

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/263263744>

Influences of the Internal Capabilities of Firms on their Innovation Performance: A Case Study Investigation in Brazil

Article · March 2013

CITATIONS

2

READS

501

1 author:



Paulo Antônio Zawislak

Universidade Federal do Rio Grande do Sul

102 PUBLICATIONS 388 CITATIONS

SEE PROFILE

Some of the authors of this publication are also working on these related projects:



Product Development in MNC Subsidiaries [View project](#)



The Paths of Innovation of Brazilian Agribusiness [View project](#)

Influences of the Internal Capabilities of Firms on their Innovation Performance: A Case Study Investigation in Brazil

Paulo Antônio Zawislak

Federal University of Rio Grande do Sul, Brazil

André Cherubini Alves

Federal University of Rio Grande do Sul, Brazil

Jorge Tello-Gamarra

Federal University of Rio Grande do Sul, Brazil

Denise Barbieux

Federal University of Rio Grande do Sul, Brazil

Fernanda Maciel Reichert

Federal University of Rio Grande do Sul, Brazil

Innovation has been identified as the inevitable outcome for the very survival of the firm. This is achieved through certain firm's capabilities. When it comes to innovation, most academic research has focused on technological capabilities as the sole source of innovation. On the other hand, there are others. The purpose of the investigation is to understand the determinants of innovation in firms, in other words, what causes some firms to be innovative and others not. We use four Brazilian cases in different sectors to exemplify and demonstrate that the firm's innovative performance is affected by four different types of internal capabilities: technology development, operations, management and transaction capabilities. The companies belong to four different industries: metalworking, electronics, footwear and beverage. Data was collected through a combination of visits, interviews and secondary data. The results show that, although the technological capability of a firm is an important component in the innovation process, it is insufficient in explaining how a firm turns internal invention into market transactions and consequently innovation. Furthermore, to exist, all firms must have developed a minimum level of each of the capabilities described, but the innovative performance of the firm is based on the predominance of at least one of them.

Introduction

Scholars recognize the importance of innovation for firm's success and survival. Success within this argument is typically achieved when firms possess or develop their technological capabilities (Lall, 1992, Bell and Pavitt, 1995). However, the idea that firms can rely mainly in its technological capabilities leaves some open questions in this research area such as: why aren't all firms that invest in technological capabilities considered to be innovative? Similarly, why other firms that do not invest so much in their technological capabilities appear to be more innovative than others that do? Moreover, if the firm is a function of innovation, what is the innovation function?

The purpose of the paper is to better understand the determinants of innovation in firms. The answer to these questions may be found on different types of internal capabilities of the firm, other than the technological capability overlook. Advances that indicate innovation as a result of a range of complementary capabilities have already been conducted (Teece, 1986; Burgelman, 1994; Christensen, 1995; Guan and Ma, 2003; Yam, et al., 2011). However, further research is necessary to consolidate this theory.

Based on transaction costs economics (Coase, 1937; Williamson, 1985) and the Neo-Schumpeterian traditions (Penrose, 1959; Richardson, 1972; Nelson and Winter, 1982), we draw a model based on four inter-related capabilities which describe what the firm can do and how it seeks for change and innovation in order to guarantee its continuity over time. It is our assumption that, besides technological capability, one should also take into account operations, management and transaction capabilities to capture the innovative performance of the firm.

Any existing firm must be, to some extent, able to: a) identify a market gap and develop the specific knowledge application (technology) to fill it; b) build an operational set of techniques and routines to produce the goods or service that will provide a recognizably valuable solution for this gap; c) guarantee that this operational set will efficiently produce the goods or service; and finally d) deliver it to market and achieve a successful business transaction.

Within this framework, innovation can be identified as embedded in different capabilities such as the ability to absorb, adapt and transform a given technology into specific managerial, operational and transactional routines that can lead a firm to achieve Schumpeterian profits.

The present ideas, framework and assumptions will be developed over four cases involving Brazilian industrial firms.

This paper is organized as follows: next section explains the capabilities of the firm and innovation through a framework that encompasses four inter-related capabilities; then we explain the method used; after that we use four Brazilian cases to advance the consolidation of the model; next, we present an analysis of some important aspects found in the four cases studied; and finally, we offer our conclusions.

Capabilities of the Firm and Innovation

To exist and perform, every firm must have some specific capabilities. Different authors have studied capabilities using a variety of different labels, such as human resources (Penrose, 1959; Becker 1962; Barney, 1991), distinctive competencies (Selznick 1957; Snow and Hrebiniak, 1980), invisible assets (Itami and Roehl, 1987), core competences (Prahalad and Hamel, 1990), specific skills (Richardson, 1972) and routines (Nelson and Winter, 1982). Nevertheless, all these labels refer to essentially the same thing: specific capabilities that the firm creates and uses strategically in order to identify market gaps to be filled with new offerings of value.

The study on capabilities has led to the development of different theoretical perspectives,

such as technological capabilities (Lall, 1992), absorptive capacity (Cohen and Levintal, 1990), organizational capabilities (Chandler, 1992), dynamic capabilities (Teece, Pisano and Shuen, 1997, Eisenhardt and Martin, 2000), etc. Nonetheless, there is no consensus regarding which capabilities ensure survival and superior performance or what are the specific building blocks of innovation.

Richardson (1972) coined the concept of capabilities as the knowledge, experience and skills of the firm. According to Dosi, Nelson and Winter (2000) capabilities refer to the degree to which the firm “knows how” to do certain things, such as, producing cars or computers, or flying from one continent to another. Later authors have related capabilities to the term ‘routines’, which is one of the central concepts of the evolutionary theory (Nelson and Winter, 1982; Grant, 1991; Chandler, 1992; Collis, 1994).

