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Capability Lifecycles: an Insight from the Innovation
Capability Evolution in Emerging Economies

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"Capability Lifecycles: an Insight from the Innovation Capability Evolution in Emerging Economies"

Abstract

My dissertation is about the study of the development of innovation capabilities using a dynamic resource based view (DRBV) approach. According to DRBV an organizational capability follows a lifecycle behavior, from its emergence, growth, renewal or retirement. I apply this approach to cases of innovation capabilities development in organizations in emerging economies.

As this study regards an emergent topic with strong context effects on the phenomenon, a multiple case study design is applied to rebuild the history of each capability history, identifying its different stages when attempting to create advanced innovation capabilities. The strength of a multiple case study methodology is based on the inclusion of contextual events on the development of the research phenomenon. Advanced innovation capabilities are created in some organizational capabilities that enable them to support innovation strategies and activities. When these innovative capabilities interact with other organizational capabilities I identify synergetic effects inside the firm, and further innovation capabilities are created in a more smoothly manner.

Each firm will create its own innovation capabilities creation trajectory, according to its strategic intentions, and supported on different clusters of firm capabilities. Heterogeneity in innovation abilities across an industry are based on these different paths when creating these capabilities, deploying different sources of competitive advantage.

This dissertation adds to the literature on technological capabilities accumulation an explanation of:

- a. The emergence of basic innovation capabilities in different organizational capabilities, and their evolution into advanced innovativeness levels,*
- b. The collaboration and interactions between different organizational capabilities while creating innovation capabilities,*

It also contributes to the resource-based view literature, providing explanations of:

- a. The dynamism in the development of capabilities, using empirical evidence of innovation capabilities accumulation in organizational firms.*
- b. The sources of firms heterogeneity as a result of different capabilities development trajectories*

I. Background and Literature Review

1.1 The Emergence of Innovation Capabilities

My specific interest is the explanation of how innovation abilities are developed in an organization, and why some capabilities develop higher innovative abilities levels than others (e.g. the innovativeness heterogeneity in different technological capabilities reported by Figuereido (2001) and Dutrénit and Vera-Cruz (2003), Dutrénit (2006) in Brazilian and Mexican enterprises).

Innovation is a critical source of competitive advantage, but this advantage is not easily obtained. Current literature has studied its outcomes, nature, and has classified its different types (products, processes, services, etc., see Schumpeter, 1994; Damapour, 1988, Abernathy and Utterback, 1978; and Tidd et. al., 1997), and considers firms as in an innovation race against their competitors. But **how** can a firm develop innovation activities? Innovation management literature does not properly explain the emergence of innovation capabilities in the firm, as they consider that organizations already possess them and focus on the optimization of the innovation process.

Interactions between different organizational capabilities (e.g. marketing, managerial, technological, market linking, etc.) are expected to be found in this process, and specific portfolios of innovative capabilities are created according to each firm's strategic intentions.

1.2 The Resource-Based View

The resource-based view (RBV) considers the firm as a bundle of resources and capabilities, which are the sources for sustained competitive advantage, when they are rare, imperfect imitable, valuable, and not substitutable (Barney, 1991). Even with some criticism, RBV remains one of the most discussed theories in Strategic Management.

1.2.1 The Dynamic Resource-Based View and the Capability Lifecycle

Helfat and Peteraf (2003) propose the "Dynamic Resource Based View", stating that all organizational capabilities behave in a dynamic way, following a lifecycle model that can explain their emergence, development, and change, even not all of them are dynamic capabilities¹. Figure 01 illustrates their main ideas, about the three lifecycle stages, and the six branches of the capability lifecycle.

Insert Figure 1 about here

1.2.1.1 Stages of the Capability Lifecycle

¹ Dynamic Capabilities: see Teece, Pisano and Shuen (1997) and Eisenhardt and Martin (2000)

- **Founding stage:** the lifecycle of a capability begins in this stage, with an organized group or team and a central objective, which achievement entails the creation of this capability.
- **Development stage:** The capability develops for viable alternatives to continue its development, which implies organizational learning, at individual/group level, by learning-by-doing or deliberate attempts to develop.
- **Maturity stage:** this stage entails capability maintenance, and it involves the practice of the capability, becoming more embedded in the organizational memory through routines.

