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Co-Creation vs. Professional Design in Smartphones

Differences in perceived perceptions and preferences

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Abstract

An increase number of existing literature mentions the importance of introducing users in existing new product development across the industries. This study is focused in the smartphone industry. Co-Creation is an active collaboration between the smartphones manufacturers and consumers, which is an innovative concept. There is little known about how consumers who did not participate in this collaboration react to it for high-complexity products, like the case with the smartphone. Considering that, this study aims to find the differences in perceptions and preferences consumers have towards different NPD processes - Co-Creation and Professional Design. Consumers' perceptions were measured by easy-adoption of Innovation and brand-consumer identification and preferences were evaluated by purchase intention.

Using the analysis of differences in means (ANOVA) it was assessed these perceptions and preferences. There was also constructed a linear model to test what was the relationship of the different variables with the Purchase Intention. In the end, the study revealed that there were positive perceptions towards the Co-Creation concept but consumers had a higher purchase intention for the Professional design. Through the outcomes of this research design, smartphone brands can use user innovations to improve the product perceptions but their brand positioning should not mention the use of this process to the general public. Limitation and opportunities for further research are also discussed.

Abstract

São diversos, e em diferentes indústrias, os exemplos existentes na literatura que mencionam a importância de introduzir os consumidores no desenvolvimento de novos produtos. Este estudo é focado na mercado dos *smartphones*. Co-criação é uma colaboração ativa entre os fabricantes de *smartphones* e os consumidores, o que é um conceito inovador. É desconhecido a reação a este processo de Co-Criação por parte dos consumidores que não participaram nesta colaboração especialmente para produtos de alta complexidade, como o caso do *smartphone*. Consequentemente, este estudo tem como objetivo encontrar as diferenças nas percepções e preferências que os consumidores têm em relação a diferentes processos de desenvolvimento de produto - Co-Criação e design profissional. A percepção dos consumidores foi medida por Adoção de Inovação e identificação do consumidor na marca e as preferências foram avaliadas por intenção de compra.

Através da análise de diferenças de médias (ANOVA) foram avaliadas estas percepções e preferências. Construiu-se um modelo linear para testar a relação das diferentes variáveis com a intenção de compra. No final, o estudo revelou que havia uma percepção positiva para o conceito de Co-Criação, mas os consumidores tinham uma intenção de compra mais elevada para o design devolvido por profissionais. Através dos resultados deste estudo, as marcas de *smartphones* podem usar os as inovações dos consumidores para melhorar as percepções do produto, no entanto, o seu posicionamento de marca não deve mencionar a utilização deste processo para o público em geral. Limitações e oportunidades para futuras pesquisas foram também discutidas.

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Table of Contents

Introduction

Attention to Research

Takeuchi and Nonaka (1986) stated, "The rules of the game in new product development are changing." Traditional NPD strategies are no longer enough to ensure competitive advantage and this model has been challenged by both academics and practitioners all over the world (e.g., Chesbrough, 2003; Cone, 2006; Lakhani, 2006; Pitt et al., 2006; Von Hippel and Katz, 2002). Luckily there are also other options for companies to pursue. New trends like the use of Open Innovation have opened the R&D process to both internal and external inputs, recognizing the value of outsiders' insights in order to improve products prior to market release; this concept has been well discussed, especially by Chesbrough, and colleagues (2006). The use of this strategy has been seen in multiple industries and companies, such as Intel, and with positive effects. However, the effect of Open Innovation strategies on the high-tech product industry has not been well explained and this study goes further on the topic.

For the first time in history, the smartphone demand has dropped indicating market saturation (Williams, 2016) and not even Apple could escape this, also registering their first iPhone sales decline (Titcomb, 2016). The market is in need for innovation, and perhaps Open Innovation could be what the market needs. In more detailed, one option that has yet to be explore is the introduction of consumer empowerment in the new product development, that will generate products that are more fit to consumers' needs. Companies can do this by using, for example, a Co-Creation strategy,

In using a Co-Creation strategy a normal consumer is empowered to take part in the product development phase together with the company. Von Hippel was one of the first to identify this opportunity in 1986 as leverage in future value creation for the consumer where he identified a specific type of user called lead user, as those who can foresee the market needs before others; these lead-users would, therefore, show motivations to participate in a cooperative new product development process. This concept has been proven to work in other industries such as the fashion industry (Schreier et al., 2012) or with big well-known companies like 3M or Adidas (Ogawa and Piller, 2006) however the same effect as yet to be proven for the high-tech products and with the growing number of

both supply and demand for such, it would be useful for companies to see whether or not it would be beneficial for them to use such strategy in future new product development phases.

Instead of focusing on all high-tech products and for the purpose of this study I will focus on the smartphones specifically. The personal connection that the smartphone can have with the user can be described as having an extra limb and smartphones are known to be a personal symbol of social status, fashion, power and identity. Consumers are known to know what they want (Poetz and Schreier 2012) and are not afraid to ask for those demands to be met as well. There have been as well some projects emerging that seem to be handing over the decision power of producing a smartphone to the hands of each buyer, introducing a user created design to the smartphone world (see Google's Project Ara). However it is still unknown how the consumer would react to see other consumer contribution into product development. Will they see as the company being consumer-centric or would they look to it with scepticism?

With all of this in mind this study could hint to whether or not co-creation can be a way to create product differentiation and help turn around the apparent market saturation or maybe consumers will see it as a negative aspect of the product and will not consider to buy it, discarding the possibility of this new product development process to be adapted to the smartphone industry.

Problem Statement

Multiple studies have been conducted to understand the effect of co-creation on the general public and those have shown the positive outcomes of strategy for multiple industries and products (Franke and Shah, 2003; Franke, von Hippel, and Schreier, 2006). However the same has yet to be verified for the smartphone. The main problem is whether consumers can understand different design concepts and what is the perception of co-created smartphones when comparing to mass production.

Research Aim

The aim of this study is to understand whether customers who did not take part in the product co-creation process can attribute value to the same process therefore increasing likelihood of buying and brand loyalty for high-tech products, in this specific case, smartphones.

