrinsically. They have a desire to “accumulate external indicators of success” (Dahling et al., 2009, p. 228). Very often contests include features that rank participants according to their number of contributions. For example, by limiting extrinsic rewards that involve a high level of recognition and an increase of status either within our outside the contest community, it can be avoided to attract too many participants with a high desire for status. These negative effects, however, could be turned into a positive effect by introducing additional social networking features to the contest. For example, displaying a ranking that is based on peer evaluation and concerns aspects such as ‘fair behavior’ or ‘helpfulness of comments’ will limit Machiavellians’ behavior. There are other design features of the platform that could take into account the different Machiavellian personality dimensions. Possibilities for anonymous participation or private chats between a certain number of participants might be attractive for participants with a high level of distrust, who are found to submit numerous high-quality designs. Finally, based on the findings of this study it is recommended to apply different measures to assess the quality of submitted designs, and not to rely solely on one single evaluation source. The expert evaluation helps to reduce evaluation biases through community members, which might arise based on either positive or negative social relationships and interactions within the community. However, these peer evaluations by other
participants or community rankings based on helpful and constructive behavior in the community might be an effective tool in detecting and reducing non-social, negative and destructive behavior in the context of online contests. Hence, companies have to take a more nuanced look at Machiavellianism in online environments and differentiate between the various dimensions. However, it is necessary to ensure a balance of personalities in order to avoid a hostile atmosphere and free-riding and also to achieve the right levels of collaboration and competition within innovation communities.

Limitations and future work

The findings of this study should be interpreted in the light of its limitations that raise the need for more academic work on the topic. We have captured Machiavellian personality traits through the self-reported dimensions of the Machiavellian Personality Scale (MPS). Although this is a well-accepted, standard and robust procedure for measuring Machiavellian characteristics in psychology and personality studies, self-reporting measures do have the potential to result in non-response biases. Voluntary participation in scientific studies with no monetary reward may not be appealing to individuals with high Machiavellian characteristics and can thus lead to a lower response rate. However, while in an offline context it may be possible to rely on other raters’ evaluations of personalities – such as supervisors evaluating employees’ personalities – this might be very difficult in a more anonymous online context. We further suggest that future research could develop and rely on new ways to operationalize Machiavellianism using scales validated by neuroscience procedures, as previously highlighted by Bagozzi et al. (2013). Further research is also needed to get a more elaborate understanding of the effects of Machiavellianism on the vitality of an online community. Future studies could address the right mix of participants. Which Machiavellian dimensions within a contest community are supportive in order to spur quality? When will the spirit and sense of community get poisoned and show counterproductive effects? Research might also shed light on the role of Machiavellianism in different crowdsourcing designs. The impact of Machiavellianism in crowdsourcing systems applied to collaborative tasks (i.e., joint innovation efforts) may differ from problem broadcasting systems with no interaction among
contestants. Furthermore, the nature of the innovation task could be considered. Because Machs have been found to have remarkable leadership skills in work groups, Machiavellian individuals might excel even more in crowdsourced collaborative tasks. We also suggest that it could be worthwhile to conduct deeper qualitative analyses of contestants’ comments regarding goals and tone to differentiate between different purposes of communication (e.g., social, elaborative or evaluative purposes).

**Conclusion**

Our study adds a new perspective to the current research on innovation contests and crowdsourcing by shedding light on the more negative characteristics of personality and their role as antecedents of participation quality and quantity. Further, our study contributes to the existing literature on the behavioral consequences of Machiavellianism because our findings highlight the necessity of differentiating between the dimensions of Machiavellian personality traits in the context of innovation contests. Besides its important managerial implications regarding the design and management of such initiatives, this study serves to motivate and advance research on online innovation activities characterized by simultaneous collaboration and competition.
References


Merriam, S.B. (2009), Qualitative research: A guide to design and implementation. Wiley, San Francisco.


Paper appendix

<table>
<thead>
<tr>
<th>Factor</th>
<th>Loading</th>
<th>CR</th>
<th>AVE</th>
<th>FLR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machiavellism:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In terms of the behavior and attitude in the contest community I am sure...</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Distrust of others</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>… that I cannot trust other participants and for that reason I dislike committing to contest communities</td>
<td>0.90</td>
<td>0.75</td>
<td>0.79</td>
<td></td>
</tr>
<tr>
<td>… that if I show any weakness in the contest, other participants will take advantage of it</td>
<td>0.83</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>… that other participants are always planning ways to take advantage of the situation at my expense</td>
<td>0.84</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Amorality</strong></td>
<td>0.91</td>
<td>0.77</td>
<td>0.77</td>
<td></td>
</tr>
<tr>
<td>… that the only good reason to communicate with others is to get information that I can use to my benefit</td>
<td>0.72</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>… that it is necessary to sabotage the efforts of other participants if they threaten my own goals</td>
<td>0.95</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>… that I would cheat in the contest if there was a low chance of getting caught</td>
<td>0.94</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Desire for Status</strong></td>
<td>0.86</td>
<td>0.67</td>
<td>0.41</td>
<td></td>
</tr>
<tr>
<td>… that status is a good sign of success in life</td>
<td>0.91</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>… that accumulating wealth is an important goal for me</td>
<td>0.76</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>… about my goal to be rich and powerful someday</td>
<td>0.75</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Theory of mind:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>When I participate in the contest, ...</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Rapport Building</strong></td>
<td>0.86</td>
<td>0.75</td>
<td>0.83</td>
<td></td>
</tr>
<tr>
<td>… I can easily start a small conversation with other participants</td>
<td>0.84</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>… I can easily start off a conversation on a general topic</td>
<td>0.91</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Shaping the interaction</strong></td>
<td>0.79</td>
<td>0.65</td>
<td>0.98</td>
<td></td>
</tr>
<tr>
<td>… I can easily act in ways that gives a conversation a positive twist</td>
<td>0.84</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>… I can easily make people feel more comfortable during the contest conversation</td>
<td>0.77</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Lead User Characteristics:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regarding my competences in the field of innovation...</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Being ahead of the trend</strong></td>
<td>0.88</td>
<td>0.79</td>
<td>0.50</td>
<td></td>
</tr>
<tr>
<td>… I am regarded as being on the &quot;cutting edge&quot; in designing train interiors</td>
<td>0.96</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>… I improved and developed new techniques in designing train interiors</td>
<td>0.82</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Role in the Community</strong></td>
<td>0.86</td>
<td>0.68</td>
<td>0.58</td>
<td></td>
</tr>
<tr>
<td>I am a very active member of the contest community</td>
<td>0.82</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I get together with members of the contest community for activities that are not related to the design of train interiors</td>
<td>0.88</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The contest community takes my opinion into account when making decisions</td>
<td>0.76</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Paper Appendix 1: Final Measurement Items as well as their psychometric properties
Appendix C: Paper 3

Shaping innovation in smart cities with the crowd

Bilgram, V.; Brunswicker, S.; Füller, J.

Accepted for publication in Business Horizon
Shaping innovation in smart cities with the crowd

With the rise of smart cities, firms aim for innovation leadership in urban ecosystems. However, providing vision to innovation in smart cities exposes firms to ‘wicked’ innovation challenges. This article presents a successful civic innovation crowdsourcing project, in which a multinational firm, Bombardier, constructs a unique global civic crowd and harnesses its know-how about local urban innovation ecosystems. We propose design principles for a three-phase crowdsourcing process, which guide managers in shaping the innovation agenda in smart cities by sensing urban innovation opportunities that integrate and contextualize local ecosystems in alignment with the firm’s strategic interest.
Setting the scene: Corporate innovation opportunities in smart cities

Today, many cities around the globe aim to establish themselves as smart cities in order to remain competitive at an international scale and retain their most important asset – the creative citizens. To become a smart city, a key requirement are smart mobility solutions that make the best use of the city’s resources and assets while having efficient, affordable, safe, and even enjoyable means of transportation (Cohen, 2012; Griffinger et al., 2007; Lerner, 2011). Thus, in many cities around the world innovation efforts are focused on smart mobility innovations in areas such as interconnected mobility or intelligent and automated driving. Corporate firms such as Cisco, IBM, or Ford aim to establish themselves as leaders of such efforts (IBM, 2015). They pioneer the exploration of mobility trends and the development of new smart mobility solutions as partners of a collaborative urban innovation ecosystem of local city governments, firms, and the citizens themselves (Alexy et al., 2013; Bakıcı et al., 2012; Cisco, 2014; Amsterdam, 2015; IBM, 2015; Maerivoet et al., 2012; Snow et al., 2011). By doing so, firms aim to improve their value as innovation partners of cities around the world. Ultimately, they intend to have the edge over rivals in future urban development projects due to their unique know-how about smart mobility innovations. With this know-how they aim to shape the agenda of urban innovation ecosystems, rather than responding to requests of city authorities (Teece 2007; Williamson and De Meyer 2012).

However, developing such an innovation advantage is not trivial. Urban mobility challenges expose firms to ‘wicked’ problems, defined as problems that are difficult to describe in the first place, and are influenced by factors in multiple and often contradictory ways (Rittel and Webber, 1973; Simon, 1962). Further, they are unsolvable in a sense that there is no objectively optimal solution, because the value of a solution is deeply embedded in the local context of the citizens (Camillus, 2008; Conklin, 2005). Despite the attention to wicked problems among public policy and urban planning experts, there is a lack of insight into how corporate firms can tackle wicked innovation challenges that emerge in a smart city (Introne et al., 2012). Unlike governments and urban planners, firms are exposed to the tension of balancing their own corporate agenda with the collective interests of the broader urban ecosystem.
when trying to shape the innovation agenda of smart cities (Alexy et al., 2013; Hargrave and van de Ven 2006; Ostrom, 1990).

In this article, we focus on firm-sponsored civic innovation crowdsourcing that allows firms to use a public crowd to develop a unique pool of crowd-sourced knowledge resource for urban mobility innovation (Alexy et al., 2013; Almirall et al., 2014; Kunz and Rittel, 1970; Malhotra and Majchrzak, 2014; Nam, 2012; Prpić et al., 2015). Specifically, we investigate the YouCity project sponsored by Bombardier, a large mobility infrastructure provider. In this initiative, Bombardier recruited a public crowd of about 900 citizens from around the globe via an open call and asked them to develop new urban mobility solutions for smart cities of the future. By harnessing the knowledge of this global crowd of citizens, Bombardier acquired hundreds of unique insights and conceptual solutions in the area of smart mobility. This pool of know-how represented a valuable extra-organizational asset, which Bombardier could access and use in order to shape the innovation agenda of smart cities around the globe. The crowdsourcing process enabled Bombardier to pinpoint governments and other smart city ecosystem players to new innovation opportunities (Alexy et al., 2013; Nam, 2012; Prpić et al., 2015; Teece, 2007; Williamson and De Meyer, 2012). According to Martin Ertl, Chief Innovation Officer of Bombardier, the crowdsourcing initiative spurred Bombardier’s strategic goal in “moving away from simply responding to customer inquiries and tenders […] to writ[ing] a new chapter in public transportation.” (Bombardier, 2014)

The existing discourse on smart cities highlights that city authorities have adopted crowdsourcing to involve their citizens when providing vision to the transformation process of a smart city (Cohen, 2012; Nam, 2012). This article sheds light on how large firms can use civic innovation crowdsourcing in order to tackle urban innovation challenges, and ultimately create a unique innovation asset that allows them to establish themselves as lead innovation partners of smart city innovation activities globally. In particular, we build upon existing work on wicked problem solving and examine how firms should design the crowdsourcing process to address two essential conditions of successful wicked problem solving: The development of integrative and contextualized solutions (Camillus, 2008; Rittel,
To derive such design principles, we retrospectively explore both (1) the process and (2) the outcomes of the successful firm-sponsored civic innovation crowdsourcing initiative YouCity led by Bombardier. A process perspective provides insight into how firms may address these conditions throughout different crowdsourcing stages. An explorative analysis of the crowd-sourced solutions clarifies whether and how the two conditions are reflected in the content developed by the crowd. Based on a synthesis of the two perspectives, we derive eleven process design principles that allow firms to construct and manage a civic crowd in a way that they can sense and seize innovation opportunities of unique value for the firm as well as the broader urban innovation ecosystem. It also provides insight into the particular challenges for corporate firms when trying to shape the innovation agenda of smart city ecosystems globally with the help of firm-sponsored civic crowdsourcing.

Smart mobility innovation exposes firms to wicked problems

The research question central to this article is: How should firms design the civic innovation crowdsourcing process for ‘wicked’ urban innovation challenges in order to develop the innovation know-how needed to shape the innovation agenda of smart city ecosystems? To answer this question, we will first clarify why smart mobility innovations expose firms to wicked problems.

Truthfully, smart urban mobility innovation is a challenging task. Whether a mobility solution is efficient, affordable, safe, and enjoyable for the citizens depends on many factors. Some examples of these factors are the existing physical infrastructure, the climate, the synchronization of public and private transport, the citizens’ preference for public versus private transport, the pricing policy, and the employment structure in cities. Further, when aiming to establish a leadership role in smart mobility ecosystems, corporate firms are exposed to potential contradictions of their own views and interests with those of city authorities and other stakeholders. Because of these challenges, urban mobility innovation activities can be classified as wicked problems that corporate firms are usually not directly exposed to, since firms usually cover only a small part of the value chain of a city’s operations.
Wicked problems are regularly discussed in the context of public policy and urban planning efforts that are focused on the task of solving grand societal challenges such as poverty, healthcare, terrorism, climate change and natural resource management (Farley, 2007). However, wickedness is not the degree of difficulty of a problem. As pointed out by Rittel and Webber (1973), the originator of the wickedness concept, it is a set of distinct features of a problem that constitute its wickedness (similar: Farley, 2007; Kunz and Rittel, 1970; Rittel and Webber, 1984).

When corporate firms engage in urban mobility innovation to shape the innovation agenda of smart city ecosystems, three characteristics of wicked problems are particularly relevant:

(1) **Problem multiplicity and interdependency:** Wicked problems that emerge in the process of developing novel urban mobility solutions subsume multiple highly interdependent sub-problem areas. One problem is a source of the other problem, and vice versa (Camillus, 2008; Conklin, 2005; Rittel and Webber, 1973; Simon, 1962). Taking a systemic view, there are different problem areas, which again are made up of multiple problems. Examples of these problem areas are mobility services (What are the service needs of citizens and what services should be offered?), mobility technologies and infrastructures (What technologies and infrastructures are needed to ensure effective, efficient and affordable transportation? How can physical infrastructures be integrated with digital infrastructures?), governance and coordination (How should mobility be coordinated within and across urban areas? How can corporate interests be best aligned with the governmental objectives and policies?). These problems and their sub-problems are embedded in the broader problem of urban mobility innovation, and mutually influence each other.

