

Extending the ideation process to the entire organization

Vitor Pinheiro Cunha^a, Maicon Gouvêa de Oliveira^b, Henrique Rozenfeld^c

^aErnst & Young

^bUniversidade Federal de Alfenas

^cUniversidade de São Paulo

e-mails: vitorcunha4@gmail.com; maicongdo@gmail.com; roz@sc.usp.br

Abstract: Innovation is dependent on a continuous flow of ideas that bring opportunities for new products and technologies. This study explores ideation as an independent process, related but not restricted to the innovation process. To this end, a multiple case research method was employed in 15 Brazilian companies. As a result, a framework comprised of the core elements of ideation processes is proposed, showing that other characteristics, apart from the idea generation and selection, need to be addressed to achieve effective results, such as innovation environment, strategic orientation, and idea sources.

Keywords: ideation, idea management, framework, innovation, case study, Brazilian companies.

1. Introduction

Companies are aware that for overcoming issues placed by the marketplace, like for example the last global economic crisis, they must encourage innovation. A worldwide study which was conducted in 2010 with 1590 executives shows that having an innovation capability is a strategic priority to handle the upcoming challenges (ANDREW et al., 2010). Innovations start with an idea and evolve to become a new product launched into the marketplace (COOPER, 2001). Then, in order to achieve successful products, companies should manage carefully their ideas (ALVES; MARQUES; MARQUES, 2005; BOEDDRICH, 2004; KOC; CEYLAN, 2007).

The ideation process deals with ideas throughout the organisation and supports their implementation into the innovation process. Despite its potential, few studies have been undertaken to address it (PAGE; SCHIRR, 2008). From an empirical perspective, some companies are able to generate a continuous flow of ideas, but the lack of robust ideas leads to a high cancellation rate. Among 100 new ideas, usually one becomes a successful product that reaches the market (COOPER; EDGETT, 2007). As a result, outcomes are negatively affected and resources are invested without delivering value (CHRISTENSEN; RAYNOR, 2003; KRISTENSSON; MAGNUSSON, 2010; MCADAM; MCCLELLAND, 2002a; SPANJOL; QUALLS; ROSA, 2011).

Most of the known frameworks fit the ideation process as a part of the innovation process. In contrast, it can be seen as an independent process, which can complement and be integrated to the innovation process (COOPER; EDGETT, 2007; NILSSON; ELG; BERGMAN, 2002). This approach

is a first step towards the development of frameworks more suitable to the ideation process, underpinning its better management and leading to improvements of its results.

This study explores the ideation process as an independent process and aims to propose a framework capable of describing its core elements. To this end, a multiple case research method was employed to investigate ideation processes in Brazilian companies. In the beginning, a conceptual model based on four process dimensions (KOSANKE, 1995) – strategy, activities, organisation and resources – was created through a literature review to support the development of the case study protocol. Then, data were collected and analysed qualitatively through individual and cross-case techniques. In the end, the core elements identified were used to build the framework of the ideation process.

This paper is structured as follows. First, the theoretical background and the research methodology adopted for this study are described. Next, the characteristics of the ideation process gathered from the literature review are shown according to the process dimensions. Afterwards, results of the multiple case studies are analysed, explained and used to propose the framework of the ideation process. Finally, conclusions and suggestions for further research are provided.

2. Idea management

According to Tidd, Bessant and Pavitt (2005) an idea can be defined as a concept or thought that becomes an invention when is converted into a tangible artefact. Boeddrich (2004) describes an idea as a preliminary solution to a problem or

as a draft that needs to be developed into a viable version. Koen et al. (2002) define an idea as a simplified form of a new product or service, which consists of a high-level view of a solution to a problem related to an opportunity.

It is important to clarify the link of ideas with opportunities and concepts. Berg, Pihlajamaa and Poskela (2008) claim that the identification of an opportunity precedes the generation of an idea. Koen et al. (2002) describe an opportunity as a business or technology gap, which a company or person realizes that exists between the current situation and future envisioned. In contrast, a concept represents a stage later an idea, i.e., an idea more robust, including a visual and written description of its first technical features and customer benefits (KOEN et al., 2002).

The management of ideas can be challenging, since they are often seen as intangible artefacts that cannot be formalized. An example of idea management is presented in Figure 1. This model, proposed by Deschamps and Nayak (1995), depicts a sequence of activities in which new ideas are generated and selected, resulting in new chances to pursuit.

3. The ideation process

The ideation is acknowledged as an important process to achieve innovations. However, it is multifunctional and integrated with the organisational context, which makes difficult its investigation and continuous improvement. This study analysed the literature of the ideation process through business process lenses, which give a structured approach to gather information and clarify its characteristics. Based on Kosanke (1995), four process dimensions can be used to explore business processes: strategy, activities, organisation and resources.