Research Questions & Conceptual Framework

The main question that this study tries to answer is the following: *Does knowing that other consumers were involved in the creation of the smartphone increase the perceived value of said smartphone?* Which the following questions have the function to fill the main framework given by the questions:

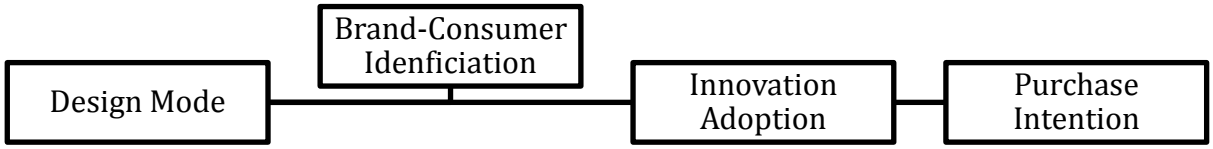
Does Co-Creation increase value in the final product? Can consumers who have not participated in the Co-Creation process recognize that added value?

Can Co-Creation make a difference in the smartphone market?

How does variables like adoption of innovation or product identification are influenced by different NPD concepts?

How does different NPD concepts influence the purchase intention?

The following figure presents the Conceptual Framework for this study:



Literature Review

This chapter contains an extensive review on the available literature related to open innovation and the main differences between Co-Creation and the professional design, which leads us to what were the findings so far. Discussing and analysing this will also help finding the gaps that need to be filled.

The fading popularity of mass production and the professional design and why it needs to change

As Takeuchi and Nonaka (1986) stated, "The rules of the game in new product development are changing." For the authors companies needed to have the awareness that many to achieve competitive advantage in todays market it will take more than just high quality, low cost or differentiation. Eliashberg and colleagues (1997) showed that 79% of the 154 senior marketing officers of US corporations believed that their New Product Development process could and should be improved. If to that we add the fact that 50 percent of new products fail when introduced to the market each year (Zirger and Maidique 1990), then it is clear that innovations need to happen to prevent further failures. Such failures cause financial losses. Ford Motor Co. lost $250 million with the Edsel in 1959 and the failure of the RCA's VideoDisc Player that represented a loss of $500 million in 1981 (Salmans 1984). When a company is unaware how to assess and fulfil consumer needs, which is fundamental to successful new product development (Hauser, Tellis, and Griffin 2006), it will most certainly lead to new product failure (Ogawa and Piller 2006). However, meeting consumers' needs and expectations is not an easy process, often not possible by employing the traditional marketing research methods (von Hippel 2005). The traditional model of where the companies internally through their R&D departments created new ideas, with full ownership of which ideas would be turned into the new products is being challenged, more each day, by innovation management academics and practitioners all over the world (e.g., Chesbrough, 2003; Cone, 2006; Lakhani, 2006; Pitt et al., 2006; Von Hippel and Katz, 2002). One alternative to this internal R&D is the use of Open Innovation. Chesbrough, and colleagues (2006) have defined Open Innovation has opening the innovation process to outsiders and recognize that external resources can be as valuable as the internal resources. Those firms who not cooperate lose the ability to better innovate and do not reduce the time to market (Enkel et al, 2009). Positive effects of the

use of open innovation can be seen through the Procter & Gamble example: with the introduction of open innovation, they were able to increase product success rate by 50% and the efficiency of the R&D by 60%; other important tech companies like Philips or Siemens also announced their own open innovation initiatives (Enkel et al, 2009). And yet professionals are important and still relevant in the competitive market. For example, and fundamental for this study, Swan, and Newell, (1995) stated the importance of professional associations in information diffusion especially considering the knowledge they had among them. Still, big companies like Apple or IBM still use internal R&D by developing their own products internally. And studies like the one developed by Cassiman and colleagues (2006) have stated that there is complementarity in both internal and external sources of innovation, which is saying that those firms who only use one R&D activity are less likely to introduce new or better products than those firms who combine both internal and external sourcing. To conclude, new businesses should take in consideration different new product development processes since innovations like the Internet also help the interaction between different stakeholders all over the world and turned the process less costly (Dahan and Hauser, 2002). The Facebook Translation system is a good example of user cooperation: since 2007, they allowed users to translate content into different languages, as they pleased and by September 2008 they had already engaged more than 30,000 users (Losse, 2008). With this Facebook was able to reach higher performing users than professional translators (Losse, 2008) and created a community that had the motivation towards a purposeful task, which was a positive outcome along side the cost saving (O'Hagan, 2009) And this external reach is not limit to only users but also, for example, through the creation of alliances with other companies. Sivadas and Dwyer (2000) established the conditions for a positive outcome alliance for new product development, for example. But in this study the focus will be on using a Co-Creation strategy with users.

What is the Co-creation process and who is participating in it?

As Prahalad and Ramaswamy (2004) defined Co-Creation as when a company and consumers work together to deliver value, this allows for the consumer to create something more suited for their context or needs. This means that the consumers act from the very beginning of the problem definition to solution creation in a two-way dialogue and construction of personalized experiences. With this level of consumers' involvement in product development companies started looking at the market as an open forum of

innovative ideas that can provide higher value creation through the management of consumer communities and providing this spaces for consumer creation (Prahalad and Ramaswamy, 2000). Co-Creation is looked as the new source of competitive advantage in today's world of business strategy. It is based on a business putting their future profits and overall growth on the interactions with the consumers with the additional value of capturing the global network of resources that otherwise will not be able to result in breakthrough value creation opportunities (Ramaswamy, 2008). Co-Creation differs from customization in the degree of user involvement. Customization is more reactive where Co-creation is a proactive involvement (Kristensson, P. et al., 2008). Co-Creation interactions are defined as a genuine conversation between businesses and consumers which implies a high access to the product concept and full transparency, both of each combined carry some risk for the company that can be translated into leaking proprietary information, the possible loss of decision power and subsequent lack of control of the brand identity (Prahalad and Ramaswamy, 2004; von Hippel, 2005). Using outside knowledge to increase one's internal knowledge is a mechanism of open innovation (Chesbrough, 2003; Laursen and Salter, 2006), which mainly occurs within a community of users that is "a voluntary association of actors, typically lacking in a priori common organization affiliation (i.e. not working for the same firm) but united by a shared instrumental goal". From these communities companies can expect the creation, modification, adoption or dissemination of innovation (West and Lakhani, 2008). Communities can be homogeneous or heterogeneous depending if their interactions only involve individuals or individuals and other entities/companies (West and Lakhani, 2008). Heterogeneous communities are an ever increasingly fundamental source of innovation, open innovation in this case, that companies should use to increase competitive advantage (von Hippel, 2005). This creation of communities has been something that companies from all around the globe are taking advantage of through the online world (Dahan and Hauser, 2002; Füller et al., 2007; Nambisan, 2002; Sawhney and Prandelli, 2000; Sawhney et al., 2005). Several examples of companies that relie on communities to assist in product development such as 3M, Ducati or Procter & Gamble who were some of the firsts to search for and take consumers' feedback and ideas for new products (Ogawa and Piller, 2006; Sawhney et al., 2005). Fuchs and Schreier (2011) redefined the two types of consumer empowerment, meaning the power that consumers experience in product creation: either "empowerment to create" in idealizing and creating new product designs; or "empowerment to select" pre-selected ideas that the company might have for them to be

