



Know your perceived expertise!
How to foster future sales strategies
with stakeholder co-creation
by the example of complex products

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Abstract

Compared to other generations Millennials are relatively little loyal to brands but search for brands and products that suit their lifestyle and character. Hence, it is crucial for managers to know how to gain their attention and what convinces them to purchase and recommend.

The present research investigates Millennials' attitude towards stakeholder co-creation. Namely brand perceptions and behavioral intentions are investigated. Whereas former studies of co-creation mainly focused on investigating user co-creation, this study compares the outcome of communicating products as co-created by stakeholders with different perceived levels of expertise for complex products. Moreover, it aims to analyze the mediating effect of co-actors' perceived expertise, which predicts Millennials' behavioral intentions.

The hypotheses are tested in a single factor, independent group, between-subjects experiment, using three levels of perceived expertise for the factor co-actor and one control group representing generic design. The data was collected with an online questionnaire on Qualtrics, quantifying respondents' perception of brand uniqueness, innovation ability, and their intentions to buy and recommend.

The findings indicate that brands, offering complex products, which are labeled as co-created, are perceived as more innovative and unique than brands with generic design. At the same time those perceptions partially influence behavioral intentions. Interestingly, results reveal that expertise is a mediator of behavioral intentions. Thus, the study suggests to managers that knowing Millennial consumers' perception about the expertise level of co-actors is crucial for the success of communication strategies.

Keywords: co-creation, product innovation, perceived expertise, behavior intention, brand perception, labeling, Millennials, complex products

Abstract in Portuguese

Em comparação com outras gerações, os Millennials são relativamente pouco fiéis às marcas, mas procuram marcas e produtos que se adequem ao seu estilo de vida e caráter. Portanto, é crucial que os gestores saibam como captar a sua atenção e o que os convence a comprar e recomendar.

A presente pesquisa investiga a atitude dos Millennials em relação à cocriação das partes interessadas. Ou seja, percepções da marca e intenções comportamentais são investigadas. Considerando que os estudos anteriores de cocriação se concentraram principalmente na investigação da cocriação de indivíduos, este estudo compara o resultado de produtos de comunicação como cocriado pelas partes interessadas com diferentes níveis de conhecimento para produtos complexos. Além disso, visa analisar o efeito mediador do nível de conhecimento dos coatores, que prevê as intenções comportamentais dos Millennials.

As hipóteses são testadas num único fator, grupo independente, utilizando três níveis de conhecimento para o fator coator e um grupo de controle representando o design genérico. Os dados foram recolhidos através de um questionário on-line sobre a Qualtrics, quantificando a percepção dos entrevistados sobre a singularidade da marca, a capacidade de inovação e suas intenções de comprar e recomendar.

Os resultados indicam que as marcas, oferecendo produtos complexos, que são rotulados como cocriados, são tidas como mais inovadoras e exclusivas do que marcas com design genérico. Ao mesmo tempo, essas percepções influenciam parcialmente as intenções comportamentais. Curiosamente, os resultados revelam que o conhecimento é um mediador das intenções comportamentais. Assim, o estudo sugere aos gestores que conhecer a percepção dos consumidores Millennials sobre o nível de conhecimento dos coatores é crucial para o sucesso das estratégias de comunicação.

Palavras-chave: cocriação, inovação de produto, percepção de conhecimento, intenção de comportamento, percepção da marca, rotulagem, Millennials, produtos complexos

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List of abbreviations

CC	Co-creation
CG	Control Group
GO	Government
IN	Influencer
NPD	New product development
PIA	Perceived innovation ability
SU	Start-up

1 Introduction

Nowadays, companies need to foster long-term growth and gain essential competitive advantage with successful product innovations as well as the ability to continually enhance innovation processes (Chapman and Hyland, 2004). Hence, coming up with new product ideas is an essential element of companies' innovation ability (West et al., 2014). Whereas companies used to focus internally on innovating new products, the paradigm of open innovation is becoming a crucial and appropriate factor in order to sustain the innovation pressure (Ili et al., 2010). Open innovation is a highly researched topic in innovation management literature and has been majorly defined as “[...] the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively” (Chesbrough et al., 2006).

A distinct form that supports an engaging knowledge flow is co-creation (CC). In this approach, stakeholders or consumers are actively integrated as co-actors and jointly work together with the company to develop new products, services, and experiences (Ramaswamy, 2009). Therefore, CC helps to overcome traditional industry boundaries and puts the locus of innovation on interaction anywhere in the system (Lee and Olson, 2012). Former examples of popular brands such as LEGO, Threadless, Starbucks, Muji, and Nivea have benefited from the joint involvement of users into their new product development (NPD) processes. Especially, user CC has become a broadly applied practice and investigated research field.

Whilst this approach has been well explored, relatively little is known about the CC with other actors who are not users (stakeholders¹). Brands such as the logistics provider DHL demonstrated that stakeholders as well could contribute with their exclusive expertise to current issues. In its case, DHL jointly co-created urban logistic concepts together with politicians, academics, and public authorities to reduce traffic (Cuccureddu, 2011). Scholars such as Pera et al. (2016) started emphasizing the relevance of stakeholder CC. This study follows this call and aims to demonstrate that communicating stakeholder CC to consumers impacts perceptions and intentions and is not only relevant but also enables success where user labeled CC reaches its limits.

Literature advises companies as well to consider how consumers perceive their brands and products in order to be successful in the industry (Knight and Young Kim, 2007). Indeed,

¹ For the further course of this study, the term “stakeholder” involves all possible stakeholders as co-actors except for consumers or the so-called users.

knowing consumers' perception of new products is crucial for sustainable growth and decides how successful a newly launched product will be (Taylor-West et al., 2013) since perceptions deliver an explanation about the reason why consumers are excited about a certain product or brand (Schreier et al., 2012).

Despite of the increasing significance of stakeholder involvement in practice, research about its impacts stays under-developed and is over-shadowed by the consumer emphasis (Pera et al., 2016). This is why this paper seeks to establish if it is profitable to reveal to the market that stakeholders have joined company's designers during the NPD processes.

The present research proposes that labeling complex products as co-created by stakeholders is capable of evoking positive effects on both brand perceptions and behavioral intentions compared to generic design, particularly if the consumer perceives the expertise of the co-actor as adequate and persuasive. Therefore, the success of communicating co-creation is mediated by the perceived expertise of the co-actor who is not a user but rather a stakeholder belonging to a more managerial environment. Moreover, the assessment of the effect of hallmarking complex products as co-created by stakeholders triggers the awareness about expertise perceptions and its activating value of labeling co-created to the broad market.

1.1 Research components complex products and Millennials

This study runs the investigation of stakeholder CC by the example of complex products. Defined as highly priced, software and technology intense (Jin et al., 2005) complex products differ regarding innovation from mass produced goods, which are studied versatility (Hobday et al., 2000). Therefore, Hobday et al. (2000) claim that complex products should get more scholarly attention since they are essential to modern economy and need general deeper understanding regarding concepts and novel evidence for innovation processes, so that brands are able to improve their performance.

Above all, former scholars have found limits for complex products with user CC. Corresponding findings revealed that including users as co-actors negatively impacts the product success due to lack in their perceived expertise and inadequate perceived skills (e.g. Schreier et al, 2012; Poetz and Schreier, 2012; Costa and Coelho do Vale, 2018).

Moreover, the present research narrows the subject "consumers" down to the generation group Millennials. Not only is this generation a highly attractive target to many consumer

industries due to its size and buying power (Mangold and Smith, 2012; Moreno et al., 2017) but also the main generation for the next years that will invest in means of transport. Compared to other generations, this considerable group has disparate behaviors, which are substantial and relevant to study for (Smith, 2011).

Millennials were those born between 1980 and 2000 (Lee & Kotler, 2015), members of this generation are currently between 17 and 38 years old. This generation reflects about 28% of world's population (two billion out of 7.1 billion worldwide) and spend about 200 billion a year, which is anticipated to double by 2020 (Karr, 2014).

Millennials are known for being in close proximity to technology and including it into their daily lifestyle, which shapes their character (Moreno et al., 2017). In addition to this, they are optimistically characterized as broad-minded, societal, energetic, aspirational, innovative, dependable, engaged, and smart young persons (Ordun, 2015). Last but not least it is worth mentioning that they are relatively little loyal to brands but search for brands and products that suit their character, *modus vivendi*, society as well as social values (Moreno et al., 2017).

1.2 Purpose and research questions

So far, comprehensive studies in the field of co-creation mainly investigated impacts on observing consumers with users as co-actors (e.g. Fuchs and Schreier, 2011; Dijk et al., 2014; Dahl et al., 2014; Meißner et al., 2017; Nishikawa et al., 2017; Liljedal and Dahlén, 2018). Thus, co-creation with consumers is already a field of many investigations. Little is known about the impact on consumers with regards to changes in behavioral intentions and brand perceptions when other stakeholders than consumers are involved in co-creation, particularly for complex products. Research has mainly looked at products such as beverage (e.g. Dijk et al., 2014) and clothes (e.g. Fuchs et al., 2013) which score low on complexity. Only a few scholars included investigations with complex products such as gardening products, robotic toys (Meißner et al., 2017), and smartwatches (Costa and Coelho do Vale, 2018).

Hence, this thesis aims to give first advice and initiates further research within the area of co-creation with different stakeholders. In addition to this, it adds value to innovation literature by showing that although product complexity could be a critical boundary condition for CC (Costa and Coelho do Vale, 2018), it is beneficial to jointly include appropriate levels of perceived stakeholder expertise. By doing so, this paper also reacts to the studies of Fuchs et al. (2011) and aims to understand whether there is also a similar positive effect toward behavior

intention and brand perceptions in complex products as previous studies demonstrate for low complexity products (e.g. Dijk et al., 2014; Fuchs and Schreier, 2012). By using complex products, the level of co-actor's perceived expertise as well as his relevant knowledge influences the outcome of co-creation on perceived innovation ability, brand uniqueness, and mediates behavior intentions (the dependent variables).

Specifically three research questions are examined:

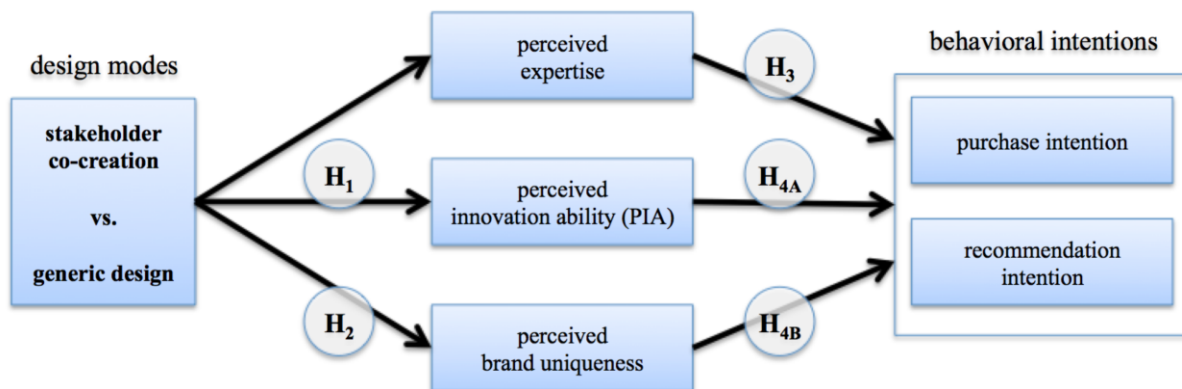
RQ 1: Are Millennials' brand perceptions positively influenced by advertised stakeholder co-creation in complex products?

RQ 2: Are Millennials' behavioral intentions influenced by advertised stakeholder co-creation in complex products?

RQ 3: Can perceived level of expertise of the co-actor explain the differences in Millennials' behavioral intentions?

