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**The firm's operational capability and innovation: Comparative studies of
innovative firms from the south of Brazil.**

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Abstract:

In emergent economies, firm's innovation is often a survival issue. This research is focused on the operational capability concept and it is intended to explain, in a comprehensive way, how this capability matters and supports innovation. This paper analyzes firms, which working under standard technology, innovate and export.

Key words: Brazil; Innovation; Operational capability; Innovation capability

1 Introduction

Nowadays, innovation is a key issue in the business field, especially if the context is an emerging country like Brazil. As an important market or as a major trading partner, Brazil is at the heart of global concern. Within this competitive context, to satisfy domestic demand or requirement of foreign markets, the firm should change to be competitive and not to perish over the competition.

Over the last thirty years, the firm's ability to change has been linked to the innovation process, which has generated interest from the academic community (Teece, 1980, 1982; Nelson & Winter, 1982; Teece, Pisano & Shuen, 1997; Dosi, Hobday & Marengo, 2003). In order to identify opportunities, to make adaptations and to act appropriately to meet the environmental market, every company needs a specific set of capabilities. These capabilities have been part of a broad range of academic approaches (Penrose, 1959; Barney, 1991; Selznick, 1957; Prahalad and Hamel, 1990; Richardson, 1972; Nelson & Winter, 1982).

Based on the development and application of these capabilities within the firm, it is possible to get different types of innovation. Based on the legacy of Schumpeter, the Oslo Manual describes four types of innovation: product innovation, process innovation, marketing innovation and organizational innovation (OECD, 2005).

In this study, the operational capability framework developed by Flynn et al. (2010), Swink & Hegarty (1998) and Schroeder et al. (2002) is taken into account. In this process, operational capabilities are crossed with the types of innovations of the Oslo Manual. The main objective is to understand and determine how these operational capabilities support the innovative profile of the firm, allowing it to continue operations in local market and exportation.

To develop this research, an exploratory design with in-depth interviews was held with Managers of four firms from different sectors and levels of technology. The firms are situated in the State of Rio Grande do Sul, which is the southernmost region of Brazil. These data and analysis are partial results of a research project called “Caminhos da Inovação na Indústria Gaúcha” which has been developing by several public and private universities.

This work is structured in six sections, included this introduction. The second section refers to the theoretical framework that presents a brief review of innovation and operational capability. Then, the method of data collection and data analysis are presented in section 3. After that, in section 4, relevant information of the cases is presented. Section 5 presents discussion and analysis of four cases. And finally, in Section 6, some final considerations are pointed out.

2 A Framework for Firm’s Capabilities and Innovation

Capability in general is a new concept, very applied in the literature but with little consensus about what it really means. It is generally accepted that every firm has a set of capabilities, those let the firm perform a unique entity. Reviewing the literature about capabilities and innovation, many works have defined those following different approaches, but at the end, all definitions and concepts refer to the same object. Thus, several authors have been studied capabilities based on human resources (Penrose, 1959; Becker 1962; Barney, 1991). Some authors have identified them as distinctive competencies (Selznick 1957; Snow and Hrebiniak, 1980). Richardson (1972) proposed to consider them as specific skills. Nelson and Winter (1982) defined them as a set of routines. Itami and Roehl (1987) considered them as

invisible assets and finally, others authors think those capabilities could be defined as core competences (Prahalad and Hamel, 1990). Despite the number of definitions, one point is clear, firms use this set of capabilities to identify market opportunities, develop new value concepts and meet customer's needs.

In addition, being focused on the firm, it is possible to identify two different approaches. The first one considers the firm as a set of resources, knowledge, skills and routines that let the firm perform a unique entity (Penrose, 1959; Richardson, 1972; Nelson & Winter, 1982, Teece, 1980, 1982). The second one considers the firm as an entity where are managed contractual relationships following a specific governance structure (Coase, 1937, Demsetz, 1968, Williamson, 1985, 1991, 2002). These two approaches are considered independent, but authors as Langlois (1999, 2007) consider these two approaches as one complements each other. That means, firms use capabilities to identify market opportunities, create a new value concept to meet customer's needs, but in this process the environmental market is full of uncertainty. So, in order to manage contractual relationships effectively and efficiently, the firm will need a specific governance structure.

