Analysing the Conditions of Emergence of Innovative Projects: Evidence from Upstream Stages of the N P D.

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Abstract:

This paper aims at investigating of the upstream and usually hidden stages of the new product/service development projects. Identifying the main stages and actions leading to a formal launch of the project is of first importance for companies willing to detect innovation opportunities and raise initiatives. The process of emergence of the innovation as well as the organisational features which condition them are reviewed and applied to an in depth case study.

As the initial stages are based on individual and group learning, the organisational factors which could facilitate or prevent the emergence of innovative projects are linked to the structure of the company (organic, organisational slack, etc…) and to the culture (learning and innovation culture, etc…). Recommendations for managers and for further research are provided for creating the conditions of the emergence of innovations at the organisational level.

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Introduction

This paper aims at the investigation of the upstream and usually hidden stages of the new product/service development projects. Identifying the main stages and actions leading to a formal launch of the project is of first importance for companies willing to foster the innovation capacity of the company. To do so, we intend to investigate what could be the process of emergence of innovation during the upstream stages of the innovation and from this process, we will propose first hypotheses on the organisational features which could support those first stages. Hypothesis will be compared with the first results of an in depth case study.

Upstream Stages of the N.P.D.

When new product/services development (NPD) is concerned, the attention of researchers is usually focused on the management of the project once it is started. After its official birth, the composition of the team, the number of stages, their content and the learning processes were among other identified as having a direct impact on both duration, costs and sales potential (Brown, and Eisenhardt., 1995;Easingwood, and Storey, 1995;Tidd, 1995;Bitran, and Pedrosa, 1998;Edward, 2000;Rajesh, 2000;Jeffrey, et al., 2001;COOPER, 1990). Having structured development projects entails however that they emerged at some time of organisational life, which put the conditions of emergence of project as being determinant for the innovative capacities.

However, the early stages of the process are less known. What happens before the project is officially given objectives, time and resources is not clearly addressed by research. It is usually said that innovative projects emerge from the ongoing flows of activities. Many reasons may explain this relative lack of interest. First, due to the low level of resources used for doing the first assumptions and experimentations, managerial and research attention remains low. Second, during its upstream stages, the development is often leaded by informal networks of people, making difficult the accountability of design efforts. Third, as the projects are not planned at this stage, individuals working on them may be considered as diverging from the organisation and by so being endangered. Time spent is taken out of the existing projects and development efforts may be perceived by management as disturbing the cohesiveness of the organisation. Not surprisingly, very few research addressed the upstream stages of the NPD. Two perspectives are usually adopted when those stages are concerned.

Following Durieux (2000), it may be considered that multiple projects constantly emerge from day to day activities, resulting from individual initiatives. Some of them results from planned actions and strategies, the other being leaded informally by employees. All projects are viewed as competing for getting access to the resources with, as consequence, the emergence of some of them. Only the one which fit with firm's strategies, or with markets conditions are due to get enough resources to emerge as official development

projects.

At the opposite, the initial stages, very often addressed as front end activities, may be considered as managed by people and not as emerging from day to day activities. Following the initial work of Khurana and Rosenthal (Khurana, and Rosenthal, 1997;Khurana, and Rosenthal, 1998, Kim and Wilemon, 2002), the front end may be defined as encompassing all the activities that occur before the first decisions go/no-go are taken by management. Opportunity identification, idea generation, product strategy formulation and initial assessment are identified as having a deep impact on the final development outcomes.

Even though the assumption that management has to improve this stage as the later, researchers added the concept of fuzziness to this part of the development in reference to the high level of uncertainty encountered by teams. Technological uncertainties, poor definition of the product specification with, as consequence, a low level of knowledge on the client's preferences are impeding the identification of the main issues of the up coming development (Gupta and Wilemon, 1990). The way development teams are managed during this stage is also considered as a major issue as, in context of high ambiguity, the involvement of internal actors (senior groups, functional groups) and external actors (clients, providers, etc…) is difficult to be achieved (Kim and Wilmeon, 2002).