The dimension “strategy” sets the boundaries of the ideation process regarding the strategic orientation of the organisation. Following the framework of Miles and Snow (2003), which defines four strategic types: defender, prospector, analytical and reactive; it can be noticed that each type requires different ideation processes to identify, gather

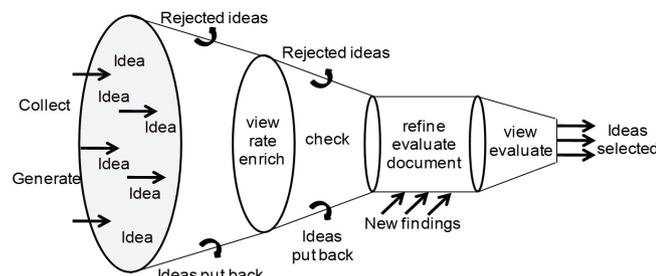


Figure 1. Activities of idea management (DESCHAMPS; NAYAK, 1995).

and manage ideas (SPANJOL; QUALLS; ROSA, 2011). The innovation trigger is also a strategic driver of the ideation process, since it establishes whether the organisation tends to adopt ideas demanded by the market (market-pull) or ideas brought by new technologies (technology-push). Commonly, ideas of radical innovations are related to technology-push strategies and ideas of incremental innovations are related to market-pull strategies. Organisations can adopt both type of triggers, seeking for balanced innovativeness (BREM; VOIGT, 2009; TERWIESCH; ULRICH, 2008).

The dimension “activities” comprises two main activities of the ideation process: the idea generation/gathering and the idea selection. The idea generation/gathering should provide enough flow of new ideas. It uses methods and tools to increase quality and quantity of ideas, such as: brainstorming, mindmapping, TRIZ, suggestion systems, voice of customer, roadmapping and competitive intelligence (MCADAM; MCCLELLAND, 2002a; POSKELA et al., 2004). The idea selection is a decision-making activity in which ideas are ranked through a set of criteria. The decision approach should be less rigorous when dealing with ideas, since they are embryonic and have high levels of uncertainty (COOPER; EDGETT, 2009; KOEN, 2001). The selection criteria should be designed to address idea characteristics and to support clear assessment. In this sense, some authors suggest the removal of financial criteria as well as indicate criteria related to strategies, markets, resources, technologies and risks (COOPER, 2001; GAMLIN; YOURD; PATRICK, 2007; MARTINSUO; POSKELA, 2011).

Another aspect related to the dimension “activities” is the level of process formalization. On one hand, formalized activities are performed to generate ideas for a context of interest through the application of systematic methods and tools. On the other hand, new ideas can be informally provided by people within the organisation and from outside it (ELFVENGREN; KORTELAJAINEN; TUOMINEN, 2009; KOEN, 2001; TERWIESCH; ULRICH, 2008). There is a discussion regarding the impact of formalization on creativity, but a consensus has not been reached. Some researchers state that formalization leads to more effective ideation processes, since people is guided and focused on the most important subjects. Others argue that formalization restricts the generation of really new ideas, impacting negatively on ideation processes (BJÖRK; MAGNUSSON, 2009).

The dimension “organisation” embraces the organisational environment, which can either motivate or hinder creativity and idea generation. According to Amabile (1997), all people are capable of being creative and the work environment can affect the level and frequency that creativity occurs. For example, Koc and Ceylan (2007) explained that there are practices that can support creativity, such as prizes,

acknowledgement and teamwork. Another characteristic related to this dimension is the source of ideas, which can be internal and external to the organisation. Usually, internal sources, like Marketing and R&D areas, are the key suppliers of new ideas (VERWORN, 2006). However, the importance of the external sources; e.g. customers, suppliers, public institutions, partners; has increased and they are playing an important role in the ideation. This fact, known as open innovation (CHESBROUGH, 2003), is a result of the increasing know-how required to develop innovative products, which is unfeasible of being concentrated within one single organisation (ALVES; MARQUES; MARQUES, 2005; HIPPEL, 1986; JAMALI et al., 2006).

The dimension “resources” considers methods and tools that support the execution and management of activities of the ideation process. Currently, information and communication technologies (ICT) allow for a complete application of ideation processes through software programs (COOPER et al., 2009; HESMER et al., 2011; HÜSIG; KOHN, 2009). Although there are concerns regarding the impact of these tools on creativity, they are expected to contribute with idea generation, since support easier and faster information sharing among employees (GORDON et al., 2008; HÜSIG; KOHN, 2009). The databases, which group and classify ideas, are another useful resource for the ideation process. They enable the effective management of current ideas and the recovering of ideas, which were discarded in the past (GESCHKA; LENK; VIETOR, 2002).

4. Methodology

This research aims to contribute to a gap about the frameworks of the ideation process. In the beginning, a literature review was performed to gather information about the state-of-the-art in the field of idea management and ideation processes. A summary of these results is presented in the former section. They underpinned the definition of the main constructs followed by this study.