1.3 Thesis overview

Figure 1: Conceptual framework of present study



The following chapters are structured as follows: In chapter two important introductory explanations are presented including facts about CC in general, an brief overview of the outcomes of user CC which inspired this study, and the development of the hypotheses. Chapter three pays closer attention to the research method, experimental design, and explains the measures involved in the analysis. In order to investigate the proposed research construct, the

present study uses automobiles and original equipment manufacturer (OEM) in the methodology to represent the object of investigation complex product.

Afterwards, chapter four focuses on the results' analysis, followed by the final chapter five that includes a final conclusion inclusive discussion, implications, as well as limitations and suggestions for further research.

Figure 1 portrays the conceptual framework of the present study.

2 Literature review

2.1 Co-creation definition, benefits, and actors

The ecosystem of global business is in need for an advanced innovation model creating shared value, which meets the challenges of networked as well as interdependent individuals, governments, organizations, and economies (Lee et al., 2012). Hence, co-creation is a growing and important field of investigation for researchers. Its influencing value and the new opportunities, which are arising from this special form of open innovation, are getting more and more important for companies (e.g. McColl-Kennedy et al., 2009; Prahalad and Ramaswamy, 2004). Based on the understanding that a company is not able to possess every smart employee, open innovation is a paradigm, which recognizes the need to work with diverse people inside as well as outside of a company in order to sustain competitive and successful (Chesbrough, 2003). Consequently, open innovation remodels a company's solid internal-only research and development boundaries into a more permeable holistic approach that enables activity movements and exchanges between the external environment and internal innovation operations (Enkel et al., 2009).

CC focuses on this external approach and steps back from a sole inside perspective. Likewise as Frow et al. (2015), this thesis "[...] adopt[s] the definition of co-creation advanced by Perks, Gruber and Edvardsson (2012): 'Co-creation involves the joint creation of value by the firm and its network of various entities (such as consumers, suppliers and distributors) termed here actors. Innovations are thus the outcomes of behaviors and interactions between individuals and organizations' (p. 935)". In other words, the external parties involved with a company's internal designers jointly create value by affiliating forces to interoperate, learn, and exchange information (Prahalad and Ramaswamy, 2004; Vargo and Lusch, 2004). As a result, the external contribution of knowledge reassembles research and development capabilities and can pave the way to a broader product portfolio (Chesbrough, 2003).

CC strategy does not only improve innovation processes by creating a network of resource integration (Frow et al., 2015) but also enables new sources of competitive advantage (Prahalad and Ramaswamy, 2004), which provides evidence of its importance for managers.

CC is a multifarious thematic area and is related to many directions as Ramaswamy and Ozcan (2018) enumerate. It is included in topics and application areas such as “[...] design and development of new goods and services, collaboration with users as innovators, efforts of users in customizing products to their needs, prosumption, co-production, participatory roles of consumers, communities, and crowds, retailing, knowledge, learning and solutioning within business networks, multi-firm partnerships, open business models, and service exchange and service systems (p.196).”

Primary, research investigates co-creation with a key external actor: the user. This means, disparate from usual consumer involvement where consumers are seen as a pure information source in marketing research activities or passive income source, more and more companies asking actively consumers to get involved mostly in the new product development (NPD) process. Hence, entitled as co-developer, users engage with internal employees in jointly problem solving to contrive product solutions (Fang, 2008; Nambisan, 2002). In general, studies have shown evidence that user engagement fosters a positive brand attitude. Not only consumer loyalty and satisfaction, but also emotional bonding, trust and commitment are key consequences of user CC (Brodie et al., 2013). At the same time, users as co-actors contribute novel creative ideas (Nishikawa et al., 2013), enhance product diversity (Al-Zu’bi and Tsinoopoulos, 2012), and decrease NPD costs as well company’s risk resulting out of higher market acceptance of products (Fuchs et al., 2011). As a result, user CC demonstrates an additional source of competence and becomes a competitive benefit to a company (Prahalad and Ramaswamy, 2000).

Besides the major research field of consumer engagement, other scholars emphasize the relevance of incorporating multiple actors in order to broaden the range of CC opportunities (Driessen and Hillebrand, 2013; Gummesson and Mele, 2010) and expand the primary focus of user CC to encompass an extended range of stakeholders (Spohrer et al., 2008). For instance Frow et al. (2015) present five main co-actor categories in their CC design framework including: “(1) customers (upstream actors), (2) suppliers (down- stream actors), (3) partners (collaborators for any types of exchange), (4) competitors (actors with a similar offering), and (5) influencers (indirect collaborators such as media, government and regulatory bodies) (p.472)“.

2.2 Perceptions of co-created products: the broad market

As already stated, user CC is a popular field of investigation. Previous scholars have shown positive effects with implications for managerial decisions. One of the first studies concentrating on consumers not involved in CC (observers) by Fuchs and Schreier (2011) reveals first evidence that the perceptions of a low-tech company and products are positively influenced by user empowerment. As opposed to non-empowering companies, corporate attitudes and behavioral intentions are more favorable to the observers. Additionally, they demonstrate that user CC triggers a higher perceived customer orientation. Hence, it seems likely to integrate empowerment strategies into innovation processes in order to gain competitive advantages through beneficial associations by the broad mass of (potential) consumers.

Dijk et al. (2014) alike consider active branding of user CC as a strategic approach to not only positively shape behavioral intentions but also product perceptions of consumers. By presenting a product as an outcome of CC with users, it is perceived more appealing, unique, innovative, and better fitting to needs compared to the equal product, which is advertised as non-co-created.

Further research by Schreier et al. (2012) detects that co-creating brands in the low-tech domains also benefit from a so-called “innovation effect of user design”, which increase consumer perceptions of the brand’s innovation ability for both functional and aesthetic design tasks. This significant effect, in turn, shapes positively crucial variables such as recommendation and purchasing intentions. This influence is valid although internal designers were valued with a superior expertise in comparison to empowered users.

Build up on this study, Meißner et al. (2017) provide additional evidence that different co-creating strategies for users (empowerment-to-select, empowerment-to-create, and full empowerment), all resulting significantly in an increased perceived innovation ability of the company. Likewise to Schreier et al. (2012), this innovation effect leads to a positive impact on behavior intentions.

An explanation for this shift in consumer preferences could be a superior targeted address of consumer needs originated from CC. Tested in the field of food and electronics, Nishikawa et al. (2017) reveal that consumers consider user-ideated new products as more promising ideas, which showed higher interest in meeting their actual needs. Additionally, Poetz and Schreier (2012) demonstrate that user-created ideas during the NPD are not merely more beneficial for the consumers but also score higher in terms of novelty by contrast with firm’s professionals.

Thus, this approach seems to establish a new way of gaining competitive advantage in the market (e.g. Lilien et al., 2002, Poetz and Schreier, 2012, Nikishawa et al., 2017). Furthermore, observers feel a sense of connection to co-actors in case they reflected similarities of demographics or share the same beliefs of a certain social group. This affiliation triggers an increased identification with the company. Hence, Dahl et al. (2014) determine a “user driven philosophy effect” which claims that observers favor purchases of user- rather than designer-driven firms.

2.3 Hypothesis development

The impetus for the present research mainly underlies the conceptual framework by Schreier et al. (2012) and is further prompted by the examinations of Fuchs and Schreier (2011) as well as Costa and Coelho do Vale (2018). The central framework idea of those mentioned scholars is about users who jointly designed a product with professionals. Through communicating CC activity, observers fostered their brand perceptions and evoked more favorable behavioral intentions towards the brand compared to a brand, which implies to be designed by company professionals only (generic design). In this manner, user CC appears to enhance perceived innovation ability, which in turn stimulates positive effects on behavioral intentions (Meißner et al., 2017).

Inspired by those outcomes, this thesis is aiming at testing the significance effects of stakeholder CC on brand perceptions and behavioral intentions. The present conceptual framework of this study outlines a presumed mediation of perceived expertise, which is impacted by the design mode, and influences purchase intentions. The research framework is tested on complex products and sets an example that CC works for complex products, too made possible by stakeholders as co-actor.

2.3.1 Innovation of complex products and the general need for co-creation

Consumer demands are raising and companies react to this occurrence by meliorating product functions, launching novel technology, and expediting innovation; generally confronted with perpetually growing complexity characterized by intense knowledge requirements. That is why product innovation is not only becoming complex but also capital intensive and hence, necessitates diversity of expertise (Zhang and Thomson, 2018).

Apart from traditional innovation models, innovation processes can also chose a cooperative approach with suppliers, consumers, and a cross-functional group or team from within an organization (Scott, 2000). Kleinsmann et al. (2010) take a similar view in their research and expound that the multidisciplinary character of products requires a wide-ranging inclusion of diverse knowledge domains through collaboration. Product design in complex products is a knowledge-intensive process whereby various developers need to apply and share specialist expertise during the NPD in order to solve product complexity (Zhang and Thomson, 2018). The consumer perceives a product as complex when the actual design task seems to be difficult to him (Rogers, 1995). Difficulty refers to the dimension to which special knowledge and expert competencies (cumulated to the term expertise) are crucial for successful design (Schreier et al., 2012). Alba and Hutchinson (1987) define expertise as the proficiency to execute product-related tasks successfully.

Besides general scholars' appraisals, studies of McKinsey & Company (e.g. 2017A, 2017B 2018), PwC (2013) and Deloitte (2013) predict in particular the need of co-creation for the purpose of dealing with the broaden disruptive revolution in the automotive industry representing complex products. They define players such as start-ups, service provider, universities, and cities as new participants for the future of this industry. Every of those actors has a specific proficiency to execute product-related tasks and could influence the perception of CC on the consumer. It seems like expanding internal borders to create a joint NPD progress with stakeholders is promising more success.

However, it is even more valuable to find out whether this move could be used to manipulate consumers' perception and intentions by officially labeling a product as co-created on the other hand. Therefore, it is helpful to detect the determinants that can foster product evaluation in the first place.

To summarize, researchers as listed before generally consider a jointly approach of expertise to gain diverse knowledge to be better in innovating technically complex products. Besides the benefits, which are traced back to CC, this thesis contributes to innovation literature by finding evidence that stakeholder CC also benefits on consumers' perception of CC.

2.3.2 The effect of stakeholder co-creation on consumers' perception of innovation ability

Studying the perception of corporate innovation is a pertinent issue since this actually affects brand evaluation and purchase intentions (Costa and Coelho do Vale, 2018; Schreier et al., 2012). Especially, Millennials who are open to frequent change, value innovation and look for this characteristic in products, business' purposes, and themselves (Syrett and Lamminman, 2004; Deloitte, 2013). This generation not only demands novel and groundbreaking products but also accelerate the speed of change as early adopters of innovative ideas, concepts, and products (Powell, 2014). Hence, it has become important to be perceived as an innovative brand when it is indented to address Millennials.

It is important to pay attention to some drivers of PIA which can be met by the nature of stakeholder CC and deserve special consideration. Lowe and Alpert (2015) examine influences, which increase PIA. They argue that innovation is oftentimes associated with newness and came up with influencing forces. Out of those, two main influences - perceived concept newness and perceived technology newness - have a high potential to be found in the CC method. Since labeling stakeholder involvement is currently not a very common advertisement strategy for complex products, it is consequently expected that this new idea can boost perceived concept newness. At the same time, stakeholders are often not directly in connection with the company's product range and therefore have access to different technical knowledge. By co-creating and exchanging skills from different fields, products can impress by complex technical accomplishments, which in turn reinforces perceived technology newness and fosters the perception of high innovation ability.

Furthermore, CC opens the NPD to diverse co-actors with multifarious skills, interests, mindsets and divergent thinking (Costa and Coelho do Vale, 2018).

Diversity makes an impact on perception of creativity (Alves et al., 2007) what is then again fostering innovation as crucial component (Kunz et al., 2011) because it enhances identifying new opportunities (Gielnik et al., 2012). Equally, Millennials consider creativity as the indicator of an innovative individual followed by academic ability and technical skills (Deloitte, 2013).

