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Product Innovation

Innovate through the design process: *How people perceive co-creation in baby market*

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Abstract (English)

The purpose of this dissertation is to understand whether co-creation, where external sources integrate new product development process, against firm's professionals lead to favorable perceptions in new products design. We aim to test whether the differences relate to the types of knowledge involved. Traditionally, firms worked with their professionals to develop new products. Contrasting with co-creation approach (with users or other external sources such as university labs) implies an interaction between external sources and firm's professionals, leading to new product designs for the entire consumer market.

For this thesis, we run an experimental study with participants, a random sample of 92 and we have tested two different ideas for baby products: baby bottled food as low complexity product and baby bottles as high complexity product. Firstly, results show that co-creation is perceived as the most innovative design model. However, the perception of co-creation does not lead to more favorable product evaluations. We found that, in the low complexity product, outcome evaluations are not significant through different scenarios. So, people do not recognized differences in firm's professionals and co-creation. However, in high complex products, people perceive significant differences in functionality dimension. So, for them is highly different when are firm's professionals involved, they will perceive higher evaluations.

Finally, we identified that the different sources possess distinct types of knowledge: firm's professionals have more technical knowledge and mothers have more experience knowledge; commonly they also have market knowledge. Through this final distinction in the type of knowledge besides different sources, we also assume that they can complement each other in the innovation process.

Keywords: idea generation, co-creation, user design, user innovation, innovation, open innovation, type of knowledge

Sumário (Português)

A presente dissertação tem como principal objectivo o estudo das percepções do processo de co-criação, em que entidades externas integram o desenvolvimento de novos produtos, em oposição à criação de novos produtos por profissionais. O intuito será, assim, testar se as diferenças nas percepções estão relacionadas com o tipo de conhecimento envolvido no processo de criação do produto. Tradicionalmente, as empresas trabalham com os seus profissionais no desenvolvimento de novos produtos. Contrastando com a co-criação que implica uma interacção entre as fontes externas e os profissionais envolvidos (próprios utilizadores bem como outras fontes externas como os laboratórios universitários) no desenvolvimento de novos produtos.

Para a presente dissertação realizou-se um estudo experimental, constituído por uma amostra aleatória de 92 participantes, onde se testou dois produtos para bebé diferentes: comida para bebés engarrafada como produto de reduzida complexidade e biberões como produto de elevada complexidade. Primeiramente os resultados mostram que a co-criação é percebida como o melhor modelo para inovar no que respeita ao *design*. No entanto, a percepção de que se está perante um produto de co-criação não conduziu necessariamente às avaliações mais favoráveis do mesmo. Adicionalmente percebeu-se que para o produto de reduzida complexidade, a avaliação do mesmo não é significativa entre cenários. Pois, as pessoas não reconhecem diferenças entre o processo tradicional, onde se incluem apenas os profissionais da empresa, e o processo de co-criação. Contudo, para o produto de elevada complexidade, as pessoas percebem diferenças significativas na funcionalidade do mesmo entre cenários. Assim, sendo a empresa a criar o produto a funcionalidade do produto será melhor avaliada.

Por fim, identificámos que as diferentes fontes contêm diferentes tipos de conhecimento percebido: os profissionais têm um conhecimento mais técnico, já as mães mais de experiência. E, ambos possuem um bom conhecimento do mercado. Através desta distinção entre os diferentes tipos de conhecimento, assumimos que se podem assim complementar no processo de inovação.

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Introduction

In order to create and capture value in the market, firms have to build a strong competitive advantage. Research started to invest in understanding the importance of innovation in a period of changes, becoming the key element in firm's new product development (NPD) process. As a consequence "open innovation" model is assuming a significant importance among companies' strategies to develop more ideas. Here, firms create new products through collaboration with external sources. If firms still rely on internal assets such as firm's professionals, external sources such as consumers, suppliers, communities, competitors and university labs are gaining predominance. The interaction with firms and external identities is studied through the co-creation model, where alongside distinct sources new product ideas are designed and potentially commercialized.

Regarding the academic importance, this topic may require further and deeper research to achieve a major consensus on what is the best process in idea generation, and to provide consistent insights to management scholars and practitioners (Poetz and Schreier, 2012). Firstly, we discovered that there are two main lines of literature that diverge in enhancing the value of co-creation vs. firm's professionals in new product development process. Conventionally, the majority of management researchers have been trying to sustain the idea that firm's professionals are more able to come up with potential successful new product ideas because they have the unique skills and expertise required to do it (Ulrich, 2007; Ulrich and Eppinger, 2008), considering consumer's role as far of the development process. Therefore, a growing line of some literature sustains the importance of consumers with capabilities in generating new products with higher potential to become commercialized (Jeppesen and Frederiksen, 2006). Consumers face the problems in using some products, being able to solve their needs co-creating effective solutions (Fuchs et al., 2012). Based on classical literatures, on previous experiences made and on our own research the goal of this study is to investigate whether co-creation or professional's products will make a difference in the baby market innovation process, specifically in the idea design. Adding to this, we intend to investigate consumer's opinion in the "open innovation" process: researchers have come up with different views but the main support of that should be based in real-world comparisons evaluated partly by consumers. From the practitioner's point of

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view running deeper in this study, companies will have the theoretical support to build a stronger position in the market when competition is intensifying.

End consumers perceive differently the “open innovation” process of developing new product ideas, leading to different product evaluation assessments: meanwhile, we would like to study and measure the impact of co-creation design against firm’s professionals in final product perceptions by consumers. The positive or negative impact developed in consumers’ behavior through quality, willingness to pay, recommendation intent and functionality and aesthetics product dimensions. We also covered the innovation perceptions in each design mode – co-creation vs. firm’s professionals.

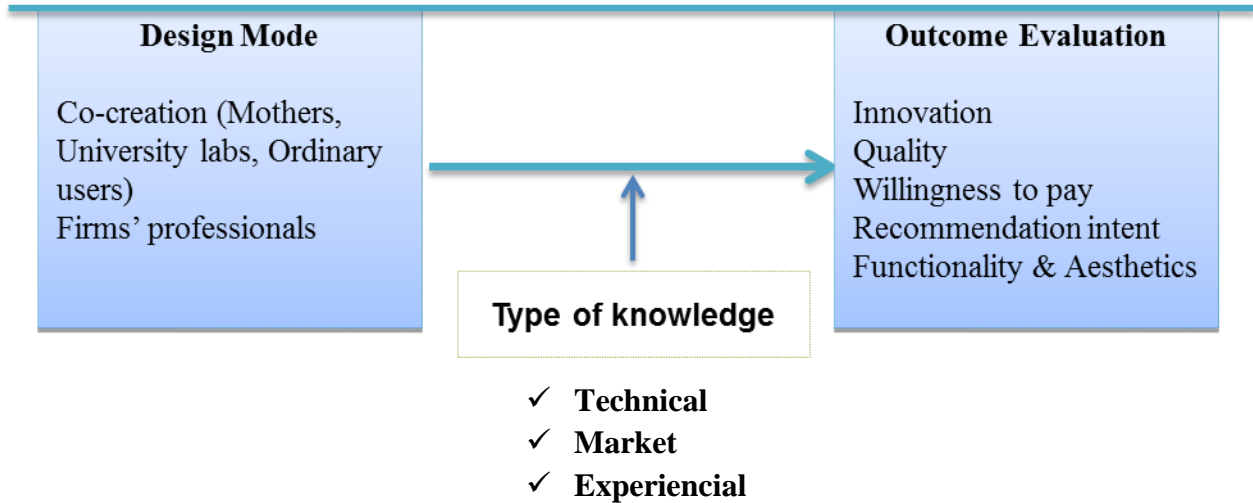
The purpose of this thesis is to understand whether the perception of co-creation against firm professionals' products makes a difference in designing new product ideas for the baby market. The main issue is to measure end-consumers perceptions about co-creation and firm professionals' respective product designs by testing two specific baby products' ideas differently in its designs complexity – baby bottled food (low complexity design) and baby bottles (high complexity design). With this distinction in products from the same market we aim to come up with differences on the final product evaluation regarding the scenario besides the design process.

In summary, we aim to experimentally validate the existence of inference/relation of design mode innovation and product perceptions in five product dimensions for co-creation (against firms). Also, confirm what the type of knowledge besides each design phenomenon is. Precisely, in the first stage of developing new product ideas, companies can follow to distinct design methods - called scenarios (independent variables) – in one hand, firms work in an *inside process*, on the other hand, firms work in a *cooperation process*. Then, the outcome will lead us to concrete product ideas assessments by participants: we will measure the innovation besides each design mode and also the idea developed in five product dimensions such as quality, willingness to pay, recommendation intent, functionality and aesthetics. With this, we will be able to understand whether co-creation is more valued than professionals, distinguishing the two different products' category from the same market. Afterwards, we will further analyze the characteristics of each design mode, including the type of knowledge associated to them as suggested by the conceptual framework (see figure1).

Conceptual Framework

Co-creation method is emerging as a consequence of the consumer's new role in the innovation process. With this research, we focus on the potential of external sources as active assets to help firms finding powerful innovations and building a stronger competitive advantage.

Figure 1 - Conceptual Framework



It is important to clarify that we only assess the design of the product including its components and formats/features - new flavors/ingredient combinations, new designs/improvements - , without considering any other elements such as package, commercial image or others.

Through our study, we aim to contribute to the literature in two important ways: first, provide real evidence on how co-creation products are perceived against firm's professional's products, measuring the impact on the final outcome. We found that the distinction between firm's products and those co-created was not found. Baby products consumers did not perceive the additional value of mothers in developing new ideas. In spite of our sample considering that mothers are already working cooperatively with firm professionals they did not recognize that this fact positively influences the products.

Hence, we found that firms occupied on average a predominant position in both product categories, mostly regarding aesthetics and functionality. More, the perceived knowledge for each type of process was broadly different: firms were mainly recognized by having a higher

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level of technical knowledge and mothers mainly for the experience knowledge; they only shared the market knowledge. Following this, we concluded that knowledge's perceptions impacts on product evaluations: for the low complexity product mother's participation was more positively valuable than in high complex products, the opposite in firms.

The thesis' structure is divided in three main parts: in the first part, we share with you a brief literature review covering all the relevant research and findings about the co-creation vs. firm professional's topic. In the second part, we explain the methodology used to support our analysis. In the third part, we present the results of the questionnaire made and develop the respective analysis. Finally, we summarize conclusions and implications of the work and present the limitations of our study adding to the future research suggested.

Literature Review and Framework

The importance of innovation

Innovation is the main driver of firm's competitiveness and economic development. The constants changings in customer's preferences have impacted on firm's competitive advantage, being easier to lose it. So, innovation becomes the main tool for firms to build and sustain its competitive advantage and to adapt to market conditions (Morris, 2013; Abdel-Razek and Alsanad, 2013).

Innovation assumes an extremely importance due to the increase in rivalry, the stronger presence of substitutes products and the consumers preferences for novel products. Firms become more successful when offer innovative and creative products and, consequently, compete better in the market (Conti, Gambardella and Mariani, 2014). Technology evolution and online proliferation have also reinforced the importance of innovation as the key element to develop new designs, production models and build relationships with customers. Firms become more visible in the market and users are more active and close to the firms (LSE Entreprise Report, 2009).

Open Innovation: a new paradigm

Nowadays, the innovation process is based on the idea that most of the times firms do not innovate alone, but instead develop in interactive relationship process among producers, users and other different institutions (Laursen and Salter 2006). To come across with novel ideas "open innovation" assumes that they can be generated internally and even externally (Chesbrough, 2003). So, the concept of "open innovation" characterizes an innovation system performed internally within firms but cooperatively with other external sources (Fredberg et al. 2008; Reichwald and Piller, 2009). This model of open innovation contrasts with the traditional one (or close model) where innovation is performed internally by firm's professionals. Products are totally designed by who works in firm (Schreier, Fuchs and Dahl, 2012).

Overall, the open innovation process is comprised of several stages where the knowledge input from internal or external sources is required to produce an output (Rao, Ahmad and Horsman, 2001). The process is broadly divided in (1) idea generation and concept development

(front end stages) or (2) product design and testing (back-end stages) (Piller, Ihl and Vossen, 2010) with constant feedback between phases (Rao, Ahmad and Horsman, 2001). The idea generation consists in a combination of formal techniques and classifications of design practices, heavily influenced by intrinsic motivations (Herring, Jones and Bailey, 2009). And, this premarket activity can be developed by different agents, including public scientific institutions, universities, lone inventors, and firms frequently iterate (Rao, Ahmad and Horsman, 2001).

NPD literature argues that firms might benefit when users are the designers rather than internal professionals since users solve their needs of coming up with effective products (Fuchs et al. 2012). Professional designers are not necessarily consumers of the product and do not integrate the consumer's environment, so they may not be able to perceive consumer's real issues (Schreier, Fuchs and Dahl, 2012) such as consumer's problems and needs (Von Hippel, 2005). Additionally, external relationships benefits understanding of the market conditions valuable to innovation performance (Baker, Grinstein and Harmancioglu, 2015). With this collaborative path, managers will create and sustain the competitive advantage (Brandeburger and Nalebuff, 1996; Gulati, Nohria, and Zahere, 2000; Iansiti and Levien, 2004).

Open innovation is growing due to the easy access to the new information and communication technologies that allow people to share and access knowledge at a lower costs, eventually, at no cost (Hienerth, Lettl and Keinz, 2014). This is an opportunity for firms to reduce product development costs and launch products that are better suited to meet consumer needs and values (e.g., Hoyer et al., 2010; Lilien et al., 2002; Ogawa and Piller, 2006; Von Hippel, 2005). Now, consumers are assuming a more active role in innovation fields; they can help firms to be more inventive and effective in the market. They tend to exercise their influence on businesses' decisions which is enhanced by the existent tools that allow them to interact with firms and thereby to "co-create" value (Prahalad and Ramaswamy, 2004). For example, through Dell online platform (IdeaStorm), customers had the opportunity to suggest product improvements and new product ideas which resulted in more than 10.000 idea submissions.