Following this statement, researchers and consultants developed tools for dealing with the different tasks identified during the stage. Divergent ideation, like the one proposed by De Bono (1986), development tools like the House of Quality (Akao, and Mazur, 2003) and the involvement of lead users in the initial stages (Von Hippel, et al., 2006a;Von Hippel, et al., 2006b) constitute among other some leverages used to succeeding this stage.

Any of the two perspectives is enough for explaining the way projects are emerging. In the first perspective, the early stages of the projects are made of random trial and errors, resulting in the allocation of resources for the most adapted initiatives. Even though it makes no doubts that the access to resources conditions the progress of projects, this stream of research tells nothing on the way the projects may fit the required specificities. The second stream of research may explain the way the first stage is leaded. However, if those contributions make sense when the projects are officially created by an organisation, they have not investigated the reason why a project was decided. In other words, the stages that occur before the official birth of the project are not known or even investigated. Multiple reasons may explain this lack of research.

First, the definition of the official birth of a project is not necessarily easy to define. Even though no definition was provided before, it could be assumed that, at minimum, three main components may turn informal developments into an official project. A specific allocation of resources, time or budget devoted to produce identified efforts is the first condition. The second condition is made of the creation of a team, made sometimes of just a team or a project leader, in charge of defining and leading the actions identified for the achievements of the objectives. Underlying the first two aspects, the explicit

formulation of an objective to achieve should constitute the third condition. Even if at this stage it may not be possible to formalise clearly the result expected, the formalisation of a direction, of a guiding vision or even of some reduced set of instructions may be considered as the condition for concluding to the existence of a new product development project. As the three conditions are not necessarily due to happen at the same time, the question of the occurrence of the NPD projects were not mentioned in previous research.

Second, the upstream stages are due to be more or less informal. As projects are not already defined, the idea that the organisation may be willing to achieve results in a specific area should not be considered as a guiding principle. During the upstream period, the organisation is not already aiming at finding a specific solution to an identified problem. Staff has not even given sense to certain events in a way that makes an innovative project a potential solution or a way to address specific issues. This creates a tremendous challenge for research project. Analysing the emergence of events requires to be at the right place to observe something that is not already known or even given sense by the participants. The likelihood of observing the right events is by so very low.

Third, the upstream period provides very few opportunities to link specific actions to success or failures. As innovation projects will be orientated downstream through multiple action plans by multiple actors, the links between the upstream and downstream events are difficult see impossible to establish formally. This means that establishing the cause/effects links may be demanding see impossible most of the time.

Fourth, the managerial perspective adopted by the mainstream of NPD researcher, probably due to the reasons mentioned above, resulted into efforts on the formal development process itself, with the underlying purpose to demonstrate that the nature of the stage, its content, the expertise associated to it may explain reasons for success. Considering the beginning of the development process is not an easy task. For example, Cooper (1994)1 contributed to the idea that one success factor relies on the generation of ideas and on their initial screening. This approach entails the existence of people having the purpose, time and budget devoted for new ideas generation. As this kind of results entails having taken initial decisions to allocate resources to specific purpose, it cannot be considered as the first stage of the development process. As result, the description of the first stages are very elusive. Most of the time, it is often naively asserted that creativity techniques may foster innovation (Haapasalo, and Kess, 2002;Andrew, and Leon, 2004;Subin, and John, 2004;Baker, and Nelson, 2005). Many reasons lead to reconsider this assertion.

First, any organisation is keen on spending time and budget if good reasons are not provided. This entails a first “non official” stage were information will be gathered and proceeded so that a decision may be taken based on some rational. Second, the NPD is considered in itself, without integrating the political involvements associated to it. Succeeding a specific project present both opportunities for some managers and threats for other. This means that in

