Building creative ideas for successful new product development

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The paper explores the relation between creativity, innovation and new product development. In this context, we claim that the development of innovative products benefits from the generation of a high number of creative ideas. Moreover, we argue that the idea generation process can be particularly fruitful within collaborative multidisciplinary environments, where firms and S&T institutions coexist and cooperate.
Our approach draws on existing literature to investigate the creativity and idea generation process within the frame of multisectoral and multidisciplinary cooperation initiatives, involving firms and S&T related institutions. We then call upon our own empirical work to identify conditions favourable to those processes and some issues that affect the fulfilment of the creative potential existent in groups of people. We will also explore methods to promote creativity and focus this creative potential on actual innovative solutions.

Keywords: creativity, innovation, new product development, multisectoral and multidisciplinary cooperation.

I. Introduction

Compelling, unrelenting and fast paced change puts enormous strain on today's business organisations. Creativity, innovation and the capacity to develop new products and services are becoming essential competencies to gain and maintain competitive positions. These activities are intimately linked to the optimization of knowledge flows, technology spillovers and the generation of creative ideas.

Many factors influence creativity, innovation and new product development, and this complicates the task of organisations that attempt to stimulate those capacities. They usually lack the resources and instruments to motivate knowledge processes and subsequent organisational innovation and they overlook management practices that would allow them to fulfil the creative potential of actual innovative solutions. This suggests the need for attitudinal and structural changes in order to overcome these strategic and organisational shortcomings.

We propose that multidisciplinary and multisectoral cooperative environments for innovation can provide credible answers to those challenges and promote the efficiency of the triad "innovation-creativity-new product development". Such environments, which often take the shape of cooperation networks, call upon a wide variety of knowledge and know-how from a multiplicity of actors and promote constant learning. This paper endorses collaborative multidisciplinary and multisectoral environments, where firms and S&T institutions coexist and cooperate.

We start by emphasizing the interdependency between creativity, innovation and new product development. We then identify and discuss the main factors that influence that triad in business organisations. We then justify the benefits of multisectoral and

multidisciplinary networks for innovation in the pursuit of creativity, innovation and product development.

The paper ends with the authors' experience with one of those networks. We summarize our involvement in a concrete case, in order to enunciate some management aspects of the creative process that we believe may be relevant to practitioners and academics in similar contexts.

II. Relationship between creativity, innovation and new products development

Today firms' and organisations have to deal with a permanent changeable environment, within which innovation and creative thinking have become vital competencies. Firms and organisations need to keep a constant flow of ideas if they want to compete through added value factors such as usage of emergent technologies and product quality and development (Kao, 1997). To keep ahead of competitors, in what respects innovative product development, firms' need to generate a high volume of ideas and translate them into commercial and technical successes.

The global explosion of computerization and communication capabilities is creating an overwhelming ripple effect on the nature of markets, the nature of work, and the nature of organizational structures. Essentially we are moving out of the industrial era of mass production and into an era of mass customization that is information and knowledge driven.

Competing in the technology marketplace in the 2lst century will require constant adaptation to shifting market demands. The most successful organizations will have an environment where creativity and innovation are occurring consistently at all levels of the organization and in all functions (Vicenzi, 2000). Any company that is not prepared to meet the varied demands of its potential customers is at risk of losing them to more agile competitors. In this challenging context, firms need to improve constantly their creative and innovative capacities.

Creativity and Innovation

To proceed with our discussion it is important to clarify the relationship between creativity and innovation. In fact there are many definitions of these two concepts in the literature and often they are used interchangeably (McAdam and McClellend, 2002; Martins and Terblanche, 2003).

The definition and assessment of creativity have been subjects of argument and disagreement amongst researchers (Amabile, 1996). Creativity has been conceptualized in a number of different ways in different fields (Im, 1999): (1) as the individual personality traits that facilitate the production of new ideas (Guilford, Mackinnon, Hirshman), (2) as the process of generating new ideas (Stein, Woodman, Shaw), (3) as the outcomes (products) of the creative process (Osborn, Gordon, de Bono), and (4) as environments conductive to engaging new ideas and behaviour (Csikszentmihalyi, Gruber, Amabile).