(2) **Indefinite and contradictory solution knowledge:** The problem of urban mobility innovation is difficult to formulate. On account of this, a proposed solution is very much dependent upon how the problem is framed and formulated. As a result, the solution space is indefinite, or as Rittel and Webber (1973) would say; wicked problems do not have an exhaustive list of potential solutions.

Further, the list of potential solutions may also be contradicting each other even if they represent valid alternatives (Conklin, 2005). For example, the adoption of emerging smart city technologies (e.g.
automated cars) versus a better integration of existing and mature mobility technologies (e.g. railway systems) represent two rather conflicting technology solutions because of their particular properties. Such contradictions among potential solutions may also result from very divergent perspectives of the sponsoring firm and other actors in the urban innovation ecosystem. In the previous example, a solution that is focused on automated cars and requires roads may be in conflict with a firm’s existing technology portfolio if it is focused on rail-based transportation.

(3) Social context dependency: Wicked problems and potential solutions are deeply embedded in their social contexts. As pointed out by Conklin (2005, 8), another central scholar in the discussion on wicked problems, “There are so many factors and conditions, all embedded in a dynamic social context, that no two wicked problems are alike, and the solutions to them will always be custom designed and fitted.” In the context of urban mobility innovation, problems are local. Numerous actors in the urban mobility ecosystem – mobility users, infrastructure providers, service providers, and policy makers – are directly and indirectly affected by the problem of urban mobility. These groups face very different mobility problems, and have very different perspectives toward the value of urban mobility solutions (Lerner, 2011). Further, smart city technologies and infrastructures have socially constructed meanings. So-called ‘technology’ frames that develop within particular groups shape how individuals perceive and evaluate particular technologies, such as by their functions and benefits (Davidson, 2002; Tilson et al., 2010).

In sum, wicked problems are different from conventional problems that urban corporate firms are usually exposed to, and so are the problem-solving approaches that are apt to tackle them. According to existing work on wicked problems, the characteristics constituting wickedness have implications as to how to address these problems effectively.

‘Mastering’ wicked problems in cities: Lessons learned from public planning

As wicked problems have a fundamentally different nature than conventional problems, scholars in public policy and social planning have deliberated on how to best address these allegedly insolvable
problems (Rittel, 1972; Rittel and Webber, 1973). Due to the wickedness of many urban innovations, the problem-solving mode is said to focus on ‘taming’ rather than solving wickedness (Conklin, 2005). To do so, Rittel suggests that “the expertise which you need in dealing with a wicked problem is usually distributed over many people” (Rittel, 1972, 394). Thus, both experts and non-experts should be involved in the problem-solving process, as they both hold critical practical knowledge to the problem at hand. Wicked problem solving should actively involve the stakeholders that are affected by the problem; as further elaborated by Rittel, “Nobody wants to be ‘planned at’” (Rittel, 1972, 354). This is why one should actively involve them in the problem-solving process. In order to develop a rich understanding of the controversial perspectives of the different stakeholders, it is particularly important to stimulate an argumentative, dialogue-based process, in which participants raise issues and share their subjective perspectives that are often contradictory to each other (Conklin, 2005; Innes and Booher, 2010; Kunz and Rittel, 1970; Rittel, 1972). Further, research on wicked problem solving suggests that the process should be designed to cater for integrative solutions that synthesize and align multiple perspectives of different stakeholders that are directly and indirectly affected by the planning process and its outcome.

In addition, the wicked problem-solving process should support the development of solutions that consider the local urban context (Conklin, 2005; Innes and Booher, 2010; Noveck, 2015). Urban wicked problems are deeply embedded in the local urban context, and thus require solutions that are customized toward this context. Even though some wicked problems seem to be structurally similar to one another, there remain distinct differences across different urban contexts. For example, the technical conditions for constructing a subway in London may appear similar to the conditions of New York. However, despite similarities in subway layout, building types, and other factors, differences in commuting patterns and mobility needs may require very different and fitted solutions (Conklin, 2005). This context dependency calls for processes sensitive to local contexts and able to incorporate user-specific aspects into solutions. Thus, a second lesson learned in urban planning is that wicked problem solving requires processes that enable the creation of contextualized solutions.
These two conditions, supporting the development of (1) integrative and (2) contextualized solutions, derive from work in the area of public policy and urban planning. But how should these conditions be met when corporate firms decided to use innovation crowdsourcing to seize innovation opportunities in smart mobility innovation? We will next introduce the concept of civic innovation crowdsourcing to answer this question.

**Civic innovation crowdsourcing: An opportunity for firms to tackle wicked innovation challenges of smart cities?**

Crowdsourcing describes an online distributed problem-solving model in which an organization ‘outsources’ a problem-solving task to a crowd via an open call (Afuah and Tucci, 2012; Prpić et al., 2015). In this article, we focus on firm-sponsored innovation crowdsourcing efforts, in which firms use crowdsourcing to create corporate innovation opportunities. When using crowdsourcing, some firms also intend to shape the innovation agenda of other firms as crowdsourcing may facilitate collaboration and alignment of interests. Such ‘agenda-shaping’ crowdsourcing initiatives regularly relate to more ill-structured problems. For example, in 2010 the multinational company GE launched the Ecomagination Challenge and crowd-sourced novel solutions for the clean tech field. They were in search of clean energy innovation to complement their traditional energy business. To solve this problem, GE invited a diverse crowd of start-ups and entrepreneurial individuals via an open call to submit their ideas through an online crowdsourcing platform (Chesbrough, 2012). Besides the immediate access to new know-how, the crowdsourcing activities also triggered new collaborations between GE and 23 other firms in the clean tech space.

Civic innovation is a new innovation domain to which such firm-sponsored innovation crowdsourcing can be applied. We define *civic innovation* as the generation of novel solutions for an urban or city-related problem. In a firm-sponsored civic innovation crowdsourcing activity, firms turn to citizens for ideas and insights due to their unique access to know-how about the urban innovation ecosystem. Nowadays, digital technologies play a central role in civic crowdsourcing. They not only
lower the costs for civic participation, but also create a variety of alternatives for organizing the crowd and their contributions. For example, they allow the sponsor to collect subjective content from a diverse crowd, and to use filtering techniques to select the solution that is best suited for the sponsor’s business problem (Afuah and Tucci, 2012; Majchrzak and Malhotra, 2013; Prpić et al., 2015).

Thus, at first glance, civic innovation crowdsourcing appears to be a suitable mode for taming wicked smart mobility challenges as it responds to Rittel’s call for direct involvement of diverse actors of different stakeholders and the consideration of their subjective perspectives towards a value-adding solution. Civic innovation crowdsourcing may allow firms to create a pool of crowd-sourced insights and solutions that reflects the crowd’s diverse perspectives towards the innovation challenge. This pool may represent a critical extra-organizational resource that firms may use to seize corporate innovation opportunities. Further, it may also help them to shape the innovation agenda of city authorities and other smart city ecosystem actors (Alexy et al., 2013; West and Bogers, 2014).

However, we argue that the question of whether a firm can develop and harness this crowd-sourced resource to shape the innovation agenda in smart city ecosystem is a question of ‘how’ they manage the crowdsourcing process; or more specifically how they address the two conditions for successful wicked problem solving introduced above: knowledge integration and contextualization. These conditions need to be considered through the three major crowdsourcing activities: (1) Constructing the crowd: Defining the nature of the crowd and recruiting or accessing new or existing crowds (2) Acquiring knowledge from a crowd: Designing the type of interactions through IT systems as well as social crowd design (guidelines, instructions, community management), (3) Assimilating the knowledge from the crowd: Integrating the crowd-based knowledge into organizational capabilities (Prpić et al., 2015; Zahra and George, 2002). Our retrospective analysis of the successful crowdsourcing case – the YouCity Initiative of Bombardier – will provide further insights into how firms can realize contextualized and integrated solutions.
The Bombardier YouCity civic innovation crowdsourcing case

Our research was focused on Bombardier’s YouCity contest, a representative case study of firm-sponsored civic innovation crowdsourcing focused smart city innovation leadership (Yin, 2003). This case offers unique insight into how a multinational firm like Bombardier used a public crowd to harness unique extra-organizational innovation resources, which allowed them to establish themselves as a leading firm in smart city ecosystems globally and significantly influence the innovation agenda in the area of smart mobility.

The Bombardier YouCity crowdsourcing initiative took place in 2012 and lasted for 3.5 months. The YouCity Challenge was explicitly focused on urban mobility innovation for smart cities of the future. The crowdsourcing project attracted almost 900 innovators from 74 countries. In addition to active innovators, there were also peripheral participants. The website counted 132,000 visitors and 1,391 user evaluations. Further, the Facebook integration resulted in 1,700 Facebook ‘likes’. The diverse crowd submitted 215 contributions that included not only written descriptions, but also video and other graphical supplements (e.g. design sketches, visualization of solutions, etc.).

To answer our research question, we engaged in a two-stage case study analysis. First, we took a process perspective and explored the particularities of civic innovation crowdsourcing process phases. We relied on archival data from multiple data sources to implement a qualitative process analysis: unstructured text of submitted solution concepts (text in forms, attachments to online forms), log files about usage data (votes, comments) and project reports. Following Prpic (2015), we organized our data according to the three crowdsourcing phases and extracted major design actions along this process that supported contextualization and integration among the crowd. In the second stage of our case study analysis, we were particularly focused on the outcome of the process. We coded the content of ninety original solutions based on more than 22,000 lines of text submitted via forms to the crowdsourcing platform, along with about a hundred of pages of text describing more detailed solutions in attachments to the online forms (PDFs, Word files). Following established coding procedures we applied a combination of descriptive and open coding (Saldana, 2012). Two coders separately coded the ideas and
triangulated the results. In total, we analyzed the idea with respect to the conditions of wicked problem solving: the development of integrated solutions and contextualization. Afterwards, we performed a descriptive statistical analysis of the solution attributes.

The process: How Bombardier worked the crowd to seize smart mobility innovation opportunities

In the YouCity Challenge, the Bombardier innovation team purposively designed the phases of crowdsourcing: (1) constructing the crowd, (2) acquiring knowledge, and (3) assimilating knowledge from the crowd. Next, we will discuss how Bombardier implemented the civic innovation crowdsourcing process to meet the need for integrative and contextualized solutions.

Phase 1: Constructing a truly diverse crowd

When Bombardier constructed the YouCity crowd, the team realized that domain expertise is not sufficient to establish the conditions for developing integrative solutions. The YouCity crowd needed to be truly different from the ‘typical’ crowds known from case studies on Topcoder or Innocentive, which bring together specialist scientists or software programmers that solve a technical and objectively solvable problem (Jeppesen and Lakhani, 2010; Prpić et al., 2015). Thus, the first crowdsourcing phase – crowd construction – focused on recruiting a truly diverse public crowd of urban planners, engineers, scientists, entrepreneurs, and non-experts with practical experiences using local transportations around the world. In the following section, we outline the search criteria (e.g. who to search for) and strategies (e.g. how to conduct the search) Bombardier used to construct the crowd so that integrated and contextualized solutions could emerge.

Using search criteria for a diverse crowd that ‘mirrors’ smart mobility ecosystems: Bombardier defined the search criteria for recruiting the crowd along three dimensions: (1) the geographic context, (2) the skills, and (3) the individual actors within the innovation ecosystem of urban mobility (e.g.
mobility users and citizens, or potential mobility service providers). To ensure diversity in terms of geographic context, Bombardier purposively focused on participants from three cities on three different continents: (1) London in the UK, a city in a mature market that is known for its smart city program, (2) Belo Horizonte in Brazil, a member of the BRICS countries that has spurred innovation in urban mobility, and (3) Vientiane in Laos, a city in an emerging market that is concerned with purposively designing urban solutions to make best use of its resources and assets (Johnson and Gann, 2010; Kitchin, 2014; Böhler-Baedecker et al., 2014). By attracting individuals residing in different urban contexts, Bombardier constructed a crowd of individuals that was exposed to very diverse local day-to-day experiences of urban dwellers and mobility users.

Constructing a diverse crowd also focused on skill diversity. The call for ideas emphasized the crucial role of interdisciplinary submissions that combined various backgrounds and considered multiple facets of urban mobility. Besides non-expert citizens and users, Bombardier purposively also aimed to attract voluntarily participating experts with deep knowledge in the areas of urban planning, engineering, and business. To recruit people in these areas, Bombardier purposively seeded the call for ideas on domain-specific online sites. Diversity in skills was also linked to the criterion that focused on the representation of the diverse actors of an urban innovation ecosystem in the crowd. The crowd design was focused on addressing key ecosystem actors, such as developers and engineers (who take care of the technological development), urban planners (who envisage the strategy of an urban area), creative urban entrepreneurs, and end-users of mobility services. To integrate and align all these diverse actors in a functional mobility ecosystem plays an important role already in the early stages of the innovation process.

Using a mixed search strategy to realize a diverse ecosystem representation: Once the search criteria had been defined, Bombardier’s search strategies did not rely on established open innovation communities, as these are not sufficiently diverse in all three dimensions. Instead, they applied a two-layered approach combining a targeted ‘seeding’ with self-selection and word-of-mouth recommendation. In the first step, the innovation team identified specific relevant online and social
media sources such as blogs, forums, social networks and university websites with the help of ethnographic principles (principles that were adopted from ethnographic research to conduct consumer research in the environment of the Internet) (Kozinets, 2002). Based on the defined search criteria, the users of these social media sources and the content of their discussions were screened and evaluated. Before advertising the challenge on the respective platforms, the administrators were contacted to ask for permission and support in promoting the challenge (Brem and Bilgram, 2015). In addition to direct recruiting from these online sources, Bombardier also relied on word-of-mouth in a second step. They encouraged the crowd to forward and share the invitation to participate. To complement the seeding and word-of-mouth efforts, the innovation team also personally contacted very influential individuals in the field of smart mobility who had central positions within their networks and a high degree of social influence in social media. Among others, bloggers and heavy users within relevant online forums were informed about the civic innovation crowdsourcing initiative in order to spread the word and recruit further participants. Besides the recruiting efforts in online and social media, the search was also extended to offline sources such as university departments specialized in urban development, social innovation, or mobility engineering. The recruiting efforts were continuously monitored measuring the source-specific growth of participants and inbound links, the effectiveness of specific search efforts, and the diversity of registered individuals.