Threadless and Quircky firms which have started develop NPD process with consumers in a permanently basis (Schreier, Fuchs and Dahl, 2012). Contrasting with the traditional design process, where professionals are the entire responsible to design products for the consumer market (Schreier, Fuchs and Dahl, 2012).

Evidence shows that actively integration firms and users knowledge, where users lead many product modifications and/or product ideas resulted in attractive market innovations (Schreier, Fuchs and Dahl, 2012). However, applying co-creation design to develop new product ideas is not a necessary condition to be entirely perceived as innovative (Brown et al. 2006). Previous studies among several product categories provided evidence that user's design enhances consumer perceptions of the firm's innovation ability, even when consumers also considered that firm's professionals have high expertise than users (Schreier, Fuchs, and Dahl, 2012).

Hence, we came up with the first hypothesis:

H1: Co-creation design mode is perceived as more innovative than firm professionals design mode in the new product development process.

It is commonly assumed that firm's professionals "have acquired skills and capabilities that allow them to perform most design tasks more effectively at a higher level of quality" (Ulrich 2007, pp. 5-6). The main driver to generate novel and useful ideas is the R&D expertise and knowledge (technical) typically in firms, and only after comes the creative skills and motivations (Amabile, 1998). So, the more skills and experience possessed the higher the expected quality of the product idea (e.g., Larkin, McDermott, Simon and Simon, 1980; Magee, 2005; Weisberg, 1993). Vicenti (1990) added that professionals such as engineers have a greater understanding of the product elements and a deeper knowledge about what failed in the past, so, they are able to invent with more consistency.

H2: Firm's professional's products have more quality than co-creation products.

In co-creation, customers engage in an experiential learning which will allow them to get an advantage in facing real problems and rapidly formulate a potential solution (Arrow, 1962). Bennett and Cooper (1981, p. 54) argued that a truly creative idea for a new product "is very often out of the scope of the normal experience of the consumer". The importance of experience knowledge is mainly for enhancing product innovation with new product improvements (Von Hippel, 2005). Shreier and colleagues (2012) found that product evaluations by consumers are more positive and the willingness to buy and recommendation intent is stronger when the product is categorized as created by users versus firm' designers. For example, among different industries we saw those positive perceptions regarding innovation by users, such as in companies that have

exclusively adopted user design as a source of innovation (Schreier, Fuchs and Dahl, 2012). Hence, we formulated the following hypothesis:

H3: Co-creation products have higher willingness to pay and recommendation intent than firm's professionals' products.

Regarding performance attributes, physical components and any attribute-performance relationship knowledge, consumers have a deeper understanding (Mitchell and Dacin, 1996). Previous study explored consumer's perceptions in products designed by users and it was possibly to found that innovation in user design revealed a more positive impact on product aesthetics and functionality (Schreier, Fuchs and Dahl, 2012)

H4: Co-creation products have higher aesthetic and functionality than firm's professionals' ideas.

Open innovation recognized the value of an active selection of user participation in the NPD design process (Schreier, Fuchs and Dahl, 2012). This model incentivizes the cooperation within wide horizontal and vertical networks such as customers, suppliers, competitors; the scientific system of university labs and research institutions; public authorities or public funding agencies (Knudsen, 2007; Tether and Tajar, 2008).

Sources involved in Open Innovation

Firms can also develop strategic alliances to gain knowledge through search for complementary assets (Gulati, 1998; Nooteboom 1999). Evidence shows that almost 3 million consumers innovated in the domain of household products, and that aggregate, annual product development expenditures of users has been 1.4 times larger than the respective expenditure invested by all U.K. firms combined (Von Hippel, De Jong and Flowers 2012). The best way to bring value to customers is innovating jointly as partners, firms and consumers (Prahalad and Ramaswamy, 2004). This type of strategic relationship is mainly developed in biotechnology industry (Powell et al., 1996; Mowery et al., 1996; Bekkers et al., 2002) and also between firms and universities research in many industries, especially high-tech by knowledge spillovers (Porter 1990; Baptista and Swann, 1998; Kenney, 2000a). On consumers side, for example in the childcare industry, mothers have family as the basis of engagement being more connected to communities of other parents where they share ideas and discuss doubts and challenges about

their children (Bhalla, 2011). With this firms are able to get unique solutions where the consumer is an active partner and creates additional value in the long run (LSE Enterprise Report, 2009).

The role of external sources

In order to get better insights firms should use external and internal (from their own R&D departments) ideas and paths (Piller, Ihl and Vossen, 2010). Consumers possess their own experience and knowledge of the firm's community, observing and collecting from the firm and the community, specific needs and opportunities and integrate them into their new business ideas (Hienerth, Lettl, and Keinz, 2013). Ulrich and Eppinger (2008) argue that companies might have to work on the interaction with customers and look around for useful information in the experience environment of the product which will allow them to discover real innovative solutions to customer needs. University technicians also have strength ability in technological fields which may complement firm's innovation in developing new products (Knudsen, 2007; Tether and Tajar 2008).

Having different sources interacting, problems are seen from different perspectives and a broader set of knowledge can be utilized to build new solutions (Terwiesch and Xu, 2008). With this, firms will increase the uniqueness and inimitability of firm's knowledge (Sawhney and Prandelli, 2000).

Co-creation types of knowledge involved

Experience Knowledge

Experience knowledge enhances product innovation by contributing to achieve different solutions information to answer problems (Von Hippel, 2005). Experience knowledge is obtained by direct acquaintance (Russell, 1948), such as the use experience which is basically when consumers learn from experience and performance (Alba and Hutchinson, 1987; Hoch and Deighton, 1989). This type of knowledge corresponds to the appropriateness of consuming certain products in a certain usage situation (Brucks, 1985; Mitchell and Dacin, 1996).

Consumers know deeper how products perform towards a certain task being the leaders in experience knowledge. As a result, they are able to find a practical solution because they experience the need as well eventual constraints (Schreier and Prug, 2008). For example,

snowboarders experienced restrictions with current snowboard (i.e. poor control of the board) therefore they designed a new product to answer that need (Schreier and Prug, 2008). Proving why users' experience and knowledge is extremely important in lead users' theory and especially in the product innovation appliance, they move ahead of the trend and challenge commercially available products (Schreier and Prugl, 2008). New product development process requires new ideas mostly enhanced through the experience, which is also crucial to gain expertise and reinforce creativity (Whitehead, 1993; Cooper, 2009).

As Arrow (1962) clarified, customers tend to engage in an experiential learning or "learning by doing", which will allow them to get an advantage in facing real problems and rapidly formulate a potential solution. As so, based on a need in improving mashed and solid food for babies required by consumers, the Bamed / MAM Group (baby product player) developed a dual process of idea generation process: internally and externally from collection ideas created by users (Poetz and Schreier, 2012). With this we achieved the following hypothesis:

H 5a: Consumers (mothers) have higher experience knowledge which leads to higher new product evaluations of co-created with mother.

Technical Knowledge

In order to meet fast changing consumer needs and take advantage of the technical opportunities to develop new product ideas firms have to be aware of the market challenges (Mahr, Lievens, 2012). Technical expertise leads to the proposal of technical solutions that might not match the demands of the market (Moenaert and Souder, 1990). The technical knowledge is the skills and expertise that might lead to product improvements and innovations. However, for each product category the level of technical knowledge required to design new products could be less or more complex (e.g. technical design of skis, cars, personal computers) (Schreier, Fuchs and Dahl, 2012). The complexity of a design task corresponds whether the design requires an extensive diversity of distinct skills and types of expert knowledge of technology, materials and processes (e.g., Hobday 1998; Novak and Eppinger 2001). Overall, input from users in products that require higher levels of technical knowledge tend to be perceived with skepticism since

consumers are perceived as having problems and difficulties in understanding specific components (Schreier, Fuchs and Dahl, 2012).

Furthermore, the ability to develop talented ideas may even depend on the industry, product category, and the nature of the problem which the firm is trying to solve (Poetz and Schreier, 2006). In complex products, in which required knowledge is more complex, difficult and costly to acquire, the level of user involvement in co-creation decreases. On the other hand, for products where the knowledge involved is linked to elements such as experience, users might be more successful in creating their own ideas with the special experience knowledge. As the feeding babies' case translates, consumers were not only sharing the problems experienced, but they created better designs to solve them (Baldwin et al., 2006; Lettl, Herstatt, Gemünden, 2006; Lüthje et al., 2005).

More so, we also have more simple design tasks that require a lesser level of technical knowledge, for products such as cereals. Regarding products with simple design tasks, different studies compared innovation in user's product design with firm's professionals product design (i.e. breakfast cereals) and concluded that users' design might be perceived as an inadequate means of creating truly innovative products (Schreier, Fuchs and Dahl, 2012). In an opposite way, we have electronics or robotic toys that require more complex design tasks involving people that have valuable expertise to provide innovations (Schreier, Fuchs and Dahl, 2012).

Therefore, we aligned the following hypothesis:

H5b: Firms and search labs have higher technical knowledge which leads to higher product evaluations of complex new products co-created with research labs.

Market Knowledge

Market knowledge corresponds to the knowledge about customers and competitors (Day 1994; Kohli and Jaworski 1990; Narver and Slater 1990). Such knowledge is identified as a structural competence in organizations (Hamel and Prahalad, 1994; Sinkula, 1994) which enable firms to enhance its competitive advantage (Cooper, 1992; Day, 1994; Griffin and Hauser, 1992). Following the market orientation theory, market knowledge is obtained by an internal process called *outside-in process* (Day 1994; Jaworski and Kohli 1993). Usually, firms implement some

processes to acquire, disseminate and interpret new information and learn about their customers' needs and preferences (Jawordki and Kohli, 1993). For example, in order to obtain such information, companies frequently build strong relationships with their customers. The benefit associated to this knowledge assessed exclusively by firms is the improvement on the speed and effectiveness of the new product development process (Carbonell et al., 2009) and the respective product result (Gruner and Homburg, 2000). This type of knowledge is used by firms in a proactive way when customers are not able to imagine and express their needs (Narver et al., 2004). More, firms also identify, collect and utilize customer and competitors' information and conditions (Luca and Atuahene-Gima, 2007).

Finally, authors show that working together (professionals and users) generally conceive ideas to solve an effective and relevant problem in the consumer goods baby market: several of the best user ideas were selected to pass to the next NPD stage, in which firms' professionals (designers and engineers) might transform them into workable prototypes (Poetz and Schreier, 2006).

Hence, we formulated the following:

H5c: Users and firms possess market knowledge which leads to higher product evaluations of new products co-created with users.

Methodology

Overview

In order to answer the research proposal of this thesis, we developed a study in consumer baby products field. The baby market is an interesting market to study not only for its complexity – large diversity of products and needs – but also for the target involved and its circumstances that makes companies want to build strong relationships with them. Previous studies used baby related products to study innovation (i.e. MAM, global firm in baby products industry, « *The Value of Crowdsourcing: Can Users Really Compete with Professionals in Generating New Product Ideas*» article).

Baby Products Industry

Overall, baby products industry is considered a viable segment in around 50 countries (B2B Information, 2010). The US, current market leader (\$7 billion annual retail baby products market), and Western Europe have the highest shares of the global baby products market (TransWorld News, 2011). In Europe, UK is the most significant market with sales of \$4.17 billion in 2010 (IBS World, 2010). UK and Western Europe baby products market have grown in the range of 7% throughout 2014. In order to anticipate the continued global growth in the baby products industry (i.e. 20% annual growth to 2015 in US), firms might have to develop strategic planning analysis to understand the tendencies in the market and all the resources required to answer that.

The baby products market comprises a huge global market with multiple product offers for diverse consumer segments. Hence, we are considering six main categories in this industry which are baby food, diapers, hair care and skin care, toiletries, bottles and pacifiers and diapers (B2B Information, 2010). Apparel and footwear should also have been included. (*Please, see graph in appendix.*). The conceptual study of the baby products industry seems very complex in define due to size differences and growth differences of the individual market in specific components targeted to baby stages, depending on the age of the baby and respective restrictions involved.

In order to select our product category we run a pilot study and selected two products directed to babies' ages between 0 to 18 months: baby food and bottles.

Co-creation in baby industry

The attractiveness of new product ideas by users, particularly in baby products industry, assumes an important role when consumers identify problems to solve with current products. From the literature reviewed we discovered that there are unsolved problems with products for the additional feeding of babies with mashed and solid food (Poetz and Schreier, 2006). In this context, for example, MAM firm, developed a research where they found that *«user-created ideas outperformed ideas generated by the firm's NPD team in terms of novelty and customer benefit»* (Poetz and Schreier, pp. 75-91, 2012).

Regarding main users involved in this market – mothers – we recognized that they are critical assets in (1) developing, (2) adopting, and (3) diffusing products (Schreier, Oberhauser and Prug, 2006) mostly because of the high involvement in childcare and its products. In this context, we believe that users have useful insights to share with companies, so, with our findings we also pretend to constitute an important contribution to validate and to foster a more active involvement in design new ideas *“to pass the gate”*. In this field, consumers experience have been a source in finding new product improvements/ solutions that will really satisfy market needs and expectations. Hence, consumers' experience possess an important role in the ideation stage: companies have a stronger technical knowledge and understanding to define the potential of an innovation, however, we believed that users have real perceptions of the potential improvements needed because they consume the products in a daily basis.

Ideation Stage – Baby products industry

After a theoretical approach, we decided to focus in a specific product category in order to provide concrete evidence for the distinct scenarios considered. The criteria used to select the industry were mainly based in the goal to study a market where end-consumers were emotionally attached to the experience in using this specific product and the importance of the moment that they are living which implies a higher attachment to the product consumption. Secondly, we focused on finding a market where the relationship firm-customer is establish enough to endorse

more interactions in solving customers' needs (e.g. companies already have communities and clubs with customers).