1.2.1.2 Branches of the Capability Lifecycle

When external factors have strong effects on its development a capability branching occurs. This factor can be internal (e.g. managerial or corporate decisions) or external (e.g. demand, science and technology, government policy). Internal firm reactions are triggered in the presence of these factors that affect the normal development of firm capabilities. They are: *retirement* (death), *retrenchment* (reduction), *renewal* (to reinforce and reconfigure the capability), *replication* (to apply it in other department/function inside the firm), *redeployment* (to apply it along a corporation), and *recombination* (to join two or more capabilities to create a new one).

1.3 The Innovation Management Literature

The accumulation of technological capabilities literature aims to explain the trajectory that conducts capabilities from performing basic routine into advanced innovation activities, thus creating innovation capabilities in the firm (Lall, 1992; Bell and Pavitt, 1995). I extend it to cover all kind of firm capabilities, as all of them can follow this trajectory when attempting to create new knowledge.

Innovation Management has two streams of literature: *The innovation practice itself*: the development of new products, processes or services; and *the creation of the ability to develop innovative activities*.

1.3.1 Innovation definition and typology

Despite innovation's critical importance there is not an academic consensus about its definition, scope, characteristics and proper operationalization (see Garcia and Calantone, 2002 for an extensive analysis of this issue).

Innovation recalls "newness" as its main characteristic. Oslo Manual defines innovation 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" (European-Commission, 2005, p. 46), extending its definition to four different types of innovation. Van de Ven (1986) defines the process of innovation as "the development and implementation of new ideas by people who over time engage in transactions with others within an institutional context" (p. 591).

The essence of innovation is change, and it can be taken in two dimensions: in the "things" (product/services) that the firm offers, and the degree of involved novelty (Tidd et. al., 1997).

Innovativeness or newness is defined by Blythe (1999) as "the degree to which a given product is outside the observer's experience". Johannessen et. al. (2001) identifies three newness dimensions: *what is new*, *how new*, and *new to whom*. The last dimension is divided in three levels: new to the company, new to the market, and new to the industry.

Kanter (1989) refers “mainstream” as the traditional activities to maintain operations in an organization, while “newstream” are the activities that aim to develop new ideas, ventures, and innovative offers. Modern firms shall work with both activities simultaneously. Few firms in emerging economies have formal R&D entities, it is expected that “mainstream” employees start innovation processes inside the company.

The need to reduce the technology gaps with leader competitors push these firms to develop newstream activities, starting at low innovativeness levels. This expertise of combining in similar work groups with both activities can create innovation capabilities, and they can continue “newstream” activities after they have already reached their competitors at the technological frontier.

1.3.2 Innovation Capability

Innovation capability is defined by Kim (1997) as the ability to create new and useful knowledge based on previous knowledge; by Burgelman et. al. (2004) as “the comprehensive set of characteristics of an organization that facilitate and support innovation strategies”. I extend the definition considering that an innovation capability is a higher order “integration capability”: they have the ability to mould and manage different key organizational capabilities and resources that successfully stimulate the innovation activities (Lawson and Samson, 2001).

1.3.2.1 Innovation Capability Creation in Emerging Economies

Previous innovation studies in emerging economies have identified that organizations in emerging economies lack the necessary base of technological knowledge to compete in the technological frontier² (Dutrénit, 2000). They are creating (in most of the cases) the first innovation capabilities that can enable the practice of innovation activities.

There are two research streams studying innovation in emerging economies. The first one studies the external conditions that enable technological capabilities creation in firms, and the second one with studies at the firm level analyzing the technological capabilities accumulation processes.

Firm-level innovation studies have identified that one critical factor in order to create the innovation capability is the accumulation of technological capabilities (Bell & Pavitt, 1992; Kim, 1997, Dutrénit, 2004; Figueiredo, 2001).

In this direction, Kim (1997) developed his three-stage innovation model (duplicative imitation, creative imitation and innovation). Technology capability is defined as the ability to make effective use of technological knowledge in efforts to assimilate, use, adapt, and change existing technologies, or the capacity to absorb existing knowledge and in turn generate new knowledge.

