

# Crowd-Design: mapping companies' crowd-based processes for product development

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## Abstract

From the term crowdsourcing, coined by Howe (2006), 'crowd' prefixes appeared to name the processes that occur through the Internet and with the participation of a crowd of people. Due to the importance of customer collaboration and participation in the product development process (PDP), clarifying which crowd-based processes are directly affecting the practice of Design concerning the PDP, and in which stages they happen, comes to attention. This paper presents a study reviewing the concept and characteristics of the process used for Internet based crowd participation product development, also referred to as Crowd-Design. For that purpose, review of the following subjects in current literature was needed: (i) the definition of crowdsourcing and its main practices, (ii) the definition of Crowd-Design, and (iii) the definition of PDP and its general model. As a complement to the literature review, the analysis of the already existent Crowd-Design processes was carried out through a benchmark analysis of four online platforms from companies such as Lego, Dell, Unilever and Procter & Gamble. As a result, it was possible: (i) to name the crowd-process applied to the Crowd-Design practices and (ii) to verify in which stages of the PDP – based on Rozenfeld *et al.* (2006) – the crowd-based processes have been used.

**Keywords:** Product development, Internet, crowdsourcing.

## *Crowd-Design: mapeamento dos processos 'crowd' utilizados por empresas no desenvolvimento de produtos*

### Resumo

*A partir do termo cunhado por Howe (2006) - crowdsourcing - vários prefixos 'crowd' surgiram para nomear os processos que ocorrem através da Internet e com a participação da multidão. Devido à importância da colaboração e da participação do cliente no processo de desenvolvimento de produtos (PDP), é importante esclarecer quais são os processos baseados na multidão que estão diretamente afetando a prática do Design no que diz respeito ao PDP e em que fases eles acontecem. Desta forma, este artigo apresenta uma investigação sobre o conceito e as características do processo utilizado para desenvolver produtos com a multidão através da Internet, chamado Crowd-Design. Para tanto, foi necessário encontrar na literatura atual: (i) a definição de crowdsourcing e suas principais práticas, (ii) a definição de Crowd-Design, e (iii) a definição de PDP e seu modelo geral. Como complemento a revisão de literatura, foi realizada a análise dos processos de Crowd-Design já existentes, através de uma análise de benchmark de quatro plataformas online de empresas como Lego, Dell, Unilever e Procter & Gamble. Com isso, foi possível (i) nomear os processos aplicados às práticas de Crowd-Design, e (ii) verificar em que fases do PDP dado por Rozenfeld et al. (2006) estes processos estão sendo usados.*

**Palavras-chave:** Desenvolvimento de produtos, Internet, crowdsourcing.

## 1. INTRODUCTION

Collaboration in product development process (PDP) is a known practice since the 1960's (Toker, 2007), and according to González & Toledo (2012) this theme has been studied since the 1980's. Studies addressed a basis and criteria for the customer integration, as well as types and benefits regarding this integration. The three main types of customer integration to the PDP, as quoted by the authors, are: (i) customer as a member of the development team; (ii) on-line customer interaction; and (iii) formal meetings with the customers. In this case, the on-line interaction is based on the use of toolkits available for the customer – however, the authors did not mention the existence of on-line platforms to do so. Thus, despite the customer integration in the PDP not being a recent topic, the possibilities of collaboration that Internet has brought are: a network of connected people, real-time interaction, and many other ways of collaboration to change and create artifacts, including in the PDP stages.

From the term 'crowdsourcing', coined by Howe (2006), a lot of 'crowd' prefixes appeared to nominate outsourcing processes that occur through the Internet and with the crowd participation. Just as it happened to the collaboration topic more than twenty years ago (González & Toledo, 2012), the interest of those crowd-based processes through the Internet is increasing in fields like Management and Marketing (Dickie & Santos, 2014).

Nevertheless, researches on the Internet crowd-based processes in the Design field are still missing. Due to the importance of the integration, collaboration and customer participation in the PDP, it is important to clarify what are the crowd-based processes that are directly affecting the practice of Design concerning the PDP and how they happen. As the term 'crowdsourcing' had been created to designate outsourcing through Internet, this study considers 'crowd-based process' as those that occur through Internet – partially or in its totality.

Almost all the referred studies from the Management and Marketing areas show information about companies that use these types of crowd-based processes to promote Open Innovation (Frey *et al.*, 2011). The main difference, however, is that Open Innovation doesn't necessarily need to be carried out through the Internet interaction. It can happen in 'offline' situations (Stanoevska-Slabeva, 2011, p. 11).

It is also possible to find studies regarding Open Design, but despite the similarities, it is not the same as Crowd-Design. Open Design regards mainly as the production, in other words, the final stage of the product development process (Howard *et al.*, 2012). As a crowd-based process, the Open Design process also happens through the Internet, and platforms with this process offer the possibility to share with the crowd an idea of a product that has already been developed, and the crowd can decide if it wants to modify it. Thus, this kind of process is related to do-it-yourself processes because the idea and the concept of the product have already been developed. Therefore, the product is ready to be produced through a FabLab, which means, by a 3D printer. Examples of Open Design platforms found in other researches are:

Instructables (<http://www.instructables.com/>);  
 Arduino (<https://www.arduino.cc/>);  
 RepRap (<https://reprappro.com/>);  
 Williwog Garage (<http://www.williwoggarage.com/>);  
 and Cunicode (<https://www.cunicode.com/>).