The research method of multiple case studies was selected to delineate the development of this work. According to Yin (2003) and Voss (2009), this research method is comprised of four main phases: establishing the research aims and context, choosing cases and preparing instruments and protocol, conducting research and collecting data, and analysing results.

After the definition of the aim and context, this work chose cases and prepared the instruments and protocol. At this phase, companies with innovation success and capable of providing data regarding their ideation processes were selected and a semi-structured questionnaire was created to support data collection. This instrument was intended to be used for interviews with employees who have a holistic view of how the ideation process is executed and

it was comprised of two parts: data about the company (sector, size and number of employees) and about the four process dimensions: strategy, activities, organisation and resources (KOSANKE, 1995). The “strategy” dimension provides the connection between strategic planning and operational processes, driving the innovation and the ideation process. The “activities” dimension represents the approach adopted for conducting the idea generation/gathering and idea selection. The “organisation” dimension includes organisational structure, people’s role of and the culture of innovation. The “resources” dimension embraces methods and tools used to support the other dimensions.

The data collected were analysed individually and by cross-case comparison using qualitative techniques (EISENHARDT, 1989) and the findings were contrasted with inputs from the literature review. As a result, the core elements of ideation processes were identified to support the proposition of the framework of the ideation process.

5. The multiple case studies

This study selected 15 companies from several industrial sectors that develop new products. They are large size companies with more than 500 employees and with turnover higher than 30 million of dollars. Moreover, they are key players of their markets and are acknowledged as innovative companies. Their distribution among industrial sectors is shown in Table 1 based on the Industry Classification Benchmarking Framework (FTSE, 2011).

The data collected from these companies are presented and analysed following the four process dimensions: strategy, activities, organisation and resources.

5.1. The dimension “Strategy”

Two characteristics were addressed within this dimension: the strategic orientation and the innovation trigger. A summary of the findings is described in Table 2, which indicates that the majority of companies adopted the analytic and prospector strategic orientations, and in Table 3, which shows that the market-pull was the most used innovation trigger, followed by the mixed trigger.

Table 1. Distribution of the companies selected for case studies among industrial sectors.

Sectors	Companies	Total
Pharmaceuticals	1	1
Auto Parts	2, 7, 9, 15	4
Medical Equipment	3, 10	2
Nondurable Household Products	4, 5, 11, 13	4
Electrical Components and Equipment	6, 8	2
Iron & Steel	12	1
Specialty Chemicals	14	1

These data suggests that companies that adopt the defender strategy orientation tend to focus on the market-pull trigger. Then, their ideation processes are commonly started by inputs from the market perspective. This characteristic seems to be a result of the fact that defender companies seek for maintain its competitive advantage through delivering value for the existing market demand. In contrast, the prospectors and analytics showed both market pull and mixed triggers. Based on the theory, it was expected that prospectors were related to the technology push trigger, but the data do not confirm this fact.

This study also noticed that to classify the strategic orientation and the innovation trigger is important to recognize the predominant characteristics, since these companies often presented a combination of strategies and triggers.

5.2. The dimension "Activities"

Two key activities were addressed at this dimension: the idea generation/gathering and idea selection; as well as the level of formalization adopted for executing them.

With regard to formalization, this study noticed that the companies analysed have their ideation process substantially formalized, but company 3. Six of the fifteen companies had high level of formalization, which means tasks and procedures defined and shared, and the remaining eight companies had medium level of formalization. Although company 3 had a low level of formalization, it showed a satisfactory performance on product and technological innovations, which implies that formalization is not directly related to better performance of the ideation process. The level of formalization of these companies is described in Table 4.

The idea generation/gathering was investigated through practices adopted by companies. Despite the large number of methods and tools available to support it, the companies analysed used only a small part of them. The most used method was brainstorming, which was applied by thirteen of the fifteen companies. The second method most used was suggestion box, which was found in twelve of the companies studied and was used to capture new ideas from the organisation. Other methods and tools were also noticed, but with less frequency: focus group, competitive intelligence, TRIZ, SWOT, Voice of Customer etc. A compilation of the methods and tools indicated by these companies is presented in Table 5.

The idea selection activity was basically performed through the application of scoring models. The companies analysed seemed to understand and conduct this activity without problems. Only two companies (5 and 13) indicated barriers for executing it. At company 5, part of the issues was an effect of the centralization made at the commercial department, which prejudiced the evaluation of resources

capacity and technical feasibility. At company 13, the idea selection was randomly performed and then some poor ideas were implemented, resulting in waste of organisational resources. In contrast, company 4 can be considered an example of excellence regarding idea selection. This company used a software program that supported the evaluation through criteria that were able to be customized.

Due to importance of criteria during the idea selection, this study collected and analysed criteria used by these companies. This compilation is presented in Table 6. Among the criteria identified, the strategic alignment was the most used one. It seems that there was a consensus among companies that an idea should first of all fit with business and organisational strategies. This fact was already

Table 2. Strategic orientation of the selected companies.