1.3.2.2 Bell and Pavitt Taxonomy (Table 01)

Based on Lall (1992), Bell and Pavitt(1995) developed a technological capabilities taxonomy, where they identified primary and supporting activities that are involved in the innovation capabilities development (see Table 01).

It has been extensively used in empirical studies to picture the level of Technological Capabilities achieved by firms in emerging economies (as Figueiredo,

² Technology frontier: “the point at which R&D becomes central to overall competitive strategy and advantage of the firm” (Hobday, 2005)

2001; Dutrénit, 2000 and 2004). It has criticism because of its static characteristic, that does not explain how the firm reached a specific innovativeness level.

Another gap in literature is the analysis of the relationship between different capabilities (as technological and managerial). Bell and Pavitt only considers firm capabilities around technological issues, ignoring other types of capabilities.

Insert Table 1 about here

1.4 Critical Assessment of Literature

I propose to develop an empirical study that analyzes the “technological capabilities accumulation” provided by internal innovation projects, and how this process and the interaction with other firm capabilities can trigger and create innovation capabilities in other types of innovation.

I identified two gaps in the innovation management literature: the identification and measurement of innovations different than product innovations, and the study of the dynamic process that explains the emergence of innovation capabilities in firms that lack minimum technological knowledge.

1.5 Objectives and Justification of the Dissertation

The central issue of this dissertation is the development of innovation capabilities in an organization in an emerging economy. This phenomenon has not been properly explained, as most innovation studies in emerging economies have used Bell and Pavitt (1995) taxonomy, that considers only Technological and related Capabilities in their explanation (Dutrénit, 2000; Figueiredo, 2001; Vera-Cruz, 2004; among others), and they have not analyzed other types of firm capabilities and their interactions in the process.

Additionally, the incorporation of temporal dynamism and the analysis of context effects in RBV will contribute in Strategic Management theory incorporating empirical evidence of emergent issues, such as the Dynamic Resource-Based View and the inclusion of lifecycle approaches to the analysis of capabilities development.

II. Research Framework

This section proposes a model that is more suitable to explain the innovation capability creation in emerging economies. The purpose of this model is to describe how different firm capabilities evolve from basic levels of innovativeness, enabling the generation of “new to the firm” or even “new to the department” innovation outcomes into higher levels of innovativeness.

2.1 Research questions

The next research questions provoke interesting research motivations to start the field work stage of the dissertation:

1. How are innovation capabilities developed in an organization?

1.1 How is the process that this organization follow when attempting to create innovation capabilities?

1.2 What are the elements that promote and hamper this process?

2. How are the relationships between the different capabilities inside an organization while increasing their innovation levels?

3. Why do some capabilities develop higher innovative levels than others and at different pace?

3.1 Does any particular capability take leadership in this process at the business level?

3.2 Why do some capabilities assume this role?

With the first question the dissertation explains the internal process that is required to create the ability to generate new knowledge in an organization, identifying stages and intervening elements; the second provides a deeper understanding of how this process is developed among different departments and work groups, and the last one explains the origin of innovation heterogeneity and different innovation trajectories among firms, and provides some insights of the internal process. The lifecycle approach is critical for answering the last research question, as it includes path dependency phenomena and the division of the analysis into different stages in the capability development (Pandža, Polajnar and Buchmesiter, 2003).

2.2 Conceptual framework for this dissertation

The proposed Innovation Capability Creation Model (ICCM) explains the accumulation of technological capabilities in selected firm capabilities, which transform to innovation capabilities that allow organizations to generate new innovation activities.

I draw on Helfat and Peteraf (2003) capability lifecycle framework, where any organizational capability will follow different stages from its founding and development to its maturity stages. My proposal includes the dynamism and interactions with contexts, reflected in each capability branch along its lifecycle. Figure 02 illustrates what I expect to identify during the field work.