**Phase 2: Acquiring integrative and contextualized solutions from the crowd**

Following the crowd construction phase, Bombardier had to focus its effort on acquiring knowledge from the crowd. Bombardier took purposive measures to ensure that the crowd integrated the diverse knowledge and perspectives of all stakeholders of a smart city ecosystem, and also contextualized their proposed solutions. Throughout this process, Bombardier also triggered the crowd to consider Bombardier’s internal know-how. In the following we discuss how Bombardier worked the crowd to realize integrated and contextualized solutions.
Using a multi-staged process: To support the generation of integrated and contextualized solutions, the innovation team realized an iterative multi-staged ideation process. The Bombardier YouCity contest was structured into two tasks, each lasting approximately four weeks. Within the first task, registered participants were asked to analyze the situation and develop a solution for the particular problem identified. The contest guidelines suggested participants to analyze the challenges, obstacles, and micro-trends, and then to develop creative solutions with technical details and specifications. This triggered the individuals to contextualize their problem and develop the solutions with their particular context in mind. In the second task, participants were asked to advance or complement the various individual solutions. The idea was to trigger knowledge integration among the crowd. These tasks were not rigidly separated. Participants could also submit a new solution for a particular problem within task two.

Facilitating a transparent dialogue: The two-stage process of the crowd-based contest emphasized the transparent dialogue among the participants during each stage of the problem-solving process. Individuals were not just asked to detail the problem that they had identified and then develop a solution for that individual problem; they were encouraged to discuss their point of view and elaborate jointly on problems and solutions, and to develop a more integrative solution with the help of social technologies for evaluating and commenting. Throughout this process, visibility and transparency played a significant role; interactions were visible to the crowd and all participants had access to other ideas and their originators. This supported Rittel’s idea of “objectification” that was postulated for wicked problem solving: It describes the process of “making the basis of one’s judgment explicit and communicating it to others” (Rittel, 1972, p. 394). In other words, transparency of the subjective problem-solving processes allowed participants to express their subjective opinion towards a particular problem and, vice versa, modify their ideas according to the feedback. Additionally, contest guidelines and community management guided and supported an integrative process by pointing out potential for collaboration, linking participants and providing advice from a firm perspective.
Ensuring knowledge co-creation among individual crowd members: To realize knowledge integration, the acquisition phase not only encouraged the crowd to engage in a dialogue, but to actively co-create new knowledge by building upon one another’s ideas through co-creation actions like knowledge sharing, highlighting, and knowledge combinations (Majchrzak and Malhotra, 2013; Malhotra and Majchrzak, 2014). To foster knowledge sharing, the individuals were explicitly encouraged to share their problem views and support them with personal experiences, as well as with facts and figures about the relevance of the particular problem or trend. Sharing the different views towards the problems was pivotal to create a dialogue about very local and context-specific problems. For example, participants added information about the city such as traffic and road safety conditions to the conversation to underscore the need for safety:

From a Feb 2012 report by the US State Department on Vientiane: “2011 recorded a significant increase in vehicle congestion over previous years. Visitors should be extremely alert to traffic patterns and unexpected movements by motorcycle drivers. Traffic laws and driving habits throughout Laos fail to achieve Western standards. Death and injury attributed to motorcycle and passenger vehicle accidents are commonplace throughout Laos. The seriousness of this is exacerbated by the unavailability of quality health care.”
https://www.osac.gov/Pages/ContentReportDetails.aspx?cid=11983 (Participant, YouCity Contest)

Other participants provided information and explanations of technologies to describe technical challenges and possible remedies:

Superconductors are used in Maglev trains. It uses Meissner effect and flux pinning to achieve levitation which can produce frictionless transport. However, it has issues with its lateral stability. Because it’s unstable in lateral controls its use until today is limited to trains which run on track. Because track provides it with lateral stability. So individual transport cannot be accomplished. It can be covered by Mevprop, however. (Participant, YouCity Contest)
The shared insights were not necessarily new, but they helped the community to further enrich the understanding of a problem or to refine proposed ideas. For instance, participants shared videos of existing solutions to point out examples or new directions to explore and to stimulate discussions:

*I made the same suggestion to the Thailand boys [note by the authors: a group of participants from Thailand] but I would appreciate also your feedback.*

*What about avoiding the metal rails of a tram system and use the same technology with wheels? Here is a link to trolleybuses http://www.youtube.com/watch?v=ouMjgcj8NQ0. I think that such a system could enable medium sized vehicles in a congested area like Vientiane and provide for a smoother ride. Probably your vehicles are too small to use such a system, but it is a thought.*

*(Participant, YouCity Contest)*

Highlighting pieces of information with the help of features like idea evaluations and tagging allowed participants to channel attention towards relevant and promising parts of the controversial discourse. To motivate individuals to engage in this important activity of highlighting, Bombardier also established an award for the most active community member. In total, participants provided more than 1,390 evaluations of submitted ideas. In doing so, the wicked problem was further refined and framed by the crowd in a bottom-up fashion. At the same time, highlighting increased transparency about the collective’s view toward critical problems and potential solutions for them. For example, encouraging posts were essential to point out which ideas and problems individuals considered to be critical:

*Really excellent presentation. [...] The parts I think are truly unique and exceptional are the battery trade in program, and the idea of a specific lane for Tuk Tuks. [...] (Participant, YouCity Contest)*

The YouCity crowdsourcing initiative benefited from the fact that comments were not just encouraging but also conflicting at times, and thus helped to make the inherent contradictions of wicked problems salient. We learned that controversial discussions align perspectives, clarify the critical issues, and help to refine rough ideas and solutions. A participant’s comment illustrates a disagreement among participants regarding estimated efforts and costs of a technological development:
Thanks for the comment [...]. I do agree that hardware cost will be a little high. But software I don’t think will be that complex. Because I have already created a simulation of such a city on a small scale as a swing program. And that I have built singlehandedly. Building it as a team will require [a] lot less time and effort. Building a system for underground will be less complex. I’ll upload the video of my simulation application very soon for reference. (Participant, YouCity Contest)

Apart from disputes related to technical or financial aspects of submitted ideas, participants predominantly provided highlights to improve solutions. Controversial discussions resulted in positive alignment and remained constructive in most cases.

I think the design of your presentation is excellent! The two concerns I have would be how to keep other vehicles out of the TukTuk lane (in a city where it's widely known that traffic laws are almost never enforced), and second, how to keep people who are getting out of a TukTuk from creating a traffic jam by trying to run to the side of the street. I might suggest moving the TukTuk lanes to the outsides of the street rather than in the center and actually blocking them off so that only TukTuks can get into them—and to stop traffic/motorcycles/etc. from weaving in and out of the lanes. Moving those lanes to the right edge of the road would also alleviate having to build all the pedestrian bridges (which would also be difficult for people carrying large loads to use). (Participant, YouCity Contest)

Digital platform features, as well as instructions to the crowd, supported the crowd in combining different perspectives. Indeed, participants pointed to links and interdependencies between two or more ideas when submitting or commenting on others’ ideas. Out of 178 ideas submitted, sixty-six ideas were explicitly referenced by other ideas.

Triggering knowledge integration through team-submissions: In addition to crowd-level measures to stimulate integrative problem solving, the YouCity platform also encouraged team submissions to allow for deeper knowledge integration. A distinct phase at the beginning of the initiative was dedicated to the formation of groups and community managers; it encouraged participants with
complementary backgrounds or ideas to join forces. Indeed, participants opted for this mode of idea generation. In total, twenty-six teams emerged, consisting of 3.6 team members on average. Participants even went as far as to suggest possible collaborations between teams by merging ideas and developing integrative solutions:

*Fundamentally the ideas we have put forth are very similar and rely on a lot of the same base concepts. It would be great if we could figure out a middle ground to merge the best parts of the two, though I understand that may not be possible.* (Participant, YouCity Contest)

*Using problem contextualization to trigger local contextualization:* Besides knowledge co-creation, the acquisition phase focused on nourishing the creation of contextualized solutions for a particular smart city ecosystem through *problem contextualization*. As mentioned earlier, the call for ideas was two-fold: The proposed ideas could relate to urban mobility as a global problem, or they could be tailored to the specific ecosystem and local conditions of one out of three cities: London, Belo Horizonte, or Vientiane. The crowdsourcing platform provided information about each of the three cities, and encouraged individuals to select one of the three cities to elaborate on a problem, and present a local innovation to solve it. At the same time, individuals could also select multiple cities or submit their solution as a truly ‘global’ solution without any city reference. In more abstract terms, the processes supported the crowd to either narrow or ‘abstract’ their problem-solving process. The crowd opted for both types of submissions: Local or global solutions. Within the first task of the contest, 36 ideas were submitted for London, 25 were submitted for Belo Horizonte, 14 for Vientiane, and 15 were submitted as global solutions.

**Phase 3: Assimilating knowledge from the crowd**

The assimilation phase was essential to further contextualize and integrate the crowd-sourced solutions. We will next discuss what we learned about the actions that facilitated Bombardier to align the collective ecosystem interests with their corporate agenda.
Providing transparency about the corporate agenda: Bombardier took measures throughout the online contest phase as well as in a subsequent face-to-face co-creation session to ‘ease’ the assimilation with the help of transparency about Bombardier’s corporate interests, goals, and also know-how. To facilitate the assimilation of the crowd-sourced knowledge, Bombardier made internal corporate technologies transparent, in a very subtle way. They selectively revealed their internal know-how without distracting the crowd. For example, feature films about Bombardier’s in-house technologies and products, as well as other corporate information, were disseminated among the participants. After the completion of the online contest, Bombardier held a face-to-face innovation camp at Bombardier’s Global Transportation headquarters in Berlin. The camp took place during the InnoTrans 2012, the world’s largest trade fair focused on rail transport. During this camp, Bombardier provided further clarity about the internal technologies they were working on.

Supporting co-creation between employees and crowd members: The innovation camp particularly focused on co-creation between firm employees and crowd members. The co-creation session brought together an interdisciplinary group of individuals: the international participants and teams who submitted the top three ideas in the previous online contest, various Bombardier representatives with innovation, marketing, and technology backgrounds, external industrial designers, and specialized workshop facilitators. In a four-day series of workshops and co-creation sessions, participants presented their ideas, discussed major needs, and elaborated the solution concepts. While representatives of Bombardier had not been actively engaged in the crowdsourcing initiatives, the Bombardier people were now an integral part of the workshop team. During the process, Bombardier’s representatives provided information about their technological knowledge as well as their strategic interest with respect to future urban mobility innovation. Confronting users and citizens who participated in the previous contest with Bombardier’s perspective additionally challenged their ideas and led to aligned and more holistic concepts. The interactive mode of co-creation facilitated the alignment of objectives among the different stakeholders, and prepared the development of technologies as well as the related business models for bringing a solution to the market. The originally submitted ideas were further enriched by Bombardier’s internal knowledge and capabilities in the area of urban mobility.
innovation. With the support of industrial designers, ideas were visualized (see Figure 1) and further developed into more mature concepts.

![Figure 1: Mobility concept elaborated during the innovation camp in Berlin](image)

The crowd’s proposed solutions: How did they integrate and contextualize the urban innovation ecosystem?

Having provided insights into how Bombardier designed the process to aim at integrative and contextualized solutions in the previous chapter, we next explored the outcome of this process. We take a closer look at characteristics of the conceptual solutions submitted by the crowd both in terms of the degree of smart city ecosystem integration and also contextualization. Both factors are pivotal in a firm’s effort to shape the innovation agenda of smart cities.
Integration: The crowd’s perspective towards interconnected smart city ecosystems

When analyzing the crowdsourcing process, we learned that the YouCity civic crowdsourcing process encouraged the development of holistic and integrative solutions. Thus, the question we asked was: How do such integration activities materialize in the actual solutions developed by the crowd? Do they actually lead to solutions that focus on ecosystem aspects like universal access, multimodality, or integration of private and public transportation (Lerner, 2011)? Integrative solutions may be essential for smart mobility solutions in urban areas as they allow cities to make best use of their existing mobility assets and infrastructures, while offering benefits for citizens and businesses living in a particular city. Integration also raises the question about the role of the corporate sponsor in the proposed mobility solution, as well as the integration of public and private offerings. To find an answer for this question, we analyzed the 90 original proposals submitted for task 1 with respect to four integration attributes (Table 1).

<table>
<thead>
<tr>
<th>Attribute/Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Ecosystem actor integration</td>
<td>Does the idea describe the integration of the different mobility ecosystem actors?</td>
</tr>
<tr>
<td>(2) Multimodality</td>
<td>Does the solution integrate different mobility modes (e.g. train, car, bike, metro)?</td>
</tr>
<tr>
<td>(3) Universal access</td>
<td>Does the idea ensure universal access for multiple demographic groups?</td>
</tr>
<tr>
<td>(4) Integration of private and public mobility systems</td>
<td>Does the idea integrate both private and public mobility systems?</td>
</tr>
</tbody>
</table>

Table 1: Attributes of integrative solutions

Our explorative content analysis showed that the crowd proposed solutions that integrate the ecosystem. As shown in Figure 2, about half of the solutions proposed the integration of different actors and organizations in the mobility ecosystem, ranging from infrastructure providers to multiple mobility service providers and end-users. Multimodality was also addressed by about half of the proposed solutions. Interestingly, only 35% of the solutions considered universal access and the integration of
various demographic groups. We learned that less than a third of the ideas explicitly integrated private and public mobility systems. These findings pointed managers at Bombardier to the difficulties in realizing fully integrated solutions from a citizens’ point of view.

To support integrative solutions, the YouCity challenge encouraged the formation of teams among strangers. Some of the participants chose this option. 32% of the submissions in our sample were team-based solutions, developed by 26 teams. Team submissions may facilitate a deeper knowledge exchange due to more cohesive and reciprocal interactions within team boundaries (Conklin, 2005; Espinosa et al., 2007; Kunz and Rittel, 1970; Tsoukas, 2009; Yuqing et al., 2007). At the same time, there is also the risk that teams become too inward-focused due to the boundaries and ‘silos’ created.

In order to shed light on the role of team-based innovation for the development of integrative solutions, we also present the integrative nature of team-based solutions in Figure 2. A comparison of team-based and individual submissions suggests that the former are more integrative with respect to the multitude of ecosystem actors, the modes of mobility, the accessibility for different mobility users and demographic groups, and the integration of the public and private sectors. In sum, team-based submissions seemed to facilitate the development of integrative solutions, which holistically considered various stakeholders, service modes, and user needs.