This variety of perspectives led to a multiplicity of definitions: creativity can be defined as the capacity to generate new and valuable ideas for products, services, processes and procedures, by individuals or groups in a specific organisational context (Martins and

Terblanche, 2003); for Sternberg (1999), creativity is the ability to produce work that is both novel (i.e., original, unexpected) and appropriate (i.e., useful, adaptive concerning task constraints); creativity is defined as the set of qualities of products or responses that are judged to be creative by appropriate observers (Amabile, 1996).

The lack of a single, integrated definition of creativity is explained by the fact that, like intelligence, creativity represents a complex and diffuse construct (Sternberg, 1999; Isaksen, Lauer et al, 2001).

The most straightforward and scientifically conservative approach to creativity is provided by the outcome perspective, focused on creative ideas, products, or programs, because it calls upon the most observable units which are least subjected to disagreement (Amabile, 1996). Yet the level of creativity output within an organisation is dependent upon the creativity of its human resources, being specific to individuals and dependent of factors such as their education, skills, imagination and working environment (Flynn, Dooley et al, 2003).

Innovation, in general terms, is associated with something new that leads to purposeful and actual change (Drucker, 1985). It can be regarded as an attitude that reflects the capacity to imagine what does not exist, to adopt novelty, to question routines and to scrutinize habits More specifically, it can be assumed as a process characterized by different stages that extends from an idea to its implementation. Earlier work by Joseph Schumpeter viewed innovation as “creative destruction” for growth (Abernathy and Clark, 1985).

Innovation can be defined as any new idea that recombines existing ideas, a scheme that challenges the present order, formula, or approach (Im, 1999). According to Tidd (Tidd, Bessant et al, 2001), innovation is the core process concerned with renewing what the organisation offers and optimising the way it generates and delivers its outputs.

Abernathy and Clark (1985) claim that innovation is concerned with the initial market introduction of a new product or process that either disrupts or entrenches existing competencies: whereas radical innovations disrupt and make existing competences obsolete, incremental innovation conserve and entrench existing competences.

In a simple way creativity is clearly identified with the generation of ideas whereas innovation implies the transformation of these ideas into a new product or service for someone to buy or use. We can thus argue that innovation is the implementation of the results of creativity. Thus creativity is seen as part of the innovation process, particularly relevant in the idea generation phases.

Within organizational contexts, creativity and innovation are highly relevant on individual, group, and organizational levels. It seems clear that a high level of creativity is a necessary (though not necessarily sufficient) requirement for innovation (Amabile, 1997). On the other hand, creative ideas must actually be implemented—that is, turned into actual innovations—in order to be of any real organizational use (Mathisen and Einarsen, 2004).

From ideas to products

Idea generation, at individual or team level, emerges as an essential component of creativity and consequently of the innovation process. The most innovative firms usually exploit various sources of ideas for new products as well as various means to process those new ideas. They need to stimulate employees’ imagination to feed the pipeline that nourishes the design and development of new products.

The idea creation phase (creativity) is usually much less costly than the later development stages of the new product development process. It thus makes sense to maximise its output by providing a larger number of ideas for further exploitation by the organisation (Flynn, Dooley et al, 2003). The basic rationale is "the greater the number of ideas at the start of the new product development process, the greater the probability of ending up with successful products".

The sources for innovative ideas are wide-ranging: customer complains, corrective action systems, unexpected occurrences, suggestion boxes, supplier developments, benchmarking studies, etc (Flynn, Dooley et al, 2003). Ideas can originate reactions to certain situations that compel the organization into action or they can originate proactive actions to exploit new opportunities (Amabile, 1997; Ekvall, 2000).

The idea generation stage is known as the fuzzy-front-end of the innovation process. It is fuzzy because the assessment of the novelty, feasibility and value of ideas is highly subjective and uncertain.