Strategic Orientation	Companies	Total
Defender	1, 13, 15	3
Prospector	2, 4, 9, 11, 12	5
Analytic	3, 5-8, 10, 14	7

Table 3. Innovation trigger of the selected companies.

Innovation Trigger	Companies	Total
Market Pull	1-3, 7, 9-11, 13, 15	9
Technology Push	5, 6	2
Mixed trigger	4, 8, 12, 14	4

Table 4. Level of formalization of the ideation processes.

Level of Formalization	Companies	Total
High	2, 6-8, 11, 12,	6
Medium	1, 4, 5, 9, 10, 13-15	8
Low	3	1

Table 5. Methods and tools used at the idea generation/gathering activity.

Methods and Tools	Companies	Total
Brainstorming	2, 4-15	14
Suggestion Box	2, 4-6, 8-14	11
Competitive Intelligence	1-3, 6-9, 15	8
Focus Group	4, 5, 7, 11-14	7
TRIZ	7-9, 11, 14, 15	6
SWOT	1, 2, 6, 9, 12, 15	6
Voice of Customer	2, 4, 8, 11, 12	5
Patent Analysis	1, 3, 4, 9, 12	5
Value Chain Analysis	1, 2, 6, 9, 15	5
Technology Intelligence	3, 4, 7, 8, 11	5
Roadmapping	6, 7, 8, 12	4
Mindmapping	2, 8, 9	3
Delphi Method	6, 8, 14	3
Gallery Method	6, 7, 14	3
Scenario Planning	5	1

Table 6. Criteria used for idea selection.

Selection Criteria	Companies	Total
Strategic Alignment	1-12, 14, 15	14
Probability of Success	2-4, 6, 7, 9-15	12
Financial Return	1, 2, 5-10, 12-15	12
Resources Availability	2, 4, 8, 10, 11, 14, 15	7
Time to Market	4	1
Board Approval	8	1

addressed and confirmed by the theory (MCADAM; MCCLELLAND, 2002b). The literature also claims that financial criteria should be avoided at the idea selection, since ideas have too much uncertainty (COOPER; EDGETT, 2007). However, data from these companies showed the financial return criterion among the most used ones, which can be a concern for the performance of ideation processes. Other criteria often applied by these companies were the probability of success and the resources availability.

5.3. The dimension "Organisation"

At this dimension, this study investigated the sources of ideas considered in companies and the practices used for motivating the generation of ideas and improvement of the ideation process.

Among the sources, the functional areas within the organisation were the most important ones. Following them, external sources, such as suppliers, arose as a substantial source of new ideas in approximately 60% of the companies studied. The other sources embraced activities such as market research and technology intelligence.

Regarding the internal sources of ideas, the marketing and R&D areas were the key sources. This fact is according to Verworn (2006), which stated these two areas as the biggest contributors of ideas within organisations. Although the board was a source of ideas with less participation, ideas provided by it had naturally more chances to be implemented. Ideas from the board seemed to have more probability of success and higher potential to leverage competitiveness if compared to ideas from other sources. A compilation of data about the participation of functional areas on proposition of new ideas is described in Figure 2.

The companies investigated indicated the use of external sources as a way for generating new ideas, in particular customers. However, they also showed the need of improvements to enable better use of customers, since this interaction missed a formalized and managed approach. In contrast, company 11 mentioned to have in place an established approach for contacting and involving its customers. Other types of external sources, such as consultants and universities were invited only in very specific cases and, then, had usually low importance for the companies investigated.

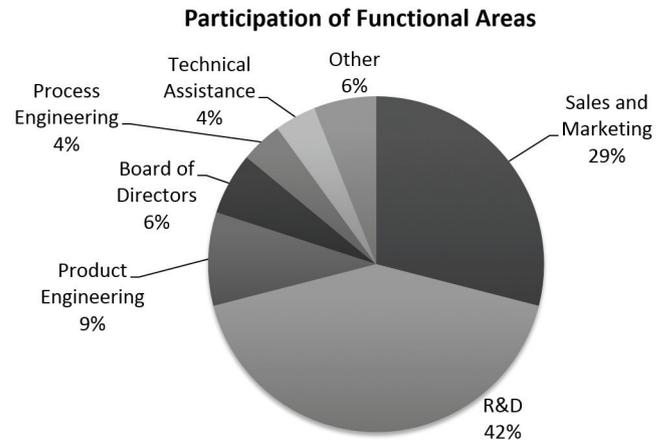


Figure 2. Participation of functional areas on proposition of new ideas.

The organisation environment is essential for the ideation process and can be analysed through the existence of certain organisational characteristics. The first one analysed in this study is the presence of multifunctional teams. Boeddrich (2004) and Koc and Ceylan (2007) declared that multifunctional teams improve knowledge sharing and, therefore, support idea generation/gathering and idea selection. The application of multifunctional teams was noticed at nine of the fifteen companies analysed, which indicated that improvements can be achieved in this sense. Other important characteristic is the innovation culture, which stimulate people to look for innovation opportunities. Data collected at these companies show that nine of them had an innovation culture and that others were aware of the importance of creating it. Rewards are also a practice frequently used by companies to support generation of ideas, being present at eleven of the companies studied through financial or non-financial prizes.

