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Do innovations change business? Exploration, exploitation, ambidexterity in the engineering-service firm from oil and gas

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Abstract

How firms can push boundaries and come up with breakthrough technologies without harming existing business? Staying competitive means capture changes and create new business opportunities. Our view is that only those organizations that proactively transform themselves without losing strength in the existing markets will be able to succeed in future. Academics call such long-living successful firms ambidextrous.

Solutions to balance two essential but competing activities can be found through specific organizational design (simultaneous or sequential ambidexterity) or using behavioral approach (contextual ambidexterity) and managerial capability. Also through alternatives as integrated structures or dynamic capabilities. In spite of these options the initial question how to be sufficiently engaged in exploration and exploitation remains open. The main argument of this research is that structural separation does not lead to efficient engagement in organizational exploration and exploitation.

We use a case study method and analysis of complex project management systems. We observe a global technology firm from oil and gas industry. Our data collection has started from actual presence of the researcher (6 months, in 2013) in the specialised unit as part of the team in innovation management. Secondly, we include results from 20 semi-structured interviews (in 2014). We selected six projects of radical and incremental solutions that was chaired and executed in specialized unit. Using interviews with R&D groups (engineers, technical support, marketing, operational specialist, project leaders) we studied NPD of breakthrough and incremental technologies. Our discussions with executives (innovation manager, head of the specialised unit, strategy manager) and also with company's champions (chief scientists of different functions) outline the top management vision on key activities.

Building theoretical conclusions, we suggest that structural separation could be seen as a way to become ambidextrous. But the organizational design with a specialized innovation unit separated from other divisions could not be efficient for mutual exploration and exploitation in a big company. Using such design a firm will be forced to develop integrated mechanisms and build structures that support mutual doing for today and creating for tomorrow. Our NPD and complex project management practices in R&D outline the key principles within structural solution for both processes and allocate resources between development of breakthrough and incremental improvements. Our research contributes to the literature on ambidexterity, NPD and could be use both by academics and managers.

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Preliminary version

Abstract

How firms can push boundaries and come up with breakthrough technologies without harming existing business? How to organize efficient co-existence of competing activities and create effective project portfolio to remain competitive today and tomorrow? Staying competitive means capture changes and respond quickly to the environment. It also means create new business opportunities. In spite of diverse options for organizations willing to become ambidextrous that could be found in the literature the initial question how to organize and coordinate exploration and exploitation remains open. To study exploration and exploitation we use a case study method and apply it to complex project management systems. We observe long – living international technology – service firm from oil and gas industry. Ambidexterity has been mostly explained from organizational level perspectives. Our case study, in contrast, uses a project level analysis. We suggest that structural separation could be seen as a way to become ambidextrous. But at the same time, organizational design with a specialized innovation unit, separated from other divisions is not fairly efficient for mutual exploration and exploitation in a big company. Using such design a firm and its executives will be forced to develop linking mechanisms and build integrating structures that support simultaneous “doing for today” and “creating for tomorrow”. NPD processes and complex project management practices in R&D from our study shows how both exploration and exploitation could be engaged to deliver manual results.

Key words: exploration, exploitation, simultaneous ambidexterity, NPD, projects

Introduction

Ability to compete on the existing markets and simultaneously develop innovations for the coming future is the main challenge for organizations. Executives of the big corporation as well as managers of small firms were challenged to organize their processes and to do both activities simultaneously. Their main concern is to organize and manage activities for today and for tomorrow. However, this is a very difficult task, as organizational resources are limited. On the one hand, managers have to support existing markets and compete with rivals to execute the current business needs. On the other hand, they need to invest in R&D to remain in the game in future. Therefore, during decision-making managers are facing a difficult task which activity to prioritize and how to allocate resources between two.

This challenging task has been also reflected in the academia. The increasing amount of studies on organizational learning during the last twenty years show the high interest to the topic from the researcher's side. Academics are searching to find out how a firm can organize the paradoxical activities to be able to do both. The competing nature of activities, existing tensions and resources scarcity are some of the reasons why does it hard for organizations to coordinate processes mutually.

The interesting question that has been also raised and reflected in the literature is why does it important to have both competing activities, as those processes are difficult to implement in the organizations. First of all, researchers explain that firm's capacity to longevity and long-term success depends on its ability to explore new opportunities and exploit existing assets. March (1991, p. 71) states that the main factor for firm's "survival and prosperity" is the balance between both essential activities. He and Wang (2004), study how exploration and exploitation influence the firm's performance and come up with assumption that there is a positive influence from both activities on the sales growth rate.