Furthermore, divergent thinking facilitates business idea expansion (Gielnik et al., 2012). There is evidence that expanding firm boundaries and involving in open interactions attains a

greater technological knowledge portfolio, which in turn simplifies the attainment of beneficial innovations (Su et al., 2015). Additionally, internal employees are considered as constricted by the firm's structure (Schreier et al., 2012); However, by incorporate with stakeholders from other industries or (businesses) contributions implicate a more out of the box approach (Schreier et al., 2012). Therefore, CC with stakeholders creates a broader range of design possibilities by merging competencies, which are complementary and raise the PIA.

Moreover, newer brands are considered as more innovative than long existing brands (Deloitte, 2013). Hence, CC can benefit from the out of the box approach not only due to yet unknown players (which will be perceived as relatively new since they were little known before) but also to a wide spectrum of start-ups.

In conclusion, it has been shown that CC with stakeholders provides characteristics, which increase PIA. As such, it is hypothesized that:

H₁: Millennial consumers will perceive higher innovation ability toward brands of complex products that communicate stakeholder co-creation in new product development than toward brands that offer generic design by company professionals.

2.3.3 The effect of stakeholder co-creation on consumers' perception of brand uniqueness

Besides PIA, studying consumer's perception of brand uniqueness is an important investigation topic, too since it affects retail patronage behavior (Rajamma et al., 2010) and impinges on consumer decision-making as well as new product acceptance (Tversky 1972).

Moreover, the Millennials look for brands that hold a sense of uniqueness and make them feel unique (Powell, 2014). Generally, they place a strong emphasis on being unique and orient themselves by taking this attribute into consideration when they spend their money (Rajamma et al., 2010). In that sense, it is beneficial for co-creating brands to be associated as unique.

Uniqueness plays a decisive role in differentiation strategies and has a positive bearing on consumer preferences and competitive advantage (Levitt, 1980). It is a sound argument to consumers substantiating their purchases (Brown and Carpenter 2000). Differentiation (whether real or perceived) happens in cases competitive firms are not perceived to evince the feature, which is dispositive for the consumer (Romaniuk and Gaillard, 2007). To the best knowledge, as yet companies offering complex products (OEMs in the case of this study in

particular) have not explicitly advertised their products as co-created with other stakeholder's expertise. This would make them a first mover in the field of labeled co-created products, and consequently unique compared to brands that design solely on their own.

Additionally, CC connects actors from various industry areas whereby there can arise unexpected and unique combinations of fields of activities. By the example of the product automobile, a brand could co-create its interior design with architects who usually focus on building houses. Such a domain combination has not been experienced in the past, which would result in a unique brand experience for the consumer.

As stated, CC has the characteristics to facilitate unique brand associations when communicating a brand position, which can be appealing to consumers. Thus, it is further hypothesized that:

H₂: Millennial consumers will perceive higher brand uniqueness toward brands of complex products that communicate stakeholder co-creation in new product development than toward brands that offer generic design by company professionals.

2.3.4 The effect of consumers' perception of designers' expertise on stakeholder co-creation

So far, whenever mentioned studies about communicated co-creation (in case with users) before, they had turned out to have a favorable outcome for the company. Nevertheless, there are also studies publicizing a negative side of displaying a user co-created label, which should be taken into consideration for the present research.

Thompson and Malaviya (2013) detected an opposing effect triggered by communication of user CC, which puts focus on the perception about expertise of involved co-actors. Observers become skeptical, simply judging the user as co-actors as not competent nor capable of contributing crucial input. This opposing effect demonstrates that consumer could assess a product based on the belief about its creators' skills. In particular, branding a product as co-created drives extra attention to the capability of the designers (Moreau and Herd, 2009). For instance, Fuchs et al. (2013) unveiled that hallmarking users as co-designers harm luxury fashion brands through decreased status signaling. The reason for this is that consumers perceive those products with lower quality as well as unable to indicate equal status compared to a company's label.

In particular complex products can be affected from this, too. Costa and Coelho do Vale (2018) set a similar connection and claim that increasing product complexity requires the necessity of a certain level of perceived abilities and specific knowledge, which a general user is perceived as unable to meet. Hence, including users to the NPD of complex products can be evaluated as inadequate (Lettl, 2017) and is inadvisable to communicate. Unlike aesthetic product characteristics, functional attributes are more challenging to the imagination and presuppose more careful cognitive development. (Dhar and Wertenbroch, 2000; Voss et al., 2003; Hirschman and Holbrook, 1982). Thus, product functionalities are inherently more complex to (co-)create than product aesthetics (Schnurr, 2017).

To put these conclusions in a nutshell, product complexity influences the need for a specific degree of competences and expertise reflected by designers in order to avoid raising skepticism towards the product. This means that if the co-actor's expertise persuades consumers' perception, a complex product design is more likely to succeed.

Thus it is more convincing to co-create complex products with designers (perceived as professionals in their field) belonging to the general business world or appropriate sectors than with users who are perceived as similar to buying consumer. First signs of support for this argument is found in the research of Costa and Coelho do Vale (2018), which indicates that identification of consumers with users as co-actor is not aimed in case of complex products.²

This is why the present research expects – in case the company wants to communicate CC for promotion purposes – that the perceived expertise has to be aligning with the product complexity and brands should keep looking for stakeholders who are related to entities coping with issues such as business, environment, and science. Generally speaking, compared to individual users as co-creators, stakeholders are associated with a specific background that helps consumers to evaluate the originated expertise and to believe in the product. Likewise to the CC study of Fuchs et al. (2013) regarding luxury products, CC must signal crucial designer expertise to observing consumers, in order to be approved. General users' backgrounds and field of skills are simply unknown to consumers and could consist of people who lack the abilities and technical knowledge to develop a sound product. This skepticism is withdrawn with stakeholders whose expertise can be associated with the entity they belong to.

² With regards to low complex products, it is advantageous to use users as co-actors because of the social identity theory (Tajfel and Turner, 1986), which states that purchase intention arises when consumers identify with the designers and trades-off the perceived expertise level (Costa and Coelho do Vale, 2018).

As such, CC automatically triggers an assessment of expertise of the involved co-actor and in cases the perceived expertise is persuasive it will trigger in turn positive consumers' behavioral intentions. As such, it is hypothesized that:

H₃: Knowledge that a product was co-created with stakeholders triggers an assessment of level of expertise, which determines behavioral intentions.

2.3.5 Further mediating effects on behavioral intentions

As derived in passages before, both perception of innovation ability and brand uniqueness are in conjunction with a brand evaluation and can therefore foster intention to purchase and recommend. Previous studies on consumer CC have already tested this interrelation and found evidence for this proposition (e.g. Meißner et al., 2017 and Schreier et al., 2012). This is why the present research follows this relation. Since stakeholder CC is hypothesized to be perceived more unique and innovative, this perception will positively influence behavioral intentions.

H_{4A}: The effect of hallmarking a complex product as co-created with stakeholders on Millennial consumers' behavioral intentions is due to the perception of innovation ability.

H_{4B}: The effect of hallmarking a complex product as co-created with stakeholders on Millennial consumers' behavioral intentions is due to perception of brand uniqueness.

3 Methodology and data

3.1 Objectives and data

The objective of this research is to find evidence for differences between the design modes stakeholder CC and generic design in terms of brand perceptions and behavioral intentions. Moreover, this research aims to demonstrate that different levels of perceived expertise of the co-actors mediates an increase of purchase intentions.

An initial pilot study determined the representatives for the three different expertise levels for co-actors. A single factor, independent group, between-subjects experiment that presented an automobile as complex product to the participants tested the hypotheses.

3.2 Automobile as representative for complex product

In order to investigate the proposed research construct, the present study used automobiles and original equipment manufacturer (OEM) to represent the object of investigation complex product. CC is de facto a hot topic for the automotive industry. In the new state of the automotive industry, where the automobile has changed from a technical to a social commodity and OEMs are constantly confronted with new mobility solutions from an environment of arising (technical) influences as well as actors, CC is a paradigm which ensures a much broader opportunity of innovational products and services than internally NPD has before.

Back in the 20th-century, the technology and engineering quintessence of automobiles was the engine. At present, software, large computing power and advanced sensors shifting a vehicle's focus from a hardware-driven machine to a software-driven electronics device. For instance, a car build in 2016 contained about 150 million software lines of code, which was 15 times higher, compared to a car build in 2010. Therefore, software competencies are becoming a huge variable within differentiation. This evolution facilitates most modern innovations, snowballs complexity, and particularly updates competition within the automotive industry. Although OEM's traditional business will remain a relevant share of the overall value pool, it is inevitable to access new disruptive business models on the basis of the technological focus shift, in order to stay sustainable. (McKinsey & Company, 2016, McKinsey & Company 2017A)

Besides the expedited rise of new technologies, not only changes in consumer preferences around ownership have triggered the automotive revolution but also digitalization and sustainability policies have paved the way for new business models. Relying on McKinsey & Company (2016) study, there are four determinant trends impacting the automotive industry's prospective development: Diverse mobility, autonomous driving, electrification, as well as connectivity. These four determinant trends are driving the current mobility-industry landscape to a more complex and very diverse directions full of possibilities for new business models and technics.

In the past the automotive industry demonstrated some initial intentions to make use of CC. Most recently, Porsche just selected the winner's team – a tech start-up - of this year's innovation competition and continued its successful experience with its open innovation platform from last year. The topic of the 2018 competition was about applications for automobiles and was open to intrigued parties all over the world especially aiming for independent developers, students, start-ups as well as internal Porsche employees. The winning team will now start to refining their idea with Porsche employees and co-create components together. To Porsche this competition is a possibility to open to novel concepts as well as outside impetus and will also in future continue expanding its ecosystem through campaigns such as the Next OI Competition (Newsroom Porsche, 2018).

To sum it up, the automobile represents as a complex product a real-life case, which is credible and has the chance to really benefit from CC. Furthermore, Millennials are confronted with cars in their every day life and can get into the experiment's scenario.

3.3 Determining product component and representatives of the expertise levels with the help of a pilot study

At first, an antecedent pilot study was conducted in order to determine (a) an automobile product component and (b) three representatives of different expertise levels (high, medium, low) for the fictive co-creation scenario of the main experiment.

Various studies of McKinsey & Company, PwC, and Deloitte were consulted to find crucial product topics, which are currently in consideration of the car manufacturers. Besides looking for a component for the main experiment, the same sources were used to filter important players within the automotive industry, which could be worth considering as co-actors (complete listing of all items for both domains can be found in appendix 1).

A pilot study (n=39, German only, mean age = 26 – 35 years) was conducted to find out (a) which car component was especially important to Millennials and how they (b) perceived various actors' expertise and ability to come up with new ideas for the automotive industry. In the style of Fuchs and Schreier (2011), respondents were confronted with listed items of these two domains and were asked to assess each one on a 5-point-Likert scale (where 1= "very unimportant", 5= "very important"). Afterwards the items were listed in descending order based on their means.

As a result, respondents evaluated connectivity as the most important topic for the car industry ($M=4.28$). With regard to the different levels of perceived expertise, start-ups were generally perceived to be associated with “high” expertise, knowledge, and ability to generate helpful ideas ($M=4.28$), government with “moderate” ($M=3.26$), and celebrities and influencers are perceived to demonstrate a “low” ($M=2.44$) level within these factors. An independent sample t-test with start-up and government proved that government’s expertise was statistically significantly lower than start-up’s, $t(38)=33,721$, $p=.001$. A further independent sample t-test with government and influencer approved that influencers’ expertise is statistically significantly lower perceived than governments’, $t(38)=20.489$, $p=.001$.

As a result, this study will continue its research on base of the just presented expertise representatives and the most important perceived automotive topic connectivity.

3.4 Main experimental method

To investigate the impact of different expertise levels of co-actors on Millennials’ intention and perception for complex products, this research used an experimental post–test-only control group design (Campbell and Stanley, 1963). In the style of Liljedal and Dahlén (2018), and Dijk et al. (2014), it was conducted a single factor (levels of expertise: high, moderate, low vs. generic professionals’ expertise), independent group, between-subjects experiment with manipulated editorial publicity texts and advertisement images about the launch of a new car with highlighted connectivity components (see appendix 2).