Insert Figure 2 about here

This adapted model does not explain the phenomenon completely, as it does not consider the motivations and interactions that starts this process. Figure 03 shows the complementary research framework that I designed for including interactions between the intervened capabilities. This is the Innovation Capability Creation Model, which is based on Kanter (1989) and Lawson and Samson (2001) ideas around the interactions of mainstream and newstream activities. I include four additional elements:

- a. Competitive environment effects (Context)
- b. Top Management Decisions
- c. Interactions between capabilities
- d. Time dimension

Insert Figure 3 about here

III. Methodology

Yin (2003) recommends the use of case studies when analyzing emergent areas of organizational inquiry with strong context effects, and where inquiry is motivated by how and why research questions. Eisenhardt (1989) considers this research design suitable to inquiries where the factors that affect the phenomenon are unknown. Benbasant et. al. (1987) also state that this research method is useful in theory building in fields where little prior research has been developed.

Previous studies regarding technological capabilities accumulation creating innovation abilities have followed this research design, providing useful insights around this process (e.g. Dutrénit, 2000; Vera-Cruz, 2004; Figureido, 2001). DRBV still requires empirical studies that can validate and extend its propositions, and this study attempts to advance in this direction, configuring an emergent inquiry field.

3.1 Research Design

Following Yin (2003) and based on the nature of the research questions, and because of the novelty of the theoretical field regarding the emergence of innovation capabilities using the DRBV, where the phenomenon and the context possess high levels of interaction, a multiple case design was selected for the dissertation.

When working with multiple cases I should use 'replication logic', similar to a multiple experiments design. I will apply literal replications, as it is expected that processes that generate innovation abilities follow similar patterns in all the cases.

3.2 Cases Selection

CONACyT's "Incentivos Fiscales 1999-2004" reports are used to select the cases to be studied. Due to economical constraints I selected among local companies (located in Nuevo Leon state, Mexico).

3.3 Data Sources (Unit of analysis and Informants)

The nature of the innovation capabilities development calls for an embedded case study design. The first unit of analysis is the firm capability, which is the element that I will analyze and measure. However, in order to facilitate its decomposition in critical elements I will use 'innovation outcomes' as a secondary unit of analysis. They are well known by internal informants, as they are visible and every participant can reflect on how he/she participated when 'innovation-like outcomes' were achieved. It also will facilitate the identification of activities, events and capabilities interactions in this process. Thus, an embedded multiple case design (or type 4 design) is selected for the dissertation.

A list of critical informants will be selected for each company. The conformation of these lists will be the result of initial meetings with top-level managers. The criteria for selecting informants will be that they had participation on specific projects that have reported specific innovation outcomes. Each informant will have an open-ended interview regarding his/her participation in the development of each "innovation outcome". In other moments I will have informal talks with them. The main topic of these interviews will regard detailed history of innovation projects, even if they were not called with this name.

Informants will be composed by top, middle managers, and key employees that can provide enough information to recreate the capabilities history.

I will use multiple sources of information, creating chains of evidence, and during the field work I will be continuously validating the case study report with informants. These elements will provide construct validity. I will triangulate information that can include additional interviews when data is not enough to obtain conclusions.

3.4 Data Analysis

I will apply Bell and Pavitt (1995) taxonomy for the innovation level measurement, and the transcription process to develop. When I finish each case I will write down the case report before replicating to the next case. This way I plan de

develop cross-case analysis, and modify the research framework in cases as necessary according to new findings from the cases.

The use of case studies allows to recreate a longitudinal approach, analyzing all the stages followed by each capability in its continuous change. The combination and analysis of both unit of analysis (firm capabilities and innovation outcomes) will discover the interactions between different capabilities in the process of creating innovation capabilities, identifying the mainstream and newstream activities.

The nature of the open-ended interviews can conduct to identify success factors and obstacles in the development of innovation capabilities in a firm. Strategic intents and decisions to continue or discontinue innovation processes will be documented and analyzed in this stage. Multiple explanations of the capabilities lifecycles will emerge as part of the data analysis. Special interest will be taken in decisions regarding the retirement, retrenchment, and renewal of innovativeness in the firm capabilities studied.