These platforms offer, in a similar way, free instruction or the possibility to download files of products that can be made at home or printed in a 3D printer (Howard *et al.*, 2012; Neves, 2014).

Other terms brought from those researches are related to the 'crowd' prefixes; they indicate specific processes occurring through the Internet with the participation of the crowd. Generally, the 'crowd' prefix is used as indicative of the classification of actions based on the collective construction. Crowd approaches, according to Mendonça (2007, p. 18), are "indispensably allied to a digital infrastructure in interactive social networks without barriers". Examples of terms that are using this prefix: crowdvoting and crowdfunding, whereupon the first refers to the open voting process, and the second to collaborative funding. It is also possible to find many other terms that use the crowd prefix: crowdstorm; crowdlabor; crowdcreativity; crowdlearning; crowd-innovation, among others (Abrahamson, 2013; crowdsourcing.org, 2016). Topic 2.1 of this study brings the definitions of those terms found on literature.

According to von Hippel's (2005 *apud* Frey *et al.*, 2011) and Bogers's *et al.* (2010 *apud* Frey *et al.*, 2011) the process of crowdsourcing for product and service development has proven itself effective to promote both incremental and radical innovations due mainly to the inclusion of users and partners in decision-making. Considering this line of thought, two questions arise for the Design field: which are the crowd-based processes that can be used in a product development process? And in which part of the PDP those crowd-processes are appropriate for use?

In order to clarify these issues this paper addresses the crowd-based processes adopted in the PDP. In order to build a structured knowledge for this field, the theory background presented here includes: (a) the state of the art of crowdsourcing; (b) the definition of Crowd-Design; and (c) a description of the general PDP, based on Rozenfeld *et al.* (2006). To investigate the Crowd-Design process a benchmark analysis brings detailed information about the current Internet crowd-based platforms of four companies and the processes they adopt. From this analysis, it was possible to identify in which stage of the PDP the crowd-based processes have been used.

## 2. THEORY BACKGROUND

The topics presented in this section refer to (i) the definition of crowdsourcing and its main practices, (ii) the definition of Crowd-Design, and (iii) the definition of PDP and its general model.

### 2.1 What is crowdsourcing and what is it used for?

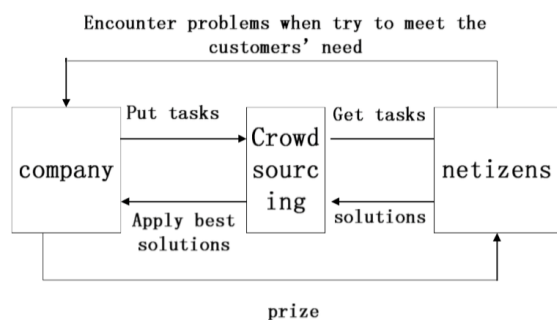
There have been many attempts to define crowdsourcing; however, to date, there is no commonly accepted definition or taxonomy (Simula & Vuori, 2012; Simula & Ahola, 2014). Howe (2006) popularized the term crowdsourcing and defines it as the act of a company or institution to outsource a function usually performed by its employees to an undefined network of people (generally large) in the form of an open call. This work can be done collaboratively or by single individuals (expert or novice). The fundamental prerequisite is the use of an open and wide call (Djelassi & Decoopman, 2013).

The generic definition of crowdsourcing, presented in the study by Estellés-Arolas and González Ladron-de-Guevara (2012, p. 355), refers to the "[...] act of outsourcing a task to a 'crowd' rather than an 'agent' designated as contractor in the form of an open invitation". However, Simula & Ahola (2014) call attention to the fact that if an organization is sufficiently large and heterogeneous, its 'pool' of employees can also act as a crowd. In this sense, large multinational corporations like IBM frequently and systematically provide their base employees for the generation of innovative ideas (Bjelland &

Wood, 2008). Thus, the 'internal outsourcing' cited by Afuah & Tucci (2012) can be named internal crowdsourcing (Villarroel & Reis, 2010; Vukovic, 2009).

Due to the characteristic of gathering many people in order to solve problems and generate innovations, crowdsourcing can also be understood as a huge social network. According to Son *et al.* (2012), the social network generated by crowdsourcing could facilitate the design process. For these authors, an online community eases interaction among customers and companies by supporting the exchange of ideas among users and understanding their needs. In this study, this issue is addressed to verify how and when this interaction occurs considering the Rozenfeld *et al.*'s (2006) PDP model.

Peng & Ruoyu (2011) present a basic model of crowdsourcing (Figure 1). According to the authors, no matter what kind of crowdsourcing, there are three constant participants: enterprises, netizens and crowdsourcing websites (the virtual environment).