Adding to this, we also based our decision to test baby products, in the studies' results presented in (Poetz and Schreier, 2012). Consumers have identified some problems with baby products, so, they will seriously benefit from new solutions to develop the feeding of a baby. We presume that baby industry provides the ideal selling to test benefits of experience, technical and market knowledge.

The next step was to look for the specific product(s) to test in the baby market.

Pilot Study

Method- Procedures and Participants

In order to assure the right selection of products to test, we run a pilot study with 30 participants from Portugal (15 students, 14 professionals and 1 housewife; 63% female and 37% male). We have not restricted the sample frame; we tried to obtain perceptions from consumers of the baby market in order to obtain comprehensive insights.

We were particularly looking to understand the level of experience and technical knowledge perceived in different baby categories: food and products. Guided by concrete applications, we have selected four different products to measure the level of experience and technical knowledge perceived by respondents, such as baby milks, baby bottled food, baby bottles and pacifiers (*see appendix*).

Measures

The study assisted in understanding which products scored the highest value in experience and technical (*see table 1*). Participants checked color pictures of current products (pictures of milk, mashed food, baby bottles and pacifiers with respective descriptions) without any association with brands or packages. Then, we asked participants to rank four statements regarding each product presented on a scale of 1 "not agree at all" to 7 "totally agree".

Table 1 - Measurement items

<i>Construct</i>	<i>Statements</i>
Technical product	Regarding your attitude to baby products. Please read the following statements and indicate to what extents do you agree or disagree with them... (1) Need a higher level of technical knowledge to be developed (2) Only firms' professionals can create this product "Strongly disagree" [1]/"Strongly Agree" [5]
Experience product	Regarding your attitude to baby products. Please read the following statements and indicate to what extents do you agree or disagree with them... (1) Use experience enhances the innovation (new idea) (2) Users can create this type of products. [1]"Strongly disagree"/"Strongly Agree" [5]

In an in depth survey approximately 2 minutes in length, each participant was also asked to make comments related with the products presented.

Findings and Discussion - Results

In general, bottled powered milk and baby bottled food were the most referred (M_milk=17.8; M_bottledfood=18.2). Although, looking to the technical product dimension, baby bottles, pacifiers and bottled/powered milk were the most referred, as we previously expected (please see figures 2 and 3). As for experience dimension, baby bottled food was considered as the most important. For example, one of the participants (mother) wrote that usually she buys natural fruit and then mashes it for her baby: "It's natural and without any additives that could damage baby nutrition".

Technical knowledge was associated to products, like baby bottles and pacifiers. Some respondents (mothers and non-mothers) stated that there are some technical problems faced in baby bottles and pacifiers: "Sometimes baby bottles do not work well and the baby needs are not satisfied efficiently." Contrarily, baby food products are easily to innovate by consumers that can use their own ingredient combinations and creativity. They argued "When babies start to eat natural food, the consumption of baby bottled food usually has a difficult adaptation: the flavors are different and the food seems not so nutritive".

So, we retained baby bottled food and baby bottles food with the highest rating on the experience and technical dimension respectively ($M_{\text{bottledffod_experience}} = 12$ and $M_{\text{babybottles_technical}} = 7.5$; $M_{\text{babybottles_experience}} = 7$ and $M_{\text{babybottles_technical}} = 11.5$).

To sum up, in the main study we tested baby bottled food (in food category) and baby bottles (in products category). As such, we could assess different perceived knowledge's needs lead perceptions in baby products - co-creation process against firms' professionals. Hence, it will be relevant to understand differences associated with different innovation modes in ideation stage: co-creation and firm's professionals.

Baby bottled food

Product designed for babies with ages between four to six months and until two years as well. It is typically “normal food” adapted – mashed - to kids, making their eating experience more positive and interactive. Usually, there are a wide variety of food combinations and flavors which increase the diversity of options to consume and to have a balanced diet in each baby growth stage. Here, consumers have more freedom in finding potential substitutes for bottled food commercialized: they can be the owner of their babies' food creation.



Figure 2 - Baby bottled food

Baby bottles

Product designed for babies and young children in different stages as well as for satisfying various needs. There is a broad diversity of bottle tips, depending on the target age and circumstance to use. For example, when for any reason a mother does not breastfeed, the specific bottles need to have special features to respond to babies' needs in feeding and maintaining the required airway protection level and nutritional needs. For instance, consumers usually change their options from one bottle to another when the first did not fit well the consumers' feeding experience. However, the change here is for another bottle that is already commercialized in the market.



Figure 3 - Baby bottles

Despite those products being in different categories – baby food vs. bottles and pacifiers – we considered it was valuable to analyze how their nature (“easy to replicate”/“not easy to replicate”) will lead or not to different assessments in measuring co-creation process vs. firm professionals. First, as we already stated for this target is typically critic, judging their experiences and needs, which could be an asset to companies that are in alert to the market signals and behaviors. Secondly, for products that consumers can replicate similar versions in a homemade basis, the innovation for companies could be more in charge, oppositely, for products that even consumers realize key aspects to improve; they are not able to conceptualize a new real version of the product.

Main Study

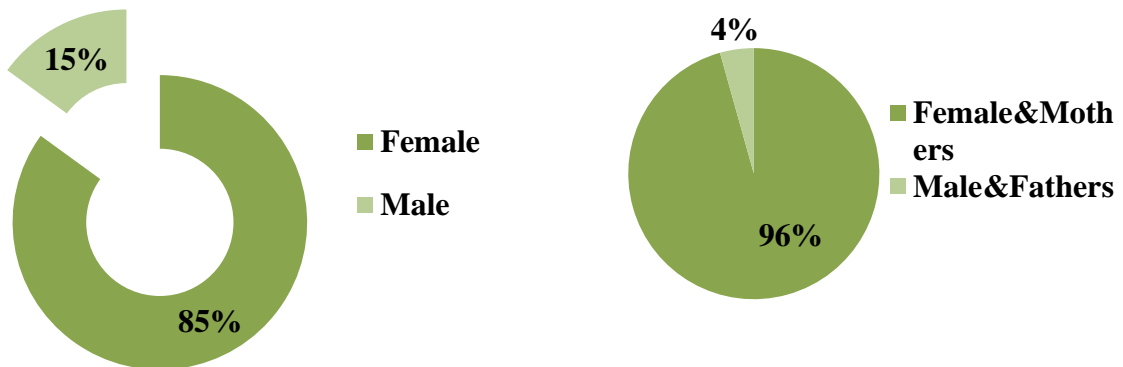
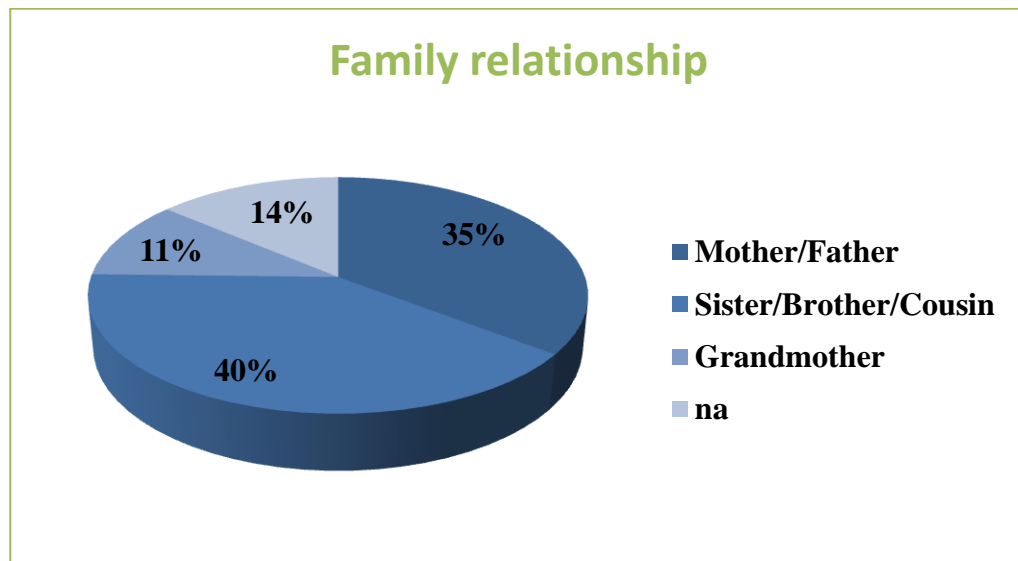
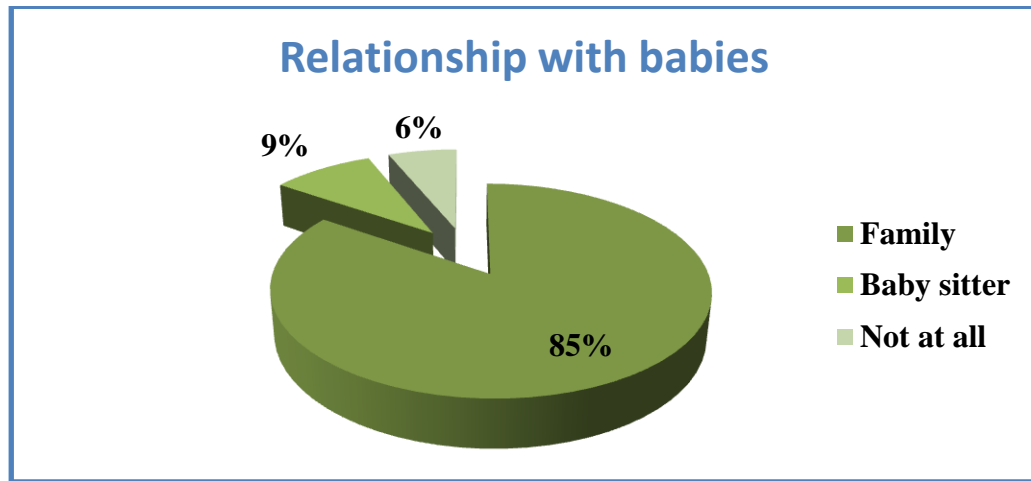
Description of the Participants Sample

Out of the 164 participants that initiated the survey, only 92 finished it. We were also forced to eliminate 27 cases in order to guarantee the consistency of our study. The main characteristics of the participants in the underlying evaluation were not consistent with the domain of baby products participants. Despite having had a majority of female participants (85%) only 40 per cent of them (22 women) are mothers with ages on average 35 to 45; the other 47 per cent of female answers were by other relative type (sister/cousin/aunt/grandmother) or even a babysitter relation (7%), 13 per cent of female participants had other type of family relationship with babies (“n.d.”).

In terms of gender diversity we saw that our recruitment was not so effective with only 10 male participants (15%), however, they predominantly had a relationship with babies (80% family, 20% baby sitter). The range of participants is partly professionals (58%) and students (31%, in which 6% have a part time job) and the remaining 5% are housewives or grandmother (without current job). The study scope was not limited to the national environment (Portuguese market) so, we extended the study to people with different nationalities. Although, as we already expected, participants were predominantly Portuguese (85%), followed by Spanish (9%) and other 5 countries.

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Figure 4- Results about participant babies' relationship characterization



Study – Testing Baby Products

Idea Generation - Scenarios

The aim of this dissertation is to measure co-creation against professional products generation, assessing whether the type of knowledge involved in co-creation is different comparing to the professionals. Nowadays, one of the firm's challenges is to understand the consumer's perceptions of a product innovation launched in the market (*is it matching the real expectations? Is it not?*). As we already pointed out, in some cases the traditional innovation model did not bring the ideal solution, so the emerging model implies a new way to achieve a more reliable consumer satisfaction. Recognizing the benefits associated to this, firms and consumers can share value and it would bring higher positive results to both, mainly in industries where users have an important level of experience and relationship with the time in consuming the product, such as the baby market.

Co-creation with Firms

Process Definition. In an open innovation system, consumers are closely following firms' activities, they tend to interact, communicate and share with ease and in a constant way. Co-creation started as a result of the consumers' dissatisfaction with available choices and their necessity to influence and participate in every part of the business creating value to the system (Prahalad and Ramaswamy, 2004). Focusing on the ideation stage, the process here is basically when people, outside the firm, are able to contribute with new idea designs. Co-creation is mostly trying to join the problem definition and solving it with contribution of external sources, such as consumers, ordinary users or university labs. They might have different perspectives and knowledge leading to various outcomes.

First, mothers (experience consumers) representing users that have experience in buy and consume such specific products. They have the power of end choice and experience with products usage effects. Second, university technicians represent academic and specialized scientists and they work to develop potential commercialized products. Here, we considered specialized technicians in baby market fields – childcare. Finally, ordinary users representing people that do not consume those specific products but are willing to work in developing new

product ideas to end users. By this, we assume that they have some experience and knowledge to think and design new product ideas, even with particular intrinsic motivations.

Firms' Professionals

Process Definition. In this traditional system, firms work in developing, searching, designing and producing new products based on human capital skills and other internal sources. Hence, consumers have a secondary role on the innovation process: professionals try to interpret consumers' signals and then they take conclusions to go straight forward. Here, as the traditional model implies, firms use their main assets such as people (designers). Contrasting with co-creation, we support on LR that firms have a stronger level of technical expertise to work effectively in developing new and profitable ideas.

We presented a scenario where Firm A which met the following criteria.

- (1) It has the desire and intention to innovate in a certain product area;
- (2) It currently uses its internal professionals' team to develop new product ideas;
- (3) It had to be willing to integrate different participants in the ideation stage in order to get a wide range of ideas to select forward.