manufactured. This concept of consumer empowerment was clarified by von Hippel (2005) for it to serve as a way to turn innovation into a democracy. Later O'Hern and Rindfleisch (2010) developed this concept and introduced four types of customer co-creation: Collaborating, Tinkering, Co-designing and Submitting that differed in the degree of user involvement and how empowered users were to contribute. Fuchs and Schreier (2011) argued that there is full consumer empowerment when both dimensions are active. Threadless, a fashion start-up, which provides consumer a platform where they can submit and select their favorite t-shirt design ideas to be marketed by the company (Ogawa and Piller, 2006), shows how a case when customers are fully empowered.

User involvement is suggested as one type of practice whereby the co-creation of innovations takes place via the generation of knowledge of latent needs (Kristensson et al., 2004). Those same users can be referred to as lead-users: 'users whose present strong needs will become general in a marketplace months or years in the future' Von Hippel (1986, p.791). The personal and urgent need also drives the lead-user to take highly advantage of the co-creation process since they would be the ones who benefit the most from the approval and manufacture of their improvements. Industries like the extreme sports is one where this phenomenon has a great impact, since the experts are the first ones to notice some fault but also the ones more capable to not only fix it but also benefit from it (Schreier et al., 2007; Schreier and Prügl, 2008). However there can be more than just lead users participating in this Co-Creation process. In today's world consumers are more aware than ever about their possibilities and know that are connected to get what they need from all the globe. Everyday consumers can and want to participate on this process since is a way for them not only to built a relationship with their favourite brands, but also create something that is better suited for their needs (Franke et al 2010; Fuchs and Schreier 2011; Prahalad and Ramaswamy 2004;Sawhney et al 2005.). According to Marketing and Innovation research there are two main reasons why this is becoming the new norm: 1. The new technologies help creating highly informed consumers (Prahalad and Ramaswamy, 2004) and help businesses construct communication channels to get consumers views and knowledge through, for example, communities; 2. Businesses understand the value of consumers' inputs. The constant need for quick innovation makes businesses be cautious on resource allocation to get the best outcome. Co-Creation allows firms the access to consumers knowledge and expertise with their products that otherwise would be unreachable or extremely costly to obtain (Von Hippel 2005).

The role of Co-Creation in value evaluation and the differences between those who have and have not participated in the process

It's with no surprise that the Co-Creation process affects consumers' perception of the final product, meaning that a product might be perceived differently whether a consumer has or not participated in the process (Moreau and Herd 2010). Although most research has been made on those who participated in the process (Fuchs and Schreier 2011), the majority of the market are those who did not take part in this process so is with the most importance to get to know the effects on those consumers (Fuchs et al 2013).

Fuchs and Schreier (2011) were the firsts to show that companies benefit from having consumer empowerment strategies in their New Product Development stage. They defined the consumers who did not take part on the process as on the "periphery" and analyse what was their perception on Co-Created products. In their research there was not only a perception that the business was more customer-oriented but also a positive corporate attitude, which means that the positive association left was transferred from the product to the company, for companies that implemented this strategy. Multiple studies have proven that consumer empowered products are preferred to products with no consumer involvement, even among those who did not participated in the co-creation process, hence the high level of preference and commercial attractiveness for co-created products (Franke and Shah, 2003; Franke, von Hippel, and Schreier, 2006). Katila and Ahuja (2002) also indicated the positive correlation between successful new product innovations and exploration of outside knowledge. This interaction has also been known to increase brand loyalty and overall satisfaction since it creates an emotional connection between consumers and companies (Brodie et.al, 2013; Bendapudi and Leone, 2003). Schreier and colleagues (2012) showed a positive correlation between common design by users and the perceived innovation ability of a firm, which led to higher intention to buy, and willingness to pay that could go higher than 50% when comparing to products that were 100% created internally. Some studies show the impact of co-creation in product development, with positive associations between co-creation and ability to innovate (eg: Kazadi, M. K., Lievens, A., and Mahr, D., 2015). Also several companies have produced successful examples of co-creation: LEGO, Threadless (Schreier et al., 2012) or Muji, where a performance evaluation concluded that user-generated products performed better on average than designer-generated products (Nishikawa,. et al., 2013).

However there are still some concerns regarding the use of this process in new product development. Some argue that the impact is not only positive and depends on multiple factors (Bolton and Saxena-Iyer, 2009; Etgar, 2008, Ulrich 2007, Thompson and Malaviya, 2013). One of these concerns is the possible expensive cost for the consumers: businesses need to ask monetary or non-monetary investments from consumers to take part on this process (for example: time, multiple resources), which might imply some risks for the same consumer (like the not being able to see the return on investment) that can result in lack of freedom of choice (Bolton and Saxena-Iyer, 2009; Etgar, 2008). Ulrich (2007) and Ulrich and Eppinger (2008) where the ones to bring the efficiency and quality concerns when they concluded that even though it was important to have consumer involvement in the brainstorming part, professionals should be the ones responsible for putting those ideas into practice since they were the ones that had the skills and capabilities to do so. Even with these concerns in mind, studies still favour user empowerment, and to further show the benefits of having consumer involvement, it was showed that new products based on professional-screened ideas even though are more likely to be more sophisticated may not serve consumer needs better than more simpler concepts that were based on consumer-screened ideas (Piller and Walcher, 2006). Adding, it has been argued that professionals do not innovate as much since they are too focused on connecting to previous designs (Kristensson et al., 2004). While Poetz and Schreier (2012) concluded that products 100% created internally are both less novel, less qualitative and less consumer beneficial comparing with co-created innovations, they are only more feasible which is not as attractive for the final consumer. Even considering some of the risks, the studies show that consumer empowerment brings more advantages than those products 100% designed by professionals.