5.4. The dimension "resources"

At this dimension, this study addresses methods and tools used to support the management of the ideation process. The first point analysed is the presence of database of ideas, which can be part of a software program or be implemented through electronic spreadsheets. Boeddrich (2004) and Cooper (2001) stated that the database of ideas is very important to create an effective ideation process. Twelve of the fifteen companies analysed used databases of ideas, but only six managed it effectively, which is a fact of concern. Following, the application of TIC is investigated. Only six companies had software programs created to support the ideation process. This fact corroborates the findings of Hüsigg and Kohn (2009), who indicated that companies are still starting to use this type of software program, in spite of their potential contribution.

6. Framework of the ideation process

The results described in the last section were used to develop the framework of the ideation process. This framework, which is depicted in Figure 3, shows the core components of ideation processes. As a result, other companies can enhance their understanding, compare their current processes and identify opportunities for improvement.

In the beginning, a formal ideation process should be established through the definition of activities, procedures and roles. The results showed that formal ideation processes often achieve better results than informal ones, since they adopt best practices for idea management, use effective methods and tools for idea generation/gathering and idea selection, and implement software programs to support the process.

Following, the strategic orientation should be reviewed and clarified regarding its innovation drivers. These drivers impact on the goals and characteristics of the ideation process and, therefore, define the boundaries that delimit its execution. A classification of strategic orientations was

provided by Miles and Snow (2003), which describes four types: prospector, defender, analyser and reactor. These types are an initial reference for companies whose strategy is unclear. However, this study also noticed that the strategic orientation can follow a combination of these types, with one or another type being predominant at specific moments.

The innovation trigger, which can follow a market-pull or technology-push approach, and the open innovation are linked to the strategic orientation and affects idea generation/gathering. Therefore, the trigger and open innovation, are related to inputs of the ideation process. Usually, companies that prefer the market-pull approach tend to be market followers and focus on incremental innovations. In contrast, companies that prefer the technology-push are likely to innovate through new technologies and radical innovations (BREM; VOIGT, 2009). Additionally, open innovation allows for participation of external collaborators, enhancing organisation knowledge and creating opportunities for generation of non-expected ideas.

The sources of new ideas are a critical factor for succeeding at the ideation process. The results indicate that