Nonetheless, to deal with change and innovation, two main theoretical approaches on capabilities are seldom referred dynamic capabilities and technological capabilities. The dynamic capabilities approach discusses the firm’s need to create, build, modify, adapt, reconfigure and update resources and organizational capabilities in order to respond to a continuously changing environment and sustain competitive advantage (Teece, Pisano and Shuen, 1997; Eisenhardt and Martin, 2000; Winter, 2003; Wang and Ahmed, 2007, Teece, 2007, Dutrénit, 2000). The technological capabilities approach attempts to solve the same problem by exploring the capabilities needed to deal with change and innovation, specifically in technological concern (Bell and Pavitt, 1995). Lall (1992), for example, stressed the power of technological capability as the way firms absorb, process, create, change and generate feasible technical applications (new technology, new processes, new products, new routines) within the knowledge frontier.

Yet, an important point is left aside: how much of all this technological effort really turns into positive performance and recognized economic outcome. In other words, if a firm has developed technological capability, it does not necessarily mean that it will consequently show innovation performance¹. We argue that the firm must develop a set of complementary capabilities to deal with innovation.

Previous studies on innovation have reinforced the idea that to reach innovation firms need to build a set of complementary capabilities (Burgelman, 1994; Christensen, 1995; Guan and Ma, 2003; Yam, et al., 2011). These inter-related capabilities of the firm can be understood through two main drivers: technology and business. The first one represents the firm’s accumulated experience in technical change and productive process, called respectively technology development and operations capabilities. The second driver denotes the assembly of organizational and transactional routines, represented by management and transaction capabilities.

The integration between these two drivers, technology and business, effectively promotes innovation, which creates competitive advantage. In other words, the type of innovation will thus depend on how technology is developed and operated as well as how business is internally managed and externally achieved by the firm. Based on the legacy of Schumpeter, the Oslo Manual essentially describes four types of innovation: product

innovation; process innovation; organizational innovation and marketing innovation (OECD, 2005).

There seems to be a clear link between the four complementary capabilities and Schumpeter's proposition. The importance of each capability to innovation is presented below.

Technology Development Capability

Since the early 1980's, technological capabilities have been defined as both: "the ability or proficiency to make effective use of technological knowledge" (Westphal, Kim and Dahlman, 1985 p.171) and as the capabilities needed to generate and manage technical change (Bell and Pavitt, 1995). The second meaning, nevertheless, includes "skills, knowledge, and experience that often (but not always) differ substantially from those needed to operate existing technical systems" (Bell and Pavitt, 1995 p.78). In this article we distinguish between the technological capability necessary to make effective use of the technology and the technological capability used to manage and generate technological change for strategic purposes (Rush et al., 2007), to create new methods, processes and techniques (Afuah, 2002), and, primarily, to offer new products (Zhou and Wu, 2010 p.557). The former will be called operations capability, while the latter, the technology development capability.

Technology development capability leads to 'development' as the result of the learning process through which firms absorb and internalize new knowledge to produce technological change and, consequently, new processes and products. Nevertheless, this process requires efficient search routines and the ability to change in order to create and re-create operations. The learning process can involve acquisition, imitation, adaptation, modification and/or the development of a new set of knowledge and technical systems for internal use. The main result of the technology development process is new products and process settled in new technical standards for the firm.

Once a firm has mastered a technology, they should put it to work. This has implications for the capability to efficiently operate the technology in order to produce tradable goods and services.

Operations Capability

"Every organization, no matter what sector, has an operations function (even if it is not called by this name) because every organization produces some mix of goods and services" (Slack and Lewis, 2008, p.1). As previously argued, there is a need to differentiate the ability to change and develop technology, which is the technology development capability, from the ability to use technology, which is the operations capability. Activities such as quality control, preventative maintenance, work flow and inventory control, mentioned by Lall (1992, p.167) as part of the technological capabilities, actually fall under the operations capability category. Thus, it can be described as what the firm really does given what it really knows.

Beyond the mere production of goods and services, operations capability should be

concerned with the alignment of the production strategy with the firm's competitive strategy and goals (Skinner, 1969) and how the firm occupies the given production capacity in order to achieve the highest productive output possible. Operations capability emerges from the selection of competitive priorities in order to take advantage of low cost, quality, delivery time, responsiveness, flexibility (Skinner, 1974, Hayes and Pisano, 1994); degree of product or service standardization; size of product mix; volumes required (Ward, et al. 1998, Hayes et al. 2005) as well as production lead-time and the ability to attend the technological innovation required by the market (Hayes et al., 2005). Hence, the major point of a firm having technology development and operations capabilities is to provide technological innovative solutions for the market.

However, in order to 'get things done', the firm needs a certain ability to coordinate efforts (or governance) that we call management capability.

Management Capability

The emergence of large-scale business enterprises at the beginning of the twentieth century, led to a growing interest in the roles and functions of managers (Taylor, 1911; Fayol, 1949; Barnard, 1966; Mintzberg, 1973; Chandler, 1977; Williamson, 1985). The main advantage of the formal managerial organization is the ability to combine the productive capabilities of human and physical resources. It can contribute to the firm's capacity to achieve higher levels of resource utilization and the ability to anticipate shortages (Lazonick, 1992). Overall, the purpose of management capability is to maintain a smooth flow of information and outputs to achieve higher rates of efficiency².

Trott (2008) argues that "the task of all managers is to improve their operation – otherwise they are supervisors and do not justify their job title" (Trott, 2008, p.119). On the other hand, it does not follow the same pattern as operating routines (Stamp, 1981; Whitley, 1989). If capabilities can be explained by a set of routines embedded in applied knowledge (technology), management capability requires a more generalist repertoire to take action through choice and decision where technology fails to be perfectly routinized. In order to cope with various and often unpredictable circumstances, management capability needs a wide range of skills that should be flexibly applied in problem solving (Langlois, 2003). In this sense, they are dynamic and evolving, ideally concerned with the maintenance of administrative structures but also with the improvement of resource coordination and use, thus combining continuity with innovation (Whitley, 1989).