While some author works on capability definitions, other authors have developed different theoretical perspectives. For instance, Lall (1992) has worked them as technological capabilities; Cohen and Levinthal (1990) have dealt with them as absorptive capacities; Chandler's perspective (1992) developed them as organizational capabilities; Flynn et al. (2010) have studied operational capabilities and ultimately the perspective of dynamic capabilities was developed by some academics (Teece, Pisano and Shuen, 1997; Eisenhardt and Martin, 2000), etc. There are some studies that show capabilities can support process of innovation at the firm with great effect on exportation (Guan & Ma, 2003; Yam, et al., 2011). Despite these efforts, there is no consensus about which perspective could support better performance or guarantee innovation.

In the literature, when firms have to deal with a process of change and innovation, it is possible to identify two theoretical approaches, defined as dynamic capabilities and technological capabilities. The first approach presents the concept as a set of capabilities that is required by the firm. In this process, the firm will change in order to meet a changing environment. As a consequence, a sustained competitive advantage could be achieved (Teece, Pisano and Shuen, 1997; Eisenhardt and Martin, 2000; Winter, 2003; Wang and Ahmed, 2007; Teece, 2007; Dutrénit, 2000). Authors as Zawislak et al. (2011) have developed a model to explain innovation based on four capabilities (technological, operational, managerial and transactional). The second approach is also focused on change and innovation, but in a technological context (Lall, 1992; Bell and Pavitt, 1995).

The present work used the Oslo Manual and its classifications of four types of innovation: product innovation; process innovation; organizational innovation and marketing innovation (OECD, 2005), which are described below:

A **product innovation** is the introduction of a good or service that is new or significantly improved with respect to its characteristics or intended uses. This includes significant improvements in technical specifications, components and materials, incorporated software, user friendliness or other functional characteristics.

A **process innovation** is the implementation of a new or significantly improved production or delivery method. This includes significant changes in techniques, equipment and/or software.

A **marketing innovation** is the implementation of a new marketing method involving significant changes in product design or packaging, product placement, product promotion or pricing.

An **organizational innovation** is the implementation of a new organizational method in the firm's business practices, workplace organization or external relations.

In order to understand how the innovation performance is supported specifically by operational capabilities, the next content will detail the operational capability approach and the key features that could guarantee firm's competitive advantage.

2.1 The operational capability in innovation

Operational capabilities are firm-specific sets of skills, processes, and routines, developed within the operations management system, that are regularly used in solving problem process (Flynn *et al.* 2010). The operations performance is normally associated with competitive criteria (quality, cost, flexibility and delivery). Last decades, authors as Wheelwright (1984), Miller and Roth (1994), Ward *et al.* (1998), Mc Kone *et al.* (2001), Boyer and Lewis (2002) and Swink *et al.* (2007) have presented studies with little variation about this approach.

Operations performance and competitive priorities are repeatedly analyzed based on the logic of trade-offs. This kind of analysis can be expressed as a function of two variables that are inversely correlated (Hayes and Pisano, 1996). The concept of trade-off should guide decision of production at the factory floor and also through the supply chain (Skinner, 1969, 1974; Wheelwright, 1984). An alternative model for the trade-offs is expressed through a synergistic approach. The sand cone model is a prime example of this approach, which states that a new capability is built on existing ones (Collins *et al.*, 1998; Corbett and Wassenhove, 1993; Ferdows and De Meyer, 1990). Thus, the prospect of cumulative capacity suggests that there is a sequence of capability development over time. Ferdows and De Meyer (1990) stated that quality, reliability, flexibility and, ultimately cost would be a construction sequence of these capabilities.

However, there is no consensus on this issue among authors. Flynn and Flynn (2004), in a cross-country study have not identified a unique pattern on the sequence of skills as suggested by Ferdows and De Meyer. On the other hand, the authors found that companies organize a

group of capabilities to achieve its strategic objectives in accordance with industry, region or country in which they operate.