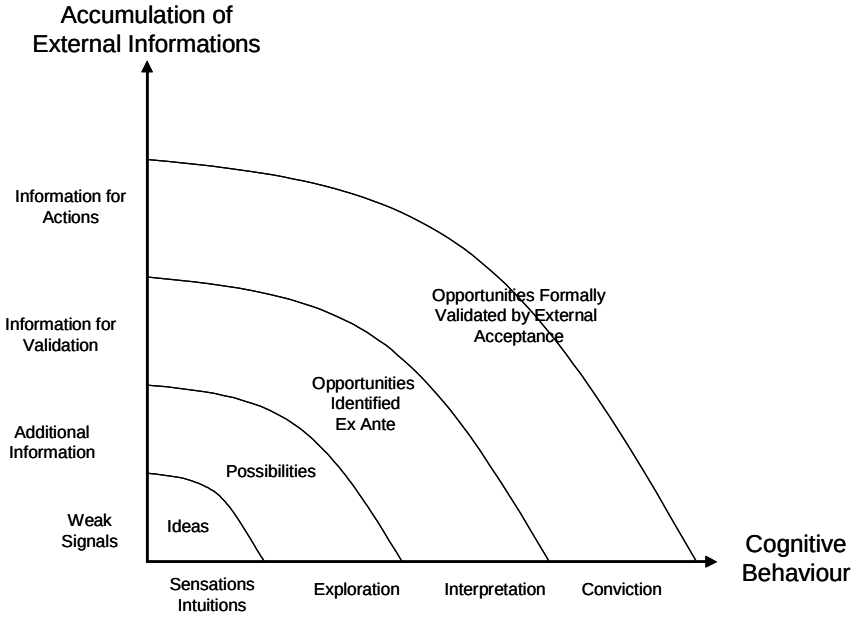
[1] COOPER, R.G., (1994), Winning At New Products, Addison Wesley Publishing Ed.

the decision to open a NDP, advantage will be given to the people who already produced ideas and first informal experiments which will be used to get the initial approval. Third, the NPD are collective processes. Getting an initial approval is likely to be the result of sharing assumptions with influential people. By so, even though the project seems to be emerging and to start with some kind of official birth, it should be considered that it was already underway and that its purpose and content is strongly conditioned by those initial conditions.

Due to this first analysis, our initial assumption is that the early and informal stages contributes to the official birth of the project and by so to the capacity to innovate. By creating the initial conditions of projects, the upstream and hidden stages of the project could strongly impact on downstream decisions. Understanding the conditions by which new projects becomes officially supported by organisation is therefore of first importance. In contrast to this assumption, few empirical studies have been conducted on the generation of projects.

It is broadly accepted that NPD are achieved through a learning process (Cohen, and Levinthal, 1990;Gary, et al., 2003;Allan, 2004;Chanal, 2004). However, in the upper part of the process, learning is due to occur with low levels of budget and time. It means that the individual have to transform the weak signals they perceive from their environment into formalised set of managerial decisions, in other words into an opportunity for innovation. Initiated by Ansoff (Ansoff 1975, (Ansoff, 1990), the model provided by S Blanco and C Genet (Ansoff, 1975;Blanco, and Genet, 2004), underlined that this process is conditioned by two dimensions as described in fig n°1: the first one is the accumulation of knowledge at the individual level and the second is made of social interactions.

Fig n°1: Identification of Opportunities by the Amplification of Weak Signals (Source S Blanco and C Genet, 2004)



The emergence of an innovative project appeared to be strongly anchored in the organisational sensemaking processes (Weick and Roberts, 1993). During the achievement of the operational tasks, the individual produces an ongoing flow of interpretations. The interpretation process unfolds right through the development process and occurs each time an event, a piece of data or an action remains uncertain. At the opposite of the routines --- the recognition of a given context triggers a learned answer --- uncertainty means that no fast and previously learned answer may suit the context. As result, a strong cognitive activity will produce many options of what could be the appropriate behaviour --- this action should produce this result ---. The production of an innovation could be defined as this creation of new causality links. Re-interpreting means that the individual either admits or is obliged to adapt their way of thinking about reality. This corresponds to the creation of knowledge which aims at reducing the degree of uncertainty.