As Coase (1937) and Penrose (1959) previously stressed, every firm has its limits. To go beyond those limits, it not only requires enhanced technology, but expanded managerial routines to deal with additional, and seldom unpredictable, operations and transactions. By surpassing its limits through management novelty, a firm is certainly innovating. As with management systems, the firm should implement the production system which is best adapted to its products, its capacity, and its customers. These decisions will influence the way a firm operates to satisfy its customers' expectations.

Technology development, operations and management activities, yet, must be sustained by the firm's capability to really deliver better utility to the market: the transaction capability.

Transaction Capability

The firm is, after all, a transaction based agent. Whatever it develops, operates and manages must be successfully traded in the market to really make economic sense. As Coase (1937) predicted, the firm will grow to the point where the cost of internalizing an additional operation is equivalent to the cost of transacting it in the market (Langlois, 2003). This means that once a firm has developed a technological solution, it needs to be able to do whatever it takes to favor its transaction and sales. Since every firm uses, manages and operates a given technology with the explicit goal of obtaining positive economic returns, it should have a specific capability to actually trade its products. From outsourcing to delivery, and including attendance, negotiation, contracting, marketing, branding, logistics, every firm has a pack of specific skills, routines and systems to trade. We refer to all these together as transaction capability³. In other words, it is the ability of the firm to reduce transaction cost.

Although attempts are being made to establish a concept for what we are calling transaction capability (Argyres, 1996; Madhok, 1996; Langlois and Foss, 1999; Williamson 1999; Mayer and Argyres, 2004; Mayer and Salomon 2006, Argyres and Mayer 2007), there is still much to be done. Like any other, transaction capability needs to be created, developed and modified, where learning plays a key role. Alternatively, if the firm's advantage can be achieved using its technology development capability (to create new products), operations capability (to produce these products more efficiently) and management capability (to maintain all areas of the firm tuned and running), the development of its transaction capability will then help to expand this advantage. Transaction innovation is thus another innovative issue.

Capability-based model of the firm

To establish a coherent set of inter-related capabilities, the firm must have a minimum amount of knowledge, mostly dependent on both the sectoral pattern (Pavitt, 1984) and the specific technical path dependency (Dosi, 1988). However, this applied amount of knowledge cannot still be considered as innovation. To aim at innovation, the firm must absorb, develop and concretely incorporate new knowledge into the existing technical and business routines. In this context, innovation will be the economic result of the firm's efforts to use new knowledge in order to change at least one of its four different and inter-related capabilities.

Innovation can emerge from one of its complementary capabilities. Although most of the academic literature focuses on technological innovation, not all firms do technologically innovate. For example, companies in commodity markets are supposed to follow technical constraints, such as production process and product mix. However, if they are trading, it is because they present some other advantage than, eventually, new technology. This trading advantage may be originated from operations itself, but also from management or transaction capabilities. Instead of just looking for technological innovation, the firm should also look for operations, management and transaction innovation (as shown in figure 1).

If we consider that every firm starts by having a special advantage, whether technological knowledge, marketing information, geographical location or institutional support, any of those advantages must be translated into recognized and accepted value in the market. If all firms exist in order to transact something special, it is because each one, from bakeries to hi-tech companies, has some kind of applied ‘know-how’. If technology development and transaction capabilities seem to constitute the very essence of the firm, one cannot forget that operations and management capabilities are in some extend always present, otherwise the firm will not become an actual economic agent. Thus, any existing firm will always be a technology-business driven issue.

As shown in Figure 2, the capabilities of the firm are organized through two main drivers: technology and business, below represented respectively by technology development & operations, and management & transaction capabilities.

The integration between these two drivers effectively promotes innovation, which creates competitive advantage. Moreover, it is the integration of the four capabilities that ‘gives life’ to the firm. Without the transaction capability, there would be a gap between producing technical change and achieving positive performance in the market.

Figure 1 – Internal Capabilities Definition and Innovation Types

Driver	Capabilities Definition	Innovation Types
Technology	Technology Development Capability The ability that any firm has to interpret the current state of the art, absorb and eventually transform a given technology to create or change its operations capacity and any other capability aiming at reaching higher levels of technical-economic efficiency.	Technological Innovation This type of innovations encompasses the development of new design, new materials and new products. In addition, they include the development of machinery, equipment and new components.
	Operations Capability The ability to perform the given productive capacity through the collection of daily routines that are embedded in knowledge, skills and technical systems at a given time.	Operations Innovation This type of innovation encompasses new processes, improvements in existent processes, introduction of modern techniques, new layouts, etc. It allows the firm to produce products with quality, efficiency, flexibility with the lowest possible cost.
Business	Management Capability Is the firm’s ability to transform the technological outcome into a coherent operational and transactional arrangement.	Management Innovation This type of innovation encompasses the development of management skills which reduce the “internal friction” between different areas of the firm. It is intended to create new methods of management and new business strategy, improve decision making and inter-functional coordination, etc.
	Transaction Capability Is the ability to reduce its marketing, outsourcing, bargaining, logistics, and delivering costs, in other words, transaction costs.	Transaction Innovation This type of innovations encompasses the development of ways to minimize transaction costs with suppliers and customers. It is intended to create new commercial strategies, improve relationships with suppliers, streamline market knowledge, etc.

Although the technology development capability of a firm is an important component of the innovation process, it does not, in itself, explain how any firm turns internal invention into market transaction and innovation.