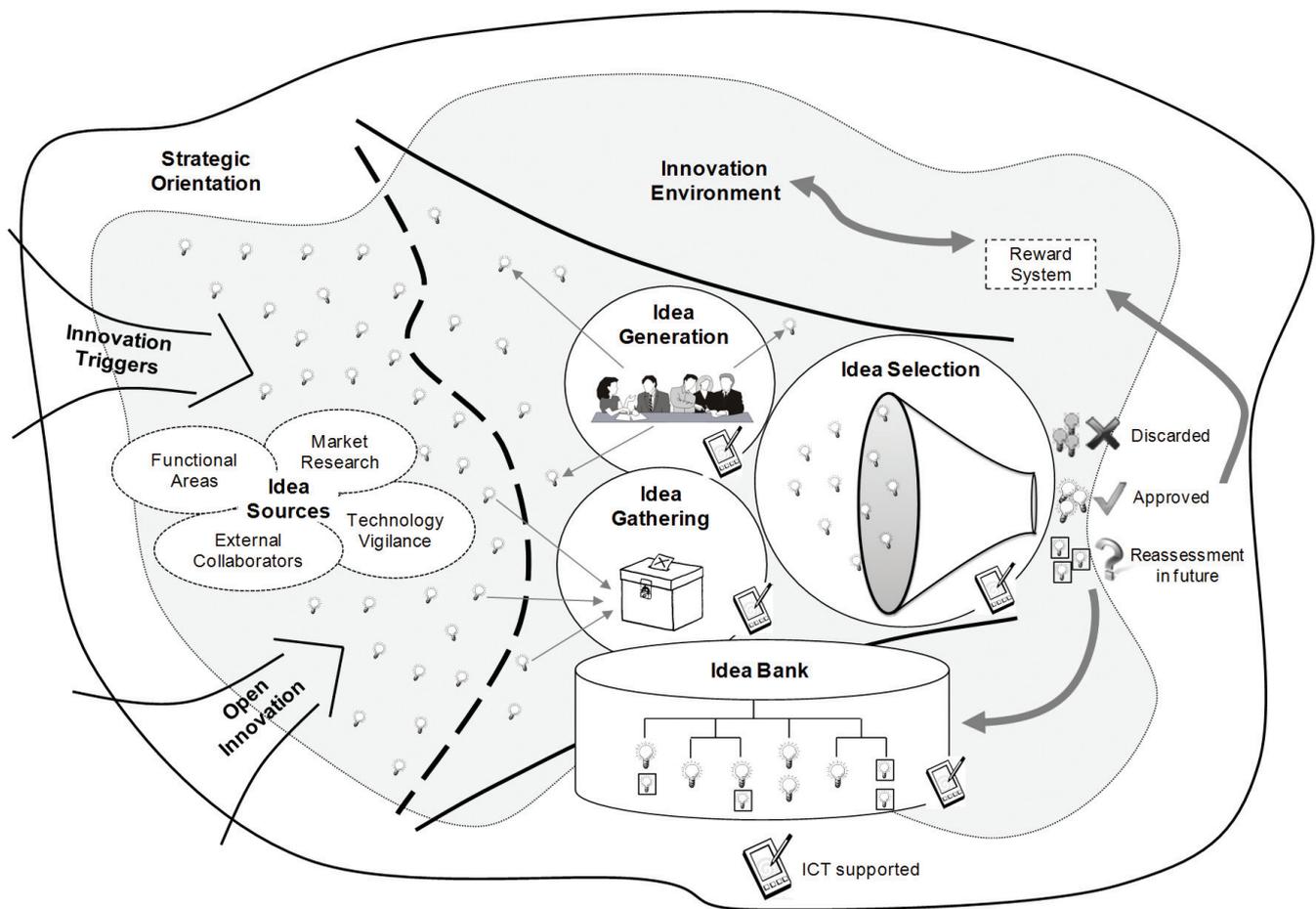


Figure 3. Framework of the ideation process.

companies should encompass a range of sources to increase its chances of identifying or generating successful ideas. The main sources used by the companies analysed were functional areas, market research, technology intelligence and external collaborators, such as customers, suppliers and partners. In particular, R&D and Marketing areas appeared as the most used sources. Customers could be further involved in the idea generation/gathering based on interviewees' comments, who also indicated customers as a very important source of successful ideas.

After sources are established, the idea generation/gathering activity should be designed to ensure that new ideas are introduced in the ideation process. In specific for the idea generation, the findings show brainstorming as the most used method, while for the idea gathering, suggestion box seems to be the most applied one. Others such as TRIZ, Roadmapping and Delphi Method were also used, but with less frequency.

Following, the idea selection activity should be applied to choose ideas that have value to the organisation. In sum, the companies investigated in this study adopted scoring models to evaluate and select ideas. Among the criteria used, the strategic alignment was the primary criterion. Despite this fact, other criteria can be used to establish a trade-off among strategies and new opportunities.

The database of ideas is a tool applied together with these activities to improve their efficiency and effectiveness. It creates a repository which embraces past ideas, ideas in use and new ideas. The findings show that these databases should be properly managed to keep ideas updated and easy to find, otherwise they can hinder the execution of the ideation process. Additionally to databases, ICT systems that embrace functions to support the entire ideation process or part of its activities can be implemented. Although these systems seem to increase the performance of the ideation process, few of the companies investigated had them in place.

Regarding the organisational aspects, the workplace appears as an essential characteristic to motivate creativity and idea generation. The companies which developed actions to induce innovation, such as: innovation challenges, personal incentives and investments in knowledge; were capable of creating more ideas than the others. An example of personal incentive is the reward system, which was applied by a substantial part of the companies through the delivery of prizes to employees who suggested the best ideas.

7. Final considerations

This paper investigated the ideation process through multiple case studies in 15 Brazilian companies acknowledged by their innovation success. Four process dimensions were addressed: strategy, activities, organisation

and resources. Data collected were individually and cross-case analysed. As a result, a framework of the ideation process is proposed to support the clarification of its core components for other companies.

Firstly, the findings suggest that companies are more aware of the importance of managing the ideation process, which is an essential starting point. Additionally, the ideation process is clearly influenced by organisational characteristics, in particular strategies and workplace. Therefore, although this study shows a framework for the ideation process, companies should note that customizations are required to support their interests.

The framework describes a compilation of the characteristics and practices adopted by the companies analysed for the core components of the ideation process. It embraces inputs and outputs of the process, its most important activities, the influence of the strategic orientation and of the organisational environment and the resources commonly used to support its execution. As a result, an overview of what is expected from an ideation process is provided to help companies with its management and integration to the innovation process. Despite of the existence other frameworks in theory, this one follows a different perspective, since it deals with the ideation as an independent process, as can be noted by its interfaces with the organisation and business processes. This difference is clearly seen when it is compared to the framework described by Cooper and Edgett (2007) and to the one described by Deschamps and Nayak (1995).

The findings of the cases alerts for two issues of the ideation process: use of financial criteria and involvement of external sources. Cooper (2001) and Koen (2001) stated that the use of financial criteria is not suitable to evaluate and select ideas, since little information is known to perform an effective financial analysis. Nevertheless, the companies analysed in this study use often this type of criteria in the idea selection activity. Concerning the external sources, Hippel (1986) and Alves, Marques and Marques (2005) highlighted the fact that companies need to involve customers, partners, supplier and other from outside the organisation to improve the idea generation, i.e., the practice of open innovation (CHESBROUGH, 2003). However, the results of this study show that only a small part of ideas come from external sources. Therefore, further improvements are still required in this sense.