Accumulation of knowledge is achieved through specific behaviours, usually associated to learning like production of inference, testing them through the mean of informal and formal conversations, getting information related to specific problems from inside or outside sources (Lane, 2001;Stevens, and Dimitriadis, 2004). However, the accumulation of knowledge realised at the individual level would be of limited effect when not shared. Due to the low level of means expected in the early stages of the development, it is suggested that the existing formal and informal networks may have an impact on the innovative process by opening possibilities for accessing to the appropriate information, or even testing part of the assumption at low costs. By selecting the required competencies, by integrating new members, by avoiding the exclusion of members who must provide an important contribution and by supporting informal communication and mutual adjustments, it should be possible to support and select among the initial intuitions and nurture one which offers the best potential.

The organisational dimension of the accumulation of knowledge leads to the crucial importance of the organisational design on the emergence of innovative projects.

Factors that supports the early stages of the process.

The research in strategy underlined factors that support or prevent the emergence of innovation. Three levels, inter-organisational, organisational and individual are usually identified. Each factor will be detailed and will be used for the production of hypothesis.

Inter-organisational level.

Very early, research on the source of innovation emphasised the determinant role played by providers and clients (Von Hippel, 1988 ; Durand, 1999). Handfield et al. (1999), investigating the way Chrysler developed its models Circus et Dodge Stratus, revealed that the providers played a major role in the design of new cars. In a similar approach, Von Hippel (1988) demonstrated that the users are one of the most important source of innovation. Their research, leaded in the sector of scientific instruments on 111 companies,

revealed that 77% resulted from the client's contribution.

Those findings put the emphasis of the inter-organisational dimension of innovative processes. Inter-firms relationships established with the providers or clients and even sometimes with competitors are identified as a factor which can stimulate or inhibit the emergence of innovative projects as asserted by Tether (2002). Investigating the inter-organisational networks, Kogut (2000) underlined the existence of network capabilities. Those capabilities consist in the ability to access to efficient actors and resources located outside firm's borders by using existing inter-organisational social networks (Sobrero et Roberts, 2002). By providing multiple interactions with the environment in which organisation is embedded, inter-organisational social networks are providing information and signals that will be used for initiating or stimulating projects. Moreover, this sensitiveness to external environment provides access to external knowledge which will be then absorbed by firms and converted into emerging innovation (Cohen et Levinthal, 1990).

Extrinsic capacities of firms are duofold. Rowley et al (2000) distinguished Structural Embedness and Relational Embedness. The first one is defined through density and heterogeneity of the links between the members of the network. According to this definition, a high interaction level (density) on varied and rich topics (heterogeneity) results into an efficient network according to Reagan and Zuckerman (2001). In such a case, the high level of coordination between members upholds a high information transfer. By this mechanism, structural embedness is due to contribute to innovation by increasing the level of information available and by so the learning capacity. The relational embedness refers to the quality of the relation between two individuals. As example, the physical proximity of network members contributes to establish stable relations and facilitates by so the transfer relevant knowledge and of high value information.

Extrinsic Capabilities framework supports the understanding of upstream stages of the NPD. First the existing social networks are due to expose individuals to a scope of information which is determined by size and quality of established relationship. Second, the informal testing of individual intuitions at low costs relies on the capacity to access to internal and external competencies provided by rich networks. Third, by providing divergent perspective on a viewpoint, external competencies will enrich the capacity to provide new solutions to encountered problems. Thus, we can conclude that inter-organisational mechanisms are due to have an impact on learning processes that occurs during the early stages of the development and by so are supposed to have direct impact on innovative projects.

This leads to formulate the following hypothesis:

- H1: *High Structural Embedness has a positive impact at the scale of the development team, specifically in the early stages of the development process, when the informal team is working with limited resources.*

- H2: *High Relational Embedness has a positive impact at the scale of the development team, specifically in the early stages of the development process, when the informal team is working with limited resources.*

The link established between firms capacity to learn and inter-organisational features, revealed that emergence of innovation may be supported by the social embedness of the firm. This statement should not hide the importance of the organisational features which have been identified as having an influence on firm's capacity to learn.

Organisational Level

Research on the emergence of innovation highlighted the importance of organisational disorder (Alter, 1995, 1999), by which divergence may be achieved. As divergence requires that actors of the organisation may have degrees of freedom in their day to day actions, acceptance of zones of disorder by the organisation is therefore required to explain how deviant individuals may provide new ideas and innovative projects. The organisational tolerance to disorder appeared to be linked to three broad factors: organisational structure, culture and slack.