The idea of sustainable high performance of a company as the result of exploration and exploitation strategies has been also described in the works of Boumgarden and Nickerson (2012). Another authors discover the importance of exploration and exploitation in static and dynamic environments. Junni, Sarala (2013) suggest that though both activities are necessary for sustainable competitive advantage, there are distinctions between different industries. They suggest, that for sustainable performance in the high – technology and service industries, exploration is more important activity. To reach the same goal in the manufacturing industry it is more important to exploit.

The advancement of exploration – exploitation studies brought the ambidexterity concept to the surface of the organizational learning. Initially introduced by Duncan (1976), the ambidextrous organizations are able to build the dual structures for innovations. The modern definition of organizational ambidexterity refers to the firm's ability to explore and exploit (O'Reilly, Tushman, 2013).

Although, there are several solutions for firms to build ambidextrous design, such as simultaneous, structural, behavioral, in practice, none of them can be efficient. In our research we try to discover how the ambidexterity is formed in a particular company and what are the elements for building the ambidextrous organizational design. We observe a case study of the engineering-service firm from oil and gas industry that has both processes.

This article has the following parts. First of all we provide our view on the existing literature with a particular focus on ambidextrous design. Secondly, we describe out data collection, how it was analyzed, including the description of the case study. Thirdly, we give perspectives and recommendations on specific solution to organize exploration and exploitation in the firm.

Theoretical interpretations

Ambidexterity: sequential, simultaneous, behavioral

During more than a decade the organizational learning literature has been studying the question of exploration of new possibilities and exploitation of existing assets. The initial question, raised by J. March (1991) has been observed from different perspectives (management of exploration – exploitation tensions, concept, models, structures and mechanisms to explore and exploit).

Exploration and exploitation are known as paradoxical. Although, there is no clear definition scholars describe the distinctions exploration and exploitation. Few papers describe differences between competing activities (ex. research on exploration – exploitation tensions: Raisch and Birkinshaw, 2009; Andriopoulos, Lewis, 2009). March gives description of what is exploration and exploitation: “Exploration includes things captured by terms such as search, variation, risk taking, experimentation, play, flexibility, discovery, innovation. Exploitation includes such things as refinement, choice, production, efficiency, selection, implementation, execution”. “The essence of exploitation is the refinement and extension of existing competencies, technologies and paradigms. Its returns are positive, proximate, and predictable. The essence of exploration is experimentation with new alternatives. Its returns are uncertain, distant, and often negative” (March, 1991, p. 71; p. 85)

Literature on organizational studies suggests that the processes are important for organization. March (1991) argues both exploration and exploitation are essential for any organization. The activities are hard to manage as they compete for resources and than the question is how to allocate resources. Chen and Katila (2008) agree that exploration and exploitation competing activities, but suggest that they are complementary.

To succeed a firm should find a balance between exploration and exploitation. March (1991) argues that an organization should engage in sufficient exploitation to support existing certainties and sufficient exploration to ensure future possibilities. To do so, academics proposed diverse mechanisms, approaches and concept as solution to reach the balance. However, the main concern on how organization can reach the balance between exploration and exploitation is still open.

The advancement of the exploration – exploitation studies brought the ambidexterity concept to the surface of the organizational learning. Initially introduced by Duncan (1976) the ambidextrous organizations are able to build dual structures for innovations. The modern definition of organizational ambidexterity refers to the firm’s ability to explore and exploit (O’Reilly, Tushman, 2013). Although there are several definitions of ambidexterity none of them gives clear understanding on what exactly is organizational ambidexterity.

Ambidexterity concept suggests three different modes (sequential, structural (simultaneous) and behavioral) for organizations to explore and exploit. Sequential mode of ambidexterity proposes to shift organizational structures to explore and exploit according to the requirements and changes of the environment (Chen, Katila, 2008, Tushman, O’Reilly, 2013). Literature provides examples when firms start to explore new ideas and exploit only the most successful one (Chen, Katila, 2008; Winter, Szulanski, 2001). Authors explain, that firm’s strategy should be aimed either on efficiency or diversity, but not on both processes, “periods of exploration should be moderated with periods of exploitation and vice versa” (Chen, Katila, 2008, p. 200).

Literature describes some examples of firms with sequential ambidextrous design as McDonalds and Pixar Animation Studio (Chen, Katila, 2008; Winter, Szulanski, 2001). Both companies start innovations from exploring new ideas and selecting an appropriate one for further development. When successful ideas were detected the firm replicated then and started to exploit. Pixar studio, for example, started exploration of new ideas by means of short videos. Full films are created only from successful short videos. Using this approach Pixar studio can test ideas before starting the

process of full film creation and reduce the amount of failures. In the same way, McDonald developed successful business model for one business unit and after applied it to large amount.