After, we shared its new product ideas with study participants, in order to obtain outcome evaluations along the five key dimensions: quality, willingness to pay, recommendation intent, functionality and aesthetics. Firm A is presented as hypothetical firms which act in the baby product market. They work in planning, conceiving and developing different baby products categories and have the main purpose of developing new product ideas for two specific products – bottled food and baby bottles – to solve consumers' issues.

Traditionally, Firm A professionals (marketers, designers and R&D teams) use various market research techniques to identify consumer needs or current problems with commercialized products in order to conceive potential ideas. However, there is no value added between its approach and other players' action which could be a constraint to differentiate each other's. So, in order to enhance the new product development process we pretend to test the impact that different sources could have in the ideation stage and in the product design result.

Method

We started by asking participants about the level of involvement with baby products industry. Then, it was described the new process development of a Firm A through a specific scenario (different in each questionnaire). In order to capture the level of respondents understanding about product development scenario, we asked participants to identify the responsible for generating the product and, after, the type of knowledge presented it. To measure the level of innovation presented, we assessed the evaluation of the design mode used to develop new product ideas by asking participants to rank the scenario described before. Finally, in the last part of the questionnaire, we showed two baby products created by the scenario previously viewed. Participants evaluated the products in five specific dimensions. (*Please, to check questionnaire, see the appendix*).

Product Attitude to baby market (goods)

This study relates to a project innovation in children food and bottles lines. Previous studies developed in this market, demonstrated that there is a strong need to launch better quality products in order to make the experience more suitable for babies and parents (study developed by Bamed/MAM Group¹, pp.249). More, for the bottles case, the market needs were identified in our pilot study where mothers and other participants (i.e. doctors or pharmaceuticals) mentioned current problems in feeding by bottles.

So, those needs justify the reasonable desire in firm A to conceptualize new product ideas (1) by its current internal idea generation method or, (2) in parallel with different users involved in the creation process (mothers, university labs and ordinary users). Afterwards, understanding the problems faced in the market, we tried to measure participants' attitudes towards baby products to ask them about their familiarity with the industry and see whether they have previously bought products from any baby product category. Besides that, we expected to relate the level of familiarity with the industry and the evaluation of the outcome.

Manipulation Scenarios – How firm A came up with new product ideas?

¹ The Value of Crowdsourcing: Can Users Really Compete with Professionals in Generating New Product Ideas?, JPIM, 2012

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In this study, after assessing the recognition of the industry we move to the case of Firm A where we explain how Firm A came up with new product ideas. Each questionnaire tests one of the four product development scenarios to analyze: firms' internal team (only), firms' internal team with (1) a group of mothers (2) a university lab. Basically the text presented is similar for the distinct situations, only differs in the agents who participate in the designing process and in the type of knowledge possessed (technical, experience and market). With this we pretend to give to the sample an idea about the process that Firm A can use to innovate in its business, helping respondents to evaluate the final product result according to the scenario showed.

In order to avoid biased interpretations, we made the scenarios' descriptions as clear as possible to make sure that they memorize the important data such as the person responsible for creating new ideas and the type of knowledge used (*manipulation check – see appendix*). Hence, at that time we are not taking into account the product itself, whether it is a bottled food or baby bottles, only focusing on the method used in the ideation stage for both.

Then, in the following part of our survey, we will assess the product result making a distinction in the product category.

Evaluation of Product Ideas – Measuring product dimensions

Next, after we provided the company background in developing new ideas by different designing approaches, we will introduce the results of that. In particular, we will show them two different products: a new baby bottled food and new baby bottles ready to be launched. The point here is that regarding the process described earlier, we ask them to evaluate the final result. Here we try to assess hypothesis defined earlier.

To test the outcome, we measure participants' opinion in specific dimensions presented on table 2.

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Table 2 - Measurement Items

Construct	Items
Product involvement	How familiar are you with baby products? "Far too little" [1]/"Far too much" [5]; Regarding your attitude to baby products. Please read the following statements and indicate to what extents do you agree or disagree with them... (1) My general interest in baby products is high; (2) I have bought different products from this category; (3) The existing products have an acceptable standard of quality
Type of knowledge*	What type of knowledge do you believe those involved in coming up with the product have? (1) Technology "Very low" [1]/"Very high" [5]; (2) Market "Very low" [1]/"Very high" [5]; (3) Experience "Very low" [1]/"Very high" [5]
Innovation**	How innovative is firm A? "Not at all" [1]/"Very innovative" [5]
Quality***	What is your overall opinion on this product? "Very Poor" [1]/"Very good" [5]
Aesthetics	Baby bottled food product and Baby bottles product: Overall, what is your attitude toward the design and functionality of this new product? I think this design is... (1) "Bad" [1]/"Good" [5]; (2) "Dislike very much" [1]/"Like very much" [5]; (3) "Boring" [1]/ "Fun" [5]; (4) "Not Appealing" [1]/ "Appealing" [5]; (5) "Unpleasant" [1]/ "Pleasant" [5]; (6) "Inferior" [1]/ "Superior" [5]
Functionality	Baby bottled food product and Baby bottles product: Overall, I think the new product is... (1) "Not at all useful" [1]/"Very useful" [5]; (2) "Not at all effective" [1]/"Very effective" [5]; (3) "Not at all functional" [1]/"Very functional" [5] Baby bottled food product: "With its baby bottled food, this company focuses on functionality (the main focus is on improving well-being and performance)" (1= "Strongly disagree" 5="Strongly agree") Baby bottles product: " "With baby bottles, this company focuses on functionality (the main focus is on improving well-being and performance)" (1= "Strongly disagree" 5="Strongly agree")

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Product Adequacy	<p>Baby bottled food product: This product contributes to... (1) “The additional feeding of babies with mashed and solid food will be more convenient for both parents and babies.” (2) “Enhances customer benefit”; (3) “Baby feeding needs can be satisfied by this product” (both items 1= “Strongly disagree” 5=“Strongly agree”)</p> <p>Baby bottles product: This product contributes to... “Using baby bottles to feed milk to babies will be more convenient for both parents and babies” (2) “Enhances customer benefit”; (3) “Baby feeding needs can be satisfied by this product” (both items 1= “Strongly disagree” 5=“Strongly agree”)</p>
Willingness to pay	<p>Baby bottled food product: In the market the product price is 2.60€ per bottle. What is the maximum amount of money you are willing to pay for baby bottled food produced by Firm A?</p> <p>Baby bottles product: In the market the product price is 10.30€ per bottle. What is the maximum amount of money you are willing to pay for a baby bottle produced by Firm A?</p>
Recommendation Intent	<p>How likely is it that you recommend this product? “Not at all” [1] / “Very likely” [5]</p>

*Three different questions to measure each type of knowledge (technical, market and experience); **Single item to measure design mode innovation; ***Single item to measure quality perceived through the product

Findings and Discussion

Primary analysis

Product Involvement

Regarding participant's level of product involvement in baby industry, findings revealed that generally people have more familiarity with this industry but less interest, experience or consumption practices. Linked to further analysis we saw that there is no significant difference between people who answered to the firm's scenario and co-creation scenario ($p > 0.05$, see table 4). As so, we rejected hypothesis 1 related with the innovation present in the design mode. As an indication, the average product involvement with the industry shows that mothers had higher level of innovation ($M_{\text{firms}} = 2.62$; $M_{\text{mothers}} = 2.64$; $M_{\text{unilabs}} = 2.46$; $p = 0.7$) (*see table 4*).

Overall, participants had a family relationship with children, mainly mothers/fathers, sisters/brothers/cousins, or even a babysitter job. As we expected, females had attributed lower product attitudes related with quality and conception of the products commercialized which reveals a potential indication of non-satisfaction with baby products.

Design scenarios – Firm's professionals vs. Co-creation

Here, participants knew how firm A is developing ideas, who was involved and the correspondent type of knowledge possessed. For both scenarios more than half of the respondents were female (%firms_female = 89%; %mothers_female = 88%; %unilabs_female = 75%), only few participants were answered by male, having had more male answers in university lab scenario (25%).

We found that, regarding our scenarios initially proposed, "Ordinary Users" were not understood by participants. Mainly, in our manipulation check, respondents did not perceive the differences in the idea transmitted. This means that we will not have into consideration these design mode scenarios in our analysis (27 scenarios answered), so, for now we only consider two different co-creation scenarios: mothers and university lab vs. firm's professionals.

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Among validated scenarios we found that 40% analyzed firm's professional scenario against 60% co-creation (mothers - 29% and Uni Labs - 31%). Firm's professionals and co-creation scenarios (mothers and university labs) were understood by the entire sample. So, our manipulation check was predominantly successful ($p < 0.05$).

Asking participants about the ones responsible for developing the designing process described, we found that participants predominantly considered "Both" responsible for developing new product ideas in each scenario (FirmProf = 61.5%; Mothers = 58%; Ulab = 75%). Although, there were relevant percentages of responses mentioning the "appropriate" responsible: 35% in Firm's professionals, 32% in mothers and 25% in Ulabs (both measured by a scale 1="mothers"/"Ulabs" to 5="Firms"). Regarding this manipulation check, we discovered a relevant aspect: when participants saw the firm's professional scenario they predominantly assume "users" (mothers) as members involved in the process, without any information about this integration. So, it is not clear the distinction between co-creation and firm's professionals because they overall assume that firms imperatively work with users, non-dissociated.

Then, we asked participants to rank (scale from 1 to 5) three different types of knowledge that the ones responsible for the design process (namely before) have possessed: technical, market and experience (*H5*). As we expected, we observed that the higher level of experience knowledge was experience with co-creation involving mothers which was completely the opposite in firm's professional's case where they strongly possessed technical knowledge which is lesser represented in mothers. More, in co-creation with university labs we saw that they also possess higher levels of technical knowledge, mostly similar to firm's case. Commonly, there is no difference perceived in market knowledge in firm's professionals or co-creation ($p > 0.05$) (*see table 3*).

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Table 3 - Type of knowledge

Single items (1 to 5 scale)	Firm's Professionals (N=26)	Mothers (N=19)	University Labs (N=20)	ANOVA
(1) Technical	4.08	2.84	4.35	F=12.552 p=0.000
(2) Market	4.35	4.26	4.00	F= 0.859 p=0.432
(3) Experience	3.31	4.32	3.95	F=3.309 p=0.043

Results also confirm that participants did not perceive relevant level of technical knowledge in mothers and relevant level of experience knowledge in firm's professional. To sum up, within different scenarios, we found that mothers and firm's professionals differ mostly regarding experience and technical knowledge, having similar knowledge of the market. More, firm's professionals did not differentiate themselves from co-creation with university labs in terms of technical knowledge, in which co-creation scored a little higher. The strongest knowledge for firm's professionals is the market awareness.

Table 4 – Summary of key findings

Study Variables (measured by single items)	Firm's Professionals (N=26)	Mothers (N=19)	University Labs (N=20)	ANOVA
Product Involvement	2.62	2.54	2.46	F= 0.325 p = 0.723
Innovation	2.08	2.47	2.75	F= 4.259 p=.018

Regarding innovation perceptions (*HI*), we found that firms innovating alone or with mothers did not change perceptions ($p=0.224$, $p > 0.05$). Although, in mothers we could observe that the innovation perceived is higher than in firms. Additionally, when the innovation process is

developed by university lab, participants perceived a difference against firm’s professionals (M_innovation_co-creation=2.75 > M_innovation_firmsprofessionals=2.08, p = 0.018).

Then, to assess product evaluations participants were presented with two product ideas. With this, we pretended to analyze whether there exists any difference on the impact that the design mode has in the outcome evaluation when products are different in categories, complexity and nature. After being exposed to the product, respondents were asked to evaluate it in five dimensions (*see table 2*) (aesthetic, functionality, single items quality, willingness to pay and recommendation intent).

Evaluating outcome | Product Dimensions

Baby bottled food – low complexity product

Firstly, we assessed the quality of the baby food product (*H2*) and what we found was that there is no difference in perceived quality according to the scenario. So, we rejected *H2* (M_firms=3.31; M_mohers=3.26; M_lab=3.65; p > 0.05 always between groups). As an indication, quality levels in the mother scenario have lower quality than in the firm’s scenario. The opposite occurs when we consider co-creation with University lab versus firm’s professional’s scenario (*please see table 5*).

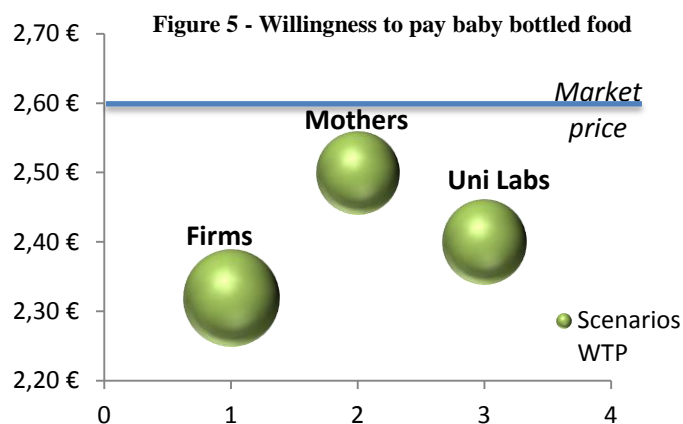
Table 5 - Summary of key findings Baby bottled food (Low complexity products / experience)

Study Variables	Firm’s	Mothers (N=19)	University Labs (N=20)	ANOVA
	Professionals (N=26)			
Quality*	3.31	3.26	3.55	F=0.710 p=.496
Aesthetics	3.66	3.44	3.63	F=0.496 p=0.611
Functionality	4.06	3.53	3.82	F=1.906 p=0.157
WTP* (2.60€)	2.33	2.50	2.40	F=0.369 p=.693
Recommendation Intent*	2.73	2.68	2.75	F=0.042 p=.959

Measuring baby bottled food aesthetic (*see measures in table 2*) we found that participants perceived lower aesthetics in mother’s scenario. More, similar attribution happened regarding the

functionality dimension: mother's scenario scored lower than firm's professional. Although, for these two dimensions, participants do not recognize relevant differences among scenarios ($p_{\text{aesthetic}}=0.6$; $p_{\text{functionality}}=0.15$, $p>0.05$). So, we rejected our H4 which translates that co-creation is higher perceived in aesthetic and functionality dimensions than firm's professionals products. As an indication, being professionals involved and conducted the design process leads to higher perceptions of aesthetic and functionality product dimensions. Finally, the hypothesis of the recommendation intent was also rejected to the low complexity products studied ($p=0.959$). The recommendation intent also revealed to be more perceived in firm's professionals ($M_{\text{firms}}=2.73$). Additionally, in the recommendation intent dimension there is no relevant differences between scenarios, however, mothers continue not being perceived higher than firms. The higher intention to recommend was in university lab scenario ($M_{\text{unilab}}=2.75$).