The early contributions on the organisational structure, leaded by Burns and Stalker (1961) and Mintzberg (1982), underlined the influence of the structure on innovation capacity. Organic structures appeared to perform better in uncertain and complex environments such as dynamic markets, frequent technological changes and high level of innovation. Characterised by a low centralisation of power and decisions, the empowerment of actors, the reduction in the hierarchic levels and a low formalisation, organic structures usually leave to their employees a greater degree of freedom in their mission. By allowing a greater flexibility and a greater heterogeneity in behaviours, they offer multiple opportunities to explore new solutions. Similarly, it is admitted that such organisational feature prevents routinised behaviours and, at the opposite, fosters the social interactions. From those characteristics, it may be concluded that organic structures are due to support divergence, the emergence of alternative solutions and, at least, innovative projects.

Following Thevenet (1993), firm's culture may be defined as: "the range of conscious and unconscious assumptions, values and evidences shared by the members of the organisation. This corpus is build from the experiences encountered in the day to day business and created in order to face problems encountered while running the operations". Sharing the assumptions, values and evidences provide to organisational members a form of collective identity and enable them to give sense to the firm's environment. Organisational culture determines the level of commitment and involvement of organisational members. By doing so, strong and cohesive cultures are due to unify behaviours and to orientate them to common and shared objectives. In parallel it appeared to be less tolerant to deviant behaviours (Thevenet, 1993). From this statement, Alter (1999) concluded that strong and cohesive culture may prevent the exploration of alternative offers and processes by excluding organisational members identified as "dissidents".

Organisational slack was identified by Cyert and March (1963) as the unemployed resources and competencies that provides to firms the capacity to face unplanned events. Donada and Dostaler (2005) disntinguished two kinds of organisational slack. Dedicated slack refers to supplementary resources that cannot be employed in new situations for example due to the specificities of

the competencies required, or to the geographical location. Unengaged slack refers to resources easy to reallocate to other operations. Donada and Dostaler (2005) asserted that the dedicated slack provides flexibility when volumes variations are concerned when unengaged slack may be used by the company for generating its own growth. This last form of slack may be interesting in the case of innovation. By offering the possibility for actors of the organisation to explore and lead missions which are not in their main objectives, the unengaged slack may be considered as a facilitator for leading diverging operations.

This leads to formulate the following hypothesis:

- H3: *Organic features are due to facilitate the emergence of new offers by offering to possibility to actors to be divergent:*
    - H3a: *Organic features of the overall organisation is associated to exploration behaviours used during the production of initial stages*
    - H3b: *At the scale of development teams, organic features facilitates the production of divergent solutions and by so of innovative offers*
- H4: *Strong and cohesive culture prevent the emergence of innovative solutions all along the innovation process. The solutions which will be selected according to their fit with the existing offers.*
- H5: *Due to unengaged slack, innovative companies will be in the position to let individual to explore new alternative offerings and/or processes.*

The organisational features described above identify factors which are due to stimulate or prevent the emergence of innovation. As described, they resulted in the freedom given to some individual to explore divergent solutions to encountered problems. However, the willingness to explore alternatives may be linked to individual characteristics as well.

Individual Level

Previous analysis highlighted that the emergence of innovation was based on the organisational capacity to capture and proceed multiple information and knowledge. As it is the individuals who have to capture and proceed the information, some researchers highlighted the importance of individual creativity in innovative companies (Amabile, 1996 ; Lubart, 1994). Being able to generate new ideas and divergent thinking in the curse of an ongoing project may be considered as a specific competency. This statement led researchers to try to identify the profile of creative individuals.

In this perspective, the work of Torrance (1974) highlighted the divergent thinking as a specific ability of individual intelligence, differentiated from the analytical capacity. As opposed to the analytical thinkers, who usually deepen each idea produced, the “divergent” thinkers are identified by their capacity to produce a great number of ideas in different categories. By producing a flow of

representation, by combining them to the existing body of ideas, the divergent thinkers may contribute to generate new offerings that may be turned into innovations.