The following topics are recommended for further research: implementation of the framework developed in this study through action-research, investigation of changes of the ideation process for companies with different strategic orientations and exploration of the performance measurement of the ideation process in order to define its efficiency and effectiveness for the innovation process.

8. References

- ALVES, J.; MARQUES, M.; MARQUES, P. Building creative ideas for successful new product development. In: EUROPEAN CONFERENCE ON CREATIVITY AND INNOVATION - ECCI, 9., 2005, Lodz, Polónia. v. 9.
- AMABILE, T. Motivating creativity in organisations: on doing what you love and loving what you do. **California Management Review**, v. 40, n. 1, p. 39-58, 1997. <http://dx.doi.org/10.2307/41165921>
- ANDREW, J. P. et al. **Innovation 2010**. A return to prominence: and the emergence of a New World order. Boston: BCG, 2010.
- BERG, P.; PIHLAJAMAA, J.; POSKELA, J. Measurement of the innovation front end: Viewpoint of process, social environment and physical environment. In PORTLAND INTERNATIONAL CONFERENCE ON MANAGEMENT OF ENGINEERING & TECHNOLOGY - PICMET, 2008. **Proceedings...** Portland: IEEE, 2008. p. 1112-1120.
- BJÖRK, J.; MAGNUSSON, M. Where do good innovation ideas come from? Exploring the influence of network connectivity on innovation idea quality. **Journal of Product Innovation Management**, v. 26, n. 6, p. 662-670, 2009. <http://dx.doi.org/10.1111/j.1540-5885.2009.00691.x>
- BOEDDRICH, H. Ideas in the workplace: a new approach towards organizing the fuzzy front end of the innovation process. **Creativity and Innovation Management**, v. 13, n. 4, p. 274-285, 2004. <http://dx.doi.org/10.1111/j.0963-1690.2004.00316.x>
- BREM, A.; VOIGT, K. Integration of market pull and technology push in the corporate front end and innovation management: insights from the German software industry. **Technovation**, v. 29, n. 5, p. 351-367, 2009. <http://dx.doi.org/10.1016/j.technovation.2008.06.003>
- CHESBROUGH, H. **Open innovation: the new imperative for creating and profiting from technology**. Boston: Harvard Business School Press, 2003.
- CHRISTENSEN, C. M.; RAYNOR, M. E. **The innovator's solution: creating and sustaining successful growth**. Cambridge: Harvard Business School Press, 2003.
- COOPER, R. G. **Winning at new products**. Cambridge: Perseus Pub., 2001.
- COOPER, R. G.; EDGETT, S. J. **Generating breakthrough new product ideas**. Ancaster: Product Development Institute, 2007.
- COOPER, R. G.; EDGETT, S. J. **Successful product innovation: a collection of our best**. Ontario: Product Development Institute, 2009.
- COOPER, R. G.; EDGETT, S. J.; KLEINSCHMIDT, E. J. **Optimizing the Stage-Gate process: what best practices companies are doing**. Stage-Gate, 2009. p. 67-80. Successful Product Innovation.
- DESCHAMPS, J. P.; NAYAK, P. R. **Product juggernauts: how companies mobilize to generate a stream of market winners**. Boston: Harvard Business Press, 1995. PMCid:PMC1801436
- EISENHARDT, K. M. Building theories from case study research. **Academy of Management Review**, v. 14, n. 4, p. 532-550, 1989.
- ELFVENGREN, K.; KORTELAJAINEN, S.; TUOMINEN, M. A GSS process to generate new product ideas and business concepts. **International Journal of Technology Management**, v. 45, n. 3-4, p. 337-348, 2009. <http://dx.doi.org/10.1504/IJTM.2009.022657>
- FTSE. **Industry Classification Benchmark (ICB): Industry Structure and Definitions**. ICB, 2011.
- GAMLIN, J. N.; YOURD, R.; PATRICK, V. Unlock creativity with "active" idea management. **Research Technology Management**, v. 50, n. 1, p. 13-16, 2007.
- GESCHKA, H.; LENK, T.; VIETOR, J. The idea and project database of WELLA AG. **International Journal of Technology Management**, v. 23, n. 5, p. 410-416, 2002. <http://dx.doi.org/10.1504/IJTM.2002.003017>
- GORDON, S. et al. Improving the front end of innovation with information technology. **Research Technology Management**, v. 51, n. 3, p. 50-58, 2008.
- HESMER, A. et al. Supporting the ideation processes by a collaborative online based toolset. **International Journal of Technology Management**, v. 55, n. 3-4, p. 218-225, 2011. <http://dx.doi.org/10.1504/IJTM.2011.041948>
- HIPPEL, E. Lead users: a source of novel product concepts. **Management Science**, v. 32, n. 7, p. 791-805, 1986. <http://dx.doi.org/10.1287/mnsc.32.7.791>
- HÜSIG, S.; KOHN, S. Computer aided innovation: state of the art from a new product development perspective. **Computers in Industry**, v. 60, n. 8, p. 551-562, 2009. <http://dx.doi.org/10.1016/j.compind.2009.05.011>
- JAMALI, N. et al. Idea management system: planning. In: INTERNATIONAL CONFERENCE ON MANAGEMENT OF TECHNOLOGY, 15., 2006, Beijing. **Proceedings...** 2006. p. 1-10.
- KOC, T.; CEYLAN, C. Factors impacting the innovative capacity in large-scale companies. **Technovation**, v. 27, n. 3, p. 105-114, 2007. <http://dx.doi.org/10.1016/j.technovation.2005.10.002>
- KOEN, P. A. et al. Fuzzy front end: effective methods, tools and techniques. In: BELLIVEAU, P.; GRIFFIN, A.;