Other studies on the subject were held in a broader perspective. Swink and Hegarty (1998) proposed seven relevant skills in the context of operations, identifying categories as improvement, innovation, integration, accuracy, control, agility and responsiveness. Flynn et al. (2010), taking the research of Swink and Hegarty (1998) as a basis, sought to clarify the limits of capability. Based on extensive theoretical review, the authors defined six key operational capabilities, which served as the basis for the preparation of the present study. The six key operational capabilities are described by Flynn et al. (2010), as:

Operational improvement: it is an incremental change in processes and operations, only for the company in which the main approach is efficiency. An organization with an operating capability will improve the ability to continuously adapt the process according to the addition of new employees and how particular characteristics of the job change over time. In addition, the ability to improve the processes will be transferred to other processes of the organization. Thus, the capability for operational improvement is embedded in the organization, not a particular person.

Operational innovation: While the operational improvement is based on incremental change, operational innovation focuses on a radical change. It represents the unique skills, processes and routines to radically improve existing processes or operations for creating and implementing new and unique manufacturing processes.

Operational Customization: While the operational improvement focuses on incremental change and operational innovation focuses on radical change, customization is operating at its core the creation of something unique. This equipment requires flexible access to a wide variety of materials, and employees

who are qualified and experienced in interpreting customer wishes vaguely articulated, using equipment commonly used to translate them into products that meet customer needs.

Operational Cooperation: It is defined as unique skills, processes and routines that help to create healthy and stable relationships with people of different internal functional areas, as well as supply chain partners abroad. Although individual members of the procurement team can establish relationships with suppliers, operational cooperation transcends the personal and institutional relationships.

Operational responsiveness: It is based on the construction by Swink and Hegarty (1998). At its core is the ability to quickly modify a standard product to meet the specific needs of an individual customer. Responsiveness is defined as operating different skills, processes and routines to react quickly and easily to changes in input or output requirements.

Operational reconfiguration: Reconfiguration operation is based on the "reconfiguration" articulated by Teece et al. (1997), and "speed" offered by Swink and Hegarty (1998). Because a mismatch between the operational strategy of an organization and its market operations can be devastating, the ability to perceive subtle points about the market environment and react appropriately can be a powerful competitive weapon. Reconfiguration operation is the ability differentiated, processes and routines to make the changes necessary to restore the fit between operations strategy and market environment, if your balance has been disturbed.

2.2 *Conclusion on the theoretical part*

Innovation is a subject of multiple approaches within the academic area. In many studies, it is supported by the firm's capabilities (Burgelman, 1994; Christensen, 1995; Guan and Ma, 2003; Yam et al., 2011). In this sense, the operational capability becomes an important issue in performing the creation of a product in small and / or large scales.

This research seeks to cross the operational capability with the different types of innovation generated at the firm. In order to classify the types of innovation in a comprehensive way, the Oslo Manual is used. Essentially, this Manual describes four types of innovation: product innovation, process innovation, organizational innovation and marketing innovation (OECD, 2005). And in order to characterize the operational capabilities, the study of Flynn et al. (2010) was used, because this work describes the key operational capabilities as operational improvement, operational innovation, operational cooperation, operational responsiveness, operational customization and operational reconfiguration.

3 Method and data

The design of this study is exploratory and it is intended to understand the relevance of operational capability in the innovation process and how it helps in improving the performance of the firm, enabling market expansion through exports. Research strategy adopted was the comparative study, with a locus constituted by four companies located in the South of Brazil, two of which are of high technological level and the other two are low technological level. The main interest features in the object profile was the market expansion through exportation. In other words, companies necessarily need to export to be considered in the study. In addition, companies are located in two industrial regions in Rio Grande do Sul (metropolitan area of Porto Alegre city and northeast of Rio Grande do Sul state) and within sectors with exporter profile (Electronic, Automotive, Furniture and Footwear). Thus, it is clear that companies have been chosen focused on the research purpose.