Efforts have been made towards the systematization of the generation and testing of new ideas, in order to add efficiency to the process. Idea generation and evaluation management systems are manual or computer-based mechanisms that assist management in capturing new ideas from different sources, evaluating them and decide on which ideas deserve further funding; it may include management components that allow quick access to pockets of knowledge and experience spread throughout the organization to help solve emerging problems (The Vancouver Research Group, 2004).

Flynn and Dooley suggest a methodology for idea generation and problem solving that comprises four different phases: (1) strategic direction, (2) environmental scanning, (3) opportunity identification, and (4) idea generation (Flynn, Dooley et al, 2003). The methodology covers the development of an idea from goal alignment and recognition of opportunity to its final definition.

Selected ideas flow through the "funnel" of innovation. During this process they become constrained and aligned by factors such as organisational goals, models of change, teams and resources: the further an idea progresses through the funnel, the more developed and precise it becomes. The most suitable ideas are approved for implementation, while others are reworked, rejected or merged to re-enter the process again (Cagan and Vogel, 2001).

The complete innovation process may be divided into three main stages: the fuzzy front end (FFE), the new product development (NPD) and commercialization. As we have seen, the FFE comprises activities that come before the more formal and well-structured NDP process: the activities are often chaotic, unpredictable and unstructured (Koen, 2004).

Once a clear-cut concept emerges from the FFE and enters the NPD phase, it is usually subjected to much more strict development methodologies (for example, the traditional stage-gate process); many companies consider the FFE ends with the creation of a business plan, which includes the product specification, financial analysis and project management plans (Kahn, 2004).

More than nurturing geniuses, organizations have to concentrate on managerial aspects and attitudes if they want to innovate constantly and successfully. In fact, this has much to do with creative use of knowledge and recombination of existing ideas than the invention of a completely new concept (Hargadon, 2003).

We have seen that the creative capabilities of organisations are essential to their ability to innovate and survive in today's competitive environment. We have also seen that creativity, innovation and new product development are intimately correlated. In the next section we will look into the determinants of creativity and innovation within an organisation.

III. Factors that influence the creative process for NPD

In the previous section, we have emphasized the interdependency between creativity, innovation and new product development (NPD) activities and the importance of this triad to promote firms' competitiveness. We will now focus on the factors that influence those activities in organizations. These factors are either exogenous or endogenous.

Exogenous factors are mainly related with the intensity and density of relationships that organizations establish with their surrounding environments. It is well known that the external environment for innovation within which organisations operate includes the institutional support basis and relevant sets of values and norms (Freire, 2000; Cooke, 2004; Galanakis, et al, 2000). We argue that creativity and NPD are subjected to similar frameworks.

In fact, firms do not generally innovate alone. Their capacity to innovate and to develop creative ideas and new products depends on their interaction with other firms and organisations, such as customers, suppliers, research institutions, public and governmental organisations, etc. (Szeto, 2000, Carlsson, 2003, cited in Alves, et al, 2004a).

The external environment for innovation plays a crucial role in the supply of new product ideas, knowledge and technology. It provides the critical mass required for knowledge spillovers and synergies that favour creativity and innovation processes and new product development.

Generally, organisations have little capacity to actively influence the evolution of external factors (Freire, 2000; Alves, 1998).

On the other hand, endogenous factors are strictly related with the internal characteristics and organizational culture of firms and, thus, are more easily controlled. We can say that they should be the focus of firms' strategic and operational management in pursuing innovation objectives.

The literature we have reviewed points out six main internal factors that impact on firm's competitive position through creativity, innovation and new product activities.

1. **Organisation strategy and resources availability**

   Organisational strategy reflects the priorities and values of organisations and consequently impacts on creativity and innovation (Martins and Terblanche, 2003; Galanakis, et al, 2000).

   The explicit incorporation of innovation in the goals and objectives of an organisation is the first step in the creation of attitudes amenable to creativity and the continuing development of new products.

   Innovation oriented organisational strategies increase the quantity and quality of long-term innovation objectives and perspectives (encouraging risk taking and new

idea generation) and of short-term project plans devoted to concrete innovation initiatives and creative problem solving.