The experiment’s data was collected via an online survey on Qualtrics. The link to the survey was spread via e-mail, social media, and messenger providers, primary to former business colleagues, fellow students, and secondary to other appropriate participants via individual effort of already participated respondents. The total sample of completed surveys consisted of 182 responses. However, for correct validation purpose, participants who did not finish the survey had been excluded from the study. As a result 168 (46% female; 63% German, 14% Portuguese; mean age ranged between 25 – 30 years) respondents passed the data quality check for the groups control group ($n= 43$), start-up ($n= 40$), government ($n= 40$), and influencer ($n= 45$)³.

³ More specific information about the demographical characteristics can be found in appendix 3.

3.5 Procedure

The survey was structured as follows. First and foremost, participants had to admit that they were born between 1980 and 2000 to be able to continue and to ensure only Millennials taken the survey. After asking about the general involvement for cars and the automotive industry, participants were randomly assigned to one of the four conditions. The design was completely randomized which means that respondents were randomly allocated to one of the three treatment groups (different levels of perceived expertise: high= Start-ups (SU), moderate= Government (GO), low= Influencer (IN)) or to the control group (CG) representing generic design. They were introduced to a brief text about a new automobile, which highlighted in particular its new connectivity functions. The control group was only exposed to a product description. Consequently, to this group the car appeared to be a firm's internal design and development. By contrast, the texts for the three treatment groups included additional information about its NPD process and mentioned respectively the co-actor.

Right after, as a manipulation check participants were asked to identify the designers. This was followed by short questions capturing perceived (a) expertise of designers involved, (b) innovation ability, and (c) uniqueness. Afterwards respondents assessed their intentions to recommend as well as purchasing the car. Then, respondents evaluated the complexity of product automobile. Finally, participants filled in details about their demographics such as gender, age, nationality, and occupation.

3.6 Measures

The chosen questions for the survey aimed to record the effects of stakeholder CC on complex products with three different expertise levels and one generic level. They were collected from previous researches related to the given research field. All questions of the online survey related to participants' assessments, preferences, and judgments used a 7-point-Likert scale. For all Likert scales 1 indicated very strong agreement whereas 7 described very strong disagreement. Uniformly, one was specified as best/highest option whereas seven indicated the worst/lowest form. According to Preston and Coleman (2000), seven response categories provide the most reliable scores and are most preferred by participants because of its simplicity to use as well as its ability to express preferences properly. Table 1 below indicates details about the amount of items used to measure each construct of the present research.

For reliability analysis, Cronbach's alpha was calculated to assess the internal consistency of the different, underlying constructs for positive effects.

Table 1: Overview of measures used for the study in the present research

Construct (Cronbach's alpha)	No. items	Measurement	
General product (category) involvement ($\alpha = .940$)	3	How do you rate cars and the automotive on the following: (a) [1] exciting / unexciting [7]; (b) [1] of meaning to me / of no meaning to me [7]; (c) [1] appealing / unappealing [7] <i>(items are adapted from Zaichkowsky, 1985; Josiassen et al., 2008)</i>	
Perceived level of designers' expertise ($\alpha = .922$)	2	In your opinion, how high is the expertise of the people designing developing for this company? They have very high [1] / They have very low design expertise [7] Do you think that the people designing for this company have the necessary skills (know-how) and competence to design new products? They have the necessary skills [1] / They don't have the necessary skills [7] <i>(items adapted from Ratneshwar and Chaiken, 1991)</i>	
Perception innovation ability ($\alpha = .918$)	6	The product development process is surprising. [1] Strongly agree / [7] Strongly disagree The product development process is somewhat unexpected. [1] Strongly agree / [7] Strongly disagree The way the product was created is completely new to me. [1] Strongly agree / [7] Strongly disagree <i>(items are adapted from Nishikawa et al., 2017)</i> What do you think about the firm's innovation ability? -I think this company's ability to innovate is... (a) very high [1] Strongly agree / [7] Strongly disagree; (b) very strong [1] Strongly agree / [7] Strongly disagree; (c) excellent [1] Strongly agree / [7] Strongly disagree <i>(items are adapted from Schreier et al., 2012)</i>	
Perception brand uniqueness ($\alpha = .915$)	3	Based on the information, what is your general view of the car brand? (a) It is unique [1] Strongly agree / [7] Strongly disagree; (b) It is different from competitors [1] Strongly agree / [7] Strongly disagree; (c) It is special [1] Strongly agree / [7] Strongly disagree <i>(items are adapted from Liljedal and Dahlén, 2018)</i>	
Purchase intention ($\alpha = .859$)	Behavioral intentions ($\alpha = .912$)	2	Please imagine that you would like to buy a product from this category. If you had the opportunity, would you consider purchasing a product from this company? (a) I would seriously consider purchasing products from this company [1] Strongly agree / [7] Strongly disagree; (b) I would actively search for this company [1] Strongly agree / [7] Strongly disagree <i>(items are adapted from Schreier et al., 2012)</i>
Recommendation intention ($\alpha = .891$)		2	I say positive things about this car brand to other people. [1] Strongly agree / [7] Strongly disagree I recommend this car brand to someone who seeks my advice. [1] Strongly agree / [7] Strongly disagree <i>(items are adapted from Gebauer et al., 2013)</i>

Perception product complexity ($\alpha = .627$)	2	These are highly engineered products. [1] Strongly agree / [7] Strongly disagree; These products are technologically very complex. [1] Strongly agree / [7] Strongly disagree (items are adapted from Anderson, 1985)
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Generally, scholars rely on Nunnally (1978) and predicate that an alpha $> .70$ is recommended in order to accept internal consistency ($>.90$ is seen as excellent). Accordingly, the Cronbach alphas of this study ranked above the advised values. Therefore, doubts about this study's reliability can be dismissed.

4 Results' analysis

4.1 Overview

At first, a manipulation check tested whether the different designer expertise levels were properly indicated. Two analyses of variances (ANOVA) ensured not only equality of perceived product complexity but also a difference of the groups'⁴ expertise level and tested the two further basic preconditions of this experiment.

After successfully having manipulated the level of expertise we performed one-way Welch ANOVA to investigate the differences of the CC effects on PIA (H_1) and on perceived uniqueness (H_2).

To proceed with the analysis of variance, we started by understanding the ANOVA assumptions. If not indicated differently, variances among the groups were heterogeneity as assessed by the Levene's test of homogeneity of variances ($p < .05$). That is why the hypothesis' conclusions are based on the approach of one-way Welch ANOVA. Afterwards Games-Howell post hoc analysis determined not only statistical significance of each mean comparison but also established the actual differences and a group order.

In order to discover the impacting variables on behavioral intentions (H_3), an ANOVA analysis was used to get first impressions of the connection between perceived expertise and behavioral intentions. Afterwards, a mediator analysis in the style of Preacher and Hayes' (2004) model four indicated perceived expertise as mediator for behavioral intentions.

⁴ In the text the term "groups" always associates the control group and the three treatment groups SU, GO, and IN.

Finally, two more single mediator analyses indicated the connection between behavioral intentions and PIA (H_{4A}) as well as perceived brand uniqueness (H_{4B}).

For all following analysis, there were no outliers in the data, as assessed by a preceding inspection of the respective boxplots in SPSS for values greater than 1.5 box-lengths from the edge of the box.

4.2 Testing manipulation check and basis preconditions

This study intends to investigate differences of (a) a complex product, which is (b) co-created by different perceived levels of stakeholder expertise (start-up, government, influencer) vs. generic design. To guarantee that this setting of the four independent groups (CG, SU, GO, IN) was recognized by the participants as such, it was important to check on this foundation first before the analysis continued to investigate the hypothesis.

Firstly, a one-sample t-test was run to determine whether complexity score for automobiles in products was different to normal, as defined as a complexity score of 4.0. Mean automobile complexity score (1.62 ± 0.49) was higher than the normal complexity score of 4.0 with a statistically significant difference of -2.38 (95% CI [-2.31; -2.46]), $t(167)=-62.755$, $p=.001$. Secondly, whether all groups (treatment groups plus CG) perceived the automobile equally as a very complex product, showed the result of a one-way ANOVA. There was homogeneity of variances, as assessed by Levene's test for equality of variances ($p=.288$). The output revealed that there were no significant differences in the complexity assessment of an automobile between the different condition groups and therefore the product complexity is perceived statistically equally by the four groups ($M_{CG}=1.60$, $M_{SU}=1.63$, $M_{GO}=1.60$, $M_{IN}=1.63$, $F(3, 164)=.044$, $p=.988$). Hence, $M_{\text{Perception product complexity}}=1.62$ implicates an agreed feeling on high complexity for the product automobile since 1 indicated a strong agreement that automobile is a highly engineered and technologically complex product.

A one-way Welch ANOVA was conducted to determine if each stakeholder group perceived the expertise and skill of the co-actors differently. A subsequent post hoc test was used to validate expertise order. The level of perceived expertise differed statistically significant for the different stakeholders ($F(3, 82.387)=36.334$, $p=.001$). Perceived expertise score increased from the influencer group ($M_{IN}=4.69$) to the government ($M_{GO}=3.30$), and start-up

($M_{SU}=1.86$). Games-Howell post hoc analysis revealed that all stakeholders are statistically different (IN to GO (1.39, 95% CI [0.53; 22.24], $p=.001$); GO to SU: (1.44, 95% CI [0.86; 2.02], $p=.001$). Consequently, there is evidence that the treatment groups evaluated the expertise of the respective co-actor all differently.

Interesting to recognize is the fact that GO, as moderate perceived stakeholder, showed no significant difference to the perceived expertise of professionals (CG to GO (-0.43, 95% CI [-0.94; 0.08], $p=.130$)). Additionally, start-up was the only co-actor perceived with better expertise than the internal designers of the CG ($p=.001$) and influencers were below internal designers being the last perceived skilled co-actor of this comparison.

As a conclusion, even though some respondents did not realize the designer mode correctly (see allocations in table 2) the output above shows that the manipulation check in total has worked out for the groups concerning different expertise levels of respective co-actors. Therefore, the manipulation check allows continuing with further investigations.