Regarding the willingness to pay dimension also integrated in hypothesis 3, we saw that there is no relevant difference perceived in being firm's professional or co-creating to develop the product ($p=0.693$). So, the hypothesis 3 was rejected. Overall, in baby bottled food, participants' WTP was substantially lower than the product price established in the market ($M_{\text{babybottledfood}} = 2.60 \text{ €}$): only 37% of the participants are willing to pay more than 2.60 € for this product and 63% are willing to pay 2.60 € or less.



The recommendation intent shows the overall idea that consumers will be willing to share the product result. We found that in firms' scenario there are more people willing to recommend the product (81% of respondents answered "likely" or "very likely"), followed by mothers' scenario.

Baby bottles – high complexity product

Contrasting with different levels of complexity, we show them a baby bottles idea. The quality perception (*H2*) was significant distinctive among scenarios ($p < 0.05$, see table 6). As so, the quality was higher attributed to co-creation with university labs, followed by firm’s professionals ($M_{unilabs}=4.00$; $M_{firma}=3.96$; $p=0.056$). With these results, we found that co-created products have more quality than firm’s professional products, which prove that Hypothesis 2 is not true.

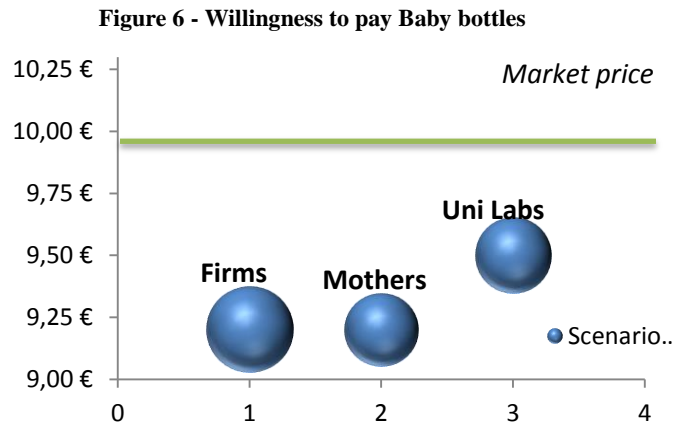
Then, regarding aesthetic and functionality dimension we found different results. Firstly, in aesthetic dimension, participants did not perceive significant differences among firms and co-creation process ($p > 0.05$). So, the hypothesis 4 is rejected in this high complexity product case. As an indication, in firm professional’s scenario the perception of aesthetic were substantially higher comparing with co-creation ($M_{firms}=4.20$; $M_{mothers}=3.5$; $M_{unilabs}=3.89$; $p=0.23$). For the aesthetic case, co-creation with mothers or university labs fields the same to perceive higher levels of aesthetic awareness.

In functionality dimension, participants recognized significant differences among scenarios ($p < 0.05$). Firm’s professional scenario had the highest level of product functionality, but university labs did not present so distant values regarding consumer’s perceptions. More, the lowest functionality perceived were in mother’s scenario ($M_{firms}=4.36$; $M_{unilabs}=4.22$, $p=0.05$). By this, we came up with the statement that hypothesis 4 was not proved. Firms high complex products were more perceived in this dimension.

Table 6 - Summary of key findings Baby bottles (High complexity products / technical)

Study Variables	Firm’s Professionals (N=26)	Mothers (N=19)	University Labs (N=20)	ANOVA
Quality*	3.96	3.37	4.00	F=3.027;p=.056
Aesthetics	4.20	3.50	3.89	F=4.025; p=0.23
Functionality	4.36	3.54	4.22	F=5.697; p=0.05
WTP* (10.30€)	9.20	9.17	9.53	F=0.123; p=.885
Recommendation				
Intent*	2.96	2.53	2.85	F=1.948 ; p=.151

For **baby bottles**, the market product price established is 10.30€, we found that generally participants predominantly were willing to pay less than 10.30€ (68% of them), 26% mentioned being willing to pay more and only 6% will pay the same amount.



The willingness to pay dimension was not significantly perceived in different scenarios ($p>0.05$). So, we rejected hypothesis 3 because they were not valid in this context. Note that, overall participants were willing to pay less than the average price 10.30€. And, university labs' presented a higher willingness to pay around 9.5€. However, to build further conclusions we should make a deeper analysis in this topic. Regarding intentions, integrated in hypothesis 3 as well, we saw that there is no significant difference to this high complex product like baby bottles ($p>0.05$). So, we rejected the hypothesis that shows that co-creation has higher recommendation intent than firm's professionals. We cannot conclude it with this analysis developed. As indication, in firm professional's scenario participants were higher willingness to share (81% of respondents answered "likely" or "very likely").

Lastly, regarding product adequacy to the market problems with current products, findings revealed that the product improvement on well-being and performance (functionality) is mostly considered in firm's professionals developed idea. More, among scenarios this fact is higher perceived in baby bottles ($p<0.05$), not having relevant differences in baby bottled food. To address the problems with taste/ flavor in food and with design in bottles, participants thought positively higher about the firm's scenario. Although, between categories, we saw that university

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labs were less able to make a better taste and mothers to design a better bottle, which makes sense with what we expected. Please, see table 7 for more details.

Table 7 - Product adequacy

		Firm's	Mothers	University Labs	F	p
Baby bottled food	"With its baby bottled food, this company focuses on functionality (the main focus is on improving well-being and performance)"	3.85	3.68	3.95	0.398	0.674
	"With its baby bottled food, this company focuses on taste (the main focus is on better flavor and more taste)"	3.77	3.58	2.90	4.296	0.018
Baby bottles	"With baby bottles, this company focuses on functionality (the main focus is on improving well-being and performance)"	4.38	3.58	3.70	5.549	0.006
	"With baby bottles, this company focuses on the requisite measurements on the sides to make sure the right amount is always there (the main focus is on better design)"	4.12	3.53	3.75	2.522	0.089

Accordingly with the product adequacy, we found that only for the (1) new baby bottled food focused on functionality - "With its baby bottled food, this company focuses on functionality (the main focus is on improving well-being and performance)", there was no significant difference between scenarios ($p > 0.05$). So, participants did not perceive the functionality aspect distinction between co-creation and firm's professionals. However, respondents were able to perceive relevant differences among scenarios for each single item related with functionality (only in baby bottles) and aesthetic (both products). In baby bottled food and baby bottles, we found the same result: firm has the higher aesthetic aspect perception, both followed by mothers ((1) $M_{\text{firms_babybottledfood}} = 3.77$; $M_{\text{mothers_babybottledfood}} = 3.58$; $p = 0.018$; (2) $M_{\text{firms_babybottles}} = 4.12$; $M_{\text{mothers_babybottles}} = 3.53$; $p = 0.089$). Finally, in baby bottles, firms and university labs were higher perceived as focused on functionality (i.e. improving performance) ($M_{\text{firms}} = 5.38$; $M_{\text{unilabs}} = 3.70$; $p = 0.006$).

Conclusion

Summary

This study provides concrete insight about the perceptions of firms' innovation against co-creation, in the baby product market. In this specific market, companies have been building strong relationships with external sources to develop novel ideas and provide useful insight and feedback. As so, our main goal with this study was to understand the user's perceptions of products designed through co-creation against firm's professionals, and to investigate whether perceptions change across the level of product complexity. To address low complexity products (easy to replicate in a home basis) we studied baby bottled food, and to address high complexity products we tested baby bottles. Moreover, we also focused our study in understanding which type of knowledge characterized each scenario, making them different or similar to each other.

Previous worked on this main topic, testing co-creation to design new products among different categories. This paradigm was already studied/ tested in different product lines and applied in the market: clothes, sports equipment's, food (i.e. cereals). However, there is a robust consumer's *skepticism* that makes it complicated to enhance the value of this innovative emerging model: firms are perceived as more able users have lower abilities and skills than professionals even regarding to easier design tasks (Schreier, Fuchs and Dahl, 2012). Therefore, an alternative view stated that consumers are assuming a dual importance in idea's development to future commercialized products: they identify needs because they can easily experiment new problems with current products, and they could also assume a strong position in providing solution based information (Poetz and Schreier, 2012). With that, we reinforced our interest in including baby product users (mothers) in our sample to obtain reliable perceptions to the industry considered.

Linked to this, we realized with this study that the effectiveness of co-creation model was not generally perceived as a superior innovation mode, although, benefits have already been established (Schreier, Fuchs and Dahl, 2012). General perceptions are that the differences are not perceived and firm professionals have the higher evaluations in main dimensions of the products.

Contribution and Implications

Our contribution to this *emerging literature* was mainly based in two specific insights: first, understand whether designing through firm professionals against co-creation (“mothers” and “university lab”) enhances product perceptions in two categories of baby market. Second, clarify which type of knowledge is used by different designers.

Through the findings we were able to show that people create different product assessments when ideas were generated by firm’s professionals and co-creation: they did not perceive additional value to the products designed by co-creation (mothers) against firms. Although the level of innovation, in the process used to develop new products, was valued in co-creation (mothers).

Regarding “baby bottled food”, participants did not perceive differences among co-creation and professionals, so we are not able to compare results through scenarios. Overall indicating, firm’s professional led to higher favorable product evaluations, mainly in idea quality, aesthetics and functionality and somewhat higher in recommendation intent. More, participants did not show as much willingness to pay the fair value of the product (market price). The main conclusion regarding the low complex product, such as baby bottled food, is that the design mode used in developing new product ideas does not influence the perception of quality, aesthetic, functionality, willingness to pay and recommendation intent product dimensions.

For “baby bottles”, we saw that was only perceived the relevance in functionality dimension. Firm professionals have been well perceived in the outcome developed, evaluating positively higher the functionality of the product. Furthermore, mothers led us to lower product evaluations and University Labs had shown a greater impact on functionality, being close to firm’s level. In this product, with high technical complexity, mothers did not transmit enough confidence to participants, they predominantly considered favorable when firms and university lab designed the products. This conclusion translates the idea that traditional design mode shows stronger skills to influence functionality dimension which prove that our fourth hypothesis is false.

Even more, despite of the co-creation process having been perceived as more innovative concerning to the design mode, - evidence shows that in baby market co-creation (mothers, university labs) enhances perceptions of firm innovativeness - the ideas themselves were not

barely perceived as better than in firms. So, people tend to be more skeptical in evaluating product ideas than models.

Regarding each design mode studied, the first conclusion taken is related with the type of knowledge possessed by who is involved in the designing process: technical, market and experience. Here we found that our 5th hypothesis was shared by the sample. Firm professionals and mothers are completely different in terms of their proper knowledge: professionals were perceived as having stronger technical knowledge and mothers stronger experience knowledge. Although, participants considered that both have common market knowledge. The co-creation with university labs were kindly similar to firms professionals scenario regarding the technical knowledge. This distinction led people to perceive and evaluate differently product dimensions besides each process.

In terms of co-creation, we concluded that people do not have a clear idea about the meaning and practical appliance. They broadly assume that firms were not innovating alone at all, which means that firms already count with customer (mothers) contribution. As so, for them this process is not isolated and that it is why they did not perceive the co-creation concept easily. Thus, we assume that co-creation might complement the work of firm professionals in the ideation stage throughout a combination of different types of knowledge. This aspect is not commonly intuitive and assumed among the classic literature reviewed.

Limitations

Our study has some important limitations that can provide new opportunities for future research. First, the sample of the study may not be representative of the overall baby products' consumers who have strong behaviors and experience in this market to evaluate with reliability. Adding to this, most of the answers given by participants were from people that do not have any attachment with this type of products, so instead of focusing their own product evaluations on the product itself they were influenced by the pictures presented, attributing lower values based on the poor quality perceived. Also, despite of having obtained 92 answers we run our analysis with only 65 (after manipulation check) which is very close to the minimum acceptable limit. Moreover, new product development scenarios were randomly selected in the questionnaires without any ratio defined between firm's professionals and co-creation. In the end, we got more

answers in the co-creations sub-scenarios than in the firm's professionals which make it more difficult to cross results and compare participants' opinions. Here, we also could not perceive a comparison between participants' opinions regarding different design models: one questionnaire only tested one type of idea development.

Future Research

This study will require further investigation that contributes for the innovation theory among the baby industry. From a practical perspective, it could be constructive to test physically these two products, making a focus group where participants could test real product samples and evaluating them more truthfully. Practically, the relevance of this thematic is assuming a considerable importance in many leading companies that have already started to experiment co-creation or even crowdsourcing initiatives in new product development process to increase consumer sales and avoid potential drawbacks. So, the second issue, testing well known branded products (i.e. concrete baby products commercialized in the market by a well-known company) could provide useful insights and confirm whether co-creation is perceived as favorable or not. With that, the conclusions would be more concrete and according to the current problems and market needs in this industry. *Finally*, to address this difference among product categories, we suggest further tests *analyzing* the perceptions differences among baby bottled food and baby bottles.