Another case of sequential ambidexterity that could be found in the literature is Intel. Burgelman (2002) describes that during one period Intel led the market using a strategy focused on incremental improvement. The changes in the business environment (market growth, internet development) made the strategy oriented on exploitation no longer efficient. As the result, Intel started the transition towards exploration activity. The periods of exploration and the period of exploitation were also led by different executives (Burgelman, 2002; Chen, Katila, 2008), that proves the ideas that different leadership types are necessary to explore and exploit (see ex. Jansen, 2009).

The second mode to balance exploration and exploitation is through simultaneous (structural) ambidexterity. Several researchers suggest to organize the activities in separated business units (Tushman, O'Reilly, 2007, 2013; He, Wong, 2004, Raisch, 2008) as sequential approach may not be efficient to capture and respond to the changes in the environment. Firms should adopt an organizational design that will allow them to explore and exploit simultaneously, that is possible if a firm separated its business units for different activities.

Studies show that simultaneous design with upstream and downstream activities allows organizations to launch more new products on the market (Katila, Ahuja, 2002; Rothaermel, Deeds, 2004). The study of 124 robotics firms shows that some firms were involved in exploration and exploitation simultaneously (Katila, Ahuja, 2002). Such firms discover new technologies and move faster to new business areas by introducing most recent products (Katila, Chen, 2006). Moreover, the firms with simultaneous activities grow faster (He, Wong, 2004), adapt quickly to rapidly changing environment and innovative quicker than those who are involved only in one activity (Chen, Katila, 2008).

In contrast to the argument that simultaneous exploration and exploitation could be reached in separated business units, Gibson and Birkinshaw (2004) propose behavioral approach. Authors suggest that simultaneous alignment and adaptability can be done by "building a business unit context that encourages individuals to make own judgments how best divide their time between the conflicting demands" (Gibson, Biskinshaw, 2004, p. 211). In addition, contextual ambidexterity model is also sustainable as it is focused on the entire business unit, and not just of the separated structures. In contrast with structural, contextual ambidexterity does not requires separation and coordination between different business units. The ability to balance exploration and exploitation is based on the "organizational context characterized by an interaction of stretch, discipline, support and trust" (Gibson, Biskinshaw, 2004, p. 213).

Using results from 41 business units of different industries researchers proved that contextual ambidexterity influence positively on organizational performance (Gibson, Biskinshaw, 2004). Their study also showed an important role of leaders and top managers in the building of ambidextrous design and effective organization. Another interesting finding of this research demonstrates that there are different path to reach organizational ambidexterity and multiple processes could be applied to tensions between paradoxical activities. Researchers mention that senior executives can foster contextual ambidexterity - "depending on the administrative heritage, of a given business, and the values of its leaders, equality valid, but slightly different, organization context solutions can be created" (Gibson, Biskinshaw, 2004, p. 223).

As contextual model is viewed together with other forms of ambidexterity, in contrast to scholars, O'Reilly and Tushman (2013) argue that contextual ambidexterity differs from sequential and structural concepts. The argument is that the model is focused on the individual and not on the organizational level and individual's willingness to be involved both in exploration and exploitation. Moreover, the research on contextual ambidexterity does not provide evidence of the

systems, processes or approaches that create such organizational design and how they allow individuals to be both involved in exploration and exploitation.

Alternative solutions

There are also alternative ways to explain how firms can balance exploration and exploitation. For example, an organization can use integrated structures (Chen, Katila, 2008) or mechanisms for complex model management (Markides, 2013) and dynamic capability when a firm can reconfigure existing assets (Teece, Pisano, 1997).

Researchers (Chen, Katila, 2008) propose to use integrated model of balance. The main argument for integrated models is that organizations need to adapt to changing environment. Existing research on innovation differentiate stable and dynamic environment. Stable environment has clear technological trends and long production cycle, while dynamic environment is unpredictable and relates to rapid changes.

Based on the difference of both environments existing research suggest that in dynamic environments simultaneous model is more appropriate. Chen and Katila (2008) explain “firms competing in more dynamic market do not have time to switch from exploration to exploitation mode because the chance for opportunity is very short. Instead, firms must continually explore new opportunities and be prepared to exploit them as they arise” (Chen, Katila, 2008, p. 209). Thus, those firms that act in dynamic environment should apply simultaneous exploration and exploitation.