Research Method

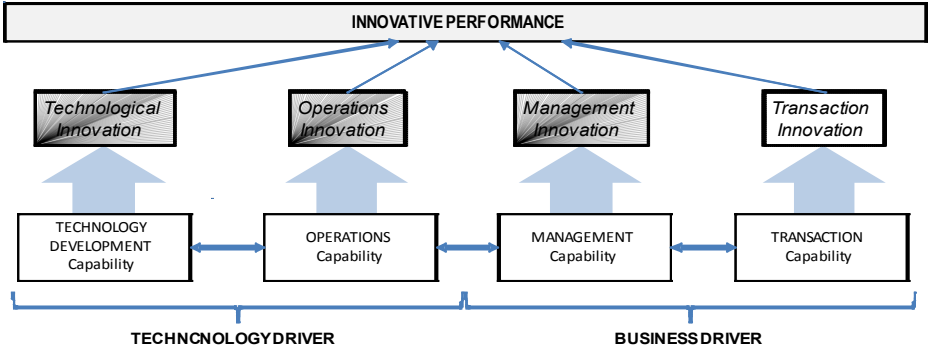
The aim of this research is to advance on the construction of an emerging concept by examining evidence obtained from selected case studies. To enlighten the capabilities need to generate innovation, a method of multiple case studies was used. According to Rowley (2002) and Yin (2003), cases must be carefully selected so that they can produce similar (literal replication), contrary or completely opposite results, but for predictable reasons (theoretical replication). Given our exploratory proposal, we found the ideal number to be one case for each of the complementary capabilities.

The cases’ selection was conducted in the Brazilian state of Rio Grande do Sul (RS), which, in 2009, accounted for 6.46% of Brazilian GDP (Conceição, et al., 2010). Due to its tradition and importance, the cases were selected from the industrial sector. First, we selected 26 companies which represent different industrial branches of the state. Afterward the framework was tested by interviewing managers and directors of the 10 companies that agreed to participate. Finally, following the cases analysis and discussions, we chose the four most representative firms, one for each of the capabilities, to build our multiple case studies. The selected cases are from the following industries: beverages, electrical and electronics, leather and footwear, and metal products.

Data collection and analysis

Data was collected in four stages. Firstly, information was collected from secondary sources (the firms’ websites, articles, annual reports, etc.) before the visits. Secondly, in-depth interviews were carried out with people with extensive knowledge of their business, such as the owner himself, directors and/or managers. Thirdly, we visited the firms’ facilities. While visiting the facilities, we collected further information on issues that were not previously fully covered. Shortly after interviewing and visiting the firm’s premises, as part of the fourth stage, we wrote a report following the same structure used in the research instrument.

Figure 2 – Capabilities of the Firm Innovation



The analysis of the cases is based on the capabilities framework and the empirical data previously sorted and filtered in the reports. To maintain confidentiality, the firms are referred to according to their specific industrial sectors: Electronics Co., Footwear Co., Metalworking Co., and Beverages Co. In each case all four capabilities are present and described, but each firm has a predominant capability.

Brazilian Cases

Metalworking Co. - Technology Development Capability

The Metalworking Co., established in 1955, produces cans and lids for different applications, such as packaging for cosmetics, food and beverages, paint and chemicals. Later, the firm expanded its facilities and bought a lithography company. In 1972, it moved to new premises and started a new cycle of expansion. Since then the company has extended its factories and bought several companies.

The firm's management capability is based on a Japanese style that guides the firm's techniques routines. Its operations capability is based on a standardized pull production system, where the clients' orders trigger internal just-in-time production. For some customers, the company established an external Kanban system. The transaction capability is responsible for identifying the customer needs which are brought to R&D staff so that they create new solutions for them. This capability is structured so as to strengthen the firm's innovative approach by building a reputation as an innovative company.

One of the most visible characteristics of the company is its constant concern with innovation. The company seeks to create an 'innovation environment', where everyone sees development and continuous improvement with the involvement of employees, who are called 'inventors'. Its innovations have occurred both in the manufacturing of new products and in its management techniques. For both, the firm has established in-house R&D department. In addition, it has constant partnerships with several research centers and participates in some innovation groups in renowned universities. This activity is consistent with the main goal of its innovation strategy, such as registering six new patents a year. Metalworking Co. focuses its efforts on technology development capability that allows the firm to constantly reach its innovative potential.

This technology development capability was central to the emergence of technological innovations. Since the firm began its operations, there were many examples of innovations. Among them, the Closure Plus system, an innovation that changed substantially the way metal packaging are closed. This technological innovation enabled the creation of a whole range of other packages and allowed the company to become a supplier of this technology to other steel cans manufactures. It also allowed the company to benefit from the royalties from that product. The success of this strategy is reflected in the various awards the company has received for its innovative products. Considering it all, the technology development capability is the most important capability in this firm.

Electronics Co. - Operations Capability

The firm assembles electronic circuits for commercial, industrial and construction business automation, as well as providing different kinds of motherboards to energy and cell phone companies. It began operating in 1986 and currently has three facilities in major cities in Brazil. Each of these facilities has its own inventory, assembly, surface-mount and through-assembly technology units, where the final products are produced, tested and dispatched. This means that each facility is sufficiently flexible and has sufficient capacity to ensure its production processes.

Although the firm does not develop new products, and has no R&D department, it still has the technology development capability to propose prototype improvements. Regarding management capability, the firm focuses on coordinating the work in the facility and guaranteeing that all products are delivered as requested in terms of quality and time. Since its major customer is also one of its owners, the strategic and organizational outlines of the firm depend on decisions made by that owner/customer. This fact also limits its transaction capability, as the Electronics Co. does not need to develop new capabilities in order to reduce its transaction costs. Most of the commercial decisions are made in absentia of the firm's business goals.

During the interviews and the visit it became apparent that one of the firm's strengths is its ability to produce small batches of high quality products. This firm is strongly characterized by its operations capability to produce high quality with flexibility. This flexibility in production processes allows the firm to compete where other companies in different countries (e.g. China), whose focus is on large batches, are not able to operate at a low cost. To strengthen this capability, in 2003, the company formed a strategic alliance with a global conglomerate of companies. This alliance was formed to ensure technology transfer, best production techniques and practices, economies of scale in component acquisitions, and increase their customer base. Given these factors, we consider this firm's operations capability to be predominant.

This case helps illustrate that in different industrial sectors may exist firms that despite not leading in technological innovations, they can develop operations innovations that allow them to differentiate themselves from competition.

Footwear Co. - Management Capability

The firm was established in 1964 in order to fill a gap in the market for beach hats. In the 1970's and 1980's it bought other apparel companies and expanded its facilities. In 1991 and 1993 it established two children's brands. As from 2000, the firm decided to focus on producing children's apparel, and then on opening franchises for its two premium brands. By that time it had built a children's footwear manufacturing facility in Rio Grande do Sul.