Can it make a difference in the smartphone market?

The complexity of the product is also a very important for measuring the consumer perception of the co-creation effect. On low complexity products (e.g. t-shirts) the innovation perception positively correlates with the consumer intention to buy if the product was designed with other consumers, but on high complexity products (e.g consumer electronics) consumers tend to be more sceptical since they see the expertise belonging internally in the business (Schreier et al 2012). When talking about complex products consumers believe that other consumers cannot provide useful inputs since they

lack the right skills (Schreier et al., 2012). Consumers are convinced that professionals have the experience, skills and training necessary to innovate and provide better products than their competitors (Dahl and Moreau 2007). This can be clearly viewed in the fashion industry. When mainstream brands like H&M announce that user design was taking into product development the demand increases but for luxury brands like Prada it is exactly the opposite effect: consumer involvement leads to lower quality perception. When there was involvement of normal consumers the image of exclusivity and social status almost disappeared which is the known value added for the high luxury industry (Fuchs et al 2013). Thompson and Malaviya (2013) also tried to go deeper in understanding the effects of the co-creation process. Using advertising they discovered that when announcing that a certain ad was co-created it can negatively affect the brand when certain variables are verified: if the audience does not have any brand loyalty or if they are not aware of any facts about the ad-creator or has the right cognitive resources to understand the message then announcing the consumer involvement will not lead to positive results.

However research of these effects on high-tech products have yet to happen. As previously mentioned high-tech are high complexity products so one might expect the same negative effect. On the same note, Mobile phones are very personal objects, they connect and change human perception of distance, power, status and identity (Katz, and Sugiyama, 2005) which can also be seen in luxury brands where the Co-Creation effect led to lower product quality perception. However Mohd and Suki (2013) showed for students in Malaysia the smartphone demand can be positively influenced by user interaction in order to better meet consumer needs and expectations. And even though Co-Creation has yet to be tested for smartphone production it has been something very common in applications and third generation mobile services and proved to be something positive to take advantage from (e.g: Lewis, Sarah, Roy Pea, and Joseph Rosen, 2010; Payne, Storbacka, and Frow, P. ,2008). So given that users can innovate (von Hippel 1986), and recognizing the globalization of the market as a contributor to an increasing market competition where only innovation as a differentiation strategy can result in long-term competitive advantage (Popadiuk and Choo, 2006), smartphone companies could take advantage of lead-users to improve their products. But even if they do, there is no known effect of using a Co-Creation strategy on smartphones, and companies do not know how those users who did not participate in the process would react to it. Perhaps there will not be a sceptic effect and rather consumers will identify themselves with the product. Or maybe the relationship with high-fashion brands and co-created products will also occur for smartphones given the

proximity in important aspects like social identity or consumers believing that, other than professionals, normal consumers don't have the right set of skills. This gap should be addressed and its findings have both academic and business relevance.

Perceptual Products Attributes & Consumer Preferences

The theory of reasoned action and planned behaviour Ajzen and Fishbein (1980) shows that the intentions of a certain consumer is what describes his or her behaviour and it is related to the new product perception. For this study the product perception will be evaluated by their perceived adoption of an IT innovation as well on how the consumer might identify with the product.

Innovativeness has been described as a hedonic or non-task-oriented quality aspect expressing the consumer's need for novelty (Steenkamp et al., 1999). It is also the second product quality dimension (Hassenzahl et al., 2000). Besides being associated with quality, innovativeness is defined to be the degree to which a new product is seen as unique when comparing to others in the same or related categories (Fu et al., 2008). And yet academics have still to fully agree on the definition of innovativeness. Moreover and equally important as innovating is, implementing correctly the innovation is one of the greatest challenges and it makes all the difference between success and failure (Brancheau and Wetherbe 1990). Ram, S., & Sheth, J. N. (1989) explained consumer innovation resistance since it's related with the degree of change in the day-to-day life. Moore, G. C., & Benbasat, I. (1991) developed a study to create an instrument to measure this adoption and mentioned multiple already existing measurement instruments. One of these was the Technology Acceptance Model created by Davis (1986) where he defined two important variables: perceived usefulness - "the degree to which a person believes that using a particular system would enhance his or her job performance" (p.320) - and ease of use - "the degree to which a person believes that using a particular system would be free of effort" (p.320). Those two variables - perceived ease of use and perceived usefulness - will determine a person's behavioral intention of adopting a technology, and have been linked to subsequent behavior (see Sheppard et al. 1988 for a meta analysis of the intention-behavior relationship). In the TAM there was a strong direct link between perceived usefulness and intention of use, that being: since the technology was useful people had an intention of use it (Davis et al, 1989). Besides this, TAM points out that perceived usefulness will be influenced by perceived ease of use since, considering other variables

stay the same, the easier a technology is to use the more useful it can be. TAM suggests, as well, that the key beliefs (i.e., perceived ease of use and perceived usefulness) work as mediators on the effect of external variables (e.g., system design characteristics) on intention. Even though studies have shown that user designs are associated with high innovation ability (Schreier, Fuchs, and Dahl 2012) there are no clear conclusions on the effect of co-created design on perceived adoption of the innovation.

Quality, much more than innovativeness, is a controversial concept where you can find multiple definitions for it in current literature (Garvin, 1984; Zeithaml, 1988; Hassenzahl, 2001). But despite this mismatch in finding one definition it is known that the perceived quality has a positive effect on the purchase intention (Carman, 1990; Boulding et al., 1993; Tsiotsou, 2006).