Furthermore, the theories of absorptive capacity and dynamic capability (Jansen, Van den Bosch, Volderda, 2005, O'Reilly, Tushman, 2008; O'Reilly, Tushman, 2013) have been seen in the ambidexterity literature as possible solutions to reduce tensions between paradoxical activities. The theories were used to explain how firms build competitive advantage and could reach sustainable organizational performance. Cohen and Levinthal (1990) describe the critical role of absorptive capacity on the innovative capabilities and argue that previous knowledge could be crucial for firm. They define absorptive capacity as “ability to recognize the value of new information, assimilate it and apply to commercial ends” (Cohen, Levinthal, 1990, p. 128). In other words, organization uses its memory to acquire knowledge, recall the existing and create new one.

Furthermore, Teece and Pisano (1997) propose that competitive advantage and its forms are the results of dynamic capabilities. They define dynamic capabilities as “ability to integrate, build and reconfigure internal and external competences to address rapidly changing environments” (Teece, Pisano, 1997, p. 516). Researchers explain, as it is hard to buy competences and capabilities, every organization should build them.

The theory of absorptive capacity shows that organizational capability towards learning depends on the individuals and their ability to acquire and exploit new knowledge. In addition Cohen and Levinthal (1990) suggest that knowledge transfer within organization and between subunits are also important for firm's absorptive capacity. Therefore, we can suggest that elements of absorptive capacity including diversity and distribution of competences, communication between organization and environment, and internal connections between units and functions can be used to build ambidextrous organizational design.

However, organizational learning is not enough. The accumulation of assets does not guarantee that an organization will be able to orchestrate them when needed. The dynamic capabilities theory argues that successful global firms have flexible product innovation and they answer rapidly to markets. In fact, organizations should be able to reconfigure and transform themselves before competitors. Those highly flexible organizations are able “to scan the environment, to evaluate markets and competitors and quickly accomplish reconfiguration and transformation” (Teece,

Pisano, 1997, p. 521). Firms can use decentralization, local autonomy, effective management and coordination of internal and external assets and competences that can make changes less painful.

Surprisingly, the literature on the absorptive capacity demonstrates the importance of firm's learning from technological environment. Absorptive capacity allows technological organizations to catch faster emerging opportunities from the environment. Otherwise, a firm may leave new technological opportunities as unattractive. Academics describe the innovation activity of firms that invest in absorptive capacity as "more proactive, exploiting new opportunities present in the environment, independent of current performance" (Cohen, Levinthal, 1990, p. 137). In contrast, companies with low absorptive capacity are more focused on existing activities (ex. profitability, market), they try to be "reactive, searching for new alternatives in response to failure on some performance criterion". Hence, we suggest that the greater absorptive capacity of the organization the higher is exploration activity of the firm. In contrary, firms with low level of absorptive capacity are more concentrated on exploitation.

Concerns in the existing literature

A major concern of exploration and exploitation studies is the broad scope of the research and loss of focus on the initial problem. Four research papers from symposium on exploration – exploitation and ambidexterity reveal the state of the research on organizational learning (see. The Academy of Management Perspectives, 2013, Vol. 27, No. 4). Papers summarize the study on the organizational learning, raises the questions that are still missing in the literature and suggest directions for future investigations.

There are multiple questions that need answers. Academics argue that exploration - exploitation and ambidexterity concept needs "refocusing and rethinking to ensure that its boom in popularity doesn't quickly lead to an equally spectacular bust" (Birkinshaw, Gupta, 2013, p. 287). In the same way, O'Reilly and Tushman (2013) agrees that previous studies on organizational ambidexterity are useful both for academics and managers and can be used understand how to explore and exploit. However, their personal view is that "scholars use the term to apply to more and more disparate phenomena, the construct itself loses meaning" (O'Reilly, Tushman, 2013, p. 333). Researchers should avoid explaining all possible organizational problems with the concept of organizational ambidexterity. It is important to stay focus on the problem (O'Reilly, Tushman, 2013). Our view is that suggested solutions to explore and exploit have limitations and could be hardly applied by managers in practice. The difficulty is that organizations are complex structures. They operate in different environments and depend of various factors. Therefore, firms should develop their unique solution to reach ambidexterity.

One of the missing answer in the existing ambidexterity literature is how in fact to explore and exploit using simultaneous (structural) ambidexterity mode. To address the question whither separated business unit can be a solution to simultaneous exploration and exploitation we use a case study analysis. We observe engineering-service firm from oil and gas industry. Our study includes the analysis of 6 complex projects of radical and incremental innovation in the firm. To study complementarities of exploration and exploitation we analyze new product development process and project management.