**Figure 1:** The Basic model of crowdsourcing process, based on Peng & Royu (2011).

The academic research identified different kinds of crowdsourcing tasks, as the routine tasks, tasks to generate content and inventive activities as well as selective and integrative operations (Stanoevska-Slabeva, 2011; Djelassi & Decoopman, 2013). In the integrative crowdsourcing, the purpose is to assemble complementary data from the crowd. In contrast, selective crowdsourcing is about selecting the best solution among those suggested by the crowd.

As mentioned before, there are many processes that use the 'crowd' prefix. Shoyama *et al.* (2014) present some 'crowd' prefixes found on literature, and others that are being used on online platforms. The most relevant to the product development process are:

- **Crowdfunding:** It consists, fundamentally, of a process where the financing of a given project is sought through small contributions from individuals, which together contribute to the feasibility of executing the project. Examples of crowdfunding platforms are: Kickstarter, Crowd About Now, Go Fund Me, Indie Go Go, Patreon, Crowd Rise, lobby.
- **Crowdvoting:** Process that usually occurs through sites that seek the opinion of a large number of people about a certain topic. Usually, the crowd is invited to attribute 'stars' or 'points'.
- **Crowdstorm:** Process to generate ideas. Unlike the brainstorming process, the crowdstorm is performed online and done by the crowd. It only demands solutions to a given problem, and it is more complex where people can interfere with the solutions given by other people, building bigger and better ideas. An example where this process occurs can be found at the LEGO Ideas and Open IDEO platforms.

- **Crowdlabor:** Process where the crowd is 'hired' to accomplish a series of tasks, from the simple to the most complex. This is the most common kind of crowd-process and some examples of platforms are: Mechanical Turk, Crowdspring, Hire the World, Innocentive, 99 designs, Its Noon, My kinda Future, Zoopa, 12 Designer, Eyeka, Idea Connection, Ideaken, Crowdbrain.

It can be said that crowdsourcing is the umbrella term used to designate a generic crowd-based process (Geiger *et al.*, 2011; Geiger & Schader, 2014). The other terms with the 'crowd' prefix are used to refer to a specific task, such as choosing (crowdvoting), giving an opinion (crowdstorm), working in a specific demand (crowdlabor) or funding a project (crowdfunding). To each different activity, there is a different term, but the term can also refer to an entire process, as the Crowd-Design.

## 2.2 Towards a Crowd-Design definition

Unlike what happens to the term 'crowdsourcing', the search results for the term 'Crowd-Design' on search engines do not show a distinguishable pattern. Instead, the results show links for access to Design Marketplace platforms. Namely, platforms that connect designers to companies or people that needs their skills. This kind of activity is directly related to crowdlabor processes.

As an attempt to clearly define the term Crowd-Design, since a proper definition was not found on literature, Dickie & Santos (2014, p.2) proposed that Crowd-Design refers to "an emerging modality of product development and production systems that utilize the knowledge and resources available to crowds, usually through the Internet, for the purpose of solving problems and/or creating content".

Crowdsourcing among products and services users has shown to be particularly suitable for yielding solutions for both incremental and breakthrough innovations (von Hippel, 2005; Bogers *et al.*, 2010 *apud* Frey *et al.*, 2011). In addition, companies are not only outsourcing manufacturing activities to other companies, but also increasingly outsourcing design activities to partnering companies. Outsourcing design decisions play a critical role in the quality, cost and lead-time of a product and therefore should form a critical component for generating a design process (Fathianathan & Panchal, 2009).

The innonatives platform (innonatives.com, 2016) presents a generic model of Crowd-Design process that embraces the stages that correspond to the Rozenfeld *et al.*'s (2006) PDP model. Its Crowd-Design process starts with a problem requested by an 'owner'. This owner could be a company or an individual. The problem is displayed at a platform (online or differently) as a challenge and is shared with the crowd as an open call to contributions. During the process of sending contributions (that can be ideas, concepts and/or solutions), the crowd can comment, share information, and also vote on the proposed solutions sent in. Throughout the process, the owner can provide the participants with information in case of doubt. In the end of the process, the best solutions can be manufactured through a crowdfunding campaign, but also by marketplace or auction.

Considering the content presented in the previous topic, it can be said that the Crowd-Design process uses a combination of crowd-based processes (Shoyama *et al.*, 2014), that can be held separately or combined; it depends on the objective of the task and the level of challenge (Stanoevska-Slabeva, 2011; Simula & Vuori, 2012). This research aims to **bring clarification about what these**

processes are and how companies have used them to support their product development process. Through the research's results, it should be possible to map the different types of crowd-based processes that have been applied to the Crowd-Design process and in which stages of the PDP they are used.