Goal clarity and open interaction between supervisors and subordinates help employees to adjust their attitudes to the organisation's objectives and to act in a creatively and innovative manner (Martins and Terblanche, 2003; Rodriguez, 2002).

Time, money and people allocated to new ideas and innovative projects contribute to the effective application of the strategy (Freire, 2000; Damanpour, 1991, Delbecq, 1985, cited in Rodriguez, 2002).

In sum, the existence of an explicit strategy and the availability of resources may promote innovation, creativity and the development of new products.

2. Appropriation of new technologies

Technological capabilities are crucial for firms that want to develop concepts leading to new products or processes and subsequently to successful innovations. This usually requires the development of new technologies or the adoption and creative adaptation of existing ones (Alves, 1998). Appropriation "measures" the extent to which the technology is assimilated in the firm's design, development and production processes. The benefits from using a given technology increase with the degree of appropriation.

Firms able to develop new technologies have total appropriation and can gain real competitive advantages through innovative product developments. This requires R&D capacity and willingness to invest in high risk ventures, two attributes in short supply amongst firms (Alves, 1998).

Alternatives to in-house technological developments include joint projects with other organisations, e.g. firms and S&T institutions. The appropriation of the technology is proportional to the involvement of the firm in the development process. The cooperation with universities is promising. Firms can access otherwise unavailable resources and competences, gain long-term innovation perspectives, get support in creative problem solving and idea generation activities and share costs and risks inherent to innovation processes and new product developments (Marques, et al, 2005a; OECD, 2001; Alves, 1998; Nieminen and Kaukonen, 2001).

We can argue that those who perceived the importance of innovation and have the necessary agility to absorb new technologies through cooperation, involving other firms and universities, are better prepared to carry out organisational changes that favour creative practices and product and process developments.

3. Research and development intensity

A research and development focus is important to stimulate creativity (Rodriguez, 2002; Galanakis, et al, 2000).

Research intensity follows the resolve of an organization to spend resources on idea generation and innovation and product development as well as their propensity to cooperate with universities and others organisations to foster technological developments and innovation activities.

Intensive R&D processes imply well-functioning communication channels both internally and externally, as access to existing knowledge is crucial for these processes. Peoples' attitudes and behaviours towards R&D are also key factors for

its success and this requires the stimulation of ways of working and thinking suitable to innovative organizational cultures (Galanakis, et al, 2000).

However, as previously implied, firms rarely benefit from organisational structures with sufficient flexibility and agility to face and take advantage of these challenges.

4. Organisation culture and communication

The basic cultural elements of an organization, such as routine behaviours, shared values, beliefs, etc. do influence the level and frequency of creative occurrences and impact on the free flow of ideas that favour innovation (Galanakis, et al, 2000). Culture aspects of an organisation significantly affect workers' knowledge and satisfaction, their capacity to communicate and experiment, as well as the capacity to adapt to changes and to learn continuously.

Hussey (1997, cited in Galanakis, et al, 2000) argues that culture shapes the organisational atmosphere, which in turn affects creativity, innovation and product development.

Openness (based on trust) and dynamic contact between individuals, teams, departments and functions facilitates the acceptance of new perspectives and ideas and is, thus, a particularly relevant trait in organisational cultures able to stimulate creativity and innovation (Barret, 1997, Robbins, 1996, cited in Martins and Terblanche, 2003; Mumford, et al, 2002).

5. Organisation structure

Attempts have been made towards the identification of the organisational structures that influence creativity, innovation and product development (Ashkenas, et al, 1995, Nadler and Tushman, 1997, Mintzberg, 1995, cited in Galanakis, et al, 2000; Martins and Terblanche, 2003).

Flexibility (eg, job rotation programme) and freedom (manifested in autonomy, empowerment and decision making) in organisations are values and practices highly regarded in the innovation literature (Martins and Terblanche, 2003; Galanakis, et al, 2000; Mumford, et al, 2002).