![Figure 2: Integrative solutions and team boundaries](image)

13 We performed a Chi-square Fisher exact test, and the difference between the groups seems to be significant for all attributes except for integration of private and public mobility assets at the level $p<0.05$, or $p<0.1$ (difference for ecosystem is significant at $p<0.05$, multimodality is significant at $p<0.1$, universal access is significant at the level of $p<0.05$.)
Team-based submissions equally benefit from the crowd-based co-creation mechanisms such as sharing and highlighting. In YouCity, any registered user could comment on team-based submissions, vote to highlight the importance of the proposed solution, and also suggest that team-based ideas are integrated with other ideas. Indeed, we found that team submissions received a larger number of evaluations and also a better community score than individual ideas (Table 2). This suggests that despite the risk that teams may become too inward-focused, crowd-embedded team innovation may overcome this risk as the teams are stimulated by the feedback and resulting discussions of the crowd.

<table>
<thead>
<tr>
<th>Mode of idea generation</th>
<th>Average number of idea evaluations</th>
<th>Average evaluation of ideas (5-point Likert scale)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Team submissions</td>
<td>10.4*</td>
<td>3.5*</td>
</tr>
<tr>
<td>Single submissions</td>
<td>7.8</td>
<td>3.1</td>
</tr>
<tr>
<td>All submissions</td>
<td>8.6</td>
<td>3.2</td>
</tr>
</tbody>
</table>

*p<0.10, **p<0.05, ***p<0.01 (one-sided ANOVA)

Table 2: Popularity of team solutions vs. individually developed solutions

In sum, this analysis suggests that the Bombardier YouCity case indeed supported the creation of solutions that integrate the perspective of different smart mobility ecosystem actors. At the same time, the results point to the difficulties that firms like Bombardier face when aiming for full ‘interconnectivity’. Further, we learned that both team and individual efforts have their advantages and disadvantages. For example, while teams seem to take a more holistic and integrative view in terms of ecosystem actors, mobility service modes, demographic groups, and the mutual existence of public and private mobility systems, individuals pay more attention to the central role of Bombardier in the emerging urban ecosystem. This suggests that firms could benefit from the dual existence of teams and individuals.
Contextualization: The crowd’s deep engagement with the local urban ecosystem context

Contextualization is another important condition of successful wicked problem solving. Thus, the question we focused on next was: How does the crowd contextualize the solutions? To examine whether the YouCity crowd considered the context in their problem-solving activities, we analyzed 90 original ideas with respect to the nature of the contextualization of the solution. As shown in Table 3, we focused on six attributes that show whether and how the crowd contextualizes the solutions towards a particular local urban ecosystem.

<table>
<thead>
<tr>
<th>Attribute/Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Consideration of local physical infrastructure</td>
<td>Does the submission consider the particularities of the local physical urban infrastructure (e.g. roads, buildings, etc.)?</td>
</tr>
<tr>
<td>(2) Consideration of local digital infrastructure</td>
<td>Does the submission consider the local digital infrastructure (e.g. wireless internet, sensor networks etc.)?</td>
</tr>
<tr>
<td>(3) Consideration of local citizen needs</td>
<td>Do these ideas refer to specific mobility-related needs of citizens in a particular urban area?</td>
</tr>
<tr>
<td>(4) Redefinition of existing urban infrastructure</td>
<td>Does the submission present a new way of using existing physical or digital urban infrastructures (redefinition of its function)?</td>
</tr>
<tr>
<td>(5) Emerging smart city technology</td>
<td>Does the submission propose an emerging smart city technology that is in the adoption phase?</td>
</tr>
<tr>
<td>(6) Consideration of local urban governance structures</td>
<td>Does the submission discuss the role of the city government and its central role in governing urban mobility?</td>
</tr>
</tbody>
</table>

Table 3: Attributes of locally contextualized solutions

As depicted in Figure 3, many ideas build upon the existing local physical infrastructures of a particular city (about 93% of the ideas). For example, the TukTuk Rapid Transit idea builds upon the existing Bus Rapid Transit system, which is common in various cities around the world and already has an extensive infrastructure in place. The consideration of the existing digital infrastructure played a less important role in the proposed solutions (31% in total).
We found that more than 80% of the submissions creatively redefine existing urban infrastructures in the context of new mobility solutions. They propose a functional integration of existing and new infrastructures. For example, one rather futuristic submission proposed a three-layer structure for the city of London that integrates different infrastructures (road, underground, rail) into a unique system of urban mobility. This finding suggests that the crowd moved beyond a linear extension of existing solutions towards a creative transformation with the help of smart city solutions. Further, the crowd deeply engaged with the needs of local citizens as well as the role of the city government for novel mobility solutions. 83% of the ideas considered the particularities of mobility needs of the citizens living in a particular city. In total, 74% of the ideas focused on the role of the local city government. This suggests that supporting contextualization in the process triggers individuals to immerse themselves in the physical local context, but also the social and even political context. This helps firms like Bombardier to explore opportunities for smart mobility that expand and also transform existing mobility solutions with help of information technology.

As discussed earlier, Bombardier encouraged submissions that were focused on a specific city while also supporting so called ‘green field’ ideas. To put it differently, they used problem contextualization to widen or narrow the problem-solving process of the crowd. The question that we explored was how a focus on one particular city context is reflected in the outcome. Figure 3 presents...
the descriptive results both for single-city focused ideas as well as globally submitted ideas. We found that there is a significant difference with respect to two attributes: the consideration of local government structures and the integration of smart city technologies. We further found that city-focused submissions address the role of city councils in designing urban mobility innovations and aligning various urban mobility actors; from infrastructure providers to service providers and the final mobility users. 92% of the local ideas that focused on a particular city tried to find a solution that integrated the local policy makers and their role in urban mobility. In contrast, submissions that were proposed as global solutions considered the governance context less frequently (43%). Apparently, creating an idea for a single city leads individuals to embrace current governance conditions. We found that global submissions were frequently focused on revolutionary smart city technologies such as automated driving (80%), while local solutions were not. This points firms like Bombardier to the contradictory tension of the need for localization on the one hand, and the corporate interest in global solutions on the other hand.

**Discussion and implications**

The contribution of our study is twofold. It enriches the lively discourse on smart city innovation, and also expands prior work on firm-sponsored innovation crowdsourcing (Cohen, 2012; Alexy et al., 2013; Boudreau and Lakhanı, 2013; Chesbrough, 2012; Malhotra and Majchrzak, 2014; Prpić et al., 2015). Overall, it has important managerial implications for firms that have identified smart cities as an important trend and that aim to establish innovation leadership in smart cities.

The existing discussion on smart cities – both in research and practice – highlights that smart city programs cannot be realized by city governments in a traditional way of governance, which is driven by the logic of professionalism, contracting, and governmental authority (Noveck, 2015). Instead, practitioners and scholars highlight the need for collaborative innovation efforts of an urban innovation

---

14 We performed a Chi-square Fisher exact test, and the difference between the groups seems to be significant for all attributes except for integration of private and public mobility assets at the level $p<0.05$, or $p<0.1$ (difference for ecosystem is significant at $p<0.05$, multimodality is significant at $p<0.1$, universal access is significant at the level of $p<0.05$.)
ecosystem (IBM, 2015). Large firms like IBM, Siemens, and Bombardier make efforts to establish themselves as innovation leaders of such ecosystems. However, shaping the innovation agenda of a smart urban innovation ecosystem is a difficult endeavour for firms. As pointed out by Williamson and De Meyer (2012), ecosystem leadership requires them to provide vision about innovation opportunities and to pinpoint city authorities and other firms to value-adding innovation opportunities. In the context of smart city innovation, this exposes firms to urban innovation challenges that are truly ‘wicked’ from a corporate perspective. Our case example of Bombardier’s crowdsourcing initiative provides insight into how firms can establish a smart city ecosystem advantage by exploring innovation opportunities for wicked urban innovation challenges jointly with a civic innovation crowd. Bombardier was able to establish a lead partner role in three cities on different continents by pinpointing city authorities and other ecosystem actors to innovation opportunities in the area of smart mobility. Further, it also increased its value for other cities around the globe that were not explicitly addressed in the YouCity initiative. Our deep exploration of the process as well as the outcome of the YouCity case highlights that this requires a very careful design of the three crowdsourcing process stages of (1) constructing the crowd, (2) acquiring knowledge from the crowd, and (3) assimilating the crowd’s knowledge. In Table 4, we present eleven design principles for civic innovation crowdsourcing. These eleven principles support managers to facilitate integrative and contextualized problem-solving activities of the crowd. They should guide managers in constructing the right crowd. Even more importantly, they should help them to manage the crowdsourcing process in a way that the crowd creates solutions that consider the broader smart city ecosystem context.
| Diversity | #1: **Take an urban innovation lifecycle perspective:** When constructing the crowd include the individual actors that participate throughout the urban innovation lifecycle ranging from engineers and scientists, urban planners and entrepreneurs to internal organizational stakeholders as well as mobility users and citizens  
#2: **Support tri-partite diversity:** Recruit a diverse crowd with respect to three dimensions: geographic context, skills, and ecosystem roles |
| --- | --- |
| Transparency | #3: **Foster ‘objectification’ during problem formulation:** Make the process of problem formulation transparent by encouraging the crowd to share their problem view and support it with facts in order to elicit a contradictory dialogue based on ‘objective’ grounds  
#4: **Support dialogue and feedback mechanisms:** Invite the crowd to reveal its point of view towards submissions proposed by others even if they are contradictory (e.g. via comments, votes, and evaluations)  
#5: **Create a visible and accessible pool of knowledge:** Empower participants to reveal their ideas and share information throughout the process  
#6: **Participate as a transparent sponsor:** Make your organization’s strategic interest transparent in order to align perspectives and business models in the assimilation stage |
| Knowledge contextualization | #7: **Engage the ‘local’ crowd:** Encourage participants with context-specific knowledge to share information and provide feedback to jointly develop more customized solutions  
#8: **Establish ‘problem’ boundaries to trigger local innovation:** Establish problem boundaries around cities and facilitate the crowd to engage more deeply with the local urban context  
#9: **Mix different levels of problem boundaries:** To trigger both the development of localized solution as well as global revolutionary ideas encourage both city-focused submissions as well as global solutions |
| Knowledge integration | #10: **Enable combination of knowledge:** Implement an iterative process and support the crowd to integrate dispersed and contradictory knowledge by stimulating dialogue (e.g. via targeted community management) and providing social technologies (features for sharing, highlighting, and combination) and incentives for knowledge sharing and combination (e.g. award for best community spirit)  
#11: **Support multiple levels of knowledge integration:** Encourage both team-based innovation as well as individual innovation to foster knowledge integration at the macro (crowd) as well as micro (team) level |

**Table 4: Design principles for firm-sponsored civic innovation crowdsourcing and smart city innovation**
These insights also enrich the existing work on firm-sponsored innovation crowdsourcing, which show the importance of knowledge integration among a diverse crowd to solve ill-structured innovation problems (Boudreau and Lakhani, 2013; Malhotra and Majchrzak, 2014). In the particular context of smart city innovation, we show that firms need to move beyond just facilitating knowledge integration among a crowd that is diverse in terms of expertise. To provide vision to smart cities globally, they need to work a very particular crowd in a ‘smart’ way: a crowd that reflects the nature of a smart city ecosystem. Further, they need to carefully design the crowdsourcing process in order to develop a unique ‘extra-organizational resource’ for smart city innovation. This resource allows them to sense and seize innovation opportunities in smart cities (Teece, 2007).

In our case analysis, we not only show that integrative and contextualized solutions are important, but also ‘how’ they can be realized in a three-staged process. (1) During the crowd constructing process, it is pivotal to take an ecosystem perspective and purposively construct a crowd that is diverse in three dimensions: skills, geography, and ecosystem actors. Existing work assumes that the crowd is already ‘there’ without being aware of the need to construct a crowd. We show that for wicked urban innovation challenges, firms need to invest resources to source participants that mirror an urban innovation ecosystem. Further, since smart cities are a global movement, it is important to align the crowd with the strategic orientation of a firm. (2) During the knowledge acquisition process, firms need to focus on multiple measures that may trigger integrative and contextualized problem solving: A multi-staged problem solving process, a transparent dialogue among the crowd, crowd co-creation, and problem contextualization are essential. Interestingly, we find that teams are not hindering knowledge integration, as argued in prior work. In the contrary, Bombardier benefited from ‘dual’ knowledge integration, among individuals and teams. (3) In the assimilation phase, firms need to proactively integrate internal and external know-how, to trigger the alignment with the corporate agenda, and to reconfigure the internal capabilities needed to provide vision for the smart city ecosystems of the future. From a corporate point of view, it is very important to integrate and align the crowd’s problem solving process with the internal organizational know-how early on. This is accomplished by providing transparency about the internal technologies and know-how in a very subtle way.
Our findings also contribute to the discussion on how firms can shape the innovation agenda of other firms within their innovation ecosystem through firm-sponsored innovation crowdsourcing. We focus our contributions on the particular context of smart cities where governments and citizens are an integral part of the innovation ecosystem (Alexy et al., 2013). Indeed, firms like Bombardier reveal their problems to set an innovation agenda and trigger alignment of the innovation paths of other ecosystem actors including those of city authorities. Our study provides insight into how the process design might affect the nature of the outcome of this agenda-shaping process. In particular, we point to role of multiple boundaries within the crowd. The way managers design these boundaries may affect how the crowd engages in the agenda-shaping process. Overall, we learn that ‘duality’ may be fruitful. The mutual existence of team-based and individual submissions may support the development of integrative solutions that consider both the interest of the smart city ecosystem as a whole as well as the interest of the corporate sponsor. Further, the mutual realization of both single-city focused as well as globally-oriented ideation may help to address the dual need for both contextualized solutions and more revolutionary and global interconnected solutions. Besides contextualized solutions with a high ‘fit’ to a particular city, the ‘green field’ ideas allowed Bombardier to provide vision beyond a single-city focus and establish global leadership in the emerging discussion on smart cities. In sum, civic innovation crowdsourcing can – if properly designed – align the collective interest with the corporate innovation agenda, and trigger ecosystem partners and city authorities to collaborate.

**Concluding remarks**

The ‘smart city’ is an important megatrend, which has triggered firms to lead smart city innovation efforts and gain global recognition for it. Smart mobility is a central component of smart city initiatives around the world and one particular kind of wicked problem. However, of equal interest are other urban wicked problems such as smart energy or smart living. Our findings may be equally applicable to these challenges, and may guide firms in gaining leadership in these smart city areas.
In sum, our design principles provide actionable guidelines for managers of other firms that operate in a smart city context. We also hope that other urban strategists, thinkers, and researchers in the emerging fields of smart cities will build upon our findings, deepening our insights on the particularities of the process design of firm-sponsored civic innovation crowdsourcing so that firms can shape the agenda of smart cities by working the crowd in a smart way.
References


Appendix D: Paper 4

Consumer empowerment in crowdsourcing systems: Effects of perceived empowerment on consumers’ innovative behavior and change in brand passion

Bilgram, V.; Füller, J.; Piller, F.