Table 2: Overview respondents groups - correct and incorrect scenario identification

		Manipulated Condition Groups			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	CG (correct)	33	19.6	19.6	19.6
	CG (non-correct)	10	6.0	6.0	25.6
	SU (correct)	36	21.4	21.4	47.0
	SU (non-correct)	4	2.4	2.4	49.4
	GO (correct)	33	19.6	19.6	69.0
	GO (non-correct)	7	4.2	4.2	73.2
	IN (correct)	35	20.8	20.8	94.0
	IN (non-correct)	10	6.0	6.0	100.0
	Total	168	100.0	100.0	

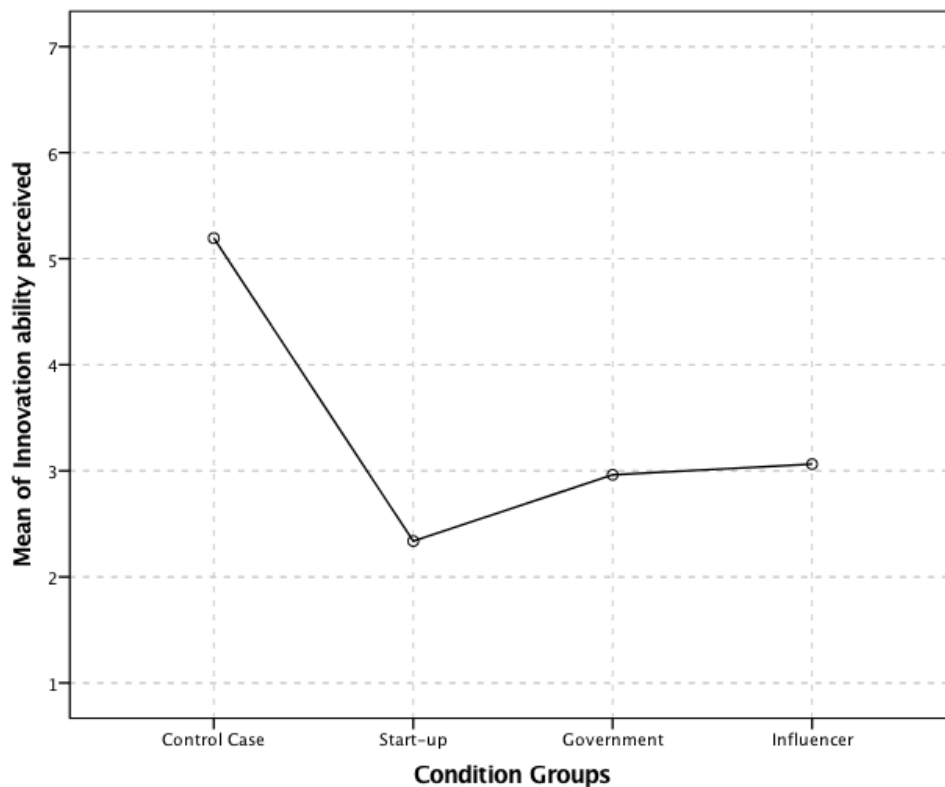
4.3 Effect of stakeholder co-creation on perceived innovation ability

H_1 predicated that Millennial consumers will perceive firms communicating stakeholder co-involvement as exhibiting higher innovation ability compared to complex product brands that offer generic design by company professionals. To test the design sources CC (represented by the three cases SU, GO, IN) versus generic design on PIA, a Welch ANOVA was used to examine significant differences between the means of these four groups. To do so, the construct “perception innovation ability” was applied as independent variable. The first step revealed that PIA was statistically significantly different for the groups ($M_{CG}=5.19$, $M_{SU}=2.34$, $M_{GO}=2.96$, $M_{IN}=3.06$, $F(3, 89.431)=39.393$, $p=.001$).

As necessary second step, closer attention was paid to the comparison of the means. For it, Games-Howell post hoc test (appendix 4) provided confidence intervals for the differences between group means. This analysis revealed a significant difference between the PIA scores of CG to each of the CC groups as can be seen in table 3 or graphically in figure 2. Indeed, the three CC groups' score statistically significant better on PIA compared to the CG, which was the lowest, mean. The increased differences to CG ranged from 2.13 for IN (95% CI [1.49; 2.77], $p=.001$), over 2.23 for GO (95% CI [1.56; 2.90]), to the highest difference for SU 2.86 (95% CI [2.11; 3.60]).

Hence, this output confirmed a significant difference of perceived innovation ability between hallmarked CC products and generic design. Moreover, the positive effect of H_1 can be accepted since all CC groups ended up with much higher PIA than the generic design mode.⁵

Figure 2: Comparing PIA means (SPSS output ANOVA analysis)



4.4 Effect of stakeholder co-creation on brand uniqueness

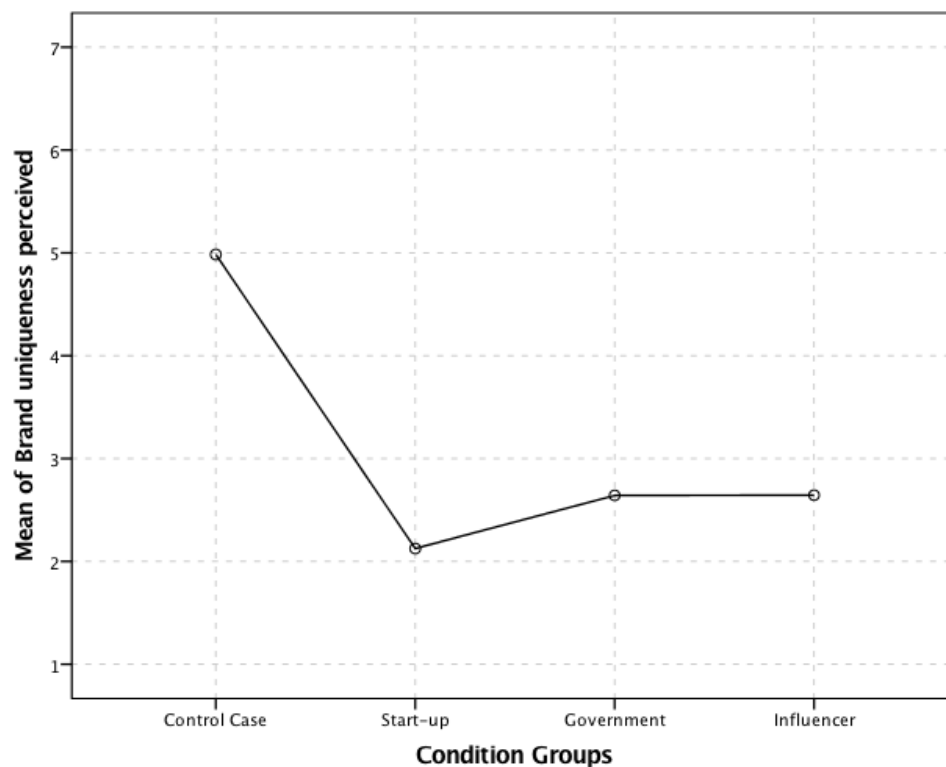
The second hypothesis predicted a further positive perception effect due to CC. It stated a higher perception of perceived brand uniqueness for Millennial consumers toward brands of

⁵ Statistically significant differences between the expertise levels for this and the upcoming ANOVA analyses are recorded in table 3.

complex products that communicate stakeholder's involvement than towards generic design. The performance of an analysis of variances (Welch ANOVA) tested the means' differences of the dependent variable "perception brand uniqueness" between the groups. The output confirmed that the level of perceived brand uniqueness differed statistically significant for the disparate groups, which is shown graphically in figure 3 ($M_{CG}=4.98$, $M_{SU}=2.13$, $M_{GO}=2.64$, $M_{IN}=2.64$, $F(3, 87.040)=31.199$, $p=.001$). Furthermore, the analysis of Games-Howell post hoc test (appendix 5) showed the differences between each CC group and the CG. As seen in table 3, CG as least unique perceived group showed by far a great significantly difference ($p=.001$) to each CC group ($CG \rightarrow SU$ 2.86 (95% CI [2.05; 3.67]), $CG \rightarrow GO$ 2.34 (95% CI [1.63; 3.06]), $CG \rightarrow IN$ 2.34 (95% CI [1.63; 3.05])).

From this it can be concluded that CC in general evokes higher perception of brand uniqueness compared to generic design. Hence, H_2 can be accepted.

Figure 3: Comparing perceived brand uniqueness means (SPSS output ANOVA analysis)



4.5 Effect of stakeholder co-creation on behavioral intentions

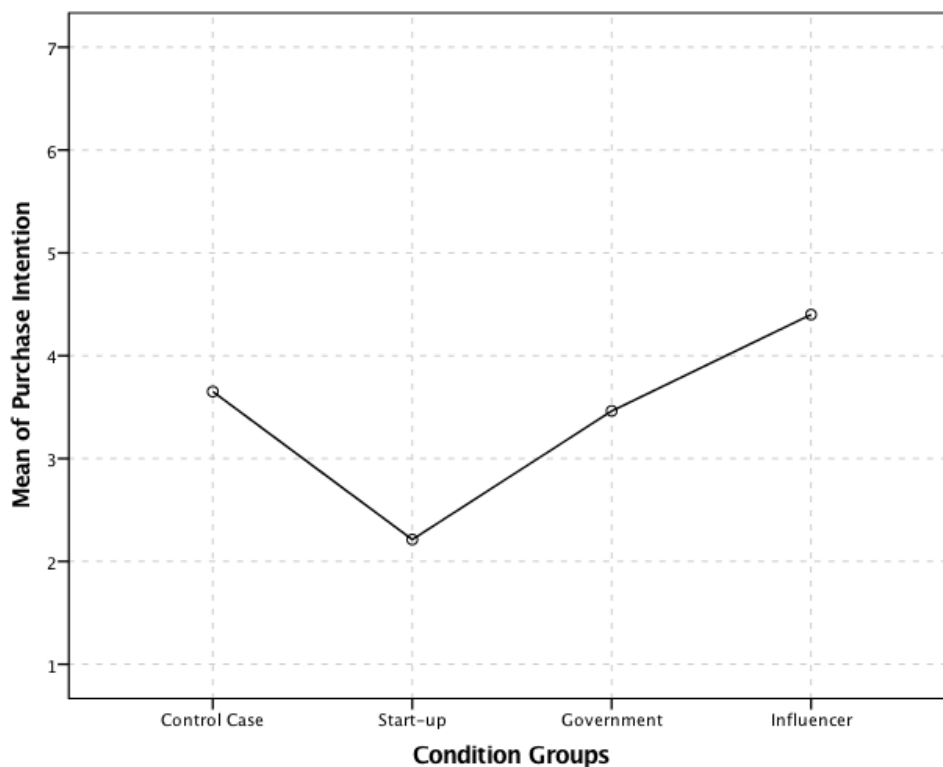
Assumptions of H_3 contained that communicating stakeholder CC triggers an assessment of level of expertise, which determines behavioral intentions. To start this investigation, two one-way Welch ANOVAs were executed to identify how (a) purchase intentions and (b) rec-

ommendation intentions differed for the CC groups compared to the CG. Each analysis of variances used the eponymous construct variable as independent variable and the groups –as before- as dependent variable.

With regard to *intentions to purchase*, purchase intention scores were statistically significantly different between the different groups, $F(3, 90.305)=22.668$, $p=.001$ (graphically overview in figure 4). Afterwards, a Games-Howell post hoc analysis was run to find out which groups differed statistically. Although the result of the one-way Welch ANOVA revealed that purchase intentions of SU ($M_{SU}=2.12$) and GO ($M_{GO}=3.46$) were perceived on average greater than CG ($M_{CG}=3.65$), Games-Howell post hoc analysis (appendix 6) revealed that only the increase from CG to SU (1.44, 95% CI [0.86; 2.02]) was statistically significant ($p=.001$) (as displayed in table 3). The difference from CG to GO did not show a significant difference ($p=.784$). However, low perceived expertise of a co-actor ($M_{IN}=4.40$) impacts a significant decrease of purchase intention compared to generic design ($p=.045$).

Hence, the output demonstrates that stakeholder CC did not generally enhance purchase intentions but rather depends on the level of perceived expertise.