Working teams and interacting groups impact on the ability of organizations to stimulate creativity, innovation and product development activities (Clark and Fujimoto, 1991, cited in Fong, 2003). They provide conditions for a fluid and dynamic mixture of ideas and ways of work and make available complementary competencies and disciplines that favour creativity and innovation. The existence of working groups especially devoted to new product development and R&D is positively related with the innovation capacity of an organisation (Marques, et al, 2005a; Alves, 1998).

The success of team work depends of the characteristics of its elements in terms of skills but also of shared values within the group.

Galanakis and others (2000) state that *"the innovative organisation allows the free communication of ideas and the interaction, formal and informal between the employees of all the teams and all the levels of the organisation"*.

6. Employee motivation and involvement

The quantity and quality of human resources allocated to innovation initiatives is crucial to the success of creative ideas. Employees often feel they "own" new ideas and they are keen on carrying them from an embryonic phase to implementation and

product launch. They create ideas and develop them into new products and processes.

Suitable stimulus and motivation of employees intensifies the generation of new ideas and helps to focus efforts on product development projects and innovation objectives. This is strongly influenced by: i) how experiments and risk taking are managed; ii) how ideas are evaluated; iii) how mistakes are handled; iv) how change is managed; v) how communication is supported and stimulated, vi) how ideas generation and identification are conducted, vii) how compensation and reward systems are established, etc. (Alves, 2005; Martins and Terblanche, 2003).

These factors suggest the relevance of strategic and operational management capacity to induce structural attitudinal changes that reinforce creativity, innovation and product development.

The features pointed out in the literature emphasize values and characteristics that the majority of the business organisations, and particularly those involved in the activities that support the empirical work that we analyse in the final sections of this paper, do not possess. In other words, our specific case is based on firms that are not exceptional in their capacity to promote creativity, innovation and new product development.

In our empirical case we have found out that multidisciplinary and multisectoral cooperation environments for innovation can help firms overcome their strategic and organizational shortcomings. In the next section, we will look briefly at the characteristics of those environments.

IV. Multidisciplinary and multisectoral cooperation environments for innovation

By multidisciplinary and multisectoral cooperation environments we mean settings, formal or informal, that bring together people and organisations from different entrepreneurial sectors that master different disciplinary competences. These milieus connect actors from complementary functional areas or sectors, involving both the industrial fabric and the S&T institutions, around common goals (Alves, et al, 2004a).

The linked organisations combine multidisciplinary competencies and localized complementary productive activities, integrating the diverse knowledge sets and skills needed to create and bring to the market more complex technologies and products (Rycroft and Kash, 2004). They benefit from the physical proximity of their members (facilitating the exchange of knowledge rooted in individuals) and constitute excellent grounds for the provision of the knowledge base required for major innovations (Alves, et al, 2004a; OECD, 2001, cited in Marques, et al, 2005b).

The singularities of such organizational structures for innovation can be synthesized into three main dimensions as source of collaborative activities: diversity (of actors and competencies); coherence (respecting the integration of complementary activities) and interactivity (strong cooperation relationships).

When successful, these multisectoral environments play important roles for firms and organizations characterized by few cooperative processes and low innovation profiles. They offer opportunities for business leaders to change their company cultures towards continuous innovation and to higher levels of interconnectedness.

The participation in cooperative environment, gathering firms from different sectors and S&T institutions, helps to create supportive conditions for creativity, innovation and new product development, in the long run. This type of organisational configuration often takes the form of multisectoral networks of cooperation.

When innovation is a strategic priority, such solutions reinforce the creative competencies that sustain future developments in the networked organisations. Multidisciplinary and multisectoral cooperation focused on innovation provides higher creative potential and greater product development capacity. They also allow for new and rich combinations of otherwise disconnected pools of ideas. The propensity to develop valuable and more radical ideas (due to knowledge diversity) and to achieve solutions adjusted to the increasing complexity of problems is higher when compared with what happens in mono-disciplinary and mono-sectoral environments.