### 2.3 Product Development Process (PDP)

The product development process (PDP) is the process in which an organization transforms data on market opportunities and technical possibilities into valuable information for commercial production (Clark & Fujimoto, 1991). The outputs of the activities of the PDP are not as tangible and verifiable as such other processes, because it often consists only of information (Browning *et al.*, 2006; Rozenfeld *et al.*, 2006). The PDP is multifunctional and requires an organizational structure that allows the flow of information among different areas of a company. Dependencies between activities are higher in other business processes than PDP. This is due to the process flexibility, which deals with creativity and ambiguity and uncertainty involved. In addition to the risks, it can be said that the development of a new product is a non-repeatable process (Rozenburg & Eckels, 1995), and also too complex with too many influencing factors. Thus, the risks involved in the PDP are higher compared to other business processes (Browning *et al.*, 2006).

According to Barbalho (2006), the PDP can be understood as a process whose essential part is defined by the identification, design and fulfilment of market needs. This statement can be used to justify the use of the crowd-based process on the PDP.

The definition proposed by Rozenfeld *et al.* (2006) establishes PDP as a set of activities carried out in a logical sequence with the objective of producing goods or services that have value for a specific group of individuals. For the same authors, the PDP is divided into three macrostages: Pre-development, Development and Post-development, as shown in figure 1.



**Figure 2:** Macro stages and Stages of PDP, according to Rozenfeld *et al.* (2006).

These macrostages are subdivided into stages that detail and specify activities within the process. These tasks require resources and time to execute and transform data from inputs to outputs, such as customer requirements for the final product. Other important aspect observed in the

Rozenfeld *et al.*'s (2006) PDP is the adoption of gates between stages, that is, establishing a formal product review and approval so that it can proceed to the next stage.

According to Rozenfeld *et al.* (2006), the 'Pre-Development' macrostage refers to the strategic planning of the company and the mapping of the requirements for the development of a new product. It is composed by three phases:

- The '**Strategic Business Plan**' phase: This is the phase where the information gathering of market, technology, behavior, among others, happens. Regarding the crowd-based processes, the company needs a clear strategy from its capabilities to define what should be developed through Crowd-Design. On the other hand, there is an opportunity for the company to review its own strategy from outside ideas through a crowdstorm or crowdvoting process, for instance. According to Sharma (2010), the crowdsourcing initiative has to be aligned to the company's vision and also has to have a well-defined set of ideals, goals and objectives.
- The '**Strategic Product Plan**' phase: Consists on the project definition activities, available resources, constraints, portfolio definitions, and the strategy for product lines. The same line of thinking regarding the Crowd-Design activities, applied on the previous phase, can be used here.
- The '**Project Planning**' phase: First of all, the company has to check the maturity level of its PDP process – which is, how many stages it has, how many activities are involved, among others. This will also facilitate the decision regarding which crowd-based processes can be added to the Crowd-Design process. It can also determine what level of participation is expected from the crowd.

The next macrostage – that is, the '**Development**' – corresponds to the design decisions for the product, its characteristics and how it will be manufactured. Its phases are (Rozenfeld *et al.* (2006):

- The '**Informational project**' phase: Whose goal is to develop a set of informations, as complete as possible, to guide the generation of solutions and provide a basis for evaluation methods and decision-making criteria in the later stages of development;
- The '**Conceptual project**' phase: Corresponds to the problem scouting for the definition of the product that will be developed; which may occur due to the accumulated experience of the company in its field of action and through market analysis or may occur involving the crowd;
- The '**Detailed project**' phase: Related to research, creation, prototyping and selection of solutions. Usually, the engineering and design department carries this phase out 'in company'. By applying a Crowd-Design process, the crowd can also be involved;
- The '**Preparation of the product production**' phase: Aims to develop and finalize all product specifications needed for production. As the product specifications requires detailed knowledge of the production processes and organizational limitations, the decision of keeping the crowd involved in this phase is made according to the company criteria;
- The '**Product launch**' phase: Related to the planning of product sale and distribution, customer service and technical assistance, and marketing campaigns. Applying

a crowd-based process can improve this phase. According to Dickie *et al.* (2014), in Crowd-Designed projects, there is the possibility of a project being fully or partially financed by the crowd, via crowdfunding. In case of a process that has been carried out by a company, Djelassi and Decoopman (2013) argue that involving the crowd in the solution development processes increases the success of a product release. In addition to the active participation and the sense of usefulness, there is also the massive adoption due to prior product acceptance.

The last macrostage, 'Post Development' refers to the monitoring of the product in the market and management of the end of the product's life cycle. According to Rozenfeld *et al.* (2006), this macrostage is composed by two phases:

- The 'Following-up the product and process' phase: In this phase, the authors suggest the company maintains a constant monitoring of product performance. Since the crowd-based processes bring customers closer to the company, the crowds work as a useful tool to get feedback.
- The 'Product discontinuation' phase: According to Shoyama *et al.* (2014), the crowd participation in this phase would be essential to (a) generate insights for future product changes needed; and (b) to avoid misunderstandings in the case of product discontinuation.

### 3. METHOD

This section is divided in two topics, according to the research development phases: (1) Literature Review and (2) the Benchmark Analysis.