To be submitted to R&D Management
Consumer empowerment in crowdsourcing systems – Effects of perceived empowerment on consumers’ innovative behavior and change in brand passion

Crowdsourcing systems are increasingly used by companies to co-create new products with consumers. While consumer-brand interactions in conventional marketing campaigns are rather limited, consumers who participate in the ideation of products and intensively interact with the brand may experience strong feelings of empowerment. A sense of empowerment may arise when consumers feel they are capable of performing a meaningful task which serves a purpose they endorse and which has an impact on the brand’s innovation efforts. Our research shows that this state of enhanced empowerment not only affects the innovative behavior of consumers, but also has an impact on emotive consumer-brand relationships. This paper provides empirical evidence that individual consumers’ empowerment experienced in a real-world crowdsourcing initiative has a positive effect on the quality of consumers’ submissions. In particular, the effect of empowerment on submission behavior is found to be stronger for first-time participants than for consumers with previous crowdsourcing experience. Additionally, results reveal that perceived empowerment is positively associated with a change in brand passion increasing the level of passion consumers feel towards the host brand in the course of their participation. Our study further finds that perceived fairness has an impact on participants’ change in brand passion. The results suggest that consumer empowerment is a favorable psychological state which is crucial in crowdsourcing systems as it offers brands new opportunities to co-create better ideas and build strong, passionate relationships with consumers.
Introduction

With the emergence of the Internet and social technologies in particular, the concept of *prosumers* (Toffler, 1980) has gained new impetus as consumers are increasingly enabled to adopt tasks originally performed by producers (Pires et al., 2006; O’Hern and Rindfleisch, 2010; Fuchs et al., 2010; de Jong and de Brujin, 2013). Consumers have grown out of their traditional role as buyers of products and claim to play a more active and meaningful role as co-creators of new products (Fuchs and Schreier, 2011; Baldwin and von Hippel, 2011). Companies like Muji (Nishikawa et al., 2013) and Beiersdorf (Lakhani et al., 2014) achieve great success developing new products in close collaboration with consumers. Other companies have even internalized the co-creation principle in their business model. Local Motors, for instance, manages a globally dispersed community of car enthusiasts to facilitate a distributed product innovation process in one of the most complex technology-driven industries (King and Lakhani, 2013).

The new role of consumers is not limited to that of choice-makers at the end of a company’s value creation process, instead, consumers may also take on the role of constructors who produce the alternatives to choose between (Firat and Dholakia, 2006). This atypical understanding of consumers provides opportunities to grant consumers even more power in value creation. As a consequence, a new age of empowerment is burgeoning facilitating unprecedented forms of consumer empowerment which even extend into the producer domain. Lately, the principle of crowdsourcing became *de rigueur* in the management of innovation (Boudreau and Lakhani, 2013) as well as in the marketing discipline (Thompson and Malaviya, 2013; Lawrence et al., 2013). Pötz and Schreier (2012) found empirical proof that crowdsourced ideas, i.e. ideas submitted by users in the context of a contest, outperform ideas generated by a firm’s professionals in terms of novelty and customer benefit (similar: Magnusson et al., 2003). Even more compelling are the findings of Nishikawa et al. (2013) who compare user-generated products to designer-generated products. The study shows that three years after product launch revenues of user-generated products are five times higher than those of designer-generated products. Hence, these studies indicate that empowering consumers and using their creativity in the innovation process may lead to superior products.
Ever since the potential of crowdsourcing became apparent, researchers focused on exploring the formula for successful crowdsourcing initiatives. It was found that enjoyable experiences (Füller et al., 2011; Faullant et al., 2011), interaction experience (Nambisan and Baron, 2007), tool support (Füller et al., 2010) and fairness (Franke et al., 2013; Gebauer et al., 2013) are crucial factors in designing crowdsourcing campaigns. Due to the inflation of crowdsourcing initiatives in recent years, however, curiosity and appreciation for this approach tend to decrease and some consumers may even consider crowdsourcing a fad. With increasing marketing fatigue among consumers (Darke and Ritchie, 2007; Keller and Fay, 2012) and a yearning for self-actualization and substance in life (Batra et al., 2012; Firat and Dholakia, 2006), we argue that enjoyable and fair experiences might not suffice to activate the crowd. Rather, we propose that consumers aspire to meaningful and impactful interactions with brands.

This study discusses the behavioral and attitudinal consequences of consumer empowerment in the context of crowdsourcing (that is an online idea contest in this study). Specifically, we explore how empowerment affects consumers’ actual innovative behavior (that is, the quality of submissions) and the emotive consumer-brand relationship (that is, consumers’ passion towards the brand). We further investigate how previous experience with crowdsourcing initiatives moderates the relationship between empowerment and submission behavior. In order to fully utilize the potential of crowdsourcing, we reason that nourishing feelings of empowerment is a sine qua non for any form of co-creation with consumers, in particular for first-time participants. Drawing on the concept of empowerment in organizational science (Thomas and Velthous, 1990; Spreitzer, 1995), we understand consumer empowerment as the strategy of actively engaging consumers in value creation by interacting with them in a meaningful, self-determined and impactful way.

Although the concept of empowerment has recently attracted more attention in the research on co-creation, little is known about the role of empowerment in real-world crowdsourcing initiatives. Füller et al. (2010) find that perceived empowerment leads to a higher intention of future participation and trust in the organization that initiated the crowdsourcing campaign. Fuchs et al. (2010) conduct experiments to explore psychological consequences of what they call empowerment to select. They find consumers show an increased demand for a product (i.e. higher willingness to pay) when they are
empowered to choose the product which is then offered in the market. However, the experiments are limited to the mere selection as opposed to the co-creation of products by consumers. In a set of experiments referring to the notion of *empowerment to create*, Fuchs and Schreier (2011) as well as Schreier et al. (2012) focus consumers from the periphery, i.e. consumers who were informed that the products had been co-created by consumers, but who did not actually participate in the creation themselves (similar: Moreau and Herd, 2010). These non-participating consumers were found to perceive the firm as more customer oriented, showed more favorable attitudes towards the firm and stronger behavioral intentions when apprised of the co-creation setting (Fuchs and Schreier, 2011). In a similar experimental design, Schreier et al. (2012) find that consumers who are manipulated that products have been co-created with other consumers have enhanced perceptions of the firm’s innovation ability.

Even though researchers have found support for the superior innovative abilities of consumers from an aggregated point of view reflecting the entire crowd of participants (Nishikawa et al., 2013; Pötz and Schreier, 2012), the impact individuals’ perceived empowerment has in co-creation remains unexplored. Thus, it is still unclear how consumers’ innovative behavior in terms of the of submissions is affected when they feel empowered to create products themselves in a real-world setting, i.e. when consumers actually experience empowerment on an individual level as opposed to an experimental empowerment manipulation. In addition, research on empowerment strategies have so far neglected the interaction of perceived empowerment and previous participation in the firm’s crowdsourcing system.

Besides the effect on consumers’ innovative behavior, we pay attention to how empowerment increases consumers’ love-like relationships with brands. While Fuchs et al. (2010) make a valuable contribution highlighting the *empowerment-product demand* effect, little attention has been paid to emotive consumer-brand relationships as a consequence of empowerment. Nambisan and Nambisan (2008), for instance, point out that companies widely ignore the broader impact of empowerment strategies on consumer-brand relationships (similar: Sawhney et al., 2005). Recently, researchers have shown an increased interest in the concept of *brand love* (Thomson et al., 2005; Carroll and Ahuvia,
2006; Albert et al., 2008; Batra et al., 2012) and related notions such as brand passion (Whang et al., 2004; Matzler et al., 2007; Bauer et al., 2007; Füller et al., 2008). Our study investigates the effect of empowerment on the change of consumers’ passion towards the brand (measured before and after the crowdsourcing campaign). Further, we explore the role of fairness as an antecedent of the submission behavior and the change in brand passion in our model.

Transformation of consumer empowerment

Historically, consumer empowerment became manifest at and around the point of purchase where consumers in their role as buyers originally interacted with firms. With consumption being the “end and aim of all economic action” (Smith, 1776 rephrased by Vaile, 1940), for a long time consumers have been empowered in a sense that “everyone who goes into a shop and chooses one article over another is casting a vote in the economic ballot box” (Powell, 1969, p. 33). While consumer empowerment originally referred to the emancipation of consumers in their ‘natural habitat’, i.e. their role as buyers, the notion has extended to new forms and intensities of empowerment more recently. Consumer empowerment entered entirely new dimensions, with the rise and wide diffusion of information and communication technologies, particularly the Internet (Labrecque et al., 2013). The Internet facilitates the access to information and thereby counterbalances information asymmetries between companies and consumers (Harrison et al., 2006). Additionally, consumers are enabled to connect and exchange with their peers. They share their product experiences with thousands of like-minded consumers and actively shape the public discourse of brands (Kozinets et al., 2004). Thus, consumers have become more powerful actors in the market as they can make informed purchase decisions. Ultimately, consumers as a collective are empowered by social technologies to join forces and carry on a dialogue with companies on equal terms (Pitt et al., 2002; Pires et al., 2006; Wang et al., 2013).

Besides a better level of information, the Internet has also tremendously changed the role of consumers in the purchase stage itself. Most notably, concepts such as mass customization have given consumers more control in the purchase stage by allowing them to configure and select their desired
individualized product within reasonable costs (Franke and Piller, 2004; Ogawa and Piller, 2006; Franke et al., 2010). The burgeoning technology of 3-D printing pushes the boundary of customization heralding the era of consumer production (de Jong and de Brujin, 2013). 3-D printing empowers consumers in an even more rigorous fashion as they also execute the production themselves by printing products based on digital data provided by firms.

While granting consumers more power and control in their role as buyers is a general practice today, firms have even started to open up previous stages of the value creation process to consumers. Based on the user innovation paradigm (von Hippel, 2005; Baldwin et al., 2006), consumers have been increasingly involved as valuable partners in firms’ innovation processes. For example, consumers are asked to determine a firm’s product offering (Fuchs et al., 2010) or even create new product ideas (Füller et al., 2010; Füller et al., 2011). Following Fuchs and Schreier (2011), we differ between empowerment to select and empowerment to create strategies. In contrast to empowerment to select, empowerment to create is employed in considerably earlier phases of new product development, i.e. the concept phase at the heart of a firm’s creative process. Firms assign creative and constructive tasks to consumers, thus, consumers are not only choice-makers, but a resource integrated in the creation of value. Co-creating ideas with consumers is a consumer empowerment strategy widely detached from the later point of purchase. As a consequence, co-ideation involves consumers in an atypical role enabling them to adopt traditionally producer-dominant constructive tasks (Firat and Dholakia, 2006). For instance, companies like Pepsi and Threadless have embarked empowerment to select strategies. They implemented mechanisms of so-called binding votes trusting the democratic discretion of consumers with the selection of the products which will eventually be offered in the market (Fuchs et al., 2010). In contrast, empowerment to create approaches have been taken by Procter & Gamble and BMW. Both companies have established their own permanent crowdsourcing platforms (P&G Co-Creation Channel and BMW Group Co-Creation Lab) to harness consumers’ ideas. These platforms serve as hubs for various innovation challenges revolving around different brands in the firm’s portfolio or currently pressing questions (Bartl. et al., 2010). While in the aforementioned cases consumers were empowered by companies, user communities such as the Apache software community even go beyond the firm-led
empowerment processes. They have managed to create brands and diffuse them among peers completely independently of firms, i.e. they are autonomous producers in user-only innovation systems (Füller et al., 2013). Our article focuses firm-initiated empowerment strategies revolving around the co-ideation of new products. We argue that empowering consumers to participate in co-ideation may achieve the highest levels of empowerment as consumers are part of the actual creative process, from which ideas for future products may spring. Thus, they participate and witness a moment which may significantly change a company’s future innovation route. The meaning of consumers’ tasks is also reflected by the mostly unrestricted solution space (von Hippel and Katz, 2002) in the ideation of new products in contrast to a rather restricted space in mere choice-based empowerment. Hence, for the purpose of this paper, we refer to empowerment as the strategy of actively engaging consumers in co-creating new product ideas via crowdsourcing by interacting with them in a meaningful, self-determined and impactful way. Thereby, consumers accomplish or co-accomplish tasks traditionally executed by firms.

**Theoretical background of empowerment**

The concept of empowerment has been applied as a theoretical basis in various domains ranging from employee (Hackman and Oldham, 1976; Conger and Kanungo, 1988; Spreitzer, 1995) and patient (Wallerstein, 1992; Salzer, 1997; Salmon and Hall, 2003; Anderson and Funnell, 2010) to consumer (Pires et al., 2006; Fuchs et al., 2010) and citizen empowerment (Zimmermann and Rappaport, 1988; Fischer, 2006). In all these domains, one party (e.g. the employee, patient or consumer) had been in an inferior and rather powerless position compared to a more dominant party (i.e. the manager, physician or the firm respectively) due to historical reasons or information asymmetries among other reasons (Wathieu et al., 2002; Conger and Kanungo, 1988). Correspondingly, the range of tasks these inferior individuals were assigned to tended to be limited in terms of meaning and impact on the organization’s future path. Besides, the assignment of tasks usually restricted the individual’s self-determination regarding the process and methods employed to solve the tasks. Within organizations, employee empowerment has been a widely acknowledged leadership style to delegate power and motivate employees by giving them meaningful tasks which have expressive value to them (Thomas and
Velthous, 1990; Maynard et al., 2012). As distributed value creation enabled by new technologies has become a reality, companies’ workforce and resources are not limited to employees but extend to external actors such as consumers. Thus, similar to the empowerment of employees, empowered consumers may create more value for the company. Drawing on empowerment literature in organizational science, two different perspectives on empowerment are taken (Conger and Kanungo, 1988). First, empowerment as a relational construct is applied to describe the process of sharing power or control with subordinates, delegation of decision making and practices of participative management (Kanter, 1979; Blau and Alba, 1982). Second, empowerment as a motivational construct describes an individual’s psychological state of increased intrinsic task motivation (Thomas and Velthouse, 1990; Spreitzer, 1995). Deci and Ryan (1985) describe empowerment as a process of enhancing self-determination or feelings of self-efficacy (similar Conger and Kanungo (1988) and Bandura (1977). Thomas and Velthouse (1990) extend the concept of empowerment and argue that empowerment is multifaceted and manifested in four cognitions: meaning, competence, self-determination and impact. In her measurement model, Spreitzer (1995) found that each of the four dimensions contribute to an overall construct of empowerment. Similarly, Seibert et al. (2011) find only little evidence of discriminant validity among the four dimensions of empowerment and show that none of the dimensions of empowerment demonstrates a stronger relationship with any of the outcome variables in the model. Within the empowerment construct, meaning refers to the value of a work goal which the individual assesses by relating it to his or her own ideals and beliefs (Thomas and Velthouse, 1990; Hackman and Oldham, 1976). Competence or the equivalent term self-efficacy (Bandura, 1977) describes the assessment by an individual of how capable he or she is to perform tasks. Self-determination refers to an individual’s causal responsibilities for actions, i.e. the assessment of personal autonomy in his or her course of action (Thomas and Velthouse, 1990). The last cognition aims at the impact an accomplished task has on the environment. The individual judges to what extent his or her action ‘makes a difference’ (Thomas and Velthouse, 1990; similar: Hackman and Oldham, 1976).