Multi-sectoral and multi-disciplinary environments call easily upon diverse knowledge bases (technical, scientific, commercial), which can only be integrated when a number of experts combine different knowledge sets through their physical proximity (OECD, 2001; Marques, et al, 2005b). This is particularly relevant when radical innovations are called for.

Multidisciplinary and multisectoral cooperation networks may promote creativity, innovation and new product development if actors involved learn how to transfer knowledge and how to maintain linkages and motivation (Powell, et al, 1996; Von Hippel, 1988, cited in Williams, 2005).

V. Creating and taking advantage of new ideas: empirical aspects

In the previous sections we discussed the correlation between creativity, innovation and new products and the main factors that influence them. We also pointed out that multidisciplinary/multisectorial environments may provide interesting frameworks for organizations that do not benefit from the spontaneous presence of these factors.

We will now look into a concrete, tangible case, and we will identify management aspects of the creative process that may be relevant to practitioners and academics. The case is based on a six years old multisectoral network for innovation, focused on the habitat meta-sector (Alves, et al, 2004a; Alves, et al, 2004b, 2005; Saur, et al, 2005).

It is important for our analysis to refer that the medium-term aims of this network lay on conceptual and technological developments in the habitat field and that there is a strong focus on highly innovative new product developments. Another key aspect for our analysis involves the nature of network participants, which include a university and a dozen companies from various sectors. The representatives of the network members may be divided in three main categories: top management; management, coordination and logistics elements; and scientists and technologists experienced or interested in the network's theme (the "House of the Future").

This network promotes idiosyncratic innovation approaches. As the cooperation is rather recent, few network members (i.e. organizations) have experience in developing radically innovative products conjointly (in a multisectoral ambiance). There are no precedents that create restrictions on creativity, no previous failure or success to determine "best" paths to be followed. This is, certainly, a good opportunity to define

original approaches to multisectoral and multidisciplinary innovation in complex environments.

Through our hands-on experience, we were convinced that this multidisciplinary / multisectoral environment provides excellent conditions for the development of creative processes. The combination of distinct mindsets, working styles and interests has provided a fertile ground for creativity in the various phases of the new product development. So far, we have worked on:

1. Generation of new ideas;
2. Idea classification and selection;
3. New (product) concept generation.

Generation of new ideas

We have promoted the generation of new ideas for the House of the Future and subsequent products for dwellings through formal creativity sessions with participants in network's activities and ad-hoc suggestions from a wider audience. We will next focus on the systematic, organized creativity sessions.

We were faced in 2002 with the challenge to generate a large number of different ideas, since we subscribed to Linus Pauling[1] notion that the best way to have good ideas is to have many. Brainstorming came to our minds as it is a well-known technique (Osborn, 1957; Brown, et al, 1998; Paulus et al, 2002). We needed to apply the technique with independent groups, in the academia and firms, as there was little interaction at that time between the operational levels of the university and firms.

We analysed the theory and learnt about the inner dynamics of brainstorming sessions. From the "rules" of brainstorming, we understood that it was important to proceed to a careful selection of participants in the sessions, ensuring high heterogeneity, both in terms of hierarchical levels and in terms of functions/disciplinary areas involved, whilst ensuring a number of participants easy to handle and creative enough (experience suggests between 10 and 20 people). We therefore took advantage of the multidisciplinarity of the academics involved in the project and, from nearly 80 interested individuals, we set up five groups of 12 to 15 participants, ensuring the highest heterogeneity possible. Five creativity sessions were held in the university in a time frame of two months. The productivity improved from one session to the next. At the end of this exercise, we had a total of 700 ideas in our portfolio.

After each creativity session, we used to do an evaluation of how things went. This type of debriefing was essential to improve our technique and to get more from future sessions. Phrases like "I wish the next sessions were different […], rhythm was low and we got too abstract ideas […] we need to change something" were common, meaning that we were looking at constant improvement.

This led us to try different approaches, testing what seemed appropriate for each particular situation. The debriefings indicated that success increased whenever the session manager was more dynamic, more enthusiastic: "the posture of the session leader was more dynamic, more active, the way in which he stimulated the participants may have been the main success factor of this session".