#### 3.1 Literature Review

The literature review was carried out through a Systematic Literature Review (SLR), based on Conforto *et al.* (2011). According to the authors, the SLR is divided into three main phases: (1) Input – meaning the research planning phase; (2) Processing – meaning the research development phase; and (3) Output – meaning the findings exposition phase. Table 1 presents the information regarding the SLR carried out in this research.

**Table 1:** Sitematic Literature Review carried out in this research, based on Conforto *et al.* (2011).

1 - INPUT	
Problem	How can crowdsourcing be applied to the Crowd-Design process?
Objectives	To clarify the concept of crowdsourcing and its main practices; To know the main contexts and purposes where crowdsourcing has been applied.
Primary Sources	To find the primary sources, a non-systematic literature review was carried out on Google. After that, the research was carried out on academic database, such as 'Portal de Periódicos da CAPES' ( <a href="http://www.periodicos.capes.gov.br/">http://www.periodicos.capes.gov.br/</a> )
Strings	The strings are a terms combination to start the research on database. In this

case, the strings were:

- Crowdsourcing + PDP
- Crowdsourcing + Design

The research brought 1.793 related works. Thus, the following criteria was adopted to select only the papers related to this research's context:

#### Inclusion Criteria

- Only papers;
- Language: English;
- Peer review;
- Published in the last 10 years.

After reading the abstracts, the following criteria was adopted to include the papers on this research's results:

#### Eligibility Criteria

- To bring the definition of crowdsourcing;
- To present case studies and examples of crowdsourcing initiatives.

### 2 – Processing

- Access the database 'Portal de Periódicos CAPES';
- Apply the strings;
- Apply the inclusion criteria;
- Read Abstracts;
- Apply the quality criteria;
- Select the papers to full read.

### 3 – Outputs

- Total of 41 papers selected;
- No papers published before 2008;
- The majority of the related journals belong to the areas of Computing and Information Technology;
- Nevertheless, it also found publications in journals of areas related to Marketing, Business Management, Knowledge and Process and Social Psychology area.

#### 3.2 The Benchmark Analysis

The benchmark analysis occurred trough the Internet by using the terms: 'crowdsourcing' and 'process'. Two searches occurred: one using only the term 'crowdsourcing' and other using the combination of both terms.

The selection criteria for the platforms was the existence of a challenge that needed a crowd to develop a product, or solve a problem by creating new products, thus, the crowd labor or crowdfunding exclusive platforms were excluded from the sample. Two platforms were left: platforms that work as 'agents', connecting the crowd with the 'seekers' (companies or organizations); and platforms owned by companies that invite the crowd to collaborate in their product development process. Considering the fact that each 'agent' platform can adapt the Crowd-Design process according to the 'seekers' needs, it was decided to exclude this kind of platform from the sample. This way, the four platforms analysed in this study belong to the following companies: Lego, Dell, Unilever and Procter & Gamble.

It is important to mention that this study does not include the analysis of the criteria used to choose the winner ideas, neither the information on the rewards offered by the companies to the participants, nor winners. The main focus, however, is the kind of crowd-based processes used to support the companies' PDP phases.

#### 4. THE CROWD-DESIGN PROCESSES

This section presents the benchmark analysis regarding the process used in the Crowd-Design platforms selected as this research sample.

##### 4.1 LEGO Ideas

<https://ideas.lego.com/>

The LEGO® Group has existed for more than 85 years and its main product is still the toy known as the 'LEGO Brick'. The LEGO Ideas platform aims to encourage the customers to share their ideas for new toy collections. The shared ideas can receive support from other customers who give feedbacks and vote. The ideas that receive a certain number of supports are analysed and chosen by the company's expert team for mass production.

According to the idea submission guidelines of the LEGO Ideas platform, anyone can send an idea. It is requested, however, that the participant share his/her idea by sending a high-quality drawing or picture. In other words, a 3D representation or a simulation utilizing the existent LEGO bricks. This way, other participants can visualize a concrete representation of the idea, not only its concept (figure 2).



Figure 3: Example of how the participant sends his/her idea on LEGO Ideas platform (2016).

There are three ways of participation: (1) by sending an idea, and/or (2) by giving feedback and/or (3) by supporting the idea by voting on it. Figure 3 shows the process as it is presented on the platform.

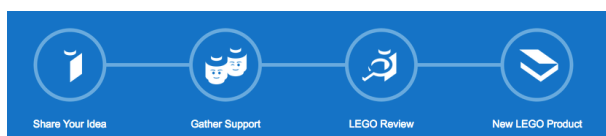


Figure 4: Phases of the LEGO Ideas' crowd-based process.

According to the figure 3, the first step corresponds to the idea sharing. Once available at the platform, the other participants can show support for the idea. If an idea sent receives more than 10 thousand votes, then the LEGO expert team analyses it and decides if it goes on to mass production and commercialization. These steps occur outside the platform.