Studies on empowerment in an organizational context have suggested various beneficial consequences of empowering employees. Among others, empowerment may lead to positive work
behavior such as increased persistence in activities, concentration and flexibility regarding the work
tasks and a higher quality of the work performance (Hackman and Oldham, 1976; Kirkman and Rosen,
1999; Seibert et al., 2011). In addition, employee attitudes such as job satisfaction and affective
organizational commitment have been found to be positively correlated with empowerment (Cordery et
al., 1991; Seibert et al., 2011). In the context of co-creation, Fuchs and colleagues (2010; 2011) find
empirical proof that empowerment leads to a higher willingness to pay, favorable corporate attitudes
and purchase intentions. Apart from these studies, little is known about the effects of empowerment
experienced by individuals in co-creation environments.

Conceptual framework and hypotheses

We introduce the following conceptual framework in order to explore the relevance of consumer
empowerment on an individual level in the context of crowdsourcing systems. It operationalizes
empowerment according to the psychological construct applied in organizational science which consists
of the factors meaning, self-determination, competence and impact. Further, our framework proposes
two consequences of perceived empowerment. The quality of submissions is a behavioral consequence,
whereas the change in brand passion is suggested as an attitudinal consequence of consumer
empowerment. Further, perceived fairness is introduced to the conceptual framework as an antecedent
to the quality of participants’ submissions as well as consumers’ change in brand passion. In the
following, we derive the hypotheses from literature.

Perceived empowerment

Following Spreitzer (1995) and Thomas and Velthouse (1990), psychological empowerment
encompasses a set of task assessments which are made by individuals and which are associated with
increased intrinsic task motivation. The highest levels of intrinsic task motivation occur when all four
dimensions of a task are high. It is conceptualized as a second order construct determined through the
factors meaning, self-determination, competence and impact. Replicating Spreitzer’s (1995) model of
empowerment as a second-order factor, Seibert et al. (2011) find confirmative empirical support that the unitary empowerment construct is most appropriate. Consumers who voluntarily participate in co-creation are likely to have ideals in common with the host brand and thus feel the task suits their standards. Hence, when actually creating value in the form of new product ideas for this brand, the activity is meaningful to consumers and a sense of empowerment may arise. Through mastery experiences during the act of co-creating, consumers may develop a strong belief in their capabilities (Wood and Bandura, 1989). Apart from the skill set required to perform the task, a strong self-belief in one’s own abilities is necessary for consumers to actually employ their skills and accomplish the task. For instance, an overly complex task in the crowdsourcing campaign may frustrate consumers and decrease feelings of empowerment. Neither may consumers feel empowered through crowdsourcing initiatives when they lack autonomy (Deci et al., 1989). For example, a very limited solution space or toolkit imposing a certain creative process can diminish consumers’ sense of self-determination (Füller et al., 2010). Rather, consumers may want to make their own decisions regarding methods and processes they apply. Last, consumers may only perceive empowerment when the outcomes they create influence the brand’s strategic or operative innovation efforts, i.e. the company’s future products and offerings (Ashforth, 1989). Therefore, we hypothesize:

**H1:** Perceived empowerment is a second order construct determined by the factors meaning, self determination, competence and impact.

*Quality of submissions*

The concept of empowerment is proposed to have desirable behavioral consequences. Empowerment in a work environment was found to positively affect innovative behavior, e.g. creating new and inspiring ideas (Spreitzer, 1995; Kanter, 1983; Seibert et al., 2011). Individuals who experience significant autonomy are more flexible regarding the methods and process they deploy. Thus, they may break new ground and show more innovative behavior (Deci and Ryan, 1985; Thomas and Velthouse, 1990). Further, if individuals feel self-determined and competent and believe their actions have an impact, they are likely to be more change-oriented and think outside the box (Spreitzer, 1995, 1449; Conger and
When consumers feel the task they are trying to accomplish corresponds with their ideals, they care about it and experience a state of empowerment which may release the creative potential within them (Humphrey et al., 2007). What is more, consumers who believe in their abilities to perform the task (e.g. experienced success may be a source of efficacy) are likely to produce better results (Bandura, 1977). Similarly, Zhang and Bartol (2010) found that psychological empowerment has a positive effect on creative process engagement which is likely to result in creative outcomes. Thus, it is posited:

**H2:** Perceived empowerment has a positive impact on the quality of participants’ submissions.

*Brand Passion*

Consumer co-creation has become a viable tool for tapping the creativity and knowledge of external users to spur firms’ new product development. More recently, however, researchers have started to pay more attention to the potential of co-creation for brands to interact with consumers and develop relationships (Nambisan and Nambisan, 2008; Fuchs et al., 2010). In recent years, brand love as a concept of emotional consumer-brand relationships has come into vogue (Ahuvia, 2005; Carroll and Ahuvia, 2006; Albert et al., 2008; Bauer et al., 2009). In consumer research, substantial evidence is provided demonstrating the emotional, love-like relationships between consumers and brands such as Apple Newton (Muniz and Schau, 2005), the VW Beetle (Brown et al., 2003; Aggarwal, 2004) or the Harley-Davidson brand (Berry, 1995; Schouten and McAlexander, 1995). Passion – one of the three dimensions of the triangular theory of love (Sternberg, 1986) – has recently been spotlighted in marketing science. In regard to consumer products, Bauer et al. (2007, p. 2190) refer to brand passion as “a primarily affective, extremely positive attitude toward a specific brand that leads to emotional attachment and influences relevant behavioural factors”. Marketers’ interest in these forms of emotional consumer-brand relationships is fuelled by the desirable behavioral consequences in the context of consumption. Researchers, for instance, found that brand passion leads to increased loyalty (Whang et al., 2004), brand evangelism (Matzler et al., 2007), purchase intention and willingness to pay (Bauer et al., 2007).
Ahuvia (2005) argues that brands tend to require significant investments by consumers in terms of time and energy in order to become loved items. Similarly, findings by Batra et al. (2012) relate passion to behaviors such as investing resources, both money and time, and interacting frequently with the brand. Empowered individuals were found to show enhanced levels of commitment (Thomas and Velthouse, 1990; Seibert et al., 2011) and to interact with brands repeatedly (Füller et al., 2010). Thus, co-creating new products with consumers within crowdsourcing systems may serve as a means to increase brand passion when offering an empowering experience. It is eligible to argue that consumers, who endorse the crowdsourced task and have spent significant amounts of time and creative resources, may develop stronger feelings of passion for the brand over the duration of the crowdsourcing initiative. This means, consumers who felt empowered during the initiative are likely to sense increased brand passion compared to the level of passion before participation. Therefore it is posited:

**H3:** Perceived empowerment has a positive effect on consumers’ change in brand passion.

*Perceived fairness*

Fairness or justice - terms that are often used interchangeably - have been investigated in several research domains such as organizational justice (Greenberg, 1987; Folger and Konovsky, 1989; Moorman, 1991), marketing studies (Oliver and Swan, 1989; Rupp and Spencer, 2006) or in research on court rulings (Tyler, 1987; Thibaut and Walker, 1978). In times of distributed innovation systems, the theory of organizational justice may be extended to actors outside the organization such as the participants in crowdsourcing initiatives. Due to the tournament character and the often unclear intellectual property situation, fairness in the context of crowdsourcing contests is a particularly sensitive and precarious subject (Hoyer et al., 2010; Franke et al., 2013). Franke et al. (2013) point out that, on account of the volatile and loose nature of crowdsourcing systems, fairness perception is also a key factor influencing consumers’ participation and behavior in crowdsourcing initiatives (similar: Faullant et al., 2011). Thus, when consumers consider participation in crowdsourcing, they may not only analyze costs and benefits on an individual basis as described in social exchange theory (Blau, 1964). Rather, they may compare
their outcome-input ratio to the ratio of others. Based on social exchange theory, Adams (1965) underpins the central role of equity theory. He proposes that an exchange is considered fair if the ratio of an individual’s input to the outcome of a dispute, negotiation or decision is considered fair in comparison to the ratio of someone else (similar: Blodgett et al., 1997). These fairness perceptions refer to the distribution of outcomes and are referred to as distributive fairness. Participants in crowdsourcing are likely to consider the firm organizing the initiative as a ‘natural counterpart’ to compare themselves with (Franke et al., 2013). Procedural justice, on the other hand, refers to the policies, procedures and criteria applied to determine the result of a decision-making process (Thibaut and Walker, 1975; Lind and Tyler, 1988; Folger and Bies, 1989). Individuals regard procedures as fair when they have a say in the decision-making process (Tyler, 1988; Thibaut and Walker, 1975; Greenberg and Folger, 1983) and when procedures are consistent, unbiased and based on accurate information (Leventhal, 1980; Leventhal et al., 1980; Greenberg, 1986).

In crowdsourcing systems consumers interact with firms as partners in innovation, i.e. they are an integral part of the ideation process and provide creative input on tasks assigned to them. Due to the proliferation of crowdsourcing campaigns in recent years, consumers become more and more experienced partners in product development and are increasingly aware of the value they create in the process. For instance, Füller et al. (2007) and Franke et al. (2013) describe how consumers feel about the benefits firms reap from their input. Although consumers appreciate the opportunity to participate in a company’s innovation process, they feel exploited when companies do not adequately share the outcomes. In light of consumers’ new producer-like role, it is only logical that they also demand a fair treatment in terms of the outcome, i.e. a compensation which is adequate comparing their input to the firm’s input. In the case of perceived unfairness, tensions occur and the individual may lower the input leading to behavioral consequences (Organ, 1988). The relevance of fairness is especially evident in crowdsourcing systems as only a few win winners are rewarded and the rest goes away empty-handed. It is well established that fairness has an impact on the willingness to submit (Franke et al., 2013) and the intention to participate in future challenges (Faullant et al., 2011). Nambisan and Baron (2010) investigate the sense of partnership in virtual co-creation and found that it has a positive effect on the
magnitude of users’ contributions in crowdsourcing systems. Thus, fair jury procedures and reward distributions are likely to stimulate participants to invest more resources in their submissions. Consequently, consumers’ perceived fairness may lead to a higher quality of submitted ideas. Hence, we propose the following hypothesis:

**H4:** Perceived fairness has a positive effect on the quality of submissions.

Research on fairness in co-creation initiatives found that perceived procedural and distributive fairness of jury decisions have an impact on attitudes and behavioral intentions such as evoked product interest (Faullant et al., 2011) or word-of-mouth (Gebauer et al., 2013). Weiss et al. (1999) found that unfair procedures leading to an unfavorable outcome may affect individuals’ emotions such as anger. Vice versa, consumers who experience a fair treatment while intensively interacting with a brand may develop positive or even passionate feelings. It is thus posited:

**H5:** Perceived fairness has a positive effect on the change in brand passion.

*Previous contest experience*

When firms embark on crowdsourcing to create product ideas, the crowd of ideators can be divided into individuals who have previous contest experience and those who participate in a contest by the host for the first time. Individuals, who participated in previous contests hosted by the brand, have gained experience in creating new ideas and visualizing them. They may as well have received helpful feedback such as hints regarding the improvement of the idea from other participants and the professional community managers throughout previous contests. In addition, the final jury decision highlights the best ideas and explains why the selected ideas have convinced the host firm. Based on this feedback, experienced participants may have derived principles underlying the ideas which have been rated well by the jury. According to Ward (1994), contestants may derive a mental category which describes ideas that have been liked or rewarded by the jury. Additionally, they may also have learned from failures of other participants in previous contests (Diwas et al., 2013). Based on these experiences and information,
individuals who repeatedly participate in a firm’s crowdsourcing initiative may be ahead of first-time participants in the learning curve. Therefore, experienced contestants may have professionalized their participation behavior in crowdsourcing systems and feelings of empowerment may be less crucial to motivate them to create high quality ideas. Thus, with repeated participation, the effect of empowerment as an impetus for innovative behavior may wane.

**H6:** Previous contest experience negatively moderates the effect of perceived empowerment on the quality of participants’ submissions.

Participation in crowdsourcing initiatives and the interaction with the host brand are likely to evoke affective responses by individuals (Forgas, 2000; Isen and Labroo, 2003). Consumers, who decide to repeatedly participate in a firm’s crowdsourcing initiative, are likely to have made positive experiences before, e.g. enjoyed meeting like-minded consumers or succeeded with their submissions. Due to this self-selection, we argue that experienced contestants’ feelings of passion for the brand may have plateaued on a rather high level. In contrast to first-time participants, the expectations of experienced contestants are determined by previous contest experiences which serve as reference points. Unless the brand exceeds these expectations by far, the effect of empowerment on the change in brand passion may not be as strong as for first-time contestants. Previous research on the effect of consumer participation indicates that there may be a certain point of saturation in terms of the level of participation (Franke et al., 2010; Atakan et al., 2014). Higher levels of participation may correspond with costs rather than additional value. Following this line of reasoning, we argue that repeated engagement may negatively moderate the effect of empowerment. The crowdsourcing initiative we analyze in this study is the third of its kind by the brand in a row. In terms of design factors, incentives and community management the initiative replicates the two previous crowdsourcing contests. Therefore, we reason that the impulses supporting the positive relationship between empowerment and change in brand passion are not likely to occur. We hypothesize:
**H7:** Previous contest experience negatively moderates the effect of perceived empowerment on the change in brand passion.

According to Franke et al. (2013), fairness perceptions are relevant to the potential contestants to decide whether or not to participate in a crowdsourcing system. If participants have experienced the distribution and procedure of the crowdsourcing initiative to be fair, they may be inclined to consider future participation in similar crowdsourcing initiatives by the firm (Faullant et al., 2011). What is more, the initial risk of assessing whether or not a host of crowdsourcing initiatives is fair may decrease with repeated participation. In other words, the host firm builds a reputation as a trustworthy and fair partner in crowdsourcing initiatives. Thus, the effect of fairness on submission quality and the change in brand passion may be stronger for first-time contestants than for experienced contest participants.