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Figures and Tables

Figure 01. Stages and branches of Capability Lifecycle (Helfat and Peteraf, 2003)

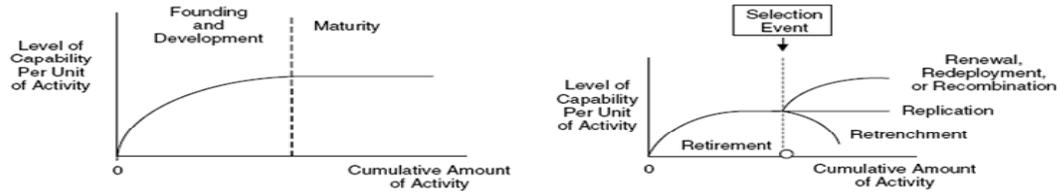


Figure 02. Cap. lifecycle and Innovativeness level (Adap. from Helfat and Peteraf, 2003)

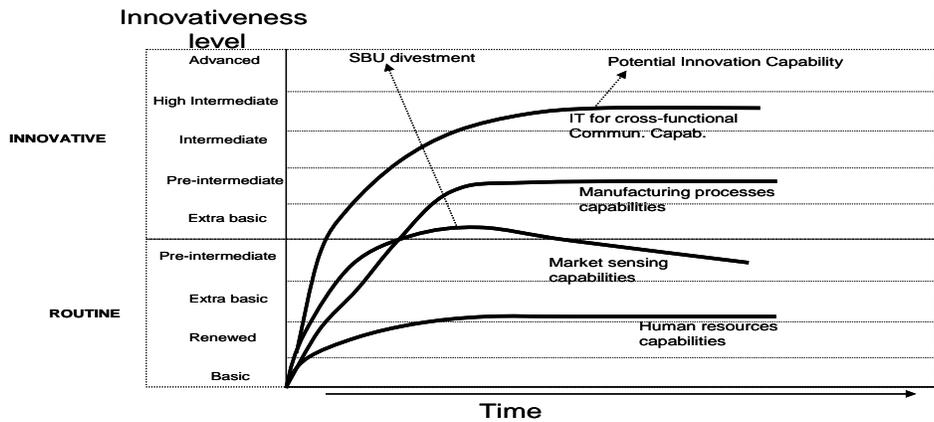


Figure 03. Innovation Capability Creation Model (Adapted from Kanter, 1989 and Lawson and Samson, 2001)

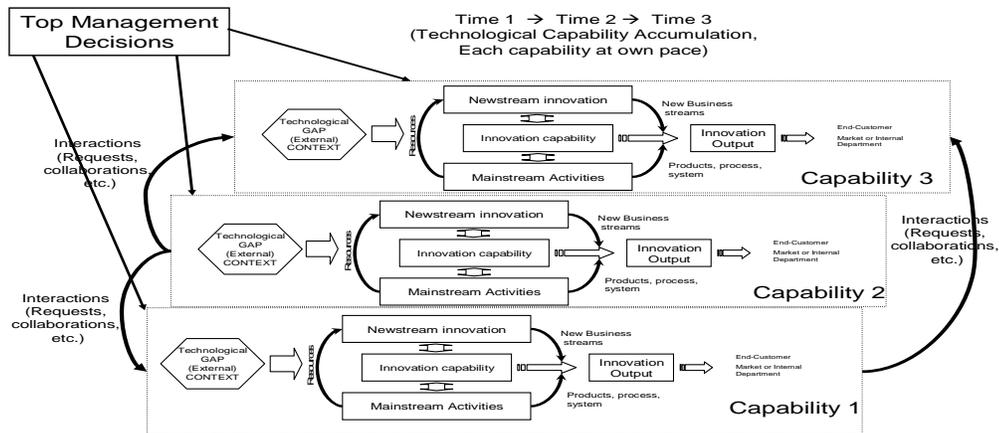


Table 01. Bell and Pavitt's taxonomy (1995)

	Primary Activities				Supporting Activities	
	Investment		Production			
	Facility user's decision making and control	Project preparation and implementation	Process and production organization	Product centered	Developing linkages	Capital goods supply
Basic production capabilities						
Capabilities to use existing production techniques						
TECHNOLOGICAL CAPABILITIES (CAPABILITIES TO GENERATE AND MANAGE TECHNICAL CHANGE)						
BASIC						
INTERMEDIATE						
ADVANCED						