Smartphones are a symbol for social power and identity which makes the study of the perception consumers might have about these products relvant to market success. Katz (2003) tried to capture the idea that a mobile phone could become a second smaller version of us. And close to the fashion reality Veblen (1934) among others realized that by wearing fashion outfits individuals separate themselves from their family in order to create their own identity. People can use fashion as a way to present themselves to others (Steele, 1997). Fashion can then also be seen as a form of communication as are mobile phones. Lee and colleagues (2011) studied how technology products are a reflection of our personal lives and "deliver symbolic meaning which enables the expression of private experiences" (p.1996). So maybe the effects in fashion and smartphones of co-creation could be similar. Adding to that, Ahearne, and colleagues (2005) concluded that Company-Customer identification positively influences the behaviours towards the products, even when the brand effect is accounted for, and identifies some attributes that contribute to the development of Company-Customer (C-C) identification such as the organization characteristics: with positive organization characteristics then there is a higher development of C-C identification.

To conclude, purchase intention and overall attraction to the product are fair measurements when assessing the consumer preference towards Co-Creation. Product attractiveness is the degree to how a consumer behaves and acts towards a product and whether he might want to know more about it to purchase it (Sweldens et al., 2010). Purchase intention is a well-known and effective measure when wanting to access whether consumers will buy or not a certain product or service (Bearden et al., 1984; Ajzen and Fishbein, 1980). The products with higher attractiveness and purchase intention are the ones assumed to have a better fit

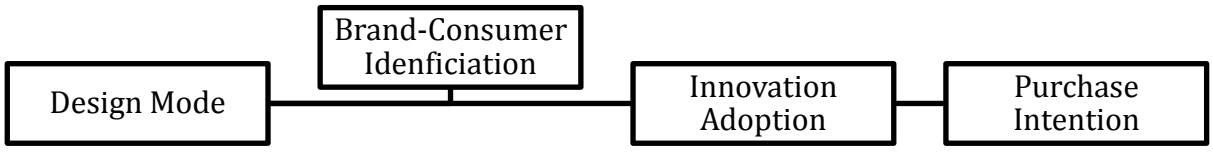
in consumer preference. We can also explained that those who rank high on quality dimensions, like innovativeness, and those who are able to generate identification on consumers will be the ones to create a positive effect on "commercial attractiveness" (Franke et al., 2006; Magnusson et al., 2003; Hassenzahl, 2001). Still, it is important to mention that there has been some discussion over the direct relationship between perceived quality and purchase intention. Studies from Tsiotsou's (2006) confirmed that before purchase intentions there was perceived quality (Carman, 1990; Boulding et al., 1993).

Hypothesis

To provide a small wrap-up, it was clear that by the literature that user innovation effect on smartphones is something that must be found. The need to move from a traditional internal new product development process was identified. The Co-creation concept was explained. Its relationship with value creation and final product perception was presented and a relevant gap was identified when it came to the smartphone market. To conclude there were presented factors that lead to product perception and purchase intention.

To answer the remaining research questions the following hypothesis were created:
H1: Products labelled as Co-Created generates a higher innovation adoption than products labelled as professionals
H2: The Co-Creation effect is strengthen by the Brand-Consumer Identification
H3: Products labelled as Co-Created generated a higher Purchase Intention than products labelled as professionals. Innovation Adoption moderates this effect.

And once again, the following figure shows the conceptual framework of this study



Research Methodology

Design & Sampling

The aim of this thesis is to identify consumers' perceptions towards co-creation. Participants on this study were then exposed to this concept through an online survey. As the literature review suggested, this thesis focuses on consumers with no participation on the co-creation process. Two different NPD scenarios were presented, one with the Co-Creation development and one with the typical Professional development. Thus the study was a 2 (innovation concepts: co-creation and professional NPD) x 1 (product category: smartphones) between-subject experiment. Three Pre-tests were made and the feedback regarding the stimulus presented was incorporated. The survey was composed of just 10 questions and as an example of a Smartphone it was presented a Xiaomi smartphone. Xiaomi is a Chinese smartphone brand that uses consumer empowerment in NPD and it is only present in the Chinese market. Appendix 1 presents the stimuli used for each scenario.

An online survey conducted in Qualtrics was used and for the Co-Creation scenario the survey was active between the 9th of February and 2nd of May 246 surveys were started and 176 with 90 answered regarding the co-creation scenario and 86 answered regarding the professional development scenario. Online survey are known to provide better results than personal interviews since participants are less afraid of judgements and so the data collected is more reliable and with almost no biased (Bronner and Ton, 2007; Deutskens et al., 2006). The disadvantages in using this method is the conversion between starting and finishing the survey is lower (Manfreda et al, 2008; Grandcolas et al., 2003), there is selection bias since it's almost impossible that this sample to be fully representative (Grandcolas et al., 2003) due to the fact that non-Internet users are left behind and the way this survey was distributed also increases the selection bias. There was no definition for the population of this study. This survey was distributed via Facebook. Studies proved that Facebook increases the snowballing effect and decreases the access barriers and participants feel more willing to dedicate some time to the survey (Gregori and Baltar, 2013). Besides this, some participants were directly asked to fill in the survey and share it or send it to people that were not on my group of possible participants.

The sample was composed with 99 female and 77 male individuals with more than 80% Portuguese. With more than 90% of the participants being university students with an average age of 22.

Measures

The variables used in the questions in the survey are presented below, so that after measures could be taken for further analysis. A 1 to 7-points scale, a Likert scale, was used in every single question for later be used further analysis.

When testing for reliability it was used both the Cronbach's alpha and the Pearson Correlation to provide how reliable could we see the variables. The difference in using different statistical tools was due to the difference of items that each measure was using. Nunnally and Bernstein (1994) stated that any alpha greater than 0.70 would be accepted and, despite still being a matter of discussion, Field (2005) concluded 0.30 as the minimum correlation from which anything above could be considered as something to take forward, depending on the sample size. Both the Cronbach alpha and the item-total correlations are above the reference values and it can be concluded that there are no reliability concerns towards this study. Single-item measures (in this study: Purchase Intention) are still being debated over possible reliability issues but there are papers that refer to them as highly reliable (Bergkvist and Rossiter, 2007; Diamantopoulos et al., 2012; Homburg et al., 2015).