Footwear Co., like most footwear companies working under a brand regime, needs not only to be aware of fashion, components and shoe production trends around the world, but also to be flexible enough to bring its own changes to every new collection. The collections are changed twice a year (summer and winter), but within each one there

may be two or three sub-collections. The main changes to the products depend on the theme they are working on and not on new technology in the shoes themselves. There is no formal R&D department as such.

It organizes its production volume on a weekly forecast, performs regular quality control checks throughout the production line and on all final products, and has a labor-intensive production system. In relation to its transaction capability, the firm sells its products (mono or multibrand) directly to retail stores, to its own stores or to its franchisees through sales representatives. It is a very traditional commercial structure.

Management capability is the most relevant one because it is able to organize multibrand production, integrate the other capabilities, and manage different types of sales to different customer by developing and offering premium quality products to the market. This flexible management system allows the firm to be sufficiently agile in all departments. The firm, on the other hand, does not develop technological novelty. It only adds or changes different components that are under the current repertoire of knowledge within the firm.

Put differently, the main advantage of this company is its ability to integrate technological innovation made elsewhere, operations efficiency and commercial goods. This is possible through the use of the management capability which the Footwear Co. developed over time. The management capability to reduce the “internal friction” between these three areas enables the firm to position itself in the market better than the competition.

Moreover, as a proof of this special ability, the firm has recently changed its management driver and system, from an operations-based to a product-based model. If our research had taken place a few years ago, we would probably have found that the operations capability was predominant in this firm. This ability to manage all areas in such efficient ways makes the firm innovative in management terms, which is verified by its financial performance. It has not only become financially independent from the head quarters, but it has also achieved above-average growth within the group.

The example of the Footwear co. helps to identify the existence of firms that, despite not being leaders in developing new manufacturing processes and creating innovative products, stand out for management innovations, such as new managerial methods, new organizational structures, better forms to make decisions, etc. Therefore, firms achieve a superior performance as a result of articulation of the other capabilities which may be inside or outside the boundaries of the firm.

Beverage Co. - Transaction Capability

This firm produces soft drinks, juices and mineral water. Since its establishment in 1924 in Rio Grande do Sul, the firm has managed to grow in a market dominated by recognized global brands. The company operates only in this state, where it holds a 12% market share in soft drinks.

Regarding its technology development capability, the firm rarely practices R&D activities and does not have personnel permanently allocated for this task. The development of new products is encouraged by the suppliers who often introduce new compounds that

are analyzed by the firm. Therefore, in the last ten years, the firm has launched three new product lines including mineral water and juices. The technology used is standardized and well established in the sector. Regarding its management capability, the firm is considering making some changes to its managerial processes to gain efficiency. The firm is still partially run by family members and needs to professionalize. At the time of the visit, it came to our knowledge that the company was initiating a new strategic planning process. In relation to its operations capability, it operates in a classic forecast and push production system. During the visit we were informed that the production area had been considered a priority for many years, however, the commercial area (transaction capability), covering distribution and sales, is now considered central to the firm's development.

Thus, we can clearly identify that the transaction capability is the firm's predominant capability. Of the firm's 650 employees, 450 work in sales, distribution, outsourcing and purchasing. This is even more significant since the firm is not a global player. It manages its suppliers through contracts (considered a differential when compared to smaller manufacturers). To ensure its sales, the company has large inventories and on time delivery, which really gives the Beverage Co. a commercial benefits over its competitors, the global players.

The Beverage Co. has developed a regional distribution system characterized by fast delivery, frequent marketing promotions, and specialized customer services. The transaction capability has allowed this company not only to continue in the market, but also to increase its market share competing with established traditional firms.

Although the transaction capability is predominant, there is a strong link with the management capability, which results in a solid business coordination pattern.

Generally speaking, firms are innovative when creating new products, new processes and new forms of management. The case of the Beverage Co., nevertheless, exemplifies that there are firms that innovate when they are able to develop new ways of minimizing their cost of transacting with their suppliers and customers. These are transaction innovations.

Analysis

The analysis of the four cases allows us to make some general and specific considerations (Figure 3). By observing performance in the four companies, we conclude that the predominant capability will determine the ongoing strategy of the firm and its innovativeness. Moreover, the way the firm presents itself to the market is clearly defined by that special capability.

In Metalworking Co., the R&D structure existing in all its three facilities allows the firm to provide customers with a special development capacity based upon its technology development capability. This is, on the one hand, is boosted by updated scientific and technological information based on relations with universities and technological research centers, and on the other, by its organizational culture focused on encouraging innovation among all ranks of employees. All employees are called "inventors". The visible results

are, other than its organic growth, a strong reputation for patenting and innovation prize winning. This is why, in the Metalworking Co., the management of technology function is of a major importance.

Electronics Co. is a typical example of a production oriented strategy based firm, with the operations capability predominating. Within the firm, every effort is made to guarantee its productive capacity in terms of the high flexibility and high quality perceived by the customers. Even the operations management structure is located inside the manufacturing plant. The major goal of the firm is to maintain its uniqueness in terms of specialty production. They even produce one-off products; something big Asian producers are still far from achieving. To be unique is to be innovative. Such firms, usually, are characterized by fill orders for firms that dominate the value chain. Thus, since these firms have a small room to innovate, its advantage lies in operating efficiency.

Footwear Co., instead of changing its technological development or operations structure to cope with recent movements in the Brazilian market, it has changed its management system. The business unit abandoned the production oriented model in favor a product-oriented model. The consequence was a typical innovative outcome in which management capability led to increased profits. These results have enabled a growing independence of the matrix. The other capabilities gained in terms of accuracy and cost reduction through the internal integration and flexibility of different management functions. The innovativeness of the Footwear Co. is discussed internally throughout the whole corporation, since this business unit has been growing around 20% each year for the last three years, while the rest of the group has grown 5%.