**H8:** Previous contest experience negatively moderates the effect of perceived fairness on the quality of submissions.

**H9:** Previous contest experience negatively moderates the effect of perceived fairness on the change in brand passion.

**Study**

*The SWAROVSKI GEMS™ Lifestyle Electronics Design Competition*

SWAROVSKI GEMS™, Swarovski’s brand for genuine gemstones and created stones, conducted an online idea contest (Piller and Walcher, 2006; Terwiesch and Xu, 2008) inviting consumers to come up with innovative ideas and designs during a two months contest phase. It was the third contest of this kind by Swarovski with differing themes each time. The goal of the third contest was to create lifestyle electronics designs (e.g. mobile phones, notebooks, tablet PCs) which incorporate SWAROVSKI GEMS™ genuine gemstones and created stones. The designs could either be designed freely, e.g. using graphical software, or with the help of an online toolkit enabling users to choose from 213 gemstones in 14 colors and place them on one of three virtual mobile phones. In total, € 9.000 in prize money were
offered as a reward to the best freely created designs which were selected by a jury consisting of six experts. The evaluation criteria were communicated on the contest platform and encompassed originality, level of innovation, technical feasibility, market potential and the creativity of using SWAROVSKI GEMS™ stones.

Method
After the winners of the contest had been announced by Swarovski, all participants of the contest were invited to a quantitative online survey via e-mail. After data had been purified, 121 cases were included in the analysis corresponding to a purified response rate of 6.7%. Table 1 provides an overview of main characteristics of study respondents. In order to test for a possible non-response bias, the means of early and late respondents were compared (Armstrong and Overton, 1977). Further, respondents and non-respondents were compared in terms of their activity on the contest platform.
### Table 1: Description of the study participants

<table>
<thead>
<tr>
<th>Characteristics</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>50.3%</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>49.7%</td>
<td></td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;20 years</td>
<td>11.6%</td>
<td></td>
</tr>
<tr>
<td>21-30 years</td>
<td>54.4%</td>
<td></td>
</tr>
<tr>
<td>31-40 years</td>
<td>22.4%</td>
<td></td>
</tr>
<tr>
<td>41-50 years</td>
<td>9.5%</td>
<td></td>
</tr>
<tr>
<td>51-60 years</td>
<td>2.0%</td>
<td></td>
</tr>
<tr>
<td>&gt;60 years</td>
<td>0.0%</td>
<td></td>
</tr>
<tr>
<td><strong>Contest history</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participation in one contest</td>
<td>70.1%</td>
<td></td>
</tr>
<tr>
<td>Participation in two contests</td>
<td>20.4%</td>
<td></td>
</tr>
<tr>
<td>Participation in three contests</td>
<td>9.5%</td>
<td></td>
</tr>
</tbody>
</table>

| **Education**            |          |          |
| Some high school         | 3.4%     |          |
| High school degree       | 15.0%    |          |
| Some college             | 17.7%    |          |
| College degree (Associate, Bachelor) | 38.8% |          |
| Graduate school (Master, PhD) | 20.4% |          |
| Other education          | 4.8%     |          |

| **Design expertise**     |          |          |
| Hobby designer           | 31.3%    |          |
| Design student           | 19.0%    |          |
| Professional designer    | 33.3%    |          |
| Other background         | 16.3%    |          |

Based on established scales in the relevant literature the questions and measures used in the study were adapted and refined. All the constructs were measured using multiple-item scales. The independent variable perceived empowerment was measured using 8 items adopted from Spreitzer (1995), i.e. the four dimensions of empowerment, meaning, competence, self-determination and impact, were measured with two items each. Brand passion was operationalized with three items adopted from Sternberg’s (1997) passion construct as part of the triangular love scale. The passion construct was adapted to the context of consumer-brand relationships and the intangible nature of brands. Brand passion was measured before and after participation, i.e. in the registration process of the contest and by means of a survey after participation, enabling us to gauge attitudinal changes. Perceived fairness was measured
along two dimensions, distributive and procedural, using three items from Colquitt (2001) and Moorman (1991). All items were measured using five point Likert-scales anchored (1) ‘strongly agree’ and (5) ‘strongly disagree’.

The behavioral consequence, i.e. the quality of submissions, which reflect actual behavior of participants on the crowdsourcing platform, was operationalized using data collected in the log files of the crowdsourcing site. Based on the decision of the expert jury, the quality of the submitted designs was determined. As a proxy for the level of quality we created a variable stating whether the submission was selected as one of the 27 best submissions or not. In the jury process, a three-step selection was conducted. First, submissions were narrowed down to 309 ideas selected from all 2,590 submissions. Then, the best 27 and the 6 winning submissions were determined. Gender, age, education and design expertise further served as control variables to account for personal characteristics, which could impact participants change in passion and quality of contributions.
<table>
<thead>
<tr>
<th>Construct</th>
<th>Item</th>
<th>Factor loading</th>
<th>Factor reliability</th>
<th>Average variance extracted</th>
<th>Fornell-Larcker Ratio(^\text{15})</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Empowerment</strong></td>
<td><strong>Meaning</strong></td>
<td>.85</td>
<td>.86</td>
<td>.60</td>
<td>.73</td>
</tr>
<tr>
<td></td>
<td>Self-Determination</td>
<td>.67</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Impact</td>
<td>.77</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Competence</td>
<td>.81</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Meaning</strong></td>
<td>Participating in the SWAROVSKI GEMS™ LEDC was very important to me.</td>
<td>.86</td>
<td>.90</td>
<td>.82</td>
<td>.62</td>
</tr>
<tr>
<td></td>
<td>Participating in the SWAROVSKI GEMS™ LEDC was personally meaningful to me.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Competence</strong></td>
<td>I am self-assured about my capabilities to perform in the SWAROVSKI GEMS™ LEDC.</td>
<td>.89</td>
<td>.82</td>
<td>.69</td>
<td>.71</td>
</tr>
<tr>
<td></td>
<td>I have mastered the skills necessary to participate in the SWAROVSKI GEMS™ LEDC.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Impact</strong></td>
<td>The SWAROVSKI GEMS™ LEDC gave me the feeling that my input is taken seriously by SWAROVSKI.</td>
<td>.80</td>
<td>.82</td>
<td>.70</td>
<td>.72</td>
</tr>
<tr>
<td></td>
<td>I had the feeling of actively influencing new product designs during participation.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Self-Determination</strong></td>
<td>I had significant autonomy in creating my design.</td>
<td>.77</td>
<td>.84</td>
<td>.73</td>
<td>.63</td>
</tr>
<tr>
<td></td>
<td>I had a great deal of freedom to make choices when creating my design.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Brand Passion</strong></td>
<td>I am enthusiastic working with SWAROVSKI GEMS™.</td>
<td>.65</td>
<td>.73</td>
<td>.48</td>
<td>.64</td>
</tr>
<tr>
<td></td>
<td>I can’t imagine jewelry work without SWAROVSKI GEMS™.</td>
<td>.59</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I feel connected to SWAROVSKI GEMS™.</td>
<td>.83</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fairness</strong></td>
<td>The jury adequately considered the viewpoint of the SWAROVSKI GEMS™ LEDC community in making decisions.</td>
<td>.90</td>
<td>.92</td>
<td>.80</td>
<td>.48</td>
</tr>
<tr>
<td></td>
<td>From my point of view the SWAROVSKI GEMS™ LEDC is a win-win situation for both, SWAROVSKI and the participants.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I perceived the distribution of the benefits from the SWAROVSKI GEMS™ LEDC between me and SWAROVSKI as fair.</td>
<td>.85</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Overview of constructs and items used within study

\(^{15}\) Note: Highest FLR shown based on the maximum intercorrelation between the constructs.
**Results**

First, reliability and validity of the measures in the measurement model were tested to calculate the factor reliability (FR) (>0.6) of the constructs, the average variance extracted (AVE) (>0.5) and the Fornell-Larcker-Ratio (FLR) (< 1) for discriminant validity (Fornell and Larcker, 1981). The results displayed in table 2 indicate a good fit between the measurement model and the data as all measurement requirements have been met. Although discriminant validity of the four dimensions of empowerment shows that each dimension is potent as a single factor, the second-order structure is justified comparing one model of first-order factors and one model consisting of a second-order factor. To test if there exists an underlying common second-order factor of the four empowerment dimensions (meaning, self-determination, competence and impact) suggested by Spreitzer (1995) we compared two models: one containing perceived empowerment as a second-order factor comprising the four dimensions and the other model consisting of the four first-order factors. This approach is similar to Thomas and Velthouse (1990) who also tested whether the four empowerment dimensions can be expressed by a common second-order factor. Thus, our results provide support that empowerment may be conceptualized as a unitary second-order construct reflecting four specific cognitions supporting H1. Table 3 shows the overall fit indices for the first- and second-order models. As both models fit the data well, the second-order factor model may be preferred to represent the construct (Rindskopf and Rose 1988).
<table>
<thead>
<tr>
<th>Model</th>
<th>χ²</th>
<th>DF</th>
<th>p</th>
<th>χ²/df</th>
<th>GFI</th>
<th>AGFI</th>
<th>NFI</th>
<th>RMSEA</th>
<th>AIC</th>
<th>BIC</th>
<th>BCC</th>
<th>CAIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>First-order factor model</td>
<td>53.151</td>
<td>62</td>
<td>.781</td>
<td>.857</td>
<td>.944</td>
<td>.906</td>
<td>.950</td>
<td>.005</td>
<td>139.151</td>
<td>259.370</td>
<td>151.437</td>
<td>302.370</td>
</tr>
<tr>
<td>Second-order factor model:</td>
<td>70.364</td>
<td>70</td>
<td>.465</td>
<td>1.005</td>
<td>.926</td>
<td>.889</td>
<td>.933</td>
<td>.007</td>
<td>140.364</td>
<td>238.219</td>
<td>150.364</td>
<td>273.217</td>
</tr>
<tr>
<td>Perceived Empowerment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3: Comparison of first-order and second-order factor model
Multiple regressions were conducted to study the main and interaction effects of perceived empowerment and perceived fairness on consumers’ change in brand passion. Binary logistic regressions were conducted to measure the effects on quality. Our results (see table 4 and 5) confirm a significant impact of consumers’ perceived empowerment on the quality of submissions ($\beta = 1.812^*$) as well as on the change in brand passion ($\beta = .508^{***}$) confirming hypotheses H2 and H3 respectively. Likewise, perceived fairness has a positive impact on the change in brand passion ($\beta = .293^{**}$) supporting hypothesis H5. However, fairness shows no significant impact on the quality of submissions ($\beta = .228 \text{n.s.}$) rejecting H4. Findings further reveal a significant negative moderating effect of previous contest experience on the relationship between perceived empowerment and submission quality ($\beta = -8.585^{†}$), thus confirming hypothesis H6. In order to see the direction of the effect, we plotted the interaction effect (figure 1). It shows that the effect of perceived empowerment on submission quality is weaker for participants with previous experience in crowdsourcing initiatives. On the other hand, the effect of empowerment on submission quality is strong for first-time contestants. However, according to regression analyses, no significant moderating effects on the relationship between empowerment and the change in brand passion and between fairness and its consequences were found. Therefore, no evidence for hypothesis H7, H8 and H9 was found.
## Table 4: Regression results – Effects on quality of submissions

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>.354</td>
<td>.655</td>
<td>.419</td>
<td>.573</td>
</tr>
<tr>
<td>Age</td>
<td>.150</td>
<td>.007</td>
<td>.413</td>
<td>.031</td>
</tr>
<tr>
<td>Design Expertise</td>
<td>.863†</td>
<td>1.018†</td>
<td>1.174*</td>
<td>1.038†</td>
</tr>
<tr>
<td>Education</td>
<td>.278</td>
<td>.252</td>
<td>.549</td>
<td>.308</td>
</tr>
<tr>
<td>Empowerment</td>
<td>.228</td>
<td>.654</td>
<td>.191</td>
<td></td>
</tr>
<tr>
<td>Experience</td>
<td>2.461</td>
<td>1.424</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Empowerment*Experience</td>
<td></td>
<td></td>
<td>-8.585†</td>
<td></td>
</tr>
<tr>
<td>Fairness*Experience</td>
<td></td>
<td>.455</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Cox &amp; Snell R²</th>
<th>Nagelkerkes R²</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.093</td>
<td>.084</td>
</tr>
<tr>
<td></td>
<td>.155</td>
<td>.097</td>
</tr>
<tr>
<td></td>
<td>.038</td>
<td>.205</td>
</tr>
<tr>
<td></td>
<td>.380</td>
<td>.239</td>
</tr>
</tbody>
</table>

†<.10; * p < .05; ** p < .01; *** p < .001

## Table 5: Regression results – Effects on change in brand passion

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>.105</td>
<td>.004</td>
<td>.009</td>
<td>.014</td>
</tr>
<tr>
<td>Age</td>
<td>-.184†</td>
<td>-.180*</td>
<td>-.191*</td>
<td>-.175*</td>
</tr>
<tr>
<td>Design Expertise</td>
<td>.117</td>
<td>.043</td>
<td>.060</td>
<td>.058</td>
</tr>
<tr>
<td>Education</td>
<td>.099</td>
<td>.120†</td>
<td>.112†</td>
<td>.131†</td>
</tr>
<tr>
<td>Empowerment</td>
<td>.508***</td>
<td>.563***</td>
<td>.325***</td>
<td></td>
</tr>
<tr>
<td>Fairness</td>
<td>.293**</td>
<td>.296**</td>
<td>.324**</td>
<td></td>
</tr>
<tr>
<td>Experience</td>
<td>.319</td>
<td>.058</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Empowerment*Experience</td>
<td>.329</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fairness*Experience</td>
<td>.166</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>R²</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.047</td>
<td>.337</td>
<td>.358</td>
<td>.342</td>
</tr>
<tr>
<td></td>
<td>1.759</td>
<td>11.867***</td>
<td>9.641***</td>
<td>9.484***</td>
</tr>
</tbody>
</table>

†<.10; * p < .05; ** p < .01; *** p < .001
Further, we found a significant impact of participants design expertise on contribution quality ($\beta = 1.018^\dagger$). Designers and design students have a higher chance to create contributions that make it into the top27 than hobby designer. Further, a significant effect of age on the change in brand passion ($\beta = -0.180^*$) was found, indicating that the younger participants may experience a stronger change in brand passion than older ones.