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Appendixes

Traditional vs. New paradigm of innovation

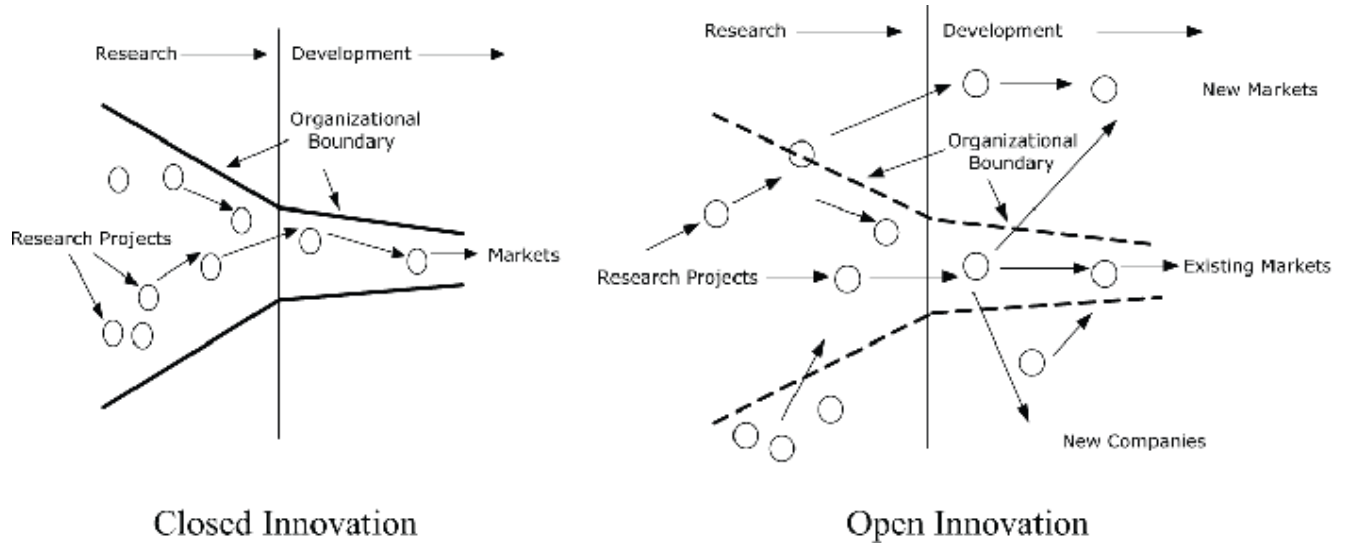


Figure 7 - Innovation Process

Source: (2003d; 2006; Chesbrough, Vanhaverbeke & West, 2006)

Baby Market Distribution



Figure 8 - Baby Market Categories

Pilot Study

1.

Please look at the following 4 products (2 different categories). According to your idea, how would you rate the following attribute to innovate?²

<i>1-Not at all</i>	2-	3-	4-	5-	6-	7- A lot
---------------------	----	----	----	----	----	----------

1.1. FOOD CATEGORY: Baby milk vs Mash food

Bottled/powered milk



It is a food designed and marketed for feeding to babies under 12 months of age, usually prepared for bottle-feeding or cup-feeding from powder (mixed with water) or liquid (with or without additional water).

	1	2	3	4	5	6	7
1. Need a higher level of technical knowledge.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Use experience enhances the innovation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Only firms' professionals can create this product.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Users can create this type of products.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Bottled baby food




It is any soft, easily consumed food that is made specifically for babies, between the ages of four to six months and two years. The food comes in multiple varieties and tastes.

	1	2	3	4	5	6	7
1. Need a higher level of technical knowledge.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Use experience enhances the innovation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Only firms' professionals can create this product.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Users can create this type of products.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

² Gurhan-Canli and Batra, 2004 – JMR (May)- Vol.41, 197-205

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Baby pacifiers



Pacifier or dummy. It is a rubber, plastic, or silicone nipple given to an infant or other young child to suck upon.

1.2. PRODUCT CATEGORY: Baby bottles vs Pacifiers

	1	2	3	4	5	6	7
1. Need a higher level of technical knowledge.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Use experience enhances the innovation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Only firms' professionals can create this product.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Users can create this type of products.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Baby bottles



It is a bottle with a teat to drink directly from. Used by babies and young children when a mother does not breastfeed, for example.

	1	2	3	4	5	6	7
1. Need a higher level of technical knowledge.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Use experience enhances the innovation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Only firms' professionals can create this product.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Users can create this type of products.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2.

Please, feel free to make any comment about the products presented above.

Are you:

Male **Female** **Age** _____

Student **Professional** **Other, please specify** **Thank you!**

Survey

This survey is part of a Master Thesis developed at Católica Lisbon School of Business and Economics. The estimated completion time is of approximately 8/12 minutes.

Please note that the information you provide us with is completely anonymous, and will exclusively be used for this Project.

Thank you for your time. We appreciate your cooperation.

>>

This research is for a Company that develops baby products.

For reasons of confidentiality the company is not identified. The company will be called Firm A.

Firm A is developing new ideas for its products. The following questions ask you your views on the products developed so far.

>>

Innovate through the design process
How people perceive co-creation in baby market

How familiar are you with baby products?

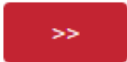
Far too Little Too Little About Right Too Much Far too Much

Regarding your attitude to baby products. Please read the following statements and indicate to what extent do you agree or disagree with them.

	Strongly Disagree	Neither disagree or agree	Strongly Agree
My general interest in baby products is high	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have never bought a baby product	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have bought different products from this category	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The existing products have an acceptable standard of quality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The existing products are well made	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Below is how Firm A came up with new product ideas.

Please, read carefully the text below. Then, we will ask you a few questions.



Scenario 1 – Firm’s Professionals

Firm A, specialist in baby products, is creating a new product to be launched soon. The new product was developed by the firm's internal team.

Firm professionals' worked in teams to conceive, plan and design potential market products.

Professionals' have a high level of technical knowledge (skills and sources) as well as a good understanding of babies and mums' needs (market).

At this stage, professionals have come up with their ideas and Firm A needs to select the best idea to be produced and launched in the market.

Scenario 2 – Mothers

Firm A, specialist in baby products, is planning to create a new product to be launched soon. The new product was developed by the firm's internal team and a group of mothers.

Mothers and firm professionals' worked in teams to conceive, plan and design potential market products.

Mothers' have a high level of experimental knowledge (user experience) as well as a good understanding of babies and mums' needs (market).

At this stage, mothers and professionals have come up with their ideas and Firm A needs to select the best idea to be produced and launched in the market.

Scenario 3 – University Lab

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How people perceive co-creation in baby market

Firm A, specialist in baby products, is planning to create a new product to be launched soon. The new product was developed by the firm's internal team and the University Lab.

University Lab technicians and firm professionals' worked in teams to conceive, plan and design potential market products.

University Lab technicians' have a high level of technical knowledge (skills and sources) as well as a good understanding of babies and mums' products (experimental).

At this stage, University Lab technicians and professionals have come up with their ideas and Firm A needs to select the best idea to be produced and launched in the market.

Scenario 4 – Ordinary Users

Firm A, specialist in baby products, is planning to create a new product to be launched soon. The new product was developed by the firm's internal team and a group of ordinary users.

Ordinary users and firm professionals' worked in teams to conceive, plan and design potential market products.

Ordinary users' have good understandings of babies and mums' products (market).

At this stage, ordinary users and professionals have come up with their ideas and Firm A needs to select the best idea to be produced and launched in the market.

Innovate through the design process
How people perceive co-creation in baby market

Now, we will show you the new products to be launched by Firm A.

Please take a moment to evaluate the product.

>>

Resulting from the process described earlier Firm A will launch new baby bottled food.

Next we show you the new outcome.

>>

The new baby food product to be launched:

Baby bottled food: Any soft, easily consumable food that is made specifically for babies, between the ages of four to six months, up to two years. This type of food comes in multiple varieties and tastes.



Innovate through the design process
How people perceive co-creation in baby market

What is your overall opinion on this product? (1 = very poor; 5 = very good)

1	2	3	4	5
---	---	---	---	---

Overall, what is your attitude toward the design and functionality of this new product?

Bad	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Good
Dislike very much	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Like very much
Boring	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Fun
Not appealing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Appealing
Unpleasant	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Pleasant
Inferior	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Superior

Overall, I think the new product is...

Not at all useful	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	Very useful
Not at all effective	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	Very effective
Not at all functional	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	Very functional

Innovate through the design process
How people perceive co-creation in baby market

To what extent do you agree with the following items/statements: (1 = "strongly disagree," and 5 = "strongly agree")

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
"With its baby bottled food, this company focuses on functionality (the main focus is on improving well-being and performance)"	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
"With its baby bottled food, this company focuses on taste (the main focus is on better flavor and more taste)"	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

How do you think this product satisfies market needs?

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
The additional feeding of babies with mashed and solid food will be more convenient for both parents and babies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Enhances customer benefit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Baby feeding needs can be satisfied by this product	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

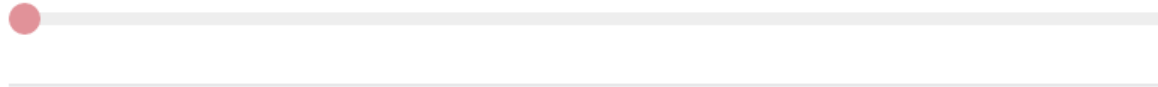
Innovate through the design process
How people perceive co-creation in baby market

In the market the product price is 2,60€ per bottle.

What is the maximum amount of money you are willing to pay for baby bottled food produced by Firm A?

1 1.4 1.8 2.2 2.6 3 3.4 3.8 4.2 4.6 5

WTP

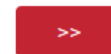


How likely is it that you recommend this product?

Very Unlikely Unlikely Likely Very Likely

Resulting from the process described earlier Firm A will also launch new baby bottles.

Next we show you the new outcome.



The new baby bottles to be launched:

Baby bottles: It is a bottle from which you directly drink from the teat. It is used by babies and young children when their mother does not breastfeed, for example.



What is your overall opinion on this product? (1 = very poor; 5 = very good)

1 2 3 4 5

Innovate through the design process
How people perceive co-creation in baby market

Overall, what is your attitude toward the design and functionality of this new product?

Bad	○ ○ ○ ○ ○	Good
Dislike very much	○ ○ ○ ○ ○	Like very much
Boring	○ ○ ○ ○ ○	Fun
Not appealing	○ ○ ○ ○ ○	Appealing
Unpleasant	○ ○ ○ ○ ○	Pleasant
Inferior	○ ○ ○ ○ ○	Superior

Overall, I think the new product is...

Not at all useful	○ ○ ○ ○ ○	Very useful
Not at all effective	○ ○ ○ ○ ○	Very effective
Not at all functional	○ ○ ○ ○ ○	Very functional

To what extent do you agree with the following items/statements: (1 = "strongly disagree," and 5 = "strongly agree")

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
"With baby bottles, this company focuses on functionality (the main focus is on improving well-being and performance)"	○	○	○	○	○
"With baby bottles, this company focuses on the requisite measurements on the sides to make sure the right amount is always there (the main focus is on better design)"	○	○	○	○	○

Innovate through the design process
How people perceive co-creation in baby market

How do you think this product satisfies market needs?

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Using baby bottles to feed milk to babies will be more convenient for both parents and babies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Enhances customer benefit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Baby feeding needs can be satisfied by this product	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

In the market the product price is 10,30€ per bottle.

What is the maximum amount of money you are willing to pay for a baby bottle produced by Firm A?

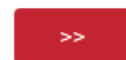
5.5 6.5 7.4 8.3 9.3 10.2 11.2 12.1 13.1 14 15

WTP



How likely is it that you recommend this product?

Very Unlikely Unlikely Likely Very Likely



Innovate through the design process
How people perceive co-creation in baby market

Sex:

Male

Female

Age:

< 25

25-30

30-45

> 45

Nationality

What is your current professional situation:

Student

Student with part-time job

Unemployed

Professional

Innovate through the design process
How people perceive co-creation in baby market

Which relationship do you have with kids:

Family

Babysitter

Not at all

If you have selected family above, please specify which kind of family relationship do you have:

(e.g. mother, father, grandfather, grandmother, sister/brother/cousin.)

>>

We thank you for your time spent taking this survey.
Your response has been recorded.