Beverage Co. is a typical example of transaction capability predominance. One can easily appreciate this just by taking a close look at its internal division of labor: 75% of the labor force is allocated to commercial functions. Management and other capabilities are there just to assure that the production capacity will generate enough products to fulfill inventories and thus, to give the company the on-time-delivery ability to be on the market before and faster than traditional global players. Whatever customers need in terms of commercial services and negotiation, they consider feasible. This is why marketing, advertising, logistics and distribution are the major functions that give the firm 12% of regional market.

Finally, with this one-specific-capability predominance each firm acquires its uniqueness vis a vis the competition and the consumers. The innovation performance of each firm, however, relies on different but complementary capabilities and its spill-overs. It should also be stated that innovation has come about due to market recognition. So, if the firm is recognized for its products, its quality, its production capacity, its management efficiency or its special attendance function, what really matters is its capability to perform as if it has always something new, unique or technologically innovative to offer.

Final Remarks

The innovative company, whether it is mostly based on technology development, operations, management or transaction capability, is always an agent of novelty, seldom

perceived by the market as a customizing player. In this paper we have proposed a new approach to examine innovation in firms, which involves a four inter-related capability framework and raises some analytical issues.

First, every firm has all four proposed capabilities. Second, one of them predominates over the others and this gives the firm its innovativeness. Third, for a firm to perpetuate in the market, it is necessary to change its technological, management, operations or transaction knowledge over time. Finally, for a firm to innovate, its capabilities need to be specific and integrated so it can generate Schumpeterian profits. For this reason, we have defined the boundaries of these capabilities. The internal capabilities allow the firm to absorb, adapt and transform a given technology into specific management, operations and transaction routines that can lead a firm to achieve Schumpeterian profits, i.e., innovation.

Figure 3 – Capabilities of the Firm Analysis

Brazilian Cases Capabilities of the Firm	Metalworking Co.	Electronic Co.	Footwear Co.	Beverage Co.
Technological Development Capability	R&D focused (new products and technologies) Partnerships with Universities and Research Centres. New projects follow technological trends. Highlight: Focus in R&D, innovation and register patents.	Products follow customers specifications. Production resources are specialised. New projects are improvement of the customers' order.	Uneventful development. Products follow fashion trends. Resources allocated in new projects are divided in 2 sectors: Research and Engineering Much effort on routine projects.	R&D focused (new products) Partnership with suppliers. New projects follow market trends, but it is difficult for them to internalize new products in production lines.
Operations Capability	Pull production system based on Japanese manufacturing techniques (Kanban system). Flexibility to produce different metal packages. Automated operations.	Pull production system based on customer's needs. Flexibility to produce specialties (around 200 different products/month). Automated operations. Highlight: Focus in the best production practices and high performance (small batches).	Push production system based on franchisee's sales. Some flexibility to produce specialties. Labour-intense system and few automated operations.	Push production system. Flexibility to produce new products in soft drinks, juice and water lines. Automated operations.
Management Capability	Uses Japanese management techniques. Pursue continuous improvement. Flexibility to solve problems in accordance to the employees' involvement.	Corporate system aggregates Marketing, Sales and Managerial departments. Hires external consultants to help solving problems in this area.	Uses many key performance measures. Has good financial performance. Has been awarded for quality and productivity. Reference in managing labour-intense production (4 to 6 new collections/year) Highlight: Focus in IT to integrate sales and production. The research sector follows franchisees product information.	Business managed by family members. Considers necessary to professionalize the management to gain process efficiency.
Transaction Capability	Negotiates in international fairs with global players. Sells technology to other companies.	In attendance in 11 countries in 5 continents. Strategic Alliance with a global conglomerate of companies.	In attendance in 8 countries. In Brazil: 164 franchisees and more than 15,000 points of sale. Negotiates with retail stores and franchisees Manages own stores.	In attendance 55,000 points of sale in RS through 5 distribution centres. Manages suppliers through contracts. Highlight: Focus in local market. Logistics system provides the best route to deliver the products. 69% employees are sales force.
Innovative Performance	Has been awarded for innovative products (market recognition). International patents registered.	Recognised by producing small batches of products of high quality in a large scale sector.	The shoes unit has achieved financial independence from the head quarters.	12% market share in RS against global players.

Technology development capability is what the firm does to change what it knows, in other words, how it internalizes new knowledge. The firm's development is based on this process of technological change, which can be seen in terms of new products, efficient manufacturing, cost reduction and higher standards of quality among others. It is the ability to employ, at a given time, a given productive capacity by using a changed set of routines embedded in knowledge, skills and technical systems. The management capability is the mechanism by which the firm transforms the technological outcome into an efficient operation. To complete the innovation process, transaction capability is necessary to take the technical, operation and management efforts to the market, through products.

In addition, the four cases studied enable us to reach some points that need to be discussed in successive works. Among which are those referred to the types of innovations. By looking at the Metalworking Co. we notice that in different industrial sectors (driven by technological) there are firms whose main advantage is linked to their technological innovations. This type of firm focuses its efforts on creating an enabling environment to develop technological solutions to customers, to patent these solutions, to establish partnerships with research centers, etc.

The case of the Electronics Co. shows that in certain markets where firms manufacture quality products in large batches and low prices, it is feasible to compete through attributes such as speed and flexibility. These companies can be quick and flexible in manufacturing small batches. Although not creating new products, firms such as Electronics Co. generate a series of operations innovations (e.g. layout and new processes), which allows them to survive in the market. Creating new products (and services) and making them effectively is a source of differentiation. The position in the value chain is related to the type of capability. That is, the more to upstream in chain, the firm is more predominant in operations capability and less on transaction capability

Another source of innovation is the reduction of "internal friction" between different areas of the firm. To the extent that a firm begins to expand its borders, it is difficult to think that family administration standards are used to coordinate all these activities (operations, technology development and transaction). Hence, firms begin to professionalize their management capabilities by creating new management models. The case of Footwear Co. reflects this type of innovation. Grow in size, necessarily, implies developing the management capability.