However, the capacity to divergent thinking has to be completed by the cognitive characteristics of the individual, and specifically by their interest to the world and their sensitivity to external information (Kirzner, 1979). As cognition refers to the way the individual proceeds, combines, memorises and use the information, the ability to perform those operations is due to facilitate or prevent the production of innovative solutions.

This leads to the following hypothesis:

- H6: *At the early stages of the development, the role of "divergent thinkers" and of individual performing operation intense in cognition may be of first importance.*
    - H6a: *The capacity to produce a great number of ideas in different categories is determinant during the early stages of NPD. As a result, it must be observed that the individuals associated to those stages present such capacity.*
    - H6b: *High cognitive capacities are determinant during the early stages of NPD. As a result, it must be observed that the individuals associated to those stages present such capacity.*
    - H6c: *During the official and latter stages of projects, the analytical thinkers are due to perform better.*

By increasing the flows of ideas produced and by supporting the cognitive processes, individual cognition mechanisms are due to support the upstream stages of the innovative processes.

Conclusions

Upstream stages of innovative processes are due to determine the potential of change of an organisation. The number of projects, their content, the fit realised with environment and internal objectives will determine their potential of success. Rather than being achieved by the means of traditional project management tools, it appeared that the leverages of the organisation may be appropriate in order to foster this part of the process. If formally confirmed by the current research program, the hypothesis would lead to formulate recommendations for both managers and academics.

Managers who want to put innovation at the core of their strategy should pay attention on the way organisation nurture or prevent the emergence of innovations. Different kinds of actions have to be supported in order to facilitate the occurrence of early stages. First, even though the early stages of the development may be informal, their detection should be done. A first scan would be beneficial when done in the purpose of detecting the knowledge and information remaining to acquire for being able to assess the potential of solutions. By making this first identification, the management may be in

position to nurture knowledge acquisition and, by doing so, to have a better view on the potential of every investigation. To do so, the connections established with the external environment have to be nurtured and formally supported when they are supposed to provide high value information and access to specific competencies.

Second, the organisational features are due to be adopted according to the intensity of innovative behaviours expected. High levels of decentralisation, low levels of formalisation will increase the development of local organisational disorders, which could results in exploration and eventually in innovations. This put the organisation at risk by reducing efficiency of coordination mechanisms. In counterpart, the capacity to adapt to complex environments and to react to fast changes will be improved by the increase in the number of development initiatives.

Third, the management should pay attention to the individual cognitive preferences. “Divergent thinkers” should be put in the positions were their capacity to produce numerous assumptions and ideas could constitute a contribution. They have to be identified in the way they produce ideas. Then, they should be supported by a culture which supports divergence. They should be given time and means for gathering information, proceeding them and generating knowledge for developing new solutions.

The multi-level dimensions of factors that influence the upstream development stages offers serious challenges for the research. As first approach, further observation is required to confirm the nature and dynamic of the early stages. As the model proposed by S Blanco and C Genet (2004) was based on qualitative methodologies, it is suggested that further replication could done to confirm the bi dimensional approach made of accumulation of information, cognitive processes. More specifically, the role of shared cognition has to be explored in more details. This leads to produce case studies produced on on-going projects. Given the informal nature of such objects, attention should be focused on companies which defined innovation as a central concern in their strategies.

While observing the different “projects”, it will be possible to focus at the micro level on the organisational and individual characteristics and to establish links if any. Doing this entails looking at the existence of links between the different dimensions developed above. Multiple case studies, comparing different projects within the same company and between two different companies may be helpful as developed by (Eisenhardt, 1989).

The generalisation of the theoretical frameworks could be demanding due to the complexity of organisations. The formal demonstration of the links established between a specific feature, such as organisational slack, and successful innovative project has to be carefully design as multiple factors may interfere. Service companies, having multiple locations operating on homogeneous markets may be a mean for testing quantitatively the assumptions.

Opening the theme of the upstream stages of innovative processes offers access to the firm’s capacity to change. Demonstrating formally the links established

between inter-organisational, organisational, and individual factors may contribute to improve new product and service development processes.

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