Data collection design

To answer the question why separated business unit could be a solution for simultaneous exploration and exploitation in the organization we use a case study research method. The method helps to understand the phenomenon and outline results from cases (Gibbert, 2008; Yin, 1994). The

design of our data collection has two stages. Firstly, our researcher spent 6 month (2013) in the engineering and service firm from oil and gas as a part of the team working on innovation management. Secondly, we selected 6 projects of radical and incremental innovations and organized semi structured interviews (in 2014) with 22 employees of different functions that have been involved in exploration and exploitation activities during selected projects.

We set the requirements to our research survey in the protocol. For instance, a firm has been chosen according to specific conditions (ex. long history, international scope of operations, multi – divisional structure, R&D department(s), business unit with specialization on innovation etc). In our case, the engineering – service firm has a long history in the petroleum industry (more than 80 years of presence on the markets). It consists of several divisions with specific functions and also has a separated transversal function specialized on innovation. The organization has an integrated in the divisions R&D activities and also transversal R&D group that manages specific activity on innovation and technology across divisions. The firm operates on the global markets and covers all activities of exploration and production of natural resources.

Our researcher was integrated in the innovation group in the specialized business unit. The unit represents transversal function with focus on new technologies and innovations. The goals of the unit were delivering of breakthrough technologies, managing new complex cross – divisional projects and supporting innovations and development of new solutions across organization. With a constant access to internal documentation, processes, procedures on innovation and new technology management the researcher was able to collect data on explorative activity. In addition, during 6 month she was involved in the creation of specific tools in the organization: to structure and improve innovation management, procedures to stimulate breakthroughs and development of new technologies across divisions.

To draw conclusions on how to organize the process to explore and exploit within the firm we decided to focus on project level analysis. After been integrated in the organization during 6 month, in April 2014 our researcher passed to the second stage that was interviews with project teams. To start with, we selected 6 projects of complex technological solutions. We studied 3 projects of technological solutions that could be described in the firm as incremental innovations and 3 projects described as radical innovations. All projects were complex projects aimed on delivering to the market either new solution or improved existing technology. These were transverse projects. Both R&D groups from divisions and from specialized on innovation business unit were involved into the new product development (NPD) process, project management and decision-making. Finally, the projects were in different stages of project maturity (ex. successfully launched technologies, approved technology but not yet started the development process, research around new technology) that allowed us cover all stages of the development process. As also suggested by Yin (1994) our view is that selected projects will allows us to predict similar or contrasting results and understand the reasoning of each case.

After selected radical and incremental projects we developed question for the interviews that could help us to answer the research question. Our 10 open questions were mainly focused on the importance and organization of radical and incremental innovations in the organization and divisions and on new product development process. The discussion started from description of the participant's background, previous positions and current role in the firm. Our participants were asked general questions to express their views on both types of the innovations and how they are organized in the firm. As our discussions were around cross-divisional projects we asked participants about their specific role in the project management and relations between divisions and specialized business unit in R&D and during NPD. The questions on the specific project were structured around emergence of an idea for new technology, organization of NPD, co-development and involvement of partners and clients (internal, external), and metrics and how they measure project performance.

Finally, we set the procedure for the interviews. The following matrix (Figure 1) could be used to describe the structure of our interviews. The interviews lasted around 1 hour. They were recorded and after transcribed. For each selected complex technological project we invited 5 interviewees that represented the following roles:

- Management (project manager, product leader, head of divisions);
- R&D (scientists, engineers);
- Technical support (mechanical/field specialist ex. on vessels);
- Sales and marketing;
- Operations

Figure 1. Interview structure, engineering-service firm

N	Complex Projects	Type of Innovation	Management	R&D	Technical Support	Sales & Marketing	Operations
1	Solution A	Radical	Interviewees	Interviewees	Interviewees	Interviewees	Interviewees
2	Solution B	Radical					
3	Solution C	Radical					
4	Solution D	Incremental					
5	Solution E	Incremental					
6	Solution F	Incremental					

We also had interviews with company's champions (chief scientists of different functions). Some of them initiated the development of radical innovations inside the company or brought significant improvement to the existing technology. In addition, to have the overall view on the radical and incremental processes we had discussions with company's executives (ex. strategy and integration executive, head of the specialized on innovation business unit, vice-president of innovation management) that express their views on key activities of the organization.

Innovations in the engineering-service firm

Technological firms are particularly sensible to innovations and development of new solutions. To stay ahead of competitors those companies invest in R&D to propose new technologies for its clients. However, in the era of fast technological development and unpredictable consumers firms need to develop several business opportunities at a time to explore and exploit.

Our study of the engineering-service firm shows that its organizational performance was supported by radical and incremental innovation process that occurred in the organization. Incremental innovations took place in divisions and were supported by current business. In contrast, radical innovation processes emerged and were grown in separated business unit with a particular function related to innovation and development of new technological solutions. Innovation and Technology unit was presented in the firm as a transversal function (see Figure 2). The head of the department was responsible for making disruptive innovations. The unit included 25 employees who were proving support for research and development of new products, solutions and services across all divisions.



Figure 2. Organizational structure of the engineering-service firm

To ensure technological development in the whole organization the unit was focused on several core –tasks. First of all, members worked on creation of innovative organizational culture. The role of employees was to deliver plans for current and future projects that could be aligned with existing business strategy. Secondly, their function was also focused on the environment for breakthrough concepts development. The idea was to support the early stages of the new concepts and projects from ideation phases in order to incubate them and deliver to the development and launch phases.

Specialized on innovation and technology unit used set of activities to create appropriate culture and communicate innovations. Among them were workshops, meetings with divisional leaders, internal and external presentations and trainings, communication via newsletters and articles with a specific focus on new technologies and innovations. Finally, the unit managed human resources, especially those employees who were involved in development of new technologies and innovations. They provided extensive support to the R&D talents and expertise in technology and engineering as well as worked on establishing of linkage between divisions. When a project team on new technology needed additional competences or expertise the innovation unit assisted in cooperation with external partners, including universities and research laboratories.

Radical and incremental innovations were supported by free main elements. Smart engineers and firm's pioneers developed radical innovation and new technologies. Hence, the first driven element for innovation was an individual perspective. New ideas and preliminary new technologies coming from brilliant employees were supported by the organization. People were taught, guided and helped to transform ideas into the final products, services and solutions. However, bureaucracy, complex R&D procedures, divergence with existing corporate strategy and short-term planning created numerous obstacles to implement the results from individual thinking and creative activities.

The second approach to innovation in technology - based company was collective creation that required cooperation with internal and external partners, clients, stakeholders and technology providers on the ideation stage. The increasing complexity of products, services and technological solutions requires interdisciplinary collaboration. Creative engineers with their brilliant ideas were no longer enough. Most of the early stage R&D projects on radical or incremental innovations required cooperation of different specialists and various experts.

Finally, to increase amount of radical and incremental innovations the company created an innovation ecosystem that had in the scope of its activity all business units, communities and employees. The goal of the ecosystem was to encourage innovations through the organization as well as develop favorable environment for ideation and implementation. In the same way, ecosystem helped to relocated resources between R&D teams, to create an appropriate working environment, to deliver necessary equipment, software or technical solution and to satisfy needs and requirements for experimentation. Strategy and planning served as guidelines for technologies of future. Innovation ecosystem was supported by such elements as for instance, internal competition between engineering teams, recognition and contribution systems and measurement of performance.

Description of NPD

To understand how innovations happen in the company we also analyzed the new product development process. As new products and services in the organizations connected with advanced technologies, the radical and incremental innovations could be developed in a firm by using a combination of exiting products or services that could bring value to customers. New technological solutions were also presented as new methods or systems that improves the operational performance of the existing business.

In order to facilitate procedures and process of development of radical and incremental innovation our innovation unit implemented new product launch cycle, that covered all the stages of new product or a service development from ideation to commercialization phases and was targeted on all business lines, departments, business functions and employees involved in R&D. The stage – gate process provided a description of how a new market opportunity could be transformed in to a final solution and launched on the market. The process was mandatory for complex cross-divisional projects that were lead by the Innovation and Technology unit and also recommended for those projects that were realized in divisions.

The new product launch process started from inspiration where ideas were collected from individuals, groups or emerged in innovation ecosystem and formulated as a new technological challenge. In practice, as in any business new ideas were coming either from individuals or as a market need. On the ideation phase ideas were evaluated and evolved by group of expertise, including engineers and senior managers to understand if a new idea could be transformed into a solution. The goal was to evaluate the feasibility of the future concept and its technological development. The implementation space covered development and industrialization phases. First of all, project team have prepared a working version of the future solution and verified its commercial interest. Later on, integrated project team delivered a complete solution with requested technical specifications. Those products and services were ready to enter markets.

The new product launch process showed that it was important to involve diverse teams and specialists to the project on the inspiration and ideation stage. The experience and knowledge sharing could create additional value and foster the development of new ideas. In addition, the cycle also supported selection process and evaluation of possible risks that allowed individuals and project team to define options before putting heavy investments in development of new technology.