In the case of mature markets, where innovation in product or processes occurs less frequently, there are firms that can benefit from other type of innovation, the transaction innovation. The Beverage Co. is a firm that carries out its activities in a mature market dominated by large brands, such as the soft drinks market. Despite this scenario, the Beverage Co. has been able to differentiate itself through services, area coverage, marketing process, etc. That is, a set of activities that can reduce transaction costs. The number of employees, allocated, to each area of the firm suggests the predominance of the main capability

Finally, the model used in the multiple case studies indicates that there could be some 'sectorial consistency'. That is, firms need to develop a specific capability in order to stay and profit in each sector, in other words, a capability characteristic of the sector. Therefore, firms that are not able to develop some capability characteristic in its industrial sector could reduce their chances of success, when compared with firms that align some predominant capability with the sector.

Future Research

The presentation of the cases is a first attempt to reach some generalization, nevertheless there remains some steps to go. This paper presented a more robust description of the concepts discussed. As a next step to consolidate the proposed model it is recommended a multi-sector survey in a large number of the industrial companies. Nonetheless it is necessary to develop a set of non-conventional innovation metrics in order to capture the resulting outcomes from the enhanced capabilities.

Notes

- 1 The definition of innovation remains open for discussion. According to Schumpeter (1942), a successful business venture necessarily provides extraordinary profits to the entrepreneur. Another may adopt a more technical definition, such as those that advocate that any novelty that is brought to the market should be considered an innovation. In this paper, we follow the Schumpeterian tradition.
- 2 Somehow, one may consider management as the former neoclassical definition of the firm: to ensure the best resource arrangement given the technology and its production function.
- 3 This concept was somehow used by Teece (1986) and Teece et al. (1994). However, they do not indicate the characteristics, scope and the necessity of this capability in order to understand the nature of the firm.

Acknowledgements

The present study was carried out with the financial support of the Brazilian Government research funding agencies Research Foundation the State of Rio Grande do Sul (FAPERGS) and the Brazilian National Council for Scientific and Technological Development (CNPq).

References

- Afuah, A.N. 2002. Mapping technological capabilities into product markets and competitive advantage. *Strategic Management Journal*, 23 (2),171-179.
- Argyres, N. 1996. Evidence on the role of firm capabilities in vertical integration decisions. *Strategic Management Journal*, 17 (2), 129-150.
- Argyres, N., Mayer, K., 2007. Contract design as a firm capability: an integration of learning and transaction cost perspectives. *Academy of Management Review*, 32 (4), 1060-1077.

- Barnard, C., 1966. *The Functions of the Executive*. Harvard University Press, Cambridge. First published in 1938.
- Barney, J., 1991. Firm resource and sustained competitive advantage. *Journal of Management*, 17 (1), 99-120.
- Becker, G., 1962. Investment in Human Capital: A Theoretical Analysis. *Journal of Political Economy*, 70 (5), 9-49.
- Bell, M., Pavitt, K., 1995. The development of technological capabilities. Trade, Technology and International Competitiveness. Economic Development Institute of the World Bank, 69-100.
- Burgelman, R., 1994. Fading memories: A process theory of strategic business exit in dynamic environments. *Administrative Science Quarterly*, 39 (1), 24-56.
- Chandler, Alfred D., Jr. 1977, *The Visible Hand*. Cambridge, Mass. and London, England: The Belknap Press of Harvard University Press.
- Chandler, A. D., 1992. Organizational capabilities and the economic history of the industrial enterprise. *Journal of Economic Perspectives*, 6 (3), 79-100.
- Christensen, J.F. 1995. Asset profiles for technological innovation. *Research Policy*, 24 (5), 727-745.
- Coase, R., 1937. The nature of the firm. *Economica*, 4 (16), 386-405.
- Cohen, W., Levinthal, D., 1990. Absorptive capacity: a new perspective on learning and innovation. *Administrative Science Quarterly*, 35 (1), 128-152.
- Collis, D.J., 1994. Research note: how valuable are organizational capabilities? *Strategic Management Journal*, 15 (8), 143-152.
- Conceição, A.C.; Grando, M., Teruchkin S.; Faria, L., eds, 2010. Um panorama gráfico (Três décadas de economia gaúcha), Porto Alegre: FEE.
- Dosi, G. 1988. The nature of the innovative process. Dosi, G., Freeman, C., Nelson, R., Soete, L, eds. *Technical Change and Economic Theory*. Pinter, London.
- Dosi, G.; Nelson, R.; Winter, S., 2000. Introduction: The Nature and Dynamics of Organizational Capabilities. In: Dosi, G., Nelson, R., Winter, S. (Eds.). *The Nature and Dynamics of Organizational Capabilities*. Oxford University Press, New York.
- Dutrénit, G., 2000. Learning and knowledge management in the firm: from knowledge accumulation to strategic capabilities. Edward Elgar, Northampton, Ma. Reprinted 2003.
- Eisenhardt, K.; Martin, J. 2000. Dynamic capabilities: What are they? *Strategic Management Journal*, 21 (10-11), 105-1121.
- Fayol, H. 1949. *General and industrial management*. London, Sir Issac Pitman & Son.
- Grant, R., 1991. The resource-based theory of competitive advance: implications for strategic formulation. *California Managerial Review*, 33 (3), 114-135.
- Guan J., Ma, N. 2003. Innovative capability and export performance of Chinese firms. *Technovation*, 23 (9), 737-747.

Hayes, R. H., Pisano, G. P., 1994. Beyond world-class: The new manufacturing strategy. *Harvard Business Review*, 77-86.

Hayes, R.H., Pisano, G.P., Upton, D., Wheelwright, S., 2005. *Operations, Strategy, and Technology: Pursuing the competitive edge*. Hoboken: Wiley.

Itami, H. and Roehl, T. 1987. *Mobilizing invisible assets*. Harvard University Press, Cambridge.