##### 4.2 Dell

<http://www.ideastorm.com/>

The Dell Company develops, produces, supports and sells a wide variety of personal computers, servers, notebooks,

storage devices, network switches, PDAs, software, peripherals, among others. Its crowd-based platform, IdeaStorm, has been used as a crowdstorm place. Anyone can suggest an idea for a new product or service and also participate in the 'Storm Sessions' – that consists in suggesting ideas for a specific topic. In both cases it is not mandatory to send a drawing or picture. The participant has access only to the options at the menu bar, as shown on figure 4.



Figure 5: Phases of the Dell's crowd-based process.

By clicking on the 'Ideas' option, the participant can see the ideas already sent and give feedback by commenting or supporting it (voting). On the 'Storm Sessions', the participant can give his/her contribution by suggesting an idea of a new product or service to solve a specific topic, suggested by the company. Another way of participation is submitting his/her own idea for product development.

There was no data on the platform regarding any explanation on what happens after the participant has his/her idea selected.

##### 4.3 Unilever

<https://foundry.unilever.com/>

The Unilever Foundry is a platform for start-ups and innovators to engage, collaborate and explore business ideas with Unilever and its 400+ brands. The objective is to build and cultivate strategic partners for the future, with Unilever as a partner of choice.

The ways of participation are three:

- **Mentorship Program:** It is indicated to small businesses that are looking to tap into Unilever marketing expertise to develop their brand, marketing strategy or product roadmap. Effective mentorship will help strengthen any application engaged to the Unilever Foundry through one of the 'brand briefs'.
- **Briefs:** The briefs outline problems that need solving, or opportunities that Unilever is seeking to grasp (Figure 5). If a small business has a proven technology or product, which has been tested in market and is looking to partner up with Unilever, then it can apply to pilot with Unilever.
- **Venture funds:** A well-established company that is looking for funding to support its growth ambitions can apply to receive Unilever financial support and develop the idea.

By choosing the 'Mentorship Program', the participant answers questions about his/her company, team and why his/her business fits this program. According to the Unilever platform, the 'Mentoring Program' is designed to run for 3 months, where the participant will meet with a mentor for approximately one hour every 2 to 3 weeks. There is a structured marketing program that includes world-class marketing tools. During this period, the participant will have

the opportunity to apply those tools to help build his/her marketing, branding and product plans. The participation on 'Briefs' occurs by sending an idea for solution. According to the Unilever platform, all applications are sent to trusted third party partners, called 'scouts'. The scouts review all applications independently, and pass on a shortlist of successful submissions to Unilever. After this process, the selected ideas will have the opportunity to deliver a pitch (including Q & A) to a Unilever internal expert panel. Then, the winner will be invited to co-create pilot ideas with relevant Unilever leaders and agencies. Each brief has its own deadline for applications.

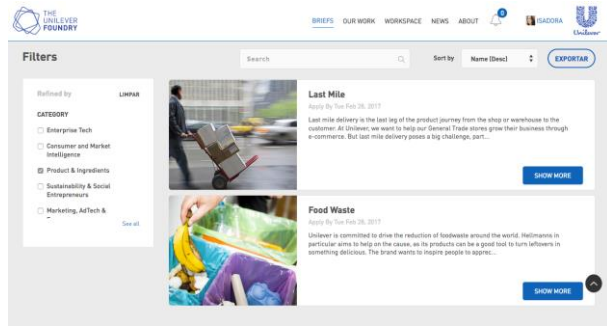


Figure 6: Example of the 'Brief List' available on Unilever's Platform (2016).

The 'Venture funds' section redirects the participant to another website (<http://www.unileverventures.com/>), where the program is extensively explained. Basically, it refers to an investment program from the Unilever group to help partners develop their brands, build competitive edge, among others.

4.4 Procter & Gamble

<http://www.pgconnectdevelop.com/> Known as the 'P&G Connect + Develop Program', this crowdsourcing platform works as an online environment to connect and to help start a partnership of individual inventors, start-ups, small businesses, or big companies with P&G.

The platform brings a list of needs regarding products, technology, in-store, e-commerce and supply chain. Figure 7 brings an example regarding 'Household Care Innovation' needs. If the needs look like a match for the company innovation participant, then it must simply submit the solution idea.

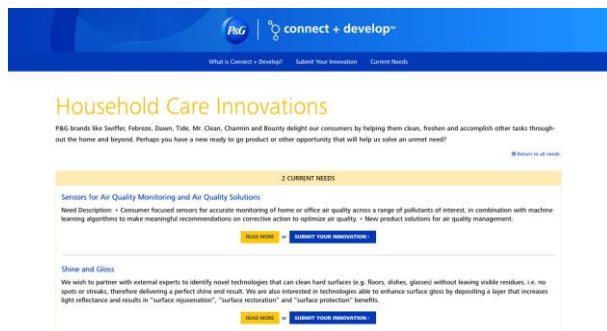


Figure 7: Example of the needs list available on P&G platform (2016).

Once the idea is submitted, the following process occurs internally: each idea is reviewed by a P&G team member who determines how to guide it to ensure it reaches the relevant business and/or technical personnel within P&G Company.