- SOMERMEYER, S. (Ed.). **The PDMA toolbox for new product development**. New York: John Wiley & Sons, 2002.
- KOEN, P. A. Providing clarity and a common language to the “fuzzy front end”. **Research Technology Management**, v. 44, n. 2, p. 46-55, 2001.
- KOSANKE, K. CIMOSA: overview and status. **Computers in Industry**, v. 27, n. 2, p. 101-109, 1995. [http://dx.doi.org/10.1016/0166-3615\(95\)00016-9](http://dx.doi.org/10.1016/0166-3615(95)00016-9)
- KRISTENSSON, P.; MAGNUSSON, P. R. Tuning users’ innovativeness during ideation. **Creativity and Innovation Management**, v. 19, n. 2, p.147-159, 2010. <http://dx.doi.org/10.1111/j.1467-8691.2010.00552.x>
- MARTINSUO, M.; POSKELA, J. Use of evaluation criteria and innovation performance in the front end of innovation. **Journal of Product Innovation Management**, v. 28, n. 6, p. 896-914, p. 1-19, 2011.
- MCADAM, R.; MCCLELLAND, J. Sources of new product ideas and creativity practices in the UK textile industry. **Technovation**, v. 22, n. 2, p. 113-121, 2002a. [http://dx.doi.org/10.1016/S0166-4972\(01\)00002-5](http://dx.doi.org/10.1016/S0166-4972(01)00002-5)
- MCADAM, R.; MCCLELLAND, J. Individual and team-based idea generation within innovation management: organisational and research agendas. **European Journal of Innovation Management**, v. 5, n. 2, p. 86-97, 2002b. <http://dx.doi.org/10.1108/14601060210428186>
- MILES, R.; SNOW, C. **Organisational strategy, structure, and process**. Stanford: Stanford University Press, 2003.
- NILSSON, L.; ELG, M.; BERGMAN, B. Managing ideas for the development of new products. *International Journal of Technology Management*, v. 24, n. 5-6, p. 498-513, 2002. <http://dx.doi.org/10.1504/IJTM.2002.003067>
- PAGE, A. L.; SCHIRR, G. R. Growth and development of a body of knowledge: 16 years of new product development research, 1989-2004. **Journal of Product Innovation Management**, v. 25, n. 3, p. 233-248, 2008. <http://dx.doi.org/10.1111/j.1540-5885.2008.00297.x>
- POSKELA, J. et al. The role of roadmaps in fuzzy-front-end phase of innovation process. In: INTERNATIONAL CONFERENCE ON MANAGEMENT OF TECHNOLOGY - IAMOT, 13., 2004, Washington. **Proceedings**.
- SPANJOL, J.; QUALLS, W. J. Q.; ROSA, J. A. How many and what kind? The role of strategic orientation in new product ideation. **Journal of Product Innovation Management**, v. 28, n. 2, p. 236-250, 2011. <http://dx.doi.org/10.1111/j.1540-5885.2010.00794.x>
- TERWIESCH, C.; ULRICH, K. Managing the opportunity portfolio. **Research Technology Management**, v. 51, n. 5, p. 27-38, 2008.
- TIDD, J.; BESSANT, J.; PAVITT, K. **Managing innovation: integrating technological, market and organisational change**. 3rd ed. Chichester: John Wiley & Sons, 2005.
- VERWORN, B. How German measurement and control firms integrate market and technological knowledge into the front end of new product development. **International Journal of Technology Management**, v. 34, n. 3-4, p. 379-389, 2006. <http://dx.doi.org/10.1504/IJTM.2006.009465>
- YIN, R. K. **Case study research: design and methods**. 3rd ed. Thousands Oaks: Sage Publications, 2003.
- VOSS, C. Case research in operations management. In: KARLSSON, C. (Ed.). **Researching operations management**. New York: Routledge, 2009. p. 162-175.