3.1 Data

The main instrument for data collection was a script of questions drawn from the research team of the project at UFRGS. These data and analysis are partial results of a research project called “Caminhos da Inovação na Indústria Gaúcha” which is developed by several public and private universities. Data was collected through in-depth interviews with manager and owners of the visited firms. Besides the instrument for data collection, notes taken during the technical visit were used. Secondary data from websites and specialized magazines were used too,

3.2 Analysis and method

Data were analyzed using content analysis (Bardin, 1977). The analyses was intended to identify aspects related to the key operational capabilities described by Flynn et al. (2010) that could support different types of innovative at the company. The different types of innovation follows the same classification defines at the theoretical framework of the Oslo Manual (OECD, 2005). Also, the interest was focused on to determine how the relationship between operation capability and innovation can support exportation.

4 Cases profile

4.1 Firm 1: Electronic

The company studied was founded in 1954, located in the metropolitan area of Porto Alegre city, with over 40,000 different products and more than 1500 employees; it is the second largest manufacturer of passive electronic components in the world. This plant produces electronic components and is considered one of the most specialized manufacturers in the world. Thus, this company is the leader in the Brazilian market of electronic components. Additionally, great portion of its productions is exported to several important firms in the world.

The passive electronic components are used in a wide range of applications (automotive, industrial, consumers and ICT). The corporate business strategy is focused on to

guarantee high level of confidence, quality and customizations. Most of the devices developed at the plant are very specialized, with a high degree of customization and produce in small batches. An important firm's feature is the capability to anticipate customer's requirement, process which is supported by a R&D department. Thus, the company supplies to very specific segments. Besides this basic detail, the operational capability shows the following characteristics.

4.1.1 Operational improvement

As presented in the literature, this capability is developed in the process of continuous improvement, which seeks to reduce the lead time, production costs and increase component quality. Internal projects keep the pace of constant change. At the same time, team integration is achieved by joining people who works at the operational level with those who works at the tactical and strategic level. The integration process is supported by professional promotion and reward policies. The plant presents incremental changes frequently. Indeed, every order placed at the plant demands some specific changes and improvement (processes, equipment and procedures). This process is critical and affects directly to the customer satisfaction and firm's competitive advantage.

4.1.2 Operational innovation

Most of the time, the operational innovation is a rare event. This happens when radically changes are required by a customer. Some times product specifications are demanded and having no previous experience at the plant a special process is performed in order to achieve this specifications. This type of changes is not very frequent. In 15 years, the company needed to perform this kind of effort only twice.

4.1.3 Operational customization

R & D department has a key role in the company's customization capability. The customization process is triggered by a posted order at the plant, which includes customer's

requirement. Usually, production process follows a standard set of activities, and most of the time customization occurs in the final stage. It is in this stage where certain components are aggregated, finishing the process and making the product unique. Many of these customizations are achieved through incremental changes (operational improvements).

4.1.4 Operational cooperation

Many of the required inputs are very specific and with few suppliers that generally are abroad. Thus, some partnerships are key issues in the company that shows how the plant depends on some specific suppliers. If the company does not take care of it, problems with the quality of raw materials could occur, mismatching customer requirement. An important point in the company is its strategy to be highly vertical integrated, which let it guarantee some level of independency. However, some partnerships are kept with competent suppliers located in the Brazilian market and abroad. About the process integration, there is high level of integration between different departments in the company, which runs throughout the development process. Moreover, they keep good partnerships with service providers and suppliers of components, making possible short waiting time when unplanned maintenance happened. At the same time, improvement in agility to implement preventive maintenance is achieved.

4.1.5 Operational responsiveness

The company has a high responsiveness level. It is possible because of the flexibility of processes, equipments, good partnerships with suppliers and service providers. New developments take, on average, two months from conception to approval. The R&D department has an important role in this process,

4.1.6 Operational reconfiguration

The integration between R & D and operational area has developed this capability. The area of R & D is often present in trade fairs and also takes part of meetings with clients. All of this is necessary to understand the real customer's need. Reconfiguration is based on

collaborative partnership and good relationships among different areas. Furthermore, the company is focused on current customer's need and makes good forecasting of future customer requirements, facilitating appropriated changes at the plant. Since the development of products and processes are discussed in conjunction with the production area, it is understood that plant capability is a key issue within the operational strategