Design of an Innovation Model for a SME in Monterrey, Mexico

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Abstract--**Firms in emerging economies realize the importance of innovation to compete in global arenas. However small and medium enterprises (SME) struggle to start the innovation practice because they lack support from innovation experts and they don't have enough resources to afford this process. Allity is a small IT company specialized in business intelligence applications located in Monterrey, Mexico, and this paper illustrates the process of designing Allity's Innovation Model in order to become an innovative firm.**

It shows the difficult environment that an SME confronts to innovate, such as the absence of institutions that support the practice of innovation and of qualified personnel to conduct innovation projects. Inside the firm this study identified some inhibitors such as the lack of knowledge of what innovation really is and that employees do not see the real possibilities that innovation can provide to the firm. Therefore the practice of innovation is seen as a risky initiative that inhibits its practice.

An innovation model facilitates this process, as it clarifies the path that the firm should follow to develop innovation projects. In Allity this project also motivated personnel to start innovation projects. A methodology to design innovation models for SME is also proposed.

I. INTRODUCTION

Firms in emerging economies have started to compete in global arenas with international strategies that confront them with global firms. In this environment these firms are pushed to acquire high competitiveness levels that require to incorporate innovation as one of its main competitive advantage sources. Large firms, such as Grupo Alfa, Cemex, or Bimbo in Mexico, or Embraer or Natura in Brazil, have successfully become innovative organizations ([5],[14]). For example, Intercorp, one of the largest corporations in Peru, hired IDEO, a leading innovation firm, to design and launch an innovative network of K-12 schools which provide high levels of education at affordable fees (around 100 dollars monthly) ([22]). Another example is CEMEX (Mexico), which has a complex innovation strategy comprising technology-push designs, supported by its R&D Center located in Switzerland ([7]), and market-pull designs using social media platforms called SHIFT, where all employees can participate in the development of innovation projects ([6]; [8]). This case illustrates that theoretical models (e.g. technology-push) are not implemented but innovation models with several elements involving organizational, procedural, financial and incentives mechanisms, as CEMEX's SHIFTs operates.

However, SME in this economies struggle to follow them, as they lack of required resources to imitate the way large firms have followed to institutionalize innovation in their corporations. Literature regarding innovation in emerging economies neglect the needs of SME firms, studying just innovation cases in large firms.

Therefore, the driving question that guides this report is how is the process that a SME located in an emerging market can follow in order to design its innovation model to start innovative projects using limited resources.

Allity is a SME company located in Monterrey, Mexico, with 13 years of experience in the market that offers advisory services in performance management tools and outsourcing in the area of business intelligence. Its customers are strongly benefitted with the use of decision making tools, Allity help them "make decisions from complex analysis based on key performance indicators, which ensure operational success and alignment with overall company strategy " ([2]). In the last years, Allity has taken the decision to carry out a structured and formal innovation process to optimize the innovation practice without consuming large amounts of resources.

This paper illustrates a methodology followed by Allity that resulted in the design of its Innovation Model. This process can be replicated by other SMEs located in emerging countries.

II. BACKGROUND

A. Innovation

Innovation is regarded as one of the most important sources of competitive advantage in the firms ([12], [26], [29]) and it is defined as the commercial application of new products, services, processes, or business models ([3], [20]), the use of new knowledge to offer new products/ services desired by markets ([1]), as "the implementation of a new or significant improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations" ([15]), among other definitions. All of them have in common novelty and commercial applications.

B. Innovation Process

Also innovation activities involve the interaction of different resources and strategic capabilities ([11]), that are composed by routines and are in continuous change ([24]), thus it can be managed as an organizational process, that it is called the innovation process. Authors, like [13], [4] and [25], consider that innovation processes are critical in order to obtain innovative products or services in the organizations. Innovation process is defined as a group of activities that allow a firm to perform innovative activities. It covers from the genesis of ideas with potential to generate innovations, the selection process of these ideas, the development of the innovation (products in new product development methods),

its manufacturing (or equivalent stage for services or processes), and its commercialization ([31]). [9] and [27], consider that as a process, it can be efficiently managed and controlled, and the ability of firms to administer it determines the quality and efficiency of innovations developed. It requires the creation of organizational units with specific role profiles, and procedures that provide stability to the innovation practice ([28]).

C. Innovation Models

Innovation theory started to develop innovation models to explain the emergence of innovation instead of administer them. For example [19] developed a static innovation model that introduced the concepts of incremental and radical innovation. Later dynamic models ([1]) introduced the evolution of technology and industry.

In a second stage literature developed innovation models that guide the practice of innovation. Technology-Push models, that follows the classical flow of R&D – New Product Development Commercialization was the first to be designed. The Market-Pull model was designed to identify market needs as sources of innovation ideas. After that a combined model (Technology-Market), an interactive and the open innovation models emerged, and all of them are called the five generations of innovation models ([21], [30]).

When exploring innovative firms, it can be seen that they don't adopt these models, but more practical ones, all of them adding a business oriented view in all the process, such as profitability measures, commercial and organizational issues. For example Accenture, a global consulting firm, designs customized innovation models to be implemented in its customers, based on the Accenture Innovation Model ([23]). This model starts in strategic issues, develops processes to start the innovation projects, and prioritize them using return on investments approaches. In the real world firms adopt innovation models to design customized processes that allow a firm to incorporate the development of innovation in its regular activities, therefore becoming an innovative organization ([1]).

Innovation literature neglects the difference between theoretical and practitioner models. This paper attempts to develop a practical model contributing to literature a methodology that can be followed to design this kind of models.

III. METHODOLOGY

This study used a consultancy methodology which comprehends three stages which help to analyze the current innovation status in Allity and that leads to design a personalized innovation model (see Figure 1).

A. Fieldwork

Fieldwork comprehends the sensibilization of key personnel for the project and to develop diagnostic activities to identify opportunities areas that can be exploited by the innovation practice.

B. Model Selection

The objective of this stage is to identify the most suitable innovation models, and to contrast them with the strategic characteristics of Allity in order to identify critical elements that can orient the design of a customized innovation model.

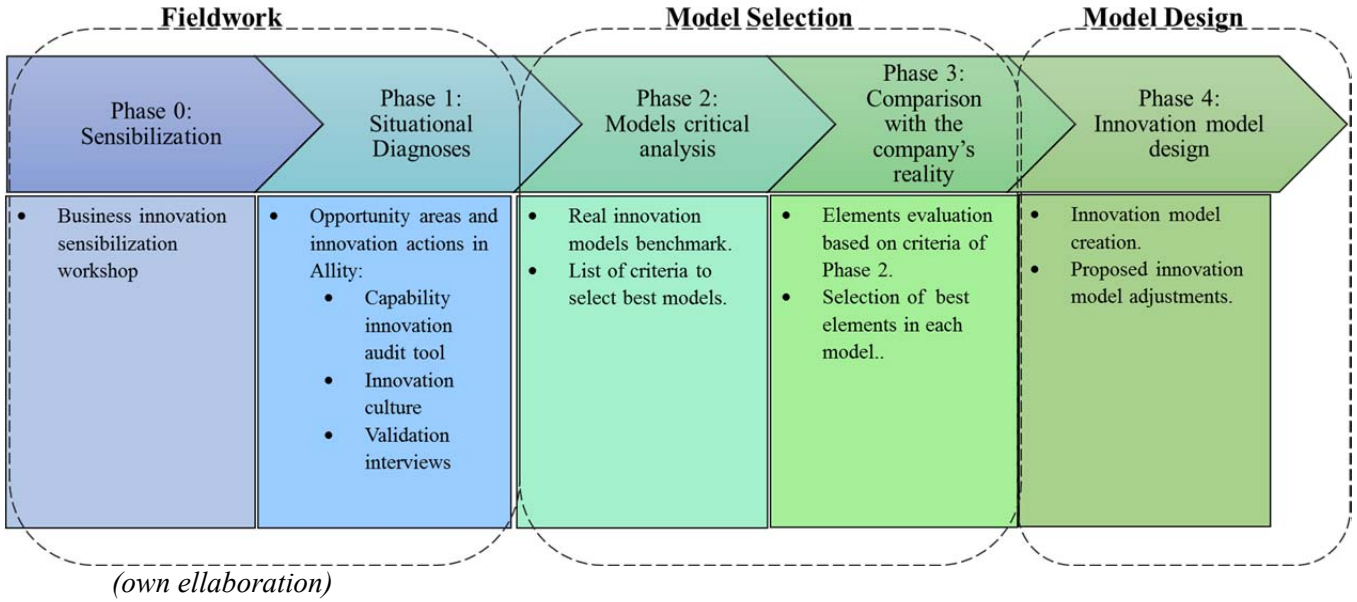

Figure 1. Innovation consultancy methodology

C. Model Design

In this stage an innovation model is designed, using the critical elements identified in the second stage. Then, described the two critical activities comprising this phase of creation of the innovation model and the adjustments to the proposed model of innovation. The proposed model is analyzed with key personnel of the firm and ends with an approved customized innovation model.

IV. DEPLOYMENT OF THE METHODOLOGY

A. Fieldwork

During the sensibilization an innovation workshop was carried out. The objective of it was to raise awareness among employees within the organization on the subject of business innovation. It was considered as vital that workers in the company where involved in the innovation theme before starting the process for two reasons: first, to create a bond with them so that during the subsequent procedures, they perform an active participation. The second reason is to help them realize that they are taken into account throughout the innovation process.

For the realization of this workshop, an expert on the subject directed it in Allity, in order to discuss with them fundamental concepts of innovation, as well as examples of successful companies that have managed to excel thanks to the formalization of the area of innovation in their organizations. Also, as a strategy to make sure most employees would attend this workshop, it was held at the monthly Allity meeting, a formal and periodic activity already implemented.

In order to study Allity's innovation current status this study applied three tools: the innovation capabilities audit, the learning and innovation culture survey, and interviews to key employees. The first tool was applied to 15 Allity employees and 10 Softtek employees, the leading IT company in Monterrey, the second tool was applied to 15 Allity employees, and it is only applied to it as it attempts to identify if its organizational culture is innovation friendly. Results of them are presented in Table 1 and Table 2.

TABLE 1. RESULTS OF INNOVATION CAPABILITY AUDIT.

	A: Best practice	**B: Your Company**	**% (B/A)**
Dimension	**SOFTTEK**	**ALLITY**	
Awareness	3.80	3.00	**-21.05%**
Search	3.10	1.79	**-42.20%**
Building a Core Technological Competence	3.40	3.04	**-10.54%**
Technological Strategy	3.10	2.58	**-20.00%**
Evaluating and Selecting Technology	3.25	2.71	**-16.67%**
Technology Acquisition	3.28	2.54	**-22.59%**
Implementation and Absorbing Technology	3.05	1.83	**-39.89%**
Learning	3.37	2.39	**-29.04%**
Exploiting External Linkages and Incentives	2.51	1.84	**-26.44%**

TABLE 2. LEARNING AND INNOVATION CULTURE

		Results Scale				
		Lowest Quartile	**Second Quartile**	**Median**	**Third Quartile**	**Highest Quartile**
COOPERATIVE AND LEARNING ENVIRONMENT	Psycological safety					
	Difference appreciation					
	Openness to new ideas.					
	Reflection time					
	Environment integration					
PROCESSES AND PRACTICES OF LEARNING SPECIFIC	Experimentation					
	Info recompilation					
	Analysis					
	Education y Capacitation					
	Information transfer					
	Learning processes integrated					
LIDERAZGO QUE REFUERZA EL APRENDIZAJE	**Leadership integration that reinforces the learning process.**					

(Own elaboration)

B. Model Selection

The critical analysis of models comprehends the study of five practical innovations models and the selection of decision criteria to select the best suitable models. These models were the Kuczmarski Model, Accenture Model, Tucker Model, Stage Gate Model and Management of Technologies and Innovation National Prize Model. Details of each model are available upon request of interested researchers.

The contrast with Allity's reality was the criteria to assess the elements of each innovation model. Based on Allity diagnosis in first stage, complemented with interviews senior management, a list of key criteria was identified, then it was possible to identify which models meet every criteria, selecting the most important elements of each model (see Table 3).

For each criteria a deep analysis was developed, with the purpose to identify which element of each model can provide key parts for the innovation model. An example is shown in Table 4.

C. Model Design

The initial innovation model was designed based on key criteria as presented in stage 2, and was composed of a previous phase, nine steps and three filters. (see Table 5).

Each organization has its own way of implementation, therefore the final design requires to be consulted with Allity. There was a meeting with key personnel to introduce the final model. The Board will have to make adjustments if necessary to the proposed model to meet the needs of the client. This will allow the company feel familiar with the model for implementing it. It was an open space where they gave feedback based on their experience and their knowledge of the needs of the organization, it helped to improve the model.

After these meetings the final design emerged, and consists of eight stages and two filters. In Table 5 the first column shows the elements of the initial design proposed in the second and final design.

TABLA 3. CRITERIA SELECTED MATRIX BASE DON REAL MODELS

Criteria	Kuczmarski Model	Accenture Model	Tucker Model	Stage-Gate Process Model	PNTI Model
1. Better adaptation to a small business				X	
2. Establishment of an innovation leader	X	X	X		
3. Constant generation of ideas	X		X	X	
4. Formal surveillance process	X				X
5. Association with external organizations					X
6.Conduct evaluations througout the stages	X		X	X	
7. Monitor the product after the launch			X	X	X

(Own Elaboration)

TABLE 4. INNOVATION MODELS ANALYSIS BASED ON KEY CRITERIA

Models that cover this crtiteria: (*Compliance)*	Allity's adaptation *(Customization)*
Stage Gate: This model has the flexibility to adapt to the size of the project or the company, so there is the facility to superimpose stages or delete them.	**Diagnosis:** Allity is a small, having fewer than 50 employees company; therefore they need a model that suits a small number of people, demonstrating a simple sequence in the elements of the model that allows the company to grow to the same extent that their resources so. **Suggestion:** This criteria doesn't pretend to slow down Allity's growth, nor keep it in a small range; what it's looking for is to pus hit by giving Allity the tools to deploy its availabilities and do not cause conflict between what Allity could do with its resources and que what today it's actually doing. The Stage Gate model has the flexibility of getting larger or shorter, by deleting or adding stages and gates, depending on the size of the company and the project. That's why in Allity, while growing, it would be added steps in the stages such as evaluations and prototypes, depending on the size of the project. As the company grows and its organizational structure has more departments and employees, it will be necessary to adapt multidisciplinary equipment for the application of the model.

TABLE 5. COMPARISON OF THE INITIAL PROPOSAL VERSUS THE FINAL DESIGN

Initial proposal	Final Design
Pre-phase: sensitization	Stage 1: Introduction to innovation
Step 1: Surveillance	Stage 2: Surveillance
Step 2: Strategic goals	
Step 3: Idea Generation	Stage 3: Idea generation
Filter 1: Ideas filter	Filter 1: Ideas filter
Step 4: Resources Analysis	Stage 4: Business Case
Filter 2: Profitability Filter	Filter 2: Profitability Filter
Step 5: Project Plan	Stage 5: Project Plan
Step 6: Prototyping	Stage 6: Prototyping and development spiral
Filter 3: Successful Prototype	
Step 7: Launching Strategy	Stage 7: Launching the product to the market
Step 8: Launching the product to the market	
Step 9: Post-launching monitoring	Stage 8: Post-launching monitoring

(own elaboration)

Figure 2. Allity's Innovation Model

D. Innovation model proposed to Allity

The customized innovation model proposed to Allity is presented in Figure 2.

The description of each activity is presented:

Stage 1: Introduction to innovation

This stage is divided into three activities: a strategic agreement, in which the team members sign a document in which it is stated the company's mission, vision, economic and strategic goals. The next activity is the selection of an innovation leader who has the following responsibilities: to train the team, to take the final decision in each filter, to evaluate the accomplishment of each stage, to lead the meetings of the project. The third activity is to sensitize the team members in order to teach them how the innovation model works.

Stage 2: Surveillance

This stage is divided into external surveillance (to look for opportunities and threats for Allity) and internal surveillance (to look for strengths and weaknesses in Allity). With the information gathered, it is recommended to make a SWOT analysis.

Stage 3: Ideas Generation

The purpose of this stage is to realize activities in order to create new ideas, such as: brainstorming, nominal group technique, Theory of inventive problem solving and catchball. Once the ideas are generated they are classified into groups according the type of idea.

Filter 1: Ideas Filter

In this section we suggest using corporate preliminary assessment of [18] for each of the ideas generated in the previous stage. The evaluation aims to answer three questions:

- Does the proposed idea fit strategically with the company?
- Does the company have the technical skills to carry out this idea?
- Does the company have the business skills to succeed in this idea?

Stage 4: Business Case

For each of the ideas that pass the first filter a business case is made to know its feasibility. A business case is a document which outlines the reasons why a new project or not performed, or if appropriate, of moving towards a new business address ([16]). It is noteworthy that a business case is useful when you want to prove the value of a new product or service the company generate, filter a set of projects to identify which ones provide more value and which should be eliminated, additional resources for a new project or initiative, modify an existing offer, raising funds for new software or training programs, and decide whether a particular function should be performed internally or externally ([17]).

Filter 2: Profitability Filter

Ideas whose profitability levels than those expected are discarded. After this filter will remain ideas more profitability for the company.

Stage 5: Project Plan

At this stage the project plan of the ideas that passed the previous filter is developed. To complement the project plan consisting of rapid prototyping rapid product design that aims to discover, to which you will be making improvements are made, but it is a preliminary to the customer to see what is the product and seek improvements.

Stage 6: Prototypes and Development Spiral

Prototypes are carried out with sophisticated methodology "spiral development" from the Stage Gate, which according to [10] consists of the following steps:

1. **Construction**: Build prototypes to be delivered to a select group of customers or users to conduct usability tests with each of them.
2. **Rating**: All versions of the prototypes made must be evaluated by the group of customers or users.
3. **Feedback**: Gather all the information you provide feedback on the prototypes presented to customers.
4. **Review**: Use all relevant information gathered during the feedback and the cycle begins again.

Stage 7: Product Launch

In Allity currently in the process of getting products to market is not structured and systematized for two reasons: the first one because this process varies depending on the product or service, and the second reason is that there is not a marketing department who has direct responsibility for this function. It is also important to mention that in the IT industry they belong to the launch of products varies depending on the organization. Due to the above the company is recommended to hire an expert consultant to advise them to structure and formalize this process.

Stage 8: Post-Launching Monitoring

Thanks to this stage, a process of learning from successes and failures is carried out, leading to continuous improvement. A key element of this phase of the project consists of the board previously mentioned in the section of strategic agreements Stage 1 model.

At this meeting the following data were analyzed:

- The performance of each of the members of the project.
- Analysis of the revenue generated and costs incurred.
- Compliance with the timelines.
- The implementation of the goals set by the project.
- Critical evaluation of the strengths and areas of opportunity found in the project.

This project finalized after the presentation of this innovation model to all personnel of the company. In the next months the company will design the manual that will operationalize this model and start to develop its innovation activities based on it.

V. CONCLUSION

The overall objective of the project, design the model of innovation relevant to Allity by applying a consulting methodology was fulfilled. During this process all personnel was trained to facilitate the implementation stage. It was necessary to assess the actual innovation capabilities and its innovation culture.

The use of real models was critical for this project, as they are designed to be applied in a structured and formal way. However this paper demonstrates that none existing model can be applied without the adaptation to the firm own characteristics.

On the other hand, the model of innovation that customers are offered help to reinforce the areas related to the processes of learning practices that represent areas of opportunity in the company. Experimentation is another area that presents difficulties Allity therefore the innovation model proposed various activities that lead to a constant experimentation. These actions involve the generation of ideas, the realization of rapid prototyping and sophisticated prototypes.

The innovation model designed to Allity is an initial key for the company to achieve progress through each stage in the process of adoption of innovation to the final level of innovation in a process of continuous improvement in all areas of the organization.

It is also important to mention that when the organization becomes a larger company, designated personnel all or most departments at each of the projects that have passed the first of its filters, so that multidisciplinary teams are formed. This is mentioned in order that each project or idea to have a holistic view and greater chances of success when launching the product or service to market.

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