Project Management

After studying new product development process we analyzed how this process and procedure were implemented in practice. We asked senior managers to select projects that could have been described as radical and incremental innovations for the organization. With the help of innovation manager, head of divisions, strategist and head of project management we selected 6 complex engineering projects from project portfolio. Selected project were both transversal and mono-divisional projects that have involved either several functional departments or single business unit. The examples of project were selected according to their novelty, complexity and market impact.

The data were received from internal sources and from discussion with managers and project team members.

We selected several factors to characterize projects. Firstly, we have tried to estimate the novelty degree of the analyzed solution (existing, improved or new for the organization). Secondly, we track the data from product development process (ex. timing, costs, market positioning, etc.). Thirdly, during discussions with head of the projects or engineers who worked on the solution development we asked them to estimate the innovation impact of the solution and provide comments about peculiarities that they have faced during project management.

Our analysis of projects and project management processes showed that engineering-service firm had both radical and incremental innovations. In fact, organization was more successful in implementation of incremental innovations rather than radical. Those projects that had a radically new component required heavy investments into the initial phases. They had long project duration that took around 60-78 month. In addition, they had a complex project execution that required teams to deliver industrial specifications, risk analysis, manufacturing plans and methods. In contrast, the complexity of the project execution in incremental innovation process was lower. Initial phases for development of these projects took less time (9- 21 month) or did not occur. This could be explained by availability of the technology on the market.

Our analysis shows that radical and incremental innovation processes were did not take place in a single business unit. In more general terms, divisions worked on optimization of existing technologies to improve products and services from project portfolio, while complex cross – divisional projects that developed new technology were done in specialized on innovation and technology business unit. This department had complex, transverse and risky, high investments projects focused on the development of new technologies, products and solutions.

In our research we tried not only to receive understanding how engineering-service firm build ambidextrous organizational design, but also we looked for the mechanisms that helps to make links and transitions between exploration and exploitation activities. In addition to describe above processes of new product development cycle and project management procedures we observed a set of actions that aimed to improve organizational ambidexterity and focused in the fostering of innovations. Among them are the following.

Ideation events: A technology – based company have set a serious of cross-divisional workshops focused on the ideation and promotion of innovations through all organizations. The goal of the workshops is to create a brainstorming with internal experts from different fields and various departments, to evaluate newly customer challenge and transform new idea into concept. During the event participant are guided by a facilitator who controls the delivery of results. Therefore, collaboration between specialist of different divisions and function help to transform new challenges and needs into the plan for future implementation.

JV: In spite of the increasing criticisms toward joint ventures the technology-based firm had few examples of development of new technologies together with foreign companies. This type of cooperation brings advantages to both parties and especially attractive for international technological firms who would like to fast acquire knowledge, new technology or receive quick access to local markets and worldwide operations. Among the drawbacks are costs of collaboration, conflicts of interests, capital mobilization and tax planning, weak compensation systems etc.

Partners and clients: The engineering-service firm had a network of partners. It also established and supported relation with existing and new clients by working together on the development of new and improvement of existing technologies. The organization worked in cooperation with services providers and outside firms that had additional expertise in specific domain. Constant cooperation with domestic and foreign universities helped firm to attract young promising students, engineers

and specialists from technological domains. The links with educational institutions support of competition and conferences created knowledge exchange and helped to discover new talents who were able to join the company and bring contribution to the organizational performance.

Summary

During more than 20 years the studies on organizational learning argues that exploration and exploitation are paradoxical. At the same time, for organizations those activities must be seen as complementary (Chen, Katila, 2008) and firms should find a way to benefit from both.

Quantitative and qualitative studies demonstrate that firms may use different approaches to do both to explore and to exploit. One of the solutions is an ambidextrous organizational design that could be reached by different forms (sequential, simultaneous and behavioral). Those organizations, which explore and exploit, are more innovative and have higher performance over time than firms focused only on one of the processes (O'Reilly, Tushman, 2004, 2013). Although, the existing literature suggest that ambidextrous organizations are more effective, the question how firms can become and remain ambidextrous over time is still unclear.

As most of the theories describe simultaneous ambidexterity as one of the mode used by the firms we decided to study how in fact a firm could be ambidextrous by making activities in separated unit. Our main objective was to study if a separated business unit could be a solution for organizations to have both exploration and exploitation. Also, as described by several authors, we observed the role of managers and executives, especially how they make decisions and in fact, what happens when different business units are engaged in different activities.