In this research design there were the following measures being evaluated:

Adoption of innovation

This measure was composed of four different variables. All variables - innovativeness, ease of use, usefulness & visual appeal - were adapted from Moore, G. C., & Benbasat, I. (1991) & Lee, S., Ha, S., & Widdows, R. (2011). The Cronbach's alpha for this measure is 0.797. All variables were measured on a scale of 1 (not at all) to 7 (extremely).

Brand-Consumer Identification

This measure was composed of two different variables - Self-expression & Customer-Centric adapted from Lee, S., Ha, S., & Widdows, R. (2011) & Ahearne, M.,et al., (2005). The Pearson correlation for this measure is 0.777. All variables were measured on the scale of 1 (not at all) to 7 (extremely).

Purchase intention

As mentioned previously, this one-single item was used to test the likelihood the respondent was willing to purchase the smartphone presented to him, on a scale of 1 (not at all) to 7 (extremely).

Product Involvement

Prior to evaluating the first three measures it was important to establish some of the relationship each participant of the study had with their smartphone. As previously mentioned in the Literature Review, a mobile phone can be seen as very personal objects, that connect and change human perception of distance, power, status and identity (Katz, and Sugiyama, 2005) so it was important to start by measuring the respondent relationship with their smartphone. For this study it was important to see how much interaction they was with the product – "How frequently do you use your smartphone?" from "I don't own a smartphone" to "I never leave home without it" – how loyal they were to a smartphone brand – "How loyal are you to your smartphone brand?" from "I don't care" to "I only buy from that brand" – and the knowledge they had about smartphones specifics and if that influenced in choosing their smartphone – "How familiar are you with smartphone specifics?" from "I just look for design and don't pay attention to anything else" from "It's very important and I pay a lot of attention to it". Each one is a one-single item and I constructed this measure.

Demographics

Since the study was not defined by any population in specific and since it was not relevant for this research design the amount of income that each participant had available, this measure just took in consideration the following single-item variables: Age, Gender, Nationality and Occupation. It was a own construct measure.

All measures will be tested and analysed by using a mean comparison. To test the hypothesis there will be an analysis on the means of the three dependent measures (H1: brand-consumer identification, H2: perceived adoption of the innovation, and H3: purchase intention) on the different independent variables: Co-Creation Design or Professional Design.

From this analysis a linear model will be created to measure the relationship that each measure has with Purchase Intention to establish important findings that could influence how the non-participants in the process of Co-Creation could see this new design and how does it influence their intention to buy the product. For this it will be also used the Product Involvement variables previously mentioned, as to see the effect of brand loyalty or degree of use of the smartphone.

Findings

In this chapter all measures and data are analyse and research questions are answered.

Preferences in Concepts

Table 1 presents the results with each of the variables included and with the standard deviation

	Co-Creation Design N=90		Professional Design N=86		
	Mean	(SD)	Mean	(SD)	p-value
Innovation Adoption	4.933	(1.11)	4.465	(1.05)	0.0046
Brand-Consumer Identification	5.206	(1.40)	3.808	(1.39)	0.000
Purchase Intention	3.333	(1.67)	3.5	(1.43)	0.477

Table 1: Average of each variable for Co-Created vs. Professional design

In order to test H1, that stated that co-creation would generate a higher innovation adoption than professional products, we used an analysis of mean (ANOVA) comparison. As it can be seen in Table 1, the results found that the perceived innovation adoption was higher for the co-creation design (mean = 4.933) than the professional design (mean = 4.465, $p<0.01$).

With this data, H1 can be accepted since the mean was higher for the Co-Creation scenario.

In order to test H2, that stated that the co-creation effect would be strengthen by the Brand-Consumer Identification, we first used an analysis of mean (ANOVA) comparison to establish the direct relationship. As presented in Table 1, the results showed that the brand-consumer identification was higher for the co-creation design (mean = 5.206) than the professional design (mean = 3.808, $p<0.001$).

With this, a linear model was created to test the moderation effect of Brand-Consumer identification on the relation between the design mode and the innovation adoption. The results can be seen in appendix 2. There was no significant relationship in the interaction of both variables, Innovation Adoption and Brand-Consumer Identification, with Purchase Intention ($p>0.1$).

Our results did not found support for H2, since there was no significant value in the moderation effect.

In order to test H3, that stated that co-created products would generate a higher purchase intention than professional labelled products, we used an analysis of mean (ANOVA) comparison. The results showed that the purchase intention was lower for the co-creation design (mean = 3.333) than the professional design (mean = 3.5, $p<0.5$). To test the mediation effect, the first step according to Baron and Kenny (1986) is to establish a significant relationship between the Design Mode and Purchase Intention and since that was not verified ($p>0.1$) than the mediation is not likely.

Our results did not found support for H3, since the mean for Professional design was higher.

Other Findings

This section will discuss opportunities for further research of potential relationships between the variables that goes beyond the hypotheses. All the following results are presented in appendix 3.

When conducting a linear model with Purchase Intention as the dependent variable and the variables Concept, Identification & Adoption of Innovation as independent variables (model 1) to see the interactions the results were interesting.
The results indicated that only the Concept (Co-Creation or Professional Design) and Adoption of Innovation have statistically significant interactions with Purchase Intention, and which the Brand-Consumer Identification is not statistically significant for Purchase Intention; besides this, it can also be concluded that Co-Creation decreases the Purchase Intention since it has a negative interaction (-0.490).

Model 2: Purchase Intention as the dependent variable and the variables Concept, Identification, Adoption of Innovation & Brand Loyalty as independent variables
What was found in the model 1 was still verified in this new model, both the variable that measured the different concept and the Adoption of Innovation maintained the statistically significant interaction and now was also a statistically significant interaction between Brand Loyalty and Purchase Intention that was a negative interaction (-0.165).
The negative statistically significant interaction between Brand Loyalty and Purchase Intention can be explained by the argument that the brand presented in the study was not the participant brand of choice.

Model 3: Purchase Intention as the dependent variable and the variables Concept, Identification, Adoption of Innovation, Brand Loyalty & Degree of interactions between the participant and their smartphone as independent variables
Most of the findings verified themselves in this model except for one particular relationship. Even though the Concept alone created a negative interaction with the Purchase Intention (-3.182) that was consisted with previous models, the interaction of different concepts with the degree of interaction with the smartphone resulted in a small but positive and statistically significant interaction with Purchase Intention (0.392).