Lall, S., 1992. Technological capabilities and industrialization. *World Development*, 20 (2), 165-186.

Langlois, R.N., 2003. The Vanishing Hand: The Changing Dynamics of Industrial Capitalism. *Industrial and Corporate Change*, 12 (2), 351-385.

Langlois, R.N., Foss, N., 1999. Capabilities and governance: the rebirth production in the theory of economic organization. *Kyklos*, 52 (2), 201-218.

Lazonick, W., 1992. Business Organisation and Competitive Advantage: Capitalist Transformations in the Twentieth Century. In: Dosi, G., Giannetti, R., Toninelli, P. A. (Eds). *Technology and Enterprise in a Historical Perspective*, Oxford University press, Oxford, 119-163.

Madhok, A., 1996. The organization of economic activity: transaction costs, firm capabilities and the nature of governance. *Organization Science*, 7 (5), 577-590.

Mayer, K., Argyres, N., 2004. Learning to contract: Evidence from the personal computer industry. *Organization Science*, 15 (4), 394-410.

Mayer, K., Salomon, R., 2006. Contract design as a firm capability: an integration of learning and transaction cost perspectives. *Academy of Management Review*, 49 (5), 942-959.

Mintzberg, H., 1973. *The Nature of Managerial Work*. Harper & Row, New York.

Nelson, R., Winter, S., 1982. *An Evolutionary Theory of Economic Change*. The Belknap Press of Harvard University Press, Cambridge, Ma.

OECD, 2005. *Oslo Manual: Proposed Guidelines for Collecting and Interpreting Technological Innovation Data*. 3th. edition. OECD, Paris.

Pavitt, K. 1984. Sectoral Patterns of Technical Change: Towards a taxonomy and a theory. *Research Policy*, 13, p. 343-373.

Penrose, E., 1959. *The Theory of the Growth of the Firm*. Oxford University Press, New York. 272p. Reprinted in 1995.

Prahalad, C., Hamel, G., 1990. The core competence of the corporation. *Harvard Business Review*, 68 (3), 79-91.

Richardson, G., 1972. The organization of industry. *Economic Journal*, 82 (327), 883-896.

Rowley, J. 2002. Using Case Studies in Research, *Management Research News*, 25 (1), 16-27.

Rush, H., Bessant, J., Hobday, M., 2007. Assessing the technological capabilities of firms: developing a policy tool. *R&D Management*, 37, 221-236.

- Schumpeter, Joseph A., 1942. *Capitalism, Socialism and Democracy*. Harper, New York.
- Selznick, P., 1957. *Leadership in administration: a sociological interpretation*. University of California Press, Berkeley and Los Angeles, Ca. Reprinted in 1984.
- Skinner, W., 1969. Manufacturing: missing link in corporate strategy. *Harvard Business Review*, 47 (3), 136-145.
- Skinner, W., 1974. The focused factory. *Harvard Business Review*, 52 (3) 113-121.
- Slack, N., Lewis, M., 2008. *Operations Strategy*. Pearson Education, Essex.
- Snow, C., Hrebiniak, L., 1980. Strategy, distinctive competence, and organizational performance. *Administrative Science Quarterly*, 25 (2), 317-336.
- Stamp, G., 1981. Levels And Types Of Managerial Capability. *Journal of Management Studies*, 18 (3), 277-298.
- Taylor, F., 1911. *Princípios de Administração Científica*. 3 ed. São Paulo: Atlas, brazilian translation in 1957.
- Teece, D., 1986. Profiting from technological innovation. *Research Policy*, 15 (6), 285– 305.
- Teece, D., Rumelt, R., Dosi, G., Winter, S., 1994. Understanding corporate coherence: Theory and evidence. *Journal of Economic Behavior and Organization*, 23 (1), 1-30.
- Teece, D., Pisano, G. and Shuen, A. 1997. Dynamic capabilities and strategic management, *Strategic Management Journal*, 18 (7), 509-533.
- Teece, D., (2007) Explicating dynamic capabilities: The nature and microfoundations of (sustainable) enterprise performance. *Strategic Management Journal*, Vol.28, No 13 pp.1319-1350.
- Trott, P. 2008. *Innovation Management and New Product Development*. 4th edition. Harlow, England: Pearson Education Limited.
- Wang, C. E Ahmed, P. 2007. Dynamic capabilities: a review and research agenda. *International Journal of Management Review*, 9 (1), 31-51.
- Ward, P., McCreery, J., Ritzman, L., Sharma, D. 1998. Competitive priorities in operations management. *Decisions Science*, 29 (4), 1035-1046.
- Westphal, L.E., Kim, L., Dahlman, C.J., 1985. Reflections on the Republic of Korea's acquisition of technological capability. In: Rosenberg, N., Frischtak, C. *International technology transfer: concepts, measures, and comparisons*. Praeger, New York.
- Whitley, R., 1989. On the nature of managerial tasks and skills: their distinguishing characteristics and organization. *Journal of Management Studies*, 26, 209-224.
- Williamson, O., 1985. *The Economic Institutions of Capitalism*. Free Press, New York. 450p.
- Williamson, O., 1999. Strategic research: governance and competence. *Strategic Management Journal*, 20 (12), 1087-1108.

Winter, S. 2003. Understanding dynamic capabilities. *Strategic Management Journal*. 24 (10), 991-995.

Yam, R.; Lo, W.; Tang, E; Lau, A. 2011. Analysis of sources of innovation, technological innovation capabilities, and performance: An empirical study of Hong Kong manufacturing industries. *Research Policy*, 40 (3), 737–747.

Yin, R. 2003. *Case Study Research: Design and Methods*. 3a Ed. Thousand Oaks, CA: SAGE Publications.

Zhou, K.Z., Wu, F., 2010. Technological capability, strategic flexibility, and product innovation. *Strategic Management Journal*, 31, 547-561.

Contact email address: paz@ea.ufrgs.br

Copyright of International Journal of Management is the property of International Journal of Management and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.