SPSS Outputs

Attitude toward baby market products

Descritivos

		N	Média	Desvio Padrão	Erro Padrão	Intervalo de confiança de 95% para média		Mínimo	Máximo
						Limite inferior	Limite superior		
How familiar are you with baby products?	Firm Professionals	26	3,04	1,148	,225	2,57	3,50	1	4
	Mothers	19	2,89	,994	,228	2,42	3,37	1	4
	University lab	20	3,10	1,165	,261	2,55	3,65	1	5
	Total	65	3,02	1,097	,136	2,74	3,29	1	5
My general interest in baby products is high	Firm Professionals	26	3,77	1,608	,315	3,12	4,42	1	5
	Mothers	19	3,21	1,475	,338	2,50	3,92	1	5
	University lab	20	3,20	1,436	,321	2,53	3,87	1	5
	Total	65	3,43	1,520	,189	3,05	3,81	1	5
I have bought different products from this category	Firm Professionals	26	4,00	1,625	,319	3,34	4,66	1	5
	Mothers	19	4,26	1,368	,314	3,60	4,92	1	5
	University lab	20	3,40	1,667	,373	2,62	4,18	1	5
	Total	65	3,89	1,582	,196	3,50	4,28	1	5
The existing products have an acceptable standard of quality	Firm Professionals	26	4,15	1,405	,276	3,59	4,72	1	5
	Mothers	19	4,05	1,224	,281	3,46	4,64	1	5
	University lab	20	3,90	1,021	,228	3,42	4,38	3	5
	Total	65	4,05	1,230	,153	3,74	4,35	1	5
The existing products are well made	Firm Professionals	26	3,69	1,379	,270	3,14	4,25	1	5
	Mothers	19	4,05	1,224	,281	3,46	4,64	1	5
	University lab	20	4,00	1,026	,229	3,52	4,48	3	5
	Total	65	3,89	1,226	,152	3,59	4,20	1	5

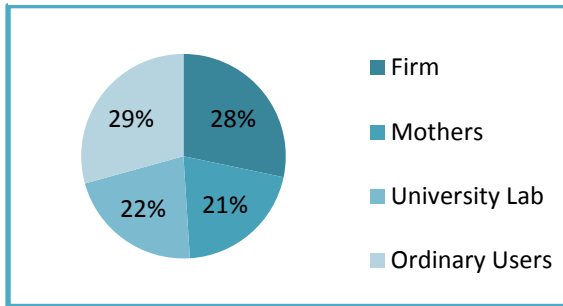
ANOVA

		Soma dos Quadrados	df	Quadrado Médio	Z	Sig.
How familiar are you with baby products?	Entre Grupos	,434	2	,217	,176	,839
	Nos grupos	76,551	62	1,235		
	Total	76,985	64			
My general interest in baby products is high	Entre Grupos	4,965	2	2,483	1,077	,347
	Nos grupos	142,973	62	2,306		
	Total	147,938	64			
I have bought different products from this category	Entre Grupos	7,762	2	3,881	1,578	,215
	Nos grupos	152,484	62	2,459		
	Total	160,246	64			
The existing products have an acceptable standard of quality	Entre Grupos	,730	2	,365	,235	,791
	Nos grupos	96,132	62	1,551		
	Total	96,862	64			
The existing products are well made	Entre Grupos	1,760	2	,880	,578	,564
	Nos grupos	94,486	62	1,524		
	Total	96,246	64			

Design Scenario - Manipulation Check

1. Percentage of scenarios assessed

Figure 9 - Percentage of scenarios answered



2. Design Scenarios - Manipulation Check

Descritivos

Who do you think was responsible for creating this new product idea?

	N	Média	Desvio Padrão	Erro Padrão	Intervalo de confiança de 95% para média		Mínimo	Máximo
					Limite inferior	Limite superior		
Firm Professionals	26	3,54	1,029	,202	3,12	3,95	1	5
Mothers	19	2,58	1,121	,257	2,04	3,12	1	5
University lab	20	2,60	,754	,169	2,25	2,95	1	3
Total	65	2,97	1,075	,133	2,70	3,24	1	5

2.1. Analyzing whether participants understood each scenario: Test Post HOC

Comparações múltiplas

Variável dependente: Who do you think was responsible for creating this new product idea?

Tukey HSD

(I) How firm A came up with new product ideas	(J) How firm A came up with new product ideas	Diferença média (I-J)	Erro Padrão	Sig.	Intervalo de Confiança 95%	
					Limite inferior	Limite superior
Firm Professionals	Mothers	,960*	,297	,005	,25	1,67
	University lab	,938*	,292	,006	,24	1,64
Mothers	Firm Professionals	-,960*	,297	,005	-1,67	-,25
	University lab	-,021	,315	,998	-,78	,74
University lab	Firm Professionals	-,938*	,292	,006	-1,64	-,24
	Mothers	,021	,315	,998	-,74	,78

*. A diferença média é significativa no nível 0.05.

2.2.. ANOVA TEST : FIRM'S PROFESSIONALS VS. CO-CREATION

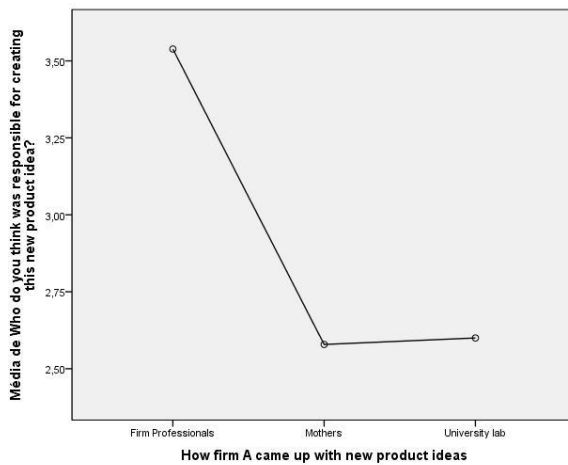
Innovate through the design process
How people perceive co-creation in baby market

ANOVA

Who do you think was responsible for creating this new product idea?

	Soma dos Quadrados	df	Quadrado Médio	Z	Sig.
Entre Grupos	14,045	2	7,023	7,270	,001
Nos grupos	59,893	62	,966		
Total	73,938	64			

2.3.Means Graph - Manipulation Check



Cross Tables

Who do you think was responsible for creating this new product idea? ^ How firm A came up with new product ideas
Tabulação cruzada

Contagem

		How firm A came up with new product ideas			Total
		Firm Professionals	Mothers	University lab	
Who do you think was responsible for creating this new product idea?	Mothers, ULab, Ordinary user	1	5	3	9
	Between both and Mothers, ULab, Ordinary user	0	1	2	3
	Both	16	11	15	42
	Between both and Firm Professionals	2	1	0	3
	Firm Professionals	7	1	0	8
Total		26	19	20	65

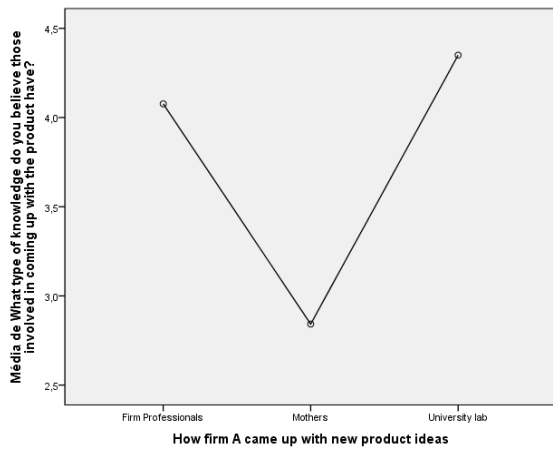
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Design Scenario – Type of Knowledge

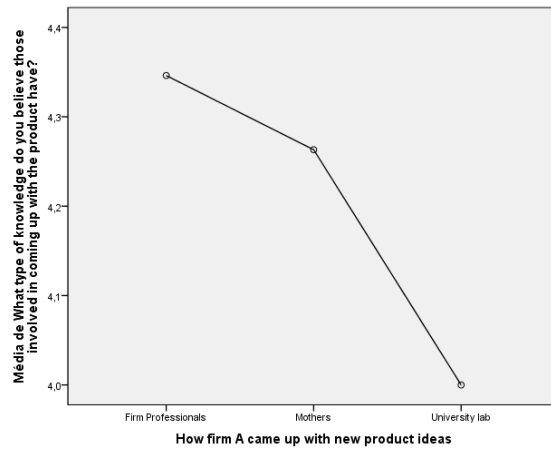
Descritivos

		N	Média	Desvio Padrão	Erro Padrão	Intervalo de confiança de 95% para média		Mínimo	Máximo
						Limite inferior	Limite superior		
What type of knowledge do you believe those involved in coming up with the product have?	Firm Professionals	26	4,08	1,129	,221	3,62	4,53	2	5
	Mothers	19	2,84	1,068	,245	2,33	3,36	1	4
	University lab	20	4,35	,745	,167	4,00	4,70	3	5
	Total	65	3,80	1,175	,146	3,51	4,09	1	5
What type of knowledge do you believe those involved in coming up with the product have?	Firm Professionals	26	4,35	,745	,146	4,05	4,65	3	5
	Mothers	19	4,26	,991	,227	3,79	4,74	2	5
	University lab	20	4,00	1,026	,229	3,52	4,48	1	5
	Total	65	4,22	,910	,113	3,99	4,44	1	5
What type of knowledge do you believe those involved in coming up with the product have?	Firm Professionals	26	3,31	1,692	,332	2,62	3,99	1	5
	Mothers	19	4,32	,749	,172	3,95	4,68	3	5
	University lab	20	3,95	1,234	,276	3,37	4,53	1	5
	Total	65	3,80	1,383	,172	3,46	4,14	1	5

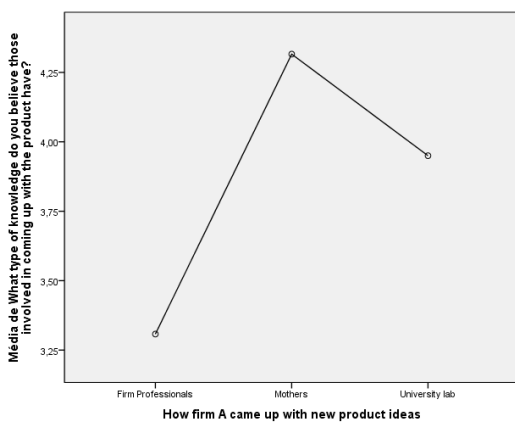
Technical Knowledge – Averages



Market Knowledge - Averages



Experience Knowledge



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How people perceive co-creation in baby market

ANOVA

		Soma dos Quadrados	df	Quadrado Médio	Z	Sig.
What type of knowledge do you believe those involved in coming up with the product have?	Entre Grupos	25,478	2	12,739	12,552	,000
	Nos grupos	62,922	62	1,015		
	Total	88,400	64			
What type of knowledge do you believe those involved in coming up with the product have?	Entre Grupos	1,416	2	,708	,851	,432
	Nos grupos	51,569	62	,832		
	Total	52,985	64			
What type of knowledge do you believe those involved in coming up with the product have?	Entre Grupos	11,806	2	5,903	3,309	,043
	Nos grupos	110,594	62	1,784		
	Total	122,400	64			

Main Analysis – Evaluating product idea result

1. Innovation – How innovative is firm A?

Descritivos

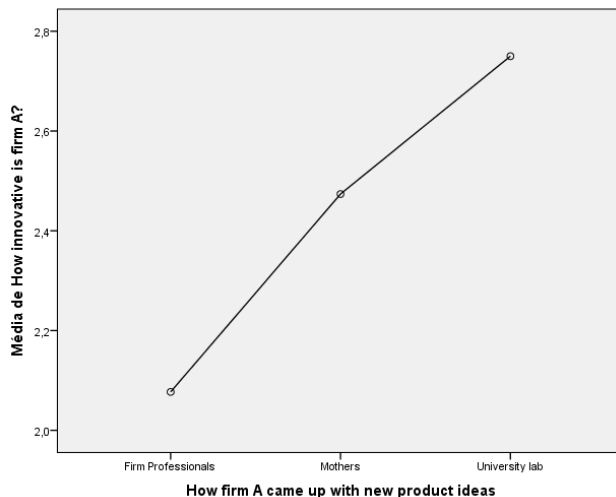
How innovative is firm A?

	N	Média	Desvio Padrão	Erro Padrão	Intervalo de confiança de 95% para média		Mínimo	Máximo	Variância entre componentes
					Limite inferior	Limite superior			
Firm Professionals	26	2,08	,628	,123	1,82	2,33	1	3	
Mothers	19	2,47	,697	,160	2,14	2,81	1	3	
University lab	20	2,75	1,020	,228	2,27	3,23	1	4	
Total	65	2,40	,825	,102	2,20	2,60	1	4	
Modelo									
Efeitos fixos			,786	,098	2,21	2,59			
Efeitos aleatórios				,204	1,52	3,28			,094

ANOVA

How innovative is firm A?

	Soma dos Quadrados	df	Quadrado Médio	Z	Sig.
Entre Grupos	5,267	2	2,634	4,259	,018
Nos grupos	38,333	62	,618		
Total	43,600	64			



3. Baby bottled food & Baby Bottles

Innovate through the design process
How people perceive co-creation in baby market

Dimension: Quality

Descritivos

		N	Média	Desvio Padrão	Erro Padrão	Intervalo de confiança de 95% para média		Mínimo	Máximo	Variância entre componentes
						Limite inferior	Limite superior			
What is your overall opinion on this product? (baby bottled food)	Firm Professionals	26	3,31	,928	,182	2,93	3,68	2	5	
	Mothers	19	3,26	,653	,150	2,95	3,58	2	4	
	University lab	20	3,55	,826	,185	3,16	3,94	2	5	
	Total	65	3,37	,821	,102	3,17	3,57	2	5	
	Modelo	Efeitos fixos			,825	,102	3,16	3,57		
	Efeitos aleatórios				,102 ^a	2,93 ^a	3,81 ^a			-,009
What is your overall opinion on this product? (baby bottles)	Firm Professionals	26	3,96	,871	,171	3,61	4,31	2	5	
	Mothers	19	3,37	,955	,219	2,91	3,83	1	5	
	University lab	20	4,00	,918	,205	3,57	4,43	2	5	
	Total	65	3,80	,939	,116	3,57	4,03	1	5	
	Modelo	Efeitos fixos			,910	,113	3,57	4,03		
	Efeitos aleatórios				,198	2,95	4,65			,078

a. Aviso: A variância entre componentes é negativa. Ela foi substituída por 0,0 no cálculo dessa medida de efeitos aleatória.