Discussions

During this fundamental chapter it will be discussed each finding previously presented and that answered both research questions and hypothesis bringing it together with the existing literature. At the end the managerial implications of the same conclusions will be discussed.

Interpretation of Findings

In the literature review a parallel was defined between the expected effect of Co-Creation on the Smartphone Brands and on Luxury Fashion Brands. Since both items were characterised as symbols of social identity (see: Fuchs et al., 2013; Katz J. E., & Sugiyama, S., 2005) one could expect that for measures that affected the product perception, effects will be similar between the two brands. Which did not occur in this study.

The study demonstrated that participants felt more identified with the Co-Created smartphone brand, that the brand was closer to consumers than in the traditional new product development of only using internal professionals. More than that, they also felt like the adoption of the new innovation would be easier for the Co-Created smartphone than in the Professional Design smartphone. Both this conclusions would, however, be closer to the conclusion that Mohd Suki (2013) had for his study on the Malaysian student population where he concluded that user interaction could positively influence demand since it provides the perception of better fit with consumers needs and expectations. According to Ahearne and colleagues (2005) Company-Consumer identification can positively influence the behaviour towards the product, however that moderation was not verified towards the possible easier innovation adoption, since this interaction was not statistically significant. One of the possible explanations could be related to the brand presented in the study, which was unknown and so there was bias towards the Company-Consumer Identification. The positive highly significant relationship between brand loyalty and purchase intention also hints towards the same conclusion.

Even though both these effects were positive for the Co-Creation scenario, the same was not verified in the Purchase Intention. Which could be in favour of the Schreier and colleagues (2012) study that saw that consumers might be sceptical in believing that outside contributors could provide the same input since they don’t have the same skill set

as professionals. Davis and colleagues (1989) stated that variables like perceived ease of use and usefulness could work as mediators towards intention, but this study did not found this relationship once there was no significant direct relationship of different design modes with purchase intention. The novelty related to this new product development strategy can be what explains the lack of statistical significance.

To further provide conclusions regarding the relationship between the variables with the Purchase intention, linear models were created and regressions were conducted.

The linear models showed a negative interaction of the Co-Creation concept with Purchase Intention, which was only reversed when combined with a variable that assessed the degree of interactions between the participant and their smartphone. This can be interpreted, as Co-Creation is a new concept, the scepticism effect associated with novel things can be reduced with the increase familiarity of the product. Which is something that Thompson and Malaviya (2013) had already identified with their study on User created Ads. Another possible interpretation is as Poetz and Schreier (2012) stated consumers are more and more aware of what they want and feel entitled to ask for it. As the degree of interactions increases so does the consumer becomes more and more aware of what its his or her needs and might appreciate more the perceived notion that Co-Creation is an effort to include those needs within a new product.

A previous study has proved that right implementation of the innovation is sometimes the real challenge and an important factor in succeeding (Brancheau and Wetherbe 1990) which was seen in the linear model that found a statistically significant relationship between the adoption of the innovation and the purchase intention. One can relate this conclusion with studies like the Davis (1986) model, which indicates that better innovation adoption, leads to innovation diffusion and product acceptance. The positive interaction between Co-Creation design and the perceived adoption of innovation can be interpreted as the user ability to produce highly innovative products (Schreier, Fuchs, and Dahl 2012) that are closer to consumer needs and desires and therefore seems easier to adopt and use as the new norm.

The lack of statistically significant interaction between Consumer-Brand Identification and Purchase Interaction is unexpected since it goes against previous present studies like the one Ahearne, M. et al. (2005) presented. One possible interpretation could be possible problems with the measure itself. If that will not be considered, then one possible interpretation might be that it just not one product attribute that consumers take in consideration while on the decision making process, or there are others that make more

difference when comparing with Consumer-Brand Identification, and those were left out of this research design. However the positive statistically significant between Co-Creation and this Consumer-Brand Identification further creates the distance between high-fashion products and smartphones.

In the end, even though Co-Creation increases the value of products, this effect cannot be verified for the smartphone market. There is an increase of innovation adoption and brand identification but that is not enough to make it seem valuable at the time of purchase.

Managerial Implications

The findings presented in this study provide some managerial implications that should be taken in consideration when creating new marketing strategies and developing sustainable competitive advantage.

In the beginning it was stated that consumers were more and more aware of what they want and are not afraid to ask for it. However there is still some scepticism that consumers could be actively a part of the new product development creation phase when it comes for high-tech products like the smartphone case.

This study does not encourage the announcement of the use of a Co-Creation design as part of the marketing strategy since it shows that decreases the Purchase Intention of the same product. However this does not necessarily mean that Co-Creation should not be use. The lack of knowledge regarding the Co-Creation method should not be an argument to not use Co-Creation in the New Product Development, but instead be acknowledged and taken in consideration before taking Co-Creation into action.

Enterprises should take this in consideration, as positive effects were found between Co-Creation and important positive product attributes such as Adoption of Innovation and Brand-Identification, which encourages the usage of Co-Creation in the New Product Development. There should also pay attention to the positive relationship between the degree of interactions with the smartphone, the Co-Creation design and the Purchase Intention. The possible interpretation from this states that it's possible that Co-Creation is only fully appreciated from the heavy-users of smartphones, and has Von Hippel (1986) also stated, lead-users will be the ones more inclined to accept and use new innovations as this new design should be taken as for the smartphone market.

An important finding was the importance of brand when buying a smartphone, which can indicate that brands with high brand loyalty index might be able to better invest in this Co-Creation process since there is a strong link between the brand and the user.

Limitation & Future Research

There were, of course, some limitations when designing and implementing this study. These limitations should be taken in consideration for further research.

Firstly, the different scenarios were presented only using descriptive stimuli. In this research were missing a "look and feel" since the only product found related to Co-Creation was only sold in China. There was no taking advantage of knowing that co-created products became more attractive with increase consumer empowerment by having an attempt of any active involvement scenario. In the end, only showing the final product made the focus of the co-creation scenario be on the personal perceptions and preferences of the final presented product. With this in mind, further research should be able to have the entire value creation process added to the research design.