5. THE CROWD-BASED PROCESSES AND THE RELATED PHASES TO PDP

The results of the analysis were obtained by confronting the findings on literature review with the benchmark analysis.

5.1 LEGO Ideas

<https://ideas.lego.com/> According to the Rozenfeld *et al.*'s (2006) PDP model, the crowd-based process used by the LEGO Ideas platform can be associated to the 'Development' macro phase, as shown on figure 7.



Figure 8: Crowd contribution on LEGO Ideas Platform according to Rozenfeld *et al.*'s (2006) PDP Model.

Considering the two ways of participation and interaction required and allowed on the LEGO Ideas platform, it is possible to infer that the crowd-based processes used are: crowd labor and crowd voting (table 2). The crowd labor process occurs by asking the participant to send an idea for a new toy collection. This idea has to be submitted with as many details as possible, including a visual representation.

Table 2: Crowd-based processes on PDP phases of LEGO Ideas case.

LEGO Ideas	
CROWD-BASED PROCESS	PDH PHASE
Crowd labor	Detailed Project
Crowd voting	Product Launch

In case of the idea being selected by receiving 10 thousand supporting votes from the other participants – through a crowd voting process –, the product will be handed over for production by the company's internal team. Considering the number of participants that support the idea, it can be said that the crowd-based process would also help the product release.

5.2 Dell

<http://www.ideastorm.com/> According to the Rozenfeld *et al.*'s (2006) PDP model, the crowd-based process used by the Dell platform can be associated to the 'Development' macro stage, as shown on figure 8.

Considering the three ways of participation and interaction required and allowed by the Dell platform, it is possible to infer that the crowd-based processes used are: crowd labor, crowd voting and crowd storm.

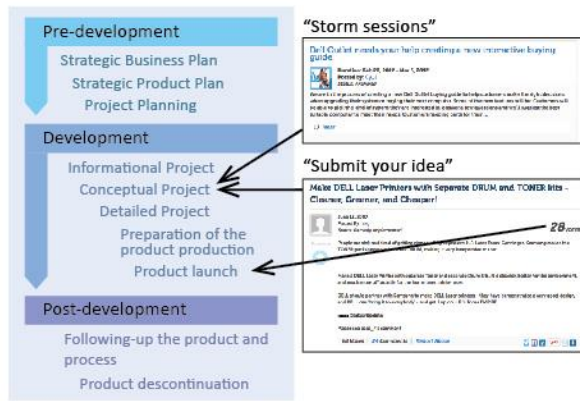


Figure 9: Crowd contribution on Dell Platform according to Rozenfeld et al.'s (2006) PDP Model.

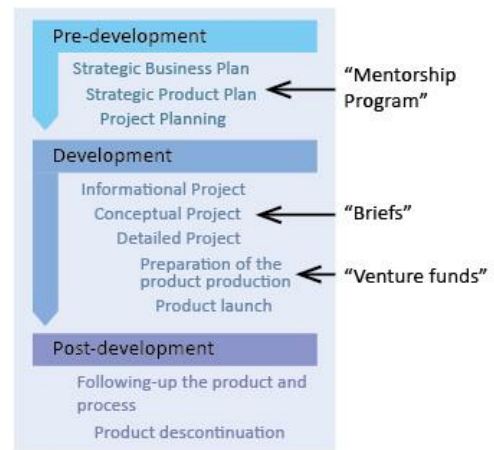


Figure 9: Crowd contribution on Unilever Platform according to Rozenfeld et al.'s (2006) PDP Model.

The crowd-based process that characterizes the interaction between the participant, who sends an idea for a new product or responds to the specific need of the company, is crowd labor. However, different from the LEGO Idea requirements, the participant of the Dell Crowd-Design process does not need to send an original drawing or image. In some cases, at the platform, the images show only the concept of the idea – which means it doesn't represent the final product. That's why the act of submitting an idea refers to the 'Conceptual Phase', according to the Rozenfeld et al.'s (2006) PDP model (table 3).

Table 3: Crowd-based processes on PDP phases of Dell case.

Dell	
CROWD-BASED PROCESS	PDH PHASE
Crowdlabor	Conceptual Project
Crowdvoting	Product Launch
Crowdstorm	Conceptual Project

As it occurs in the LEGO Ideas case, other participants can support the sent ideas, through a crowdvoting process. According to Djelassi & Decoopman (2013), it increases the chances of success on the 'Product Launch' phase.

The crowdstorm process happens, in this case, because the crowd is invited to send ideas for solution for specific topics suggested by the company. That is to say, the 'sharing ideas' crowd-based process can be compared to the 'brainstorm' process.

5.3 Unilever

<https://foundry.unilever.com/>

According to the Rozenfeld et al.'s (2006) PDP model, the crowd-based process used by the Unilever platform can be associated to the 'Pre-Development' and 'Development' macro phases, as shown on figure 9.