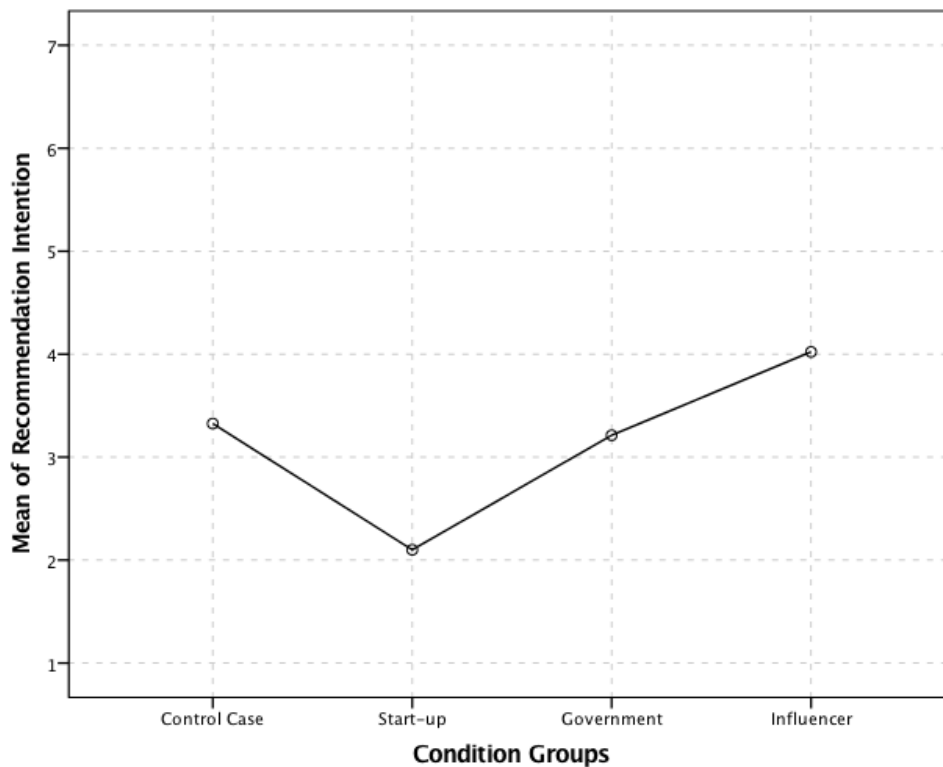
Figure 4: Comparing purchase intention means (SPSS output ANOVA analysis)



In respect of *intentions to recommend*, a similar outcome is discernible (see figure 5). The analyses of variances verified statistically significant differences between the groups on intentions to recommend, Welch's $F(3, 87.802) = 23.183, p = .001$. Again, SU ($M_{SU} = 2.10$) and GO ($M_{GO} = 3.21$) showed higher means than CG ($M_{CG} = 3.33$). However, only the increase from CG to SU (1.23, 95% CI [0.77; 1.68]) was statistically significant ($p = .001$) due to Games-Howell post hoc analysis (appendix 7). CG and GO did not show significant differences ($p = .905$) but CG and IN demonstrated a statistically significant decrease of the compared means (-.70, 95% CI [-1.33; -0.07]), $p = .024$.

This means that stakeholder CC triggers no general improvement of intention to recommend as well.

Figure 5: Comparing recommendation intention means (SPSS output ANOVA analysis)



In conclusion, these outputs showed that compared to generic design, stakeholder CC could not universally trigger a rise of behavioral intentions. It is worth mentioning, that only co-creating with actors of high-perceived expertise (who are usually overtopping the perceived expertise of company designers) could positively differentiate the behavioral intentions from generic design. Conversely, low perceived expertise of co-actors evoked a negative impact and decreased behavioral intentions compared to generic design and moderate perceived expertise evokes rather equal behavioral intentions compared to generic design.

Relying on this finding, the next step tested a mediation effect of expertise on purchase intentions

Table 3: Overview of the mean comparison output inclusive post hoc output

		Design mode				(Welch F-test)	Games-Howell post hoc analysis
		Internal Design	Co-creation modes				
Measures	Control Group	Start-up	Government	Influencer			
	(1)	(2)	(3)	(4)			
Brand perception	Perceived expertise	2.87	1.86	3.30	4.69	36.344*	(1)-(2)*; (1)-(3)n.s.; (1)-(4)*; (2)-(3)*; (2)-(4)*; (3)-(4)*
	Perceived innovation ability	5.19	2.34	2.96	3.01	39.303*	(1)-(2)*; (1)-(3)*; (1)-(4)*; (2)-(3)n.s.; (2)-(4)**; (3)-(4)n.s.
	Perceived brand uniqueness	4.98	2.13	2.64	2.64	31.199*	(1)-(2)*; (1)-(3)*; (1)-(4)*; (2)-(3)n.s.; (2)-(4)n.s.; (3)-(4)n.s.
Behavioral intentions	Purchase intention	3.65	2.21	3.46	4.40	22.668*	(1)-(2)*; (1)-(3)n.s.; (1)-(4)**; (2)-(3)*; (2)-(4)*; (3)-(4)**
	Recommendation intention	3.36	2.10	3.21	4.02	23.183*	(1)-(2)*; (1)-(3)n.s.; (1)-(4)**; (2)-(3)*; (2)-(4)*; (3)-(4)**

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

4.6 The effect of perceived expertise as mediator

A mediation model was built to investigate the hypothesis that expertise would mediate the effect of design mode on behavioral intentions (H₃). The model was designed in accordance with Preacher and Hayes (2004) model four indicating the design mode condition as independent variable and perceived expertise as mediator (as displayed in figure 6). Likewise various scholars such as Preacher and Hayes (2004) or Pizzutti dos Santos and Basso (2012), a bootstrap analysis was used to analyze the mediation hypotheses and to assess the overall significance of the indirect effect.

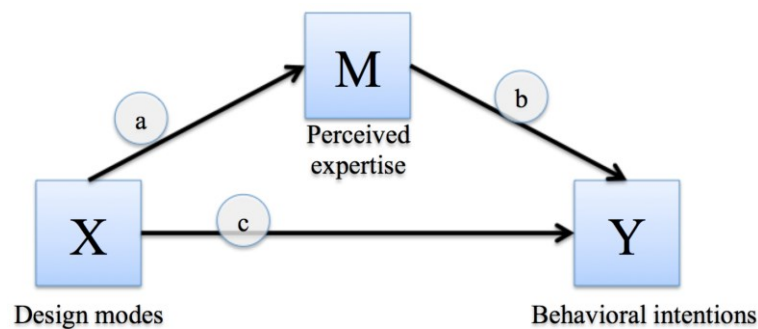
The independent effect was significant when the confidence interval calculated through this method excluded zero (Zhao et al., 2010). In addition to this prerequisite, Mascha et al. (2013) listed two additional general requirements, which have to be met in order to assert an effect of exposure on outcome. Firstly, the independent variable has to affect the mediator. Secondly, there has to be an impact – independent from the independent variable - from the mediator to

the dependent variable. Above all, there has to be a general significant relationship between the two variables before starting to evaluate the mediation effect (Baron and Kenny, 1986). Finally, in case the direct effect drops to non-significance while the mediator is included, results report a fully mediating effect. If the direct effect stays significant, the mediator's effect is describes as partially mediating (Aaron & Aaron, 1994).

These conditions were used to determine the significance of the present mediation models.

To get started, Preacher and Hayes' (2004) macro model four and 5,000 bootstrapped samples was used.

Figure 6: Mediation model testing perceived expertise as mediator



Since purchase and recommendation intentions obtained a similar result in the ANOVA analysis before, they were put together for the mediation model as one construct behavioral intentions representing the dependent variable. Cronbach's alpha tested internal consistency of the four items and reached an excellent score of .912, which allows continuing the analysis with this merger.

The model showed a significant total effect of the relationship between design mode and behavioral intentions ($c: \beta=0.33, SE=0.08, p=.001$). Results for H_3 indicated that the design mode was a significant predictor of perceived expertise, $a: \beta=0.69, SE=0.09, p=.001$, and that perceived expertise was as well a significant predictor of behavioral intentions, $b: \beta=0.56, SE=0.05, p=.001$. Moreover, the bootstrap analysis identified a significant partially standardized indirect effect (95% CI [0.21; 0.42]) with the coefficient of perceived expertise on behavioral intentions ($\beta=0.31, BootSE= 0.05$). The total effect was stable when the control (covariate) variable product involvement was added ($\beta=0.31, 95\% CI [0.16; 0.49], p=0.01$), which demonstrated that it did not appear to predict behavioral intentions ($p>.05$).

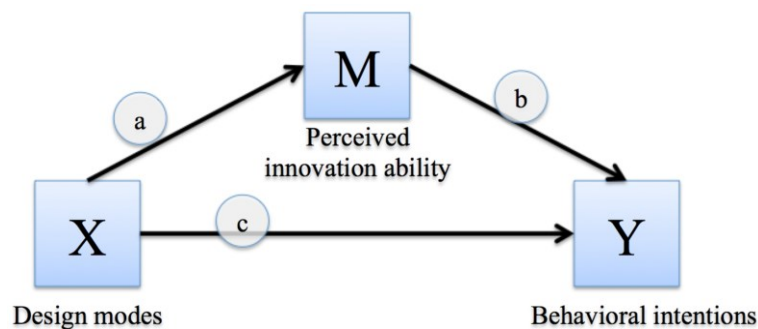
Furthermore, while the total effect of expertise perception on behavioral intentions is significant, the direct effect is non-significant (95% CI [-0.2; 0.09], $p=.48$), indicating full mediation.

Summarizing, this section found reasonable evidence that perceived expertise is a full mediator of the relationship design mode and behavioral intentions since an indirect effect was identified as significant while the direct affect was not and therefore, H_3 can be accepted.

4.7 The effect of perceived innovation ability and perceived uniqueness as mediators

At first, H_{4A} assumed that the effect of hallmarking a complex product as co-created with stakeholders on Millennial consumers' behavioral intentions is due to the *perception of innovation ability*.

Figure 7: Mediation model testing PIA as mediator



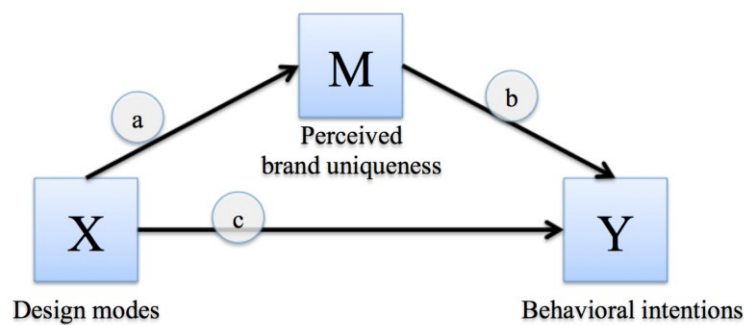
Another PROCESS model 4 was run to test this (figure 7). It found a significant total effect of the relationship between PIA and behavioral intentions ($c: \beta = -0.33, SE = 0.8, p = .001$). PIA was significantly predicted by the design mode, $a: \beta = -0.58, SE = 0.01, p = .001$. Moreover, PIA was indicated as significant predictor for behavioral intentions as well, $b: \beta = 0.5, SE = 0.05, p = .001$. By using the bootstrap analysis, it became significant that the partially standardized indirect effect ($\beta = -0.23, BootSE = 0.05, 95\% CI [-0.32; -0.14]$) with the coefficient of PIA on behavioral intentions was valid. The total effect was resilient when the control (covariate) variable product involvement was added ($95\% CI [0.16, 0.45]$), which demonstrates that it did not appear to predict behavioral intentions ($p > .05$).

Furthermore, the total effect of expertise perception on behavioral intentions is significant likewise the direct effect ($95\% CI [0.47; 0.76], p = .001$), indicating partial mediation. Since

partial mediation explains not the total effect, only some, the CC effect is not fully explainable due to PIA and H_{4A} can be rejected.

Second, H_{4B} assumed that the effect of hallmarking a complex product as co-created with stakeholders on Millennial consumers' behavioral intentions is due to the *perception of brand uniqueness*.

Figure 8: Mediation model testing perceived brand uniqueness as mediator



A last PROCESS model 4 was run to test this (figure 8). It found a significant total effect of the relationship between PIA and behavioral intentions (c: $\beta = 0.33$, $SE = 0.08$, $p = .001$). Brand uniqueness was significantly predicted by the design mode, a: $\beta = -0.65$, $SE = 0.09$, $p = .001$. Moreover, brand uniqueness was indicated as significant predictor for behavioral intentions as well, b: $\beta = 0.45$, $SE = 0.06$, $p = .001$. By using the bootstrap analysis, it became significant that the partially standardized indirect effect ($\beta = -0.23$, $BootSE = 0.04$, 95% CI [-0.32; -0.16]) with the coefficient of brand uniqueness on behavioral intentions was valid. The result was resilient when the control (covariate) variable product involvement was added (95% CI [0.16, 0.26], $p = .001$), which demonstrates that it did not appear to predict behavioral intentions ($p > .05$).

Furthermore, the total effect of expertise perception on behavioral intentions is significant likewise the direct effect (95% CI [0.47; 0.79], $p = .001$), indicating partial mediation. Since partial mediation explains not the total effect, only some, the CC effect is not fully explainable due to perceived brand uniqueness and H_{4B} can be rejected.