Our main finding was the following: when exploration and exploitation occurs in different business units, the managers and organizations in whole will start to build integrated structures using different mechanisms for mutual exploration and exploitation. The reason is that when separated, neither explorative unit, nor exploitative unit will be able to reach the maximum benefit from their activity by itself. Therefore, the unit involved in exploitation will search for exceptional resources and expertise (ex. investments, knowledge) from the explorative unit. The explorative unit will be engaged with exploitative unit to get access to existing assets and capabilities that can be used to satisfy both the organizational explorative and exploitation activity's needs (ex. mutual engagement of exploration and exploitation business units in development of radical and incremental innovations).

In more precise terms, the engineering-service firm was both involved in exploration and exploitation. Originally, both activities were separated and managed in different business units. Exploitation activity occurs in divisions that were responsible to deliver short-term objectives, maintain the markets and competitors and satisfy the current business needs. The exploration was organized in the specialized business unit that was devoted to innovation and technological development. The main objective of the unit was to deliver breakthrough, create and support the innovative environment (ecosystem) for innovations in divisional R&D departments and through the whole organization. However, after some period, the organization started to create links to connect both entities.

Such separation of the units has its explanation. The head of the specialized innovation and technology business unit described such separation because the processes are contradictory. In the company divisions satisfied the needs of existing business. Managers and leaders operate under the pressure of markets, they needed to make sure that current objectives and planning would be accomplished. They used a well-defined new product development process

for project execution. In technology – based firm divisional managers delivered short-term objectives. In explorative unit was engaged in the work devoted to the development and delivering of breakthrough. With the highest R&D expenditures they needed to develop new products. The project manager explains, it happened because the process is unclear, a “firm should break the barriers and go to the market where nobody else is”. As exploration deals with high risks and uncertainty executives and managers should control carefully the process of radical innovations to be able to stop useless projects expenditures.

Thus, our results, firstly, demonstrate that exploration and exploitation are paradoxical. They require different mechanisms for organization, control and management of activities. For example, the new product development process in incremental projects (exploitation) was well defined and had a clear stage gate process. In contrast in radical projects, managed by explorative business unit, the NPD process was described by project manager as a “strange, uncontrolled process”. In terms of strategy, the managers from divisional R&D delivered short-term objectives and met perfectly the market’s needs. Divisions did 90% of new products and technological solutions of incremental innovations. The rest 10% were devoted to the breakthrough technologies delivered by the specialized business unit. Having the higher R&D expenditures, the specialized on exploration business unit has the lower revenue indicators.

Secondly, the results show that to benefit from exploration and exploitation firms should create linking mechanisms and in fact, develop more integrated organizational form to explore and exploit. In the case of engineering – service firm, an organization created specific actions to reach better engagements of specialized unit and divisions and to benefit from exploration and exploitation. For example, one was a brainstorming session for R&D specialist both from divisions and specialized business unit. The goal of the session was to use “collective brain” to evaluate new radical idea or a market challenge. The outcomes of such session could be either an idea or an action plan for further NPD and project management.

Another example, is co-development of costly radical technologies. The firm involved partners and clients into the early stage of development of new solutions. Cooperation with customers allowed company to foresee markets trends, to work together on the development of new technology, to get additional investments to the costly projects and to receive early contracts. Merging and acquisition strategy, together with JV were also used to support exploration and exploitation. It provided organization with access to new resources especially access to specific knowledge and expertise, new technologies and markets. Cooperation with universities, research laboratories, joint events, participation in the conferences and workshops created on-going learning process and attracted competent newcomers to the company.

In our research we were able to define that there is a need to create an integrated process and make a link between business units involved in exploration and exploitation activities. One of the difficulties is how to make sure the degree of involvement of different units in the one process (ex. in product development). Another question that managers are facing with is how to prioritize the activities and how to allocate resources between them. Those decisions are very hard to make. Managers always rely on the results from the balance sheets and it is hard to convince executives to allocate resources to the projects to explore new technology. It might be particularly difficult for companies with declining financial situation, when the lack of resources forces executives to cut the investments for R&D to expand the business.

Nevertheless, both managers and academics agree that exploration and exploitation are important. For sustainable growth organization have to explore and exploit. The decisions about how to organize those processes and what is the correct level of both activities should be

taken by every organization, including its current state, industry peculiarities, history and capabilities.

Our study shows that after some period, the organization started to create links to connect originally separated entities that explore and exploit. To get better understanding on the question if a separated business unit could be a solution to reach the appropriate level of exploration and exploitation it is necessary to extend the existing research. It is important to study why does separated units try to decrease the gap between them over time. One potential way to do it could be by analyzing more organizations that use simultaneous mode of ambidexterity and see how they deal with contradicting processes. Qualitative and quantitative method of analysis of different firms with separated exploration and exploitation can increase the robustness of the research.

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