**Discussion**

Crowdsourcing has become an expedient tool for distributed innovation complementing internal corporate innovation systems (Nishikawa et al., 2013). Firm-led crowdsourcing idea contests encourage consumers to adopt a new role as co-creators in product ideation and thus experience unprecedented levels of empowerment. Our study investigates the role of consumer empowerment in crowdsourcing systems (specifically, an idea contest conducted by a Swarovski brand). Using a data set comprising multiple sources, i.e. log file data and survey data gathered before and after the contest, we find that a sense of empowerment leads to favorable submission behavior of participants (higher quality ideas) and positively affects their feelings of passion for the host brand (specifically the change of brand passion).
in the course of the crowdsourcing initiative). The findings reported in this paper contribute to the research on co-creation in general (Prahalad and Ramaswamy, 2000, 2004; Sawhney et al., 2005; Prandelli et al., 2006; Nambisan and Baron, 2007; Baldwin and von Hippel, 2011; Füller, 2010; Kohler et al., 2011) and consumer empowerment in particular (Wathieu et al., 2002; Pires et al., 2006; O’Hern and Rindfleisch, 2010; Fuchs et al., 2010; Füller et al., 2010; Fuchs and Schreier, 2011) in several ways.

Our findings add to previous, mostly experimental work on consumer empowerment in the co-creation domain (Fuchs et al., 2010; Fuchs and Schreier, 2011). Most notably, in contrast to previous research on consumer empowerment, our study is based on empowerment conceptualized as a beneficial state actually experienced and perceived by consumers who participated in a real-world crowdsourcing initiative. While consumer empowerment has been previously investigated in experimental settings in which participants are exposed to an empowerment treatment, we shed light on the effects of actually empowering consumers. It is shown that a sense of empowerment has beneficial consequences in the context of crowdsourcing idea contests. In terms of innovative behavior, our results imply that consumers who feel empowered tend to perform better, i.e. submit high quality ideas. Our findings thus add to the literature on empowerment in organizations by extending the concept of empowerment to the domain of distributive innovation systems and digital environments. Similar to the positive effects of empowerment on individual’s task performance and creativity in traditional organization research (Spreitzer, 1995; Zhang and Bartol, 2010; Seibert et al., 2011), our study finds support that empowerment has a positive effect on the innovative behavior of external actors in distributive innovation systems as well.

Besides the effect on consumers’ innovative behavior, the results should also be discussed in terms of consumer-brand relationships. Our findings have implications for firms’ customer relationship management as crowdsourcing initiatives provide environments and interactions which may enhance consumers’ brand passion. In order to boost feelings of passion, however, crowdsourcing initiatives have to offer an empowering experience and be perceived as fair. Results show that empowered consumers have increased feelings of passion for the host brand compared to the point before they were empowered through the crowdsourcing initiative.
Likewise, fairness has been found to predict consumers’ change in brand passion over the duration of the contest. This finding suggests that perceptions of an unfair reward system may lead to negative affective responses towards the host brand. We find support in our sample that empowerment has an even stronger effect on submission behavior and attitudinal changes than fairness perceptions. While it is indisputable that consumers want to have a fair deal when co-creating with firms, this finding suggests that feelings of empowerment may be equally important to the success of co-creation.

Thus, we find support for Nambisan’s and colleagues (2007; 2008) suggestion that digital consumer environments may not only help to generate innovative ideas, but also have positive effects on the relationship between consumers and brands. While previous research has focused on consequences such as a higher willingness to pay, perceived customer-orientation or favorable corporate attitudes, the results of our study show that empowerment also induces emotive consumer-brand relationships. This finding is especially relevant to firms that have focused solely on the advantages of crowdsourcing for new product development. While the innovation outcomes of crowd-driven ideation are remarkable (Pötz and Schreier, 2012), firms may be advised to design crowdsourcing initiatives aiming at both innovation and branding goals (Nambisan and Nambisan, 2008). Unlike in many traditional communication dyads, companies embracing crowdsourcing systems are challenged to establish an innovation mode which provides consumers the feeling that they work for a meaningful purpose they can relate to. In light of the inflation of crowdsourcing initiatives which court consumers today, consumers may be looking for the ‘real deal’, i.e. tasks that really matter and that enable them to self-actualize. A credible task that lives up to consumers’ ideals and endorsed meanings, may foster consumers’ sense of empowerment and thus be vital for recruiting creative high caliber participants. Especially in times of staged marketing experiences and interactive marketing campaigns, consumers yearn for interactions with their favorite brands that revolve around real tasks and serve a purpose that matters. Ultimately, consumers do not only want to be entertained and enjoy a compelling experience, but be assured that their contribution will eventually make a difference. However, consumer empowerment not only makes high demands on the task consumers are supposed to tackle, but also the task design. This means that consumers want to deploy their own strategy and method to solve a task and they want to be confident that they are capable of accomplishing it. Through empowerment
strategies, companies can leverage the meaningful and authentic experiences consumer make when co-creating new products with a brand.

Our study further contributes to the research on how to design crowdsourcing systems. In an attempt to capitalize on the creativity and knowledge of users in distributed innovation efforts, to date, research on crowdsourcing as a strategy to co-create product ideas has been primarily committed to explore design and system parameters, boundary conditions as well as participation motives (Füller, 2010; Nambisan and Baron, 2007; Franke et al., 2013; Ihl et al., 2012). Many design factors such as tool support (Füller et al., 2010), an enjoyable co-creation experience (Füller et al., 2011) or a fair distribution system (Franke et al., 2013) may increasingly become hygiene factors which are prerequisites for participation. Our results emphasize the importance of empowerment in crowdsourcing initiatives. Empowerment strategies may help to boost consumers’ submission quality as well as their brand passion relative to their attitude before the initiative. By guiding the attention to consumers’ perceived empowerment, we highlight the importance of designing tasks which raise consumers’ feelings of empowerment. As a result, companies may turn consumers into more valuable co-creators of product ideas and eventually make crowdsourcing systems more effective. In addition, empowerment strategies may be capable of turning participants in crowdsourcing initiatives into passionate brand followers.

The results also indicate that the effect of empowerment on the quality of submissions is less strong for participants with previous contest experience. According to the authors’ knowledge, the interaction effect of perceived empowerment and previous participation in crowdsourcing initiatives has so far not been examined. The findings add to previous literature on empowerment strategies providing insights into the moderating effect of previous experience. Nourishing feelings of empowerment appears to be particularly important to activate and inspire first-time participants. This is relevant to crowdsourcing systems as these newbies in crowdsourcing systems may be especially capable of providing novel ideas which are not subject to cognitive fixation (Bayus, 2013). The interaction effect implies that empowerment strategies may wear off the more crowdsourcing-experienced consumers are. The abating effect of contest experience may also be ascribed to the temporary design of crowdsourcing system. While consumers were repeatedly invited to the firm’s crowdsourcing initiatives, there was a significant time lag of several months and the digital environment varied each time. Thus, the brand’s
initiatives were rather isolated and did not support an ongoing and seamless empowerment strategy. Future research may shed light on this interaction effect by investigating continuous co-creation platforms designed to create an ongoing dialogue and a coherent overarching co-creation experience. In addition, it may be a relevant contribution to conduct qualitative research to explore reasons behind this interaction effect.

Further, we also find support that the effect of perceived empowerment on the change in brand passion is stronger for younger participants indicating that co-creation may be particularly suitable to strengthen relationships with younger customer segments. These so called ‘digital natives’ (also referred to as millennials), who grew up surrounded by social media and are well familiar with participatory consumer-brand interactions, may be more susceptible to empowerment strategies applied to invigorate a brand and to turn consumers into passionate brand enthusiasts. In light of the significant differences between cohorts of participants in co-creation, it may be worthwhile for future research to investigate the effect of age and internet savviness more closely to inform brands about how to design for a new generation of co-creators.

Our research investigates the concept of consumer empowerment in an early phase of the innovation process, i.e. the generation of product ideas. So far, for the most part, empowerment has been used as a theoretical basis to study strategies of involving consumers in more active tasks at or slightly prior to the point of consumption. For instance, consumer empowerment is practiced in mass customization approaches (Franke et al., 2010) and binding votes (Fuchs et al., 2010). In these empowerment approaches consumers become more active and creative, e.g. they configure their product within a certain solution space; however, they remain in their natural habitat, i.e. the purchasing stage. Our study guides attention to strategies that prepone the act of empowering consumers to earlier stages in the innovation process. By assigning ideation tasks to consumers which distinctly deviate from archetypical consumer activities, empowerment strategies extend to new areas clearly beyond the consumption domain. This is particularly remarkable as product ideation for long has been considered an irrevocable core competence and sacrosanct domain of firms. Especially established brands like Swarovski, which are renowned for their design competence, had for long relied on professional designers to create new products. Although co-ideation of products allows consumers to get closer the
sanctum of firms’ value creation and may thus amplify the meaning of the task, the time lag between the point of ideation and realization in the marketplace increases significantly. As a consequence, the immediate effect of empowerment vanishes, i.e. consumers do not see an instant result of their action in the marketplace. Nevertheless, our research substantiates that consumer empowerment is also a relevant psychological state in the ideation phase of new product development predicting consumer behavior and affective attitudes towards the brand. For future research, it would be worthwhile to investigate the conflicting effects of the enhanced meaning through involvement in co-ideation on the one hand and the diminished immediate effect of consumers’ actions on the other hand. This call for research appears to be even more relevant in light of recent research examining opportunities of involving consumers in the development of firm strategies (Stieger et al., 2012). The task of co-creating a firm’s strategy is even more abstract and generic as it does not have an immediate impact on the product roadmap but rather defines general strategic trajectories of the company.

**Limitations**

While this study provides initial insights into the consequences of consumer empowerment in crowdsourcing systems, the research bears several limitations. First, the brand that hosted the idea contest is a high-involvement brand among jewelry and design enthusiasts. The goal of the idea contest was to create innovative design ideas and thus the defined task that was outsourced to consumers referred to a rather passion-driven and artistic topic. For future research it may be useful to investigate other branches of industry and a wider variety of product categories such as low-involvement products to corroborate our findings. Second, the crowdsourcing initiative is situated in the ideation phase of new product development and thus results may not be generalizable for empowerment strategies which assign other tasks to consumers. For example, future studies may investigate empowerment in crowdsourcing initiatives designed to co-create corporate strategies or to solve R&D problems. In addition, research on consumer empowerment in crowdfunding initiatives, a strategy of tapping the crowd as a source of finance (Belleflamme et al., 2014), may help to understand the notion of empowerment when consumers invest money instead of time. Third, our study focuses on two specific consequences of perceived empowerment, the submission behavior and the change in brand passion.
Future research would make a valuable contribution by shedding light on further attitudinal and behavioral consequences of empowerment in the crowdsourcing context. What is more, antecedents of consumer empowerment may demand more attention to unveil how firms may foster feelings of empowerment among participants of crowdsourcing initiatives. Fourth, our study refers to a temporary crowdsourcing system. Even though, two initiatives have been conducted prior to the crowdsourcing initiatives, which served as the unit of analysis for this study, the insights into longitudinal effects have not been emphasized. Future research might explore how consumer empowerment can be maintained over time and how the consequences develop in longitudinal studies. Fifth, with regard to the contest experience effect, longitudinal studies of crowdsourcing systems covering a longer period of repeated contests might be worthwhile to explore. Specifically, the effect of empowerment may be more fluctuating throughout the first few contests and might consolidate after some more contest experience. The present study only investigated the ‘immediate’ moderating effect within the first three contests. It could be assumed that empowerment strategies might have an oppositional effect after initial consolidation of the experience. Last, the findings are limited to crowdsourcing initiatives which are organized as tournaments. The reward system is likely to influence the consequences of fairness and empowerment. Research on crowdsourcing initiatives with other incentive mechanisms might help to understand the role of rewards in consumer empowerment strategies.
References


Appendix E: Overview of further papers

The following overview outlines additional papers published in the course of my thesis in chronological order. Although they are not part of this thesis project, they relate and add to my research on co-creation and may shed some additional light on the topic.

2011

Title: Getting closer to the consumer: How Nivea co-creates new products
Authors: Bilgram, V.; Bartl, M.; Biel, S. (2011)

Title: Erfolgsmessung von Open Innovation Projekten: Ein Überblick über Kennzahlen in Forschung und Praxis
Authors: Bilgram, V.; Jawecki, G. (2011)

2012

Title: Performance measurement of co-creation initiatives: A conceptual framework for measuring the value of idea contests
Authors: Bilgram, V. (2012)

Title: Spielerisch zur Innovation: Gamification in der gemeinsamen Ideengenerierung und –selektion mit Konsumenten
Authors: Birke, M.; Bilgram, V.; Füller, J. (2012)
Open Innovation im Enterprise 2.0: Unternehmensinterne Voraussetzungen zur Einbindung externer Stakeholder in den Innovationsprozess

Jawecki, G.; Bilgram, V. (2012)


Innovation in information-based services


Regulatory Push/Pull: Neue Impulse für das Innovationsmanagement


Eine Allianz gegen Flecken


Phänomen Crowdsourcing: Was privater und öffentlicher Sektor voneinander lernen können

Bilgram, V.; Rapp, M. (2013)

Title: The potential of crowdsourcing for co-marketing: How consumers may be turned into brand ambassadors

Authors: Bilgram, V.; Füller, J.; Koch, G.; Rapp, M. (2013)


Title: Empowering members of a brand community to gain consumer insights and create new products

Authors: Kröper, M.; Bilgram, V.; Wehlig, R. (2013)


2014

Title: Nivea (A)

Authors: Lakhani, K.; Füller, J.; Bilgram, V.; Friar, G. (2014)


2015

Title: The search for innovative partners in co-creation: Identifying lead users in social media through netnography and crowdsourcing

Authors: Brem, A.; Bilgram, V. (2015)


2016

Title: Gamification: Best practices in research and tourism

Authors: Stadler, D.; Bilgram, V. (2016)

Title: Easy Rider: Die Erschließung der Welt des autonomen Fahrens aus Sicht von Markt und Kunde


Eidesstattliche Erklärung

Ich erkläre hiermit an Eides statt durch meine eigenhändige Unterschrift, dass ich die vorliegende Arbeit selbständig verfasst und keine anderen als die angegebenen Quellen und Hilfsmittel verwendet habe. Alle Stellen, die wörtlich oder inhaltlich den angegebenen Quellen entnommen wurden, sind als solche kenntlich gemacht.

Die vorliegende Arbeit wurde bisher in gleicher oder ähnlicher Form noch nicht als Master-/ Diplomarbeit/Dissertation eingereicht.

_________________________________  __________________________________
Datum                             Unterschrift