[1] See (Linus Pauling – Scientist for the Ages, The Linus Pauling Institute) for bibliography of Pauling, Nobel Prize laureate.

One of our concerns was that, during brainstorming sessions, ideas were generated quickly in the beginning, but after the initial enthusiasm (which usually lasted for 20 – 25 minutes), the flux was blocked and the last half an hour was not very productive. We also noted that participants acted differently: some would get into the spirit faster and be very verbal; others would remain reserved and quiet. Theory had prepared us for this: brainstorming was said to favour extroverted participants; on the other hand, brainwriting (VanGundy, 1983; Rosenau, 1996) seemed to be able to overcome the timidity of introverted individuals. Therefore, we tested a mixed session, starting and keeping with brainstorming for 20-25 minutes and continuing afterwards with brainwriting. This turned out to be very successful.

At the same time we were conducting similar exercises in some of the network firms. These exercises were strongly focused on the professional inclinations of each company. We could not choose the participants, so from this perspective we had to rely exclusively on the capacity of the session leader to simulate the group. We witnessed the same phenomenon as in the academic brainstorming sessions in terms of creativity levels, yet the number of ideas was smaller and with lower levels of innovativeness. We believe the reasons can be found on the lower heterogeneity of the groups and on the more pragmatic, market-orientated focus of entrepreneurs and of their employees. Nevertheless, we ended those sessions with more 320 ideas.

Management implications

Our experience shows that, first of all, it is important to prepare carefully the creativity sessions, namely taking care that all materials are available, ensuring that all people know where to come, sending reminders before the sessions. Furthermore, the organizers need to ensure that individuals invited will be present. This is particularly relevant in multi-organization environments, as was our case, where participants may be ready to cooperate, yet do not feel direct responsibility for final results and thus may assign low priorities to the brainstorming/creativity sessions.

Second, it is important to have an enthusiastic and active session leader, able to overcome the initial reserve of some participants, but firm at the same time in order to keep the exercise on track. In our case, the presence of a charismatic leader helped by two active assistants helped create a good climate for creativity. This also helped us overcome the shortcomings of the homogeneity of groups in some of the firms.

Third, it is important to do a close follow-up of the creativity sessions and identify good and bad features, in order to improve continuously the overall process. In this context, the opinion of the participants is important. Using systematically this type of follow-up, we were able to improve our sessions as the global creativity exercise unfolded.

Fourth and last, it is useful to know a variety of creativity techniques and to be prepared to test their combination in actual creativity sessions. It is important to combine them in such a way that the limitations of one can be compensated by the advantages of another.

Idea classification and selection

After the idea generation exercise, we were wondering about what to do with such a large portfolio. We started by arranging all ideas according to criteria like: function performed, room where the idea could be used, organization that could take advantage of the idea, degree of innovativeness, feasibility etc. We assumed that different organizations would look into the list from different perspectives and that this

arrangement would increase the usefulness of the portfolio in this multidisciplinary and multisectoral environment. Note though that we were not aware of what perspective would better suit one particular organization's understanding. We sent the list to the firms, hoping that they would use it to select the new products they wanted to develop. This did not happen.

We looked for convergence techniques in order to reduce the number of ideas, using more analytical or logical approaches. Two of them attracted our attention: Evaluation Matrix (Rosenau, 1996) and Stoplight Voting (Chauvel, 2004). We assumed that Stoplight Voting would be less appropriate in professional environments due to its apparent lack of rigour. So, we focused on the Evaluation Matrix technique.

Each firms was asked to participate in a convergence sessions in order to decide upon the products to be developed for the House of the Future. We confronted the firms with a selection of ideas that seemed more in line with their interests and competences (we selected those ideas ourselves, using stoplight voting and evaluation matrixes). Firms brought to these sessions top managers and elements from their development, production and marketing departments. We described the Evaluation Matrix and the technique was well understood and appreciated. However, we never had the opportunity to actually apply it to real circumstances. An interesting phenomenon occurred: in spite of the apparent faith in the quality of such a decision-support tool, the participants adopted instinctively intuitive decision process, analysing the list and making spontaneous choices using their own strategic perspectives.