5 Findings, discussion and implications

5.1 Conclusion and discussion

The present study investigates the approach of communicating stakeholder co-creation within the NPD process by the example of complex products. It focuses on findings concerning brand image and behavioral intentions. In doing so, the principal focus lies on the effect of different perceived expertise levels, emanated by the co-actor. Although CC has become a widely researched field of interest, little is known about the effects of this concept in case it is applied with stakeholders and on complex products. Initial theoretical approaches have touched the area of labeling CC on complex products but solely included users as co-actors who seemed to negatively impact the outcome due to lack in their perceived expertise and inadequate perceived skills (e.g. Schreier et al, 2012; Poetz and Schreier, 2012; Costa and Coelho do Vale, 2018). Nevertheless, this research aims to demonstrate that stakeholder CC is not merely relevant but successfully possible for high complex products under right circumstances. To investigate these statements, the present study used automobiles as representatives for complex product to test Millennial's perceptions and intentions since this generation is the imminent great buyer group expecting to spend about 400 billion a year by 2020 (Karr, 2014). The study elaborates three key findings.

Firstly, the findings demonstrate that brands which hallmarking a complex product as output of a jointly developed process with stakeholders has positive corporate associations. Firms that use stakeholder in their innovation process are perceived as more innovative compared to a generic design. A labeled co-created complex product obtains greater agreement of stronger innovation ability than the generic product. The results suggest that CC imparts a fresh creative way of developing new complex products, which is realized as well as appreciated by Millennial consumers. This can be traced back to the surprisingly newness of this approach which appears to be unexpected.

Similar to this, communicating CC activities with stakeholders has an effect on how consumers perceive the brand. Learning that a product was co-created results in higher perceived brand uniqueness compared to the usual product communication. Compared to generic NPD, a stakeholder CC approach is valued by Millennials as special, which makes it different from competitors and especially from complex products, which seem to result from standard development processes.

Because of the effects on corporate abilities and brand perceptions, CC is interesting for companies who want to gain Millennials' attention with a novel concept for developing complex products. With the help of communicating stakeholder CC, it is possible to differentiate the brand image regarding innovativeness and uniqueness from the crowd.

However, secondly, perceived brand uniqueness and PIA showed only a partial mediation effect on behavioral intentions, which indicates that there are further aspects, which play a crucial role. Although these two components differentiate significantly from generic design, they do not fully mediate behavioral intentions.

Thirdly, the study reveals no general valid improvement of behavioral intentions by comparing the two design modes. Stakeholder CC only enhances behavioral intention compared to generic design in case the co-actor is perceived with significantly higher expertise than the professional. Using co-actors of moderate expertise results in no significant difference in case of behavioral intentions compared to professionals. In these cases, the intention to purchase or recommend a complex product stays the same whether CC is communicated or not. However, behavioral intentions are adversely impacted by lower perceived expertise. In such a case, Millennials tend to not declare themselves in favor of co-created complex products.

That is why it seems like Millennials need more persuasive arguments to significantly intensify their intentions to purchase and recommend complex products than an improved innovative and unique appearance. They need to be convinced by the skills of the co-actor and by believing in his expertise. This is why, this research did not only assume expertise to play a decisive role within CC on complex products but also showed its full mediation effect on behavioral intentions. In other words, the selling success of labeling complex products depends on the expertise level, which is perceived of the co-actor by consumers in this approach. Therefore, the higher Millennials perceive the skills of the CC partner, the higher the chance to purchase and recommend a co-created complex product.

Summarizing, since Millennials are a generation which is known for the power of its influencing word of mouth, their decisive way of purchasing (Mangold and Smith, 2012), and not being brand loyal as older generations⁶ (Viswanathan and Jain, 2013), the present research has shown how brands can benefit from stakeholder CC and communicating this activity in

⁶ This means they change brands and products faster and more conscious.

particular for complex products. In conclusion, stakeholder CC gains their attention through higher innovative and unique appearance differing the brand from competitors. After attention is gained, intentions to purchase and recommend depend on the mediating level of perceived expertise.

5.2 Academic implications

CC has become a widely researched field within the last years. The primary focus is on CC with users as co-actors and various studies published scientific knowledge adding to this field of interest. Recently, scholars have taken notice of complex products and started studying subject matters with hallmarking this user-design. Many of them realized that users might not be adequate as co-actors to use for product labeling strategies since consumers evaluate their level of perceived skill as insufficient (e.g. Poetz and Schreier, 2012; Thompson and Malaviya, 2013). This provided the vital starting point for the present study and inspired to further contribute to CC researches by providing novel conceptual approaches including elements that have been speculated about.

First, since perceived expertise seemed to constitute an obstacle to complex products, present findings extends former studies and found a way how this could be dealt with and draws attention to CC with stakeholders other than users. It joins the call of Pera et al. (2016) to further contribute to investigations in the field of stakeholder co-creation and reminds scholars that actors are not limited to users and that there are other actors who are able to perform where users reach their limits. Especially in a world where old habits are left behind, modern approaches are applied, and everything is getting more connected as well as borderless, stakeholder CC has potential to become the next big thing in economy and for scholars.

Second, the study provides a greater understanding how CC is perceived in complex products. It provides initial evidence that complex products can raise brand perceptions and behavioral intentions with the help of hallmarked stakeholder CC. Formerly tested on low complex products such as nourishments or fashion, this study adds focus on highly engineered products (automobile) and demonstrates that stakeholder CC is also possible for more expensive products differentiate from everyday necessities and is not necessarily a boundary condition.

Third, it complements assumptions about persuasive perceived expertise and proves that perceived expertise is indeed a crucial mediator for the success of behavioral intentions. The present concept framework indicates that the impact of communication joint involvement during the NPD stages depends on the level of perceived expertise, which is emanated by the design mode. By keeping this in mind, success of stakeholder CC with complex products can be expected and presents a mediator that replies to Fuchs et al.'s (2011) and Poetz et al.'s (2012) request to stress complex products out of a different industry and study whether positive effects are also possible in this case.

Summarized in other words, this research studied the effect of expertise as an explanation mechanism of consumer purchase intention for co-created products and set the focus on stakeholders as co-actors.

5.3 Managerial implications

The first implication for managers is that labeling complex products as a result of co-creation will benefit particularly if the target group are Millennials. Regardless what kind of co-actor joins the co-development, Millennials perceive a co-creating brand as more innovative and unique. Since Millennials tend to be disloyal to brands and look for products that represent their, *inter alia* innovative and unique characters (Moreno et al., 2017; Powell, 2014), co-created complex products meet the requirements to arouse their interest.

Managers can use this novel approach as a differentiation strategy and attract the attention within the competitive market where a lot of players come up with new business models. Innovation is known to be a great possibility to build up a differentiation strategy (Lengnick-Hall, 1992). This is especially helpful for companies that want to position themselves as innovators.

Especially nowadays CC has not been communicated greatly in industries of complex products such as the automotive industry, which makes this step special as well as unique compared to the generic developed products of competitors. By doing so, a respective brand appears to be a first mover, which is related to achieving long-term competitive advantage, too (Kerin et al., 1992).

However, if managers do not only want to attract interest but also improvingly impact behavioral intentions they have to scrutinize the perceived expertise of their used co-actor. It is advised to run market research with their target groups prior to releasing product communica-

tion with CC. It is important for managers to bear in mind that merely co-actors who elicit high-perceived expertise or are perceived as at least as skilled as professionals can affect a rise in Millennial consumers' behavioral intentions. For managers of the automotive industry, emerging start-ups should get special attention and treated with extra effort to come up with co-created products. Additionally, this study shows how important it is for managers not only to enter strategic partnerships with stakeholders but also to manage the perceptions of expertise triggered by the partner and be aware of the positive and negative consequences. Thus, this leads to a new field of how brands manage strategic partnerships.

This leads over to implication number three. There may be CC activities already running in the background of industries with complex products. However, it is important to note that labeling stakeholders as co-actors for complex product may not always bring value. As advised in the implication before, behavioral intentions accounted for sales success are mediated by perceived expertise of the co-actor. This means that in cases of moderate or low perceived expertise findings indicate that it may not cause extra value or be worth to promote CC activities. Although the product itself and its functions may be highly successful, a marketer has to focus on the brands' appearance. This suggests that in cases consumers perceive a co-actor as inadequate, product advertisement should remain silent about its actual development history.

5.4 Limitations

The present study contains some limitations, which are briefly explained below to school awareness for further research.

Most of the respondents were picked and chosen. This is why a lot of them are (fellow) students and at younger age. At the same time another majority is composed of persons who are connected to the automotive industry (either because of personal interest or work related) evincing a deeper knowledge and relatedness to the experiment's topic. This may slightly biased the study since they know that this is an upcoming topic for the industry or even have already dealt with such approaches. Thus, the outcome could differ for the general population. Therefore, further research with a more diverse public sample is recommended.

Moreover, although brand specification about the OEM was excluded in the experiment, in order to avoid potential branding effects and to generalize the findings for this study, the

brand has an influence on the purchase behavior of consumers (Meißner et al., 2017). In particular OEMs hold specific brand images, which can influence perceived expertise of the co-actor within the CC interaction. For instance, just an idea: Tesla is associated to be an inventive car company, which is aspirational due to its novel visions (Ong, 2017). By any chance, Millennials would have rated a co-creation with IN more appealing due to believe that this approach is just as novel as the brand itself. Moreover, Fuchs et al. (2011) found out that companies branded as luxury might not cope as positively as non-luxury brands, which might be an issue for luxury complex products as well.

In addition to this, there were no further specifications or characteristics listed, which could “brand” the co-actors. Survey participants received only limited information about the co-actors. This leaves much room for interpretation of their backgrounds and skills (in particular for the IN).

Furthermore, the construct variable innovation was defined in the literature review by two components: newness of the NPD process and the strength how innovation is created. By pooling these characteristics, the output of respective investigations was evaluated equally with both components. Since stakeholder CC for complex products is a relatively novel approach to use for communication purposes, findings benefited from the newness component. This can be seen as limitation. In this sense, it would be advisable for the longer term to only focus on the intrinsic strength of innovation.

Regarding the mediation results, it is conspicuous that brand uniqueness and PIA achieved very similar mediation effects and showed to be partial mediators indication more influences. Having said this, expertise was evaluated as full mediator, which should mean that this effect already explains the connection by its own. Those outcomes appear to be contradictory, which could be traced back to too few survey respondents.

Finally, the present research is limited to the investigation of a functional design component of a complex product. Whereas it was explained in chapter 2.3.4 that functional product components are inherently more complex to contrive (Schnurr, 2017), an output comparison to an aesthetic component of a complex product could further specify chances and conditions of communicating CC with complex products.

5.5 Further research

The present study provides a first step into the investigation field of stakeholder co-creation. Further research can build up on those initial findings and further probe scenarios. Some topics for further research are suggested below.

First, as described in the literature review, so far CC is more popular for low-complex products and known for its jointly development with consumers. To the best knowledge, high-complex products were neither investigated that much nor were they tested with non-consumer-related co-actors before. However, as elaborated in the literature review, stakeholder CC is not only an upcoming development in general but also predicts to be an expedient way for technological to stay competitive and implement new business models. It is interesting to examine how the consumers' evaluation will alter when more and more brands of complex products begin to engage and actively promote stakeholder CC practices. It might prejudice consumers' level of curiosity or attention, or even wear out (Dijk et al., 2014).

Second, the representatives of the different levels of perceived expertise (SU, GO, IN) are based on a pilot study where 39 respondents evaluated the adventurous skills as well expertise of a given list of presented actors. However, this research did not cover any actual investigation on attributes or characteristics, which determine co-actors' levels of expertise. Further research should take this area into consideration in order to gain knowledge about attributes that make a co-actor's expertise highly persuasive.