The between-subject research design was also a limitation since it does not allow comparing the two concepts (Co-Creation design and Professional design) for the same participant. Adding to this, the measures in some cases did not behave as expected of them after what the literature suggested. There should be some improvements in the research design referring to how the concepts and measures are presented and evaluated. Besides this, future research should add more measures to better analyse and discover the reasons that explain the so far negative relationship between the Co-Creation scenario and the Purchase Intention. One of those measures could be based on the Thompson and Malaviya (2013) study about disclaiming some facts of those participating on the Co-Creation process. There should be a better establishment of product involvement and even the discovery of different consumer profiles and their relationship with the concepts.

The sample size of 176 valid responses cannot be considered a meaningful representation of the general population, since besides that is composed mainly of Portuguese university students. This represents an important limitation when testing the hypothesis as well.
Future studies should have a larger, more culturally diversified sample and be more careful with the sampling technique used in terms of demographics. The more heterogeneous sample will be beneficial since it will translate in different perceptions of the scenarios, which is fundamental to get the bigger picture. One possible important demographic

measure would be the income level of participants since these products tend to carry an important financial level during the decision making process.

In the end, there is still much to be discussed about this topic. Further research should take this study as some first insights about the subject and continue investigating the relationship between the Co-Creation design in the smartphone market and be able to better answer the initial question.

Essentially, the generalizability of the research findings requires additional research and the present research findings and design can also be replicated in other contexts other than the smartphone market and should be use in other high-tech products to also compare the findings.

Conclusion

The purpose of the study was fulfilled since it is a start in understanding the consumer preferences regarding different new product development processes, the traditional professional and internal process or the Co-Creation with users process. There was partial coherence with the existing literature regarding some of the expected relationship and the parallel with the high-fashion brands was rejected, which provides important insights for further research. Each concept of new product development was tested using some product attributes and the overall purchase intention of the final product. Even though there were positive perceived product attributes towards the Co-Creation process output, the purchase intention did not had a positive relationship with the Co-Creation output and the overall conclusion is that there was no perceived added value attributed to the possibility of having a group of users participating actively in the new product development. There was, however, a hint in that users with a high degree of interaction with their smartphones would value Co-Creation. Further research should also further conclude the reasons that lead to this effect.

Managerially, smartphone producers can take this information and improve their new product development processes by implementing user empowerment for products that target consumers that have high degree of interactions with their smartphone. In regards to marketing strategy targeting the general market this study does not recommend since it is still a new concept with some scepticism. This study is without some limitations that should be taken in consideration for further research to increase feasibility in practise. But this study opens a door of potential opportunities and with further research to enhance viability, companies could be less afraid to use this process for future products to quicken their businesses and create competitive advantage.

The main problem has, therefore, been solved and the aim to understand if consumers who did not take part in the Co-Creation process of new product development value the final product as much as if it was in the traditional process of internally professional design, with the use of some product attributes, was accomplished.

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Appendices

Appendix 1 – Survey Stimulus

Co-Creation Scenario

Now consider the following smartphone & brand.
Xiaomi is a Chinese smartphone manufacture. Their products are only sold in the Chinese market but they are considered the fastest growing tech company ever.
The main difference between Xiaomi and their competitors is the degree of involvement their consumers have with the company. Products are constantly being improved through the incorporation of consumer feedback. "Our goal isn't to make a cheap phone in China. We're building a toy for our fans," says LXiaomi, Xiaomi Technology's founder and CEO. For Lei Jun, the benefit are obvious: "Every user becomes your R&D. Every user becomes your salesman. And every user becomes your friend. That's the company we want to build."
RMB 1299 = $200 / RMB 1499 = $234

Professional Scenario

Now consider the following smartphone & brand.
Xiaomi is a Chinese smartphone manufacture. Their products are only sold in the Chinese market but they are considered the fastest growing tech company ever.
The main difference between Xiaomi and their competitors is the degree of involvement their professionals have with the company. Products are constantly being improved through the incorporation of Xiaomi professionals' feedback.
RMB 1299 = $200 / RMB 1499 = $234

Appendix 2 –Findings

Moderation effect of Brand-Consumer Identification on the relationship of Innovation Adoption with Design Mode

	Dependent variable:
	Concept
identification	0.087
	(0.082)
adoption	-0.160**
	(0.078)
identification:adoption	0.020
	(0.016)
Constant	0.416
	(0.326)
Observations	176
R2	0.226
Adjusted R2	0.213
Residual Std. Error	0.445 (df = 172)
F Statistic	16.742*** (df = 3; 172)
Note:	*p<0.1; **p<0.05; ***p<0.01

Appendix 3 –Other Findings

First Model: Brand-Consumer Identification, Concept & Adoption of innovation.

	Dependent variable:
	PI
identification	-0.029
	(0.098)
Concept	-0.490**
	(0.228)
innovativeness	0.777***
	(0.126)
Constant	0.140
	(0.441)
Observations	176
R2	0.276
Adjusted R2	0.263
Residual Std. Error	1.334 (df = 172)
F Statistic	21.849*** (df = 3; 172)
Note:	*p<0.1; **p<0.05; ***p<0.01

Second model: Brand-Consumer Identification, Concept, Adoption of innovation, Loyalty

	Dependent variable:
	PI
identification	0.043
	(0.099)
Concept	-0.563**
	(0.225)
innovativeness	0.677***
	(0.128)
Loyalty	-0.165***
	(0.058)
Constant	0.976*
	(0.523)
Observations	176
R2	0.309
Adjusted R2	0.293
Residual Std. Error	1.307 (df = 171)
F Statistic	19.090*** (df = 4; 171)
Note:	*p<0.1; **p<0.05; ***p<0.01

Third model: Brand-Consumer Identification, Concept, Adoption of innovation, Loyalty and interaction between degree of interaction with smartphone and Concept

	Dependent variable:
	PI
identification	0.059
	(0.097)
Concept	-3.182***
	(1.103)
innovativeness	0.592***
	(0.128)
Loyalty	-0.226***
	(0.061)
Usage	0.076
	(0.105)
Concept:Usage	0.392**
	(0.168)
Constant	1.081
	(0.699)
Observations	176
R2	0.350
Adjusted R2	0.327
Residual Std. Error	1.275 (df = 169)
F Statistic	15.199*** (df = 6; 169)