The main objective of the convergence sessions was nevertheless attained. Our sensation based on the feedback obtained from the firms and from our own debriefings was that the Evaluation Matrix was a tool too systematic for the job at hand. The participants were able and accustomed to take decisions spontaneously.

Management implications

First, it is important to present a reduced number of ideas, previously selected, to decision-makers. A large number of ideas would have complicated the final decision process.

Second, it is important that these previously selected ideas be obtained as a result of a sound back-stage process, using systematic convergence techniques in order to ensure the quality of results. However, intuitive approaches may complement more reflexive ones. This helped us in the convergence sessions, since decision-makers were comforted by knowing that the selected ideas were chosen through rigorous, "scientific", approaches.

Third, it may be useful to choose convergence techniques closer to the entrepreneurial culture, more in tune with its normal decision-making style. Otherwise they may be rejected or ignored.

New (product) concept generation and selection

After the initial phases of generation and selection of ideas, we had to pass to the more concrete stage of new product definition and development. This is a recent activity in our project, so the developments in this area are rather incipient and conclusive results are not yet available.

We approached the new products definition phase by trying to integrate into encompassing products some of the ideas that have survived the selection phase. This required that those ideas should evidence some conceptual proximity. This was facilitated by the arrangement of ideas according to specific criteria, as was described above on the subject of ideas classification. For example, some ideas were classified as being relevant for "kitchen, cooking", and these could provide a sound basis for a product that we could call "kitchen of the future". We could then propose a kitchen concept to the associates with direct and indirect interests in this topic, which would then be reconfigured according to their intuition, concerns or organizational strategy.

Then, more focused creativity sessions took place for each defined characteristic of the "kitchen of the future", organized for the benefit of the new product development team[2]. First in informal ambiance and then in organized brainstorming/brainwriting sessions, new ideas/solutions for e.g. how to move a kitchen anywhere inside a house, were generated, complementing the initial ideas and helping specify the product and better define the concept. One such organized creativity session led to more 170 ideas, 37 of which survived after a first classification and evaluation. Systematic evaluation will follow, using the Stoplight Voting technique or the Evaluation Matrix.

Management implications

This phase is still ongoing, so we can only advance some preliminary observations.

First, we believe that it is advantageous to create product concepts by integrating ideas obtained in prior creativity sessions carried out at higher levels of abstraction.

Second, we believe it is important to maintain space to intuitive approaches, in order to add to ideas from previous creativity sessions. This allows for new suggestions to be accommodated and it ensures the new product development process is open to changes in any of its phases and particularly in its fuzzy-front-end.

Third and last, we believe it is important to complement the initial ideas with new, more focused, creativity sessions and selection processes, in order to allow a better specification of the products to be developed and to allow a better evaluation of risk and execution capacity.

[2] The new product development team is developing highly innovative new products, with multisectoral characteristics […] and surpassing the selfish interests of network members. Five multisectoral teams were created, each coordinated by a network leader. They share a core group of six people that work full-time in the project. In each team, this group is complemented, on a part-time basis, by people from network organizations (Saur, et al, 2005).

V. Conclusions

Our paper looks at the path that goes from idea generation to product development. It reports on work-in-progress, and so some of the conclusions are still preliminary.

In the second section, we delineated the intimate relationships between creativity, innovation and new product development. We resorted mainly to references to the extensive literature on those topics.

In the third section we investigated the main factors that influence the capacity of firms to promote the triad “creativity – innovation – NPD”. We suggested that unexceptional firms do not control efficiently the majority of those factors. We then argued that multidisciplinary and multisectoral environments may help firms overcome strategic and organizational deficiencies that lie behind that incapacity.

In the fourth section, we described the practical approach that we have followed to manage the idea generation and selection processes in a multidisciplinary and multisectoral network. We have also indicated the first steps undertaken to initiate the “new product development” phase. We have extracted from our experience some management implications that might be useful for researchers and practitioners in this field of activity.

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