Third, within this study the focus is on the CC actors and their different levels of perceived expertise. The scenarios presented to the survey participants were consistent in regards of the level of engagement (full engagement) and did not contain any information about the duration of engagement in the NPD. According to the CC design framework of Frow et al. (2015), level of engagement and duration of engagement of the co-actors are major design components revealing new CC opportunities. It would be interesting to test how Millennial consumers react to (1) one-off interactions; (2) recurring interactions; and (3) continuous interactions with actors.

Fourth, it could be investigated if the different levels of perceived expertise causing more value if the empowerment within the NPD is adjusted. In the present research scenario all actors

created and selected the vehicle's component SYNC Connect together (full empowerment). However, Meißner et al. (2017) point out three possible empowerment strategies for the research of user co-creation: empowerment to create, to select, and full. Further studies could examine whether there are regulating effects in the interplay of perceived expertise and empowerment strategies for stakeholder CC (with complex products).

Finally, it is becoming popular to not only co-create with one stakeholder at a time but multiple (Kazadi et al., 2016; Pera et al., 2016). Hence in the long run, it would be interesting to ascertain whether there are trade-off observations of consumers' perceptions and intentions due to different levels of co-expertise working together.

Appendix

Appendix 1: Content and outcome of pilot study

Block 1: How important to you are following topics within the automotive industry? [1 very unimportant / 5 very important]

Descriptive Statistics (Means are ranked from highest to lowest)

	N	Minimum	Maximum	Mean (Mode)	Std. Deviation	Variance
Connectivity of the car (with its environment, apps, smartphone, etc.)	39	2	5	4.28 (5&4)	.759	.576
Interior design	39	3	5	4.23 (5)	.777	.603
Engine power and technology (e.g., horsepower, sports suspension, braking systems, etc.)	39	1	5	4.10 (5)	.995	.989
Digitalization	39	1	5	3.95 (4)	.916	.839
Exterior Design	39	2	5	3.95 (4)	.857	.734
Mobility und Service Apps	39	1	5	3.82 (4)	.970	.941
New Mobility Solutions	39	1	5	3.82 (3)	.997	.993
Entertainment und Infotainment Systems	39	2	5	3.72 (4)	.916	.839
Customer experience with the car brand (online & offline)	39	2	5	3.64 (4)	1.063	1.131
Car sharing	39	1	5	3.54 (4)	.996	.992
Electrification of vehicles (purely electric and hybrid)	39	1	5	3.46 (4&3)	1.211	1.466
Autonomous driving	39	1	5	3.21(4)	1.151	1.325
Experience at car dealer	39	1	5	3.08 (4)	1.010	1.020
Advertisement of car brand (online & offline)	39	1	4	2.82 (3)	.885	.783
Valid N (listwise)	39					

Component Groups:

Digital technology
Design
Driving technology
Experience

Block 2: How high do you perceive the expertise and knowledge of following actors for the automotive industry? [1 very weak / 5 very strong]

Descriptive Statistics (Means are ranked from highest to lowest)

	N	Minimum	Maximum	Mean (Mode)	Std. Deviation	Variance
Start Up	39	2	5	4.28	.793	.629
Competitor	39	2	5	4.18	.790	.625
Automotive ingenieur	39	2	5	4.13	.732	.536
Current customers of a car brand	39	3	5	4.13	.656	.430
Digital players (i.e. Apple, Google, or similar)	39	2	5	4.05	.887	.787
Automotive suppliers	39	2	5	4.00	.795	.632
University research / students	39	2	5	3.97	.903	.815
App and web developer	39	2	5	3.95	.999	.997
Serviceprovider	39	2	5	3.33	.806	.649
Government	39	1	5	3.26	.993	.985
Fanbase of a car brand	39	1	5	3.08	1.010	1.020
City / municipality	39	1	5	3.08	.929	.862
Celebrities and influencer	39	1	5	2.44	1.046	1.094
Valid N (listwise)	39					

Appendix 2: Editorial publicity texts and advertisement images for main experiment

(Texts are adapted from Costa and Coelho do Vale, 2018)

(1.) Control case: The product will be displayed as own company design (without mention a co-creation):

An automobile brand that develops and manufactures cars introduced a new car model with extended connectivity features called SYNC Connect. The connectivity features offer e.g.:

- possibility to remotely start your vehicle, unlock the doors, check the fuel level, and much more from your smartphone, operating through the new Car app.
- compatibility with Amazon Echo, so you will be able to simply voice control your car from the comfort of your home
- driving features that let you share this car with other people or integrate this car with a home security system
- preselection of parking locations based on your current GPS coordinates, and parking times with the ability to extend sessions remotely via the ParkNow app
- and more...

The new car model is now available online and in all dealerships.



(2.) Co-creation partner perceived expertise high: Start up

(3.) Co-creation partner perceived expertise medium: Government

(4.) Co-creation partner perceived expertise low: Influencer

An automobile brand that develops and manufactures cars introduced a new car model with extended connectivity features called SYNC Connect. The connectivity features offer e.g.:

- possibility to remotely start your vehicle, unlock the doors, check the fuel level, and much more from your smartphone, operating through the new Car app.
- compatibility with Amazon Echo, so you will be able to simply voice control your car from the comfort of your home

- driving features that let you share this car with other people or integrate this car with a home security system
- preselection of parking locations based on your current GPS coordinates, and parking times with the ability to extend sessions remotely via the ParkNow app
- and more...

What is new is how ideas for the connectivity designs and functionalities came about. The way they did it:

The company collaborated with a (1.) tech start-up company / (2.) the government / (3.) an influencer to come up with new connectivity designs as well as features and engineered them together. The new connectivity components of the new car were a result of a close collaboration between company's professionals and the (1.) tech start-up company / (2.) the government / (3.) an influencer. From the large set of highly creative designs and features together with the tech start-up company, the car brand selected the best connectivity features to include in the new car model. The new car model is now available online and in all dealerships.





Appendix 3: Demographic details of main experiment (SPSS frequency tables)

How old are you?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid <=18 years	6	3.6	3.6	3.6
19 - 24 years	52	31.0	31.0	34.5
25 - 30 years	76	45.2	45.2	79.8
31 - 36 years	27	16.1	16.1	95.8
>= 37	7	4.2	4.2	100.0
Total	168	100.0	100.0	

What's your gender?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Female	78	46.4	46.4	46.4
Male	90	53.6	53.6	100.0
Total	168	100.0	100.0	

What is your nationality? - Selected Choice

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid German	106	63.1	63.1	63.1
Portuguese	24	14.3	14.3	77.4
American	10	6.0	6.0	83.3
Austrian	7	4.2	4.2	87.5
French	2	1.2	1.2	88.7
Spanish	4	2.4	2.4	91.1
Italian	4	2.4	2.4	93.5
Croatian	6	3.6	3.6	97.0
Other:	5	3.0	3.0	100.0
Total	168	100.0	100.0	

What is the current occupation which suites you best?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid School student	6	3.6	3.6	3.6
Bachelor Student	13	7.7	7.7	11.3
Master Student	52	31.0	31.0	42.3
Young Professional (1-4 years of work experience)	53	31.5	31.5	73.8
Professional (> = 5 years of work experience)	36	21.4	21.4	95.2
Not employed	8	4.8	4.8	100.0
Total	168	100.0	100.0	

Appendix 4: Games-Howell post-hoc test output for effect of stakeholder co-creation on perceived innovation ability

Post Hoc Tests

Multiple Comparisons

Dependent Variable: Innovation ability perceived
Games-Howell

(I) Condition Groups	(J) Condition Groups	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Control Case	Start-up	2.85630*	.28331	.000	2.1131	3.5995
	Government	2.23130*	.25402	.000	1.5643	2.8983
	Influencer	2.13084*	.24427	.000	1.4891	2.7726
Start-up	Control Case	-2.85630*	.28331	.000	-3.5995	-2.1131
	Government	-.62500	.25325	.074	-1.2907	.0407
	Influencer	-.72546*	.24347	.020	-1.3660	-.0849
Government	Control Case	-2.23130*	.25402	.000	-2.8983	-1.5643
	Start-up	.62500	.25325	.074	-.0407	1.2907
	Influencer	-.10046	.20866	.963	-.6479	.4469
Influencer	Control Case	-2.13084*	.24427	.000	-2.7726	-1.4891
	Start-up	.72546*	.24347	.020	.0849	1.3660
	Government	.10046	.20866	.963	-.4469	.6479

*. The mean difference is significant at the 0.05 level.

Appendix 4: Games-Howell post-hoc test output for effect of stakeholder co-creation on perceived brand uniqueness

Post Hoc Tests

Multiple Comparisons

Dependent Variable: Brand uniqueness perceived
Games-Howell

(I) Condition Groups	(J) Condition Groups	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Control Case	Start-up	2.85950*	.30892	.000	2.0481	3.6709
	Government	2.34283*	.27129	.000	1.6253	3.0603
	Influencer	2.34005*	.26806	.000	1.6304	3.0497
Start-up	Control Case	-2.85950*	.30892	.000	-3.6709	-2.0481
	Government	-.51667	.21618	.089	-1.0869	.0536
	Influencer	-.51944	.21212	.079	-1.0795	.0406
Government	Control Case	-2.34283*	.27129	.000	-3.0603	-1.6253
	Start-up	.51667	.21618	.089	-.0536	1.0869
	Influencer	-.00278	.15217	1.000	-.4019	.3963
Influencer	Control Case	-2.34005*	.26806	.000	-3.0497	-1.6304
	Start-up	.51944	.21212	.079	-.0406	1.0795
	Government	.00278	.15217	1.000	-.3963	.4019

*. The mean difference is significant at the 0.05 level.

Appendix 5: Games-Howell post-hoc test output for effect of stakeholder co-creation on purchase intentions

Post Hoc Tests

Multiple Comparisons

Dependent Variable: Purchase Intention
Games-Howell

(I) Condition Groups	(J) Condition Groups	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Control Case	Start-up	1.43866*	.22174	.000	.8565	2.0209
	Government	.18866	.20088	.784	-.3383	.7156
	Influencer	-.74884*	.27989	.045	-1.4852	-.0125
Start-up	Control Case	-1.43866*	.22174	.000	-2.0209	-.8565
	Government	-1.25000*	.22092	.000	-1.8304	-.6696
	Influencer	-2.18750*	.29460	.000	-2.9611	-1.4139
Government	Control Case	-.18866	.20088	.784	-.7156	.3383
	Start-up	1.25000*	.22092	.000	.6696	1.8304
	Influencer	-.93750*	.27924	.007	-1.6724	-.2026
Influencer	Control Case	.74884*	.27989	.045	.0125	1.4852
	Start-up	2.18750*	.29460	.000	1.4139	2.9611
	Government	.93750*	.27924	.007	.2026	1.6724

*. The mean difference is significant at the 0.05 level.

Appendix 6: Games-Howell post-hoc test output for effect of stakeholder co-creation on recommendation intentions

Post Hoc Tests

Multiple Comparisons

Dependent Variable: Recommendation Intention

Games-Howell

(I) Condition Groups	(J) Condition Groups	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Control Case	Start-up	1.22558*	.17426	.000	.7665	1.6847
	Government	.11308	.16644	.905	-.3250	.5511
	Influencer	-.69664*	.23779	.024	-1.3251	-.0682
Start-up	Control Case	-1.22558*	.17426	.000	-1.6847	-.7665
	Government	-1.11250*	.20103	.000	-1.6403	-.5847
	Influencer	-1.92222*	.26316	.000	-2.6136	-1.2308
Government	Control Case	-.11308	.16644	.905	-.5511	.3250
	Start-up	1.11250*	.20103	.000	.5847	1.6403
	Influencer	-.80972*	.25805	.013	-1.4882	-.1312
Influencer	Control Case	.69664*	.23779	.024	.0682	1.3251
	Start-up	1.92222*	.26316	.000	1.2308	2.6136
	Government	.80972*	.25805	.013	.1312	1.4882

*. The mean difference is significant at the 0.05 level.

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