ANOVA

		Soma dos Quadrados	df	Quadrado Médio	Z	Sig.
What is your overall opinion on this product? (baby bottled food)	Entre Grupos	,966	2	,483	,710	,496
	Nos grupos	42,173	62	,680		
	Total	43,138	64			
What is your overall opinion on this product? (baby bottles)	Entre Grupos	5,017	2	2,509	3,027	,056
	Nos grupos	51,383	62	,829		
	Total	56,400	64			

Innovate through the design process
How people perceive co-creation in baby market

Dimension: Aeshthetics and Design

Descritivos

		N	Média	Desvio Padrão	Erro Padrão	Intervalo de confiança de 95% para média		Mínimo	Máximo	Variância entre componentes
						Limite inferior	Limite superior			
Overall, what is your attitude toward the design and functionality of this new product?	Firm Professionals	26	3,81	1,059	,208	3,38	4,24	2	5	
	Mothers	19	3,37	,955	,219	2,91	3,83	2	5	
	University lab	20	3,90	1,021	,228	3,42	4,38	1	5	
	Total	65	3,71	1,027	,127	3,45	3,96	1	5	
	Modelo Efeitos fixos Efeitos aleatórios				1,018	,126 ,157	3,46 3,03	3,96 4,38		
Overall, what is your attitude toward the design and functionality of this new product?	Firm Professionals	26	3,54	,905	,177	3,17	3,90	2	5	
	Mothers	19	3,63	,761	,175	3,26	4,00	2	5	
	University lab	20	3,85	,933	,209	3,41	4,29	2	5	
	Total	65	3,66	,871	,108	3,45	3,88	2	5	
	Modelo Efeitos fixos Efeitos aleatórios				,875	,108 ,108 ^a	3,44 3,19 ^a	3,88 4,13 ^a		
Overall, what is your attitude toward the design and functionality of this new product?	Firm Professionals	26	3,38	1,023	,201	2,97	3,80	2	5	
	Mothers	19	3,26	,872	,200	2,84	3,68	2	5	
	University lab	20	3,35	1,137	,254	2,82	3,88	1	5	
	Total	65	3,34	1,004	,125	3,09	3,59	1	5	
	Modelo Efeitos fixos Efeitos aleatórios				1,019	,126 ,126 ^a	3,09 2,79 ^a	3,59 3,88 ^a		
Overall, what is your attitude toward the design and functionality of this new product?	Firm Professionals	26	3,96	1,038	,204	3,54	4,38	2	5	
	Mothers	19	3,42	,961	,221	2,96	3,88	2	5	
	University lab	20	3,45	1,317	,294	2,83	4,07	1	5	
	Total	65	3,65	1,124	,139	3,37	3,92	1	5	
	Modelo Efeitos fixos Efeitos aleatórios				1,111	,138 ,183	3,37 2,86	3,92 4,44		
Overall, what is your attitude toward the design and functionality of this new product?	Firm Professionals	26	3,73	,778	,152	3,42	4,04	3	5	
	Mothers	19	3,68	,820	,188	3,29	4,08	2	5	
	University lab	20	3,80	1,056	,236	3,31	4,29	1	5	
	Total	65	3,74	,871	,108	3,52	3,95	1	5	
	Modelo Efeitos fixos Efeitos aleatórios				,884	,110 ,110 ^a	3,52 3,27 ^a	3,96 4,21 ^a		
Overall, what is your attitude toward the design and functionality of this new product?	Firm Professionals	26	3,54	,706	,138	3,25	3,82	3	5	
	Mothers	19	3,26	,806	,185	2,87	3,65	2	5	
	University lab	20	3,40	,883	,197	2,99	3,81	1	5	
	Total	65	3,42	,788	,098	3,22	3,61	1	5	
	Modelo Efeitos fixos Efeitos aleatórios				,793	,098 ,098 ^a	3,22 2,99 ^a	3,61 3,84 ^a		
"With its baby bottled food, this company focuses on taste (the main focus is on better flavor and more taste)"	Firm Professionals	26	3,77	,908	,178	3,40	4,14	2	5	
	Mothers	19	3,58	1,071	,246	3,06	4,09	1	5	
	University lab	20	2,90	1,119	,250	2,38	3,42	1	5	
	Total	65	3,45	1,076	,133	3,18	3,71	1	5	
	Modelo Efeitos fixos Efeitos aleatórios				1,024	,127 ,266	3,19 2,30	3,70 4,59		

a. Aviso: A variância entre componentes é negativa. Ela foi substituída por 0,0 no cálculo dessa medida de efeitos aleatórios.

Innovate through the design process
How people perceive co-creation in baby market

ANOVA

		Soma dos Quadrados	df	Quadrado Médio	Z	Sig.
Overall, what is your attitude toward the design and functionality of this new product?	Entre Grupos	3,187	2	1,593	1,537	,223
	Nos grupos	64,260	62	1,036		
	Total	67,446	64			
Overall, what is your attitude toward the design and functionality of this new product?	Entre Grupos	1,121	2	,561	,733	,485
	Nos grupos	47,433	62	,765		
	Total	48,554	64			
Overall, what is your attitude toward the design and functionality of this new product?	Entre Grupos	,166	2	,083	,080	,923
	Nos grupos	64,388	62	1,039		
	Total	64,554	64			
Overall, what is your attitude toward the design and functionality of this new product?	Entre Grupos	4,318	2	2,159	1,749	,182
	Nos grupos	76,543	62	1,235		
	Total	80,862	64			
Overall, what is your attitude toward the design and functionality of this new product?	Entre Grupos	,133	2	,067	,085	,918
	Nos grupos	48,421	62	,781		
	Total	48,554	64			
Overall, what is your attitude toward the design and functionality of this new product?	Entre Grupos	,839	2	,419	,668	,517
	Nos grupos	38,946	62	,628		
	Total	39,785	64			
"With its baby bottled food, this company focuses on taste (the main focus is on better flavor and more taste)"	Entre Grupos	9,015	2	4,507	4,296	,018
	Nos grupos	65,047	62	1,049		
	Total	74,062	64			

Descritivos

		N	Média	Desvio Padrão	Erro Padrão	Intervalo de confiança de 95% para média		Mínimo	Máximo	Variância entre componentes	
						Limite inferior	Limite superior				
Overall, what is your attitude toward the design and functionality of this new product?	Firm Professionals	26	4,35	,629	,123	4,09	4,60	3	5		
	Mothers	19	3,58	,838	,192	3,18	3,98	1	5		
	University lab	20	4,15	1,040	,233	3,66	4,64	2	5		
	Total	65	4,06	,882	,109	3,84	4,28	1	5		
	Modelo	Efeitos fixos			,833	,103	3,85	4,27			
		Efeitos aleatórios				,230	3,07	5,05			,124
Overall, what is your attitude toward the design and functionality of this new product?	Firm Professionals	26	4,08	,744	,146	3,78	4,38	3	5		
	Mothers	19	3,42	,838	,192	3,02	3,82	1	5		
	University lab	20	3,95	,999	,223	3,48	4,42	2	5		
	Total	65	3,85	,888	,110	3,63	4,07	1	5		
	Modelo	Efeitos fixos			,856	,106	3,63	4,06			
		Efeitos aleatórios				,199	2,99	4,70			,083
Overall, what is your attitude toward the design and functionality of this new product?	Firm Professionals	26	4,35	,846	,166	4,00	4,69	3	5		
	Mothers	19	3,53	1,020	,234	3,03	4,02	1	5		
	University lab	20	3,90	1,071	,240	3,40	4,40	2	5		
	Total	65	3,97	1,015	,126	3,72	4,22	1	5		
	Modelo	Efeitos fixos			,971	,120	3,73	4,21			
		Efeitos aleatórios				,243	2,92	5,02			,131
Overall, what is your attitude toward the design and functionality of this new product?	Firm Professionals	26	4,42	,758	,149	4,12	4,73	3	5		
	Mothers	19	3,63	1,116	,256	3,09	4,17	1	5		
	University lab	20	3,85	1,089	,244	3,34	4,36	2	5		
	Total	65	4,02	1,023	,127	3,76	4,27	1	5		
	Modelo	Efeitos fixos			,978	,121	3,77	4,26			
		Efeitos aleatórios				,246	2,96	5,07			,134
Overall, what is your attitude toward the design and functionality of this new product?	Firm Professionals	26	4,35	,846	,166	4,00	4,69	3	5		
	Mothers	19	3,63	,831	,191	3,23	4,03	1	5		
	University lab	20	3,85	1,089	,244	3,34	4,36	2	5		
	Total	65	3,98	,960	,119	3,75	4,22	1	5		
	Modelo	Efeitos fixos			,923	,115	3,76	4,21			
		Efeitos aleatórios				,220	3,04	4,93			,103
Overall, what is your attitude toward the design and functionality of this new product?	Firm Professionals	26	3,65	,892	,175	3,29	4,01	2	5		
	Mothers	19	3,21	,918	,211	2,77	3,65	1	5		
	University lab	20	3,65	1,137	,254	3,12	4,18	1	5		
	Total	65	3,52	,986	,122	3,28	3,77	1	5		
	Modelo	Efeitos fixos			,980	,122	3,28	3,77			
		Efeitos aleatórios				,143	2,91	4,14			,016
"With baby bottles, this company focuses on the requisite measurements on the sides to make sure the right amount is always there (the main focus is on better design)"	Firm Professionals	26	4,12	,711	,140	3,83	4,40	3	5		
	Mothers	19	3,53	,964	,221	3,06	3,99	1	5		
	University lab	20	3,75	1,020	,228	3,27	4,23	1	5		
	Total	65	3,83	,911	,113	3,60	4,06	1	5		
	Modelo	Efeitos fixos			,890	,110	3,61	4,05			
		Efeitos aleatórios				,177	3,07	4,59			,056

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ANOVA

		Soma dos Quadrados	df	Quadrado Médio	Z	Sig.
Overall, what is your attitude toward the design and functionality of this new product?	Entre Grupos	6,688	2	3,344	4,814	,011
	Nos grupos	43,066	62	,695		
	Total	49,754	64			
Overall, what is your attitude toward the design and functionality of this new product?	Entre Grupos	5,034	2	2,517	3,435	,038
	Nos grupos	45,428	62	,733		
	Total	50,462	64			
Overall, what is your attitude toward the design and functionality of this new product?	Entre Grupos	7,517	2	3,759	3,989	,023
	Nos grupos	58,421	62	,942		
	Total	65,938	64			
Overall, what is your attitude toward the design and functionality of this new product?	Entre Grupos	7,667	2	3,834	4,007	,023
	Nos grupos	59,317	62	,957		
	Total	66,985	64			
Overall, what is your attitude toward the design and functionality of this new product?	Entre Grupos	6,129	2	3,064	3,595	,033
	Nos grupos	52,856	62	,853		
	Total	58,985	64			
Overall, what is your attitude toward the design and functionality of this new product?	Entre Grupos	2,623	2	1,311	1,364	,263
	Nos grupos	59,593	62	,961		
	Total	62,215	64			
"With baby bottles, this company focuses on the requisite measurements on the sides to make sure the right amount is always there (the main focus is on better design)"	Entre Grupos	3,998	2	1,999	2,522	,089
	Nos grupos	49,141	62	,793		
	Total	53,138	64			

Innovate through the design process
How people perceive co-creation in baby market

Dimension: Functionality

		Descritivos									
		N	Média	Desvio Padrão	Erro Padrão	Intervalo de confiança de 95% para média		Mínimo	Máximo	Variância entre componentes	
						Limite inferior	Limite superior				
Overall, I think the new product is...	Firm Professionals	26	4,08	,845	,166	3,74	4,42	3	5		
	Mothers	19	3,53	1,073	,246	3,01	4,04	1	5		
	University lab	20	3,85	1,226	,274	3,28	4,42	1	5		
	Total	65	3,85	1,049	,130	3,59	4,11	1	5		
	Modelo Efeitos fixos				1,041	,129	3,59	4,10			
	Efeitos aleatórios				,161	3,15	4,54			,027	
Overall, I think the new product is...	Firm Professionals	26	3,92	,845	,166	3,58	4,26	3	5		
	Mothers	19	3,47	1,020	,234	2,98	3,97	1	5		
	University lab	20	3,65	1,089	,244	3,14	4,16	2	5		
	Total	65	3,71	,980	,122	3,46	3,95	1	5		
	Modelo Efeitos fixos				,977	,121	3,47	3,95			
	Efeitos aleatórios				,134	3,13	4,28			,009	
Overall, I think the new product is...	Firm Professionals	26	4,19	,801	,157	3,87	4,52	3	5		
	Mothers	19	3,58	1,071	,246	3,06	4,09	1	5		
	University lab	20	3,95	1,050	,235	3,46	4,44	2	5		
	Total	65	3,94	,982	,122	3,70	4,18	1	5		
	Modelo Efeitos fixos				,964	,120	3,70	4,18			
	Efeitos aleatórios				,180	3,16	4,71			,053	
"With its baby bottled food, this company focuses on functionality (the main focus is on improving well-being and performance)"	Firm Professionals	26	3,85	,732	,143	3,55	4,14	3	5		
	Mothers	19	3,68	1,057	,242	3,17	4,19	1	5		
	University lab	20	3,95	1,050	,235	3,46	4,44	1	5		
	Total	65	3,83	,928	,115	3,60	4,06	1	5		
	Modelo Efeitos fixos				,937	,116	3,60	4,06			
	Efeitos aleatórios				,116 ^a	3,33 ^a	4,33 ^a			-,025	

a. Aviso: A variância entre componentes é negativa. Ela foi substituída por 0,0 no cálculo dessa medida de efeitos aleatória.

ANOVA

		Soma dos Quadrados	df	Quadrado Médio	Z	Sig.
Overall, I think the new product is...	Entre Grupos	3,329	2	1,664	1,537	,223
	Nos grupos	67,133	62	1,083		
	Total	70,462	64			
Overall, I think the new product is...	Entre Grupos	2,313	2	1,157	1,213	,304
	Nos grupos	59,133	62	,954		
	Total	61,446	64			
Overall, I think the new product is...	Entre Grupos	4,134	2	2,067	2,224	,117
	Nos grupos	57,620	62	,929		
	Total	61,754	64			
"With its baby bottled food, this company focuses on functionality (the main focus is on improving well-being and performance)"	Entre Grupos	,699	2	,349	,398	,674
	Nos grupos	54,440	62	,878		
	Total	55,138	64			