Considering the three ways of participation and interaction required and allowed by the Unilever platform, it is possible to infer that the crowd-based process used in one of the three cases is crowd labor. Despite the 'Mentor Program' program referring to an invitation to receive Unilever's Consulting only, this invitation occurs through an Internet open call. It was not found on the current literature the definition that could classify this kind of crowd-based process. The same happens with the 'Venture funds' program. But, since they both are part of the Unilever's crowdsourcing process, they were included on the PDP's stages analysis.

In the 'Briefs' case, the participant, due to the fact that the platform does not allow the visualization of ideas sent, it was not possible to verify the level of detail that has to be shown. But, considering the context of the challenges (an example can be accessed here: <https://foundry.unilever.com/challenges/spchallenge/view/challenge/2503/>) and the offered rewards (such as monetary investment to develop the pilot), it can be inferred that, according to the Rozenfeld et al.'s (2006) PDP model, the crowd-based process used in this case can be associated to the 'Development', specifically to the 'Detailed Project' phase (figure 9).

Table 4: Crowd-based processes on PDP phases of Unilever case.

Unilever	
CROWD-BASED PROCESS	PDH PHASE
Crowd-based process (still unnamed)	Strategic Product Plan
Crowdlabor	Conceptual Project
Crowd-based process (still unnamed)	Preparation of the product production

It is important to highlight that there is no exchange of information among the crowd. The platform works as a tool to connect a specific kind of crowd – composed by innovators, start-ups or small businesses – to the Unilever Company, but the ideas and solutions submitted are not shared with the public. This is the main reason the crowd-based process, in this case, can be considered as a crowd labor process.

5.4 Procter & Gamble

<http://www.pgconnectdevelop.com/>

According to the Rozenfeld et al.'s (2006) PDP model, the crowd-based process used by the P&G platform can be associated to the 'Development' macro phase, as shown on figure 10.

Considering the one way only participation method, interaction required and allowed by the Dell platform, it is possible to infer that the crowd-based process used is: crowd labor (table 5).

Table 5: Crowd-based processes on PDP phases of P&G case.

Procter & Gamble	
CROWD-BASED PROCESS	PDH PHASE
Crowdlabor	Conceptual Project



As in the Unilever case, P&G’s platform is another example of a crowdsourcing platform that despite operating with a crowd-based process, there is no information exchange among the crowd. Therefore, the platform is a tool to find and connect partners around the world to increase the company’s capacity of innovation.



Figure 10: Crowd contribution on P&G Platform according to Rozenfeld *et al.*'s (2006) PDP Model.

6. CONCLUDING REMARKS

In order to have an overview of the results obtained on this study, the data previously presented were organized on table 6. It brings the correlation of the Rozenfeld *et al.*'s (2006) PDP stages with the crowd-based processes. Once there was no crowd-based process related to the 'Post-Development' macro phase, its phases do not appear on it.

According to the table 6, it is possible to notice that the most applied crowd-based process is crowdlabor. (Despite appearing only twice on table 6, it was used by the four platforms). According to Djelassi & Decoopman (2013), in crowdlabor, the consumer provides the workforce and is considered as a real worker in the company. In LEGO Ideas and Dell cases, it is just what happens: even though not all ideas are selected the winning ideas become new products. On the other hand, as in the Unilever and P&G cases, the crowdlabor can also mean the relationship between the companies and their partners can be considered as outsourced.

According to this study, crowdlabor seems to be related to two stages of the PDP: 'Conceptual Project' and 'Detailed Project'. The reason for it could be the fact that on these stages, ideas can still be improved, with participation from the company’s internal team of experts. Thus, the 'open call' is an opportunity to improve the company’s knowledge regarding the customers real needs and wishes. Even though the company does not develop all the ideas sent, these could mean a starting point for generating other ideas for solutions.

Regarding crowdvoting, this study’s analysis considers Djelassi & Decoopman (2013) statement which says that crowd-based practices could reinforce, in several ways, the relationship between companies and its customers. First of all, the authors found that the customers perceive these practices as a new and original marketing practice and it represents to them a significant experience as a way, for example, to help choosing the brand’s new product. Because of that, the outcomes of a crowd-based process could be bigger than only finding the best solution: it can mean the generation of a big 'buzz' – which means, many people talking about not only the company’s initiative, but also

about the company itself. So, crowd-based processes can also be considered as a communication campaign that legitimates the products developed through it.

Table 6: Results overview: correspondence of the Rozenfeld *et al.*'s (2006) PDP phases with the crowd-based process.


	Crowdlabor	Crowdvoting	Crowdstorm	"Call for Consulting"	"Call to Invest"
Strategic Business Plan				X	
Strategic Product Plan					
Project Plan					
Informational Project					
Conceptual Project	X		X		
Detailed Project	X				
Preparation of the Product Production					X
Product Launch		X			

Crowdstorm appears in this study as a 'brainstorming' synonym. Due to the characteristics of creativity stimulation, this crowd-based process was associated to the 'Conceptual Project' in the PDP stages.

Future studies could be addressed on finding out how the companies have been converting the inputs generated by the crowd-based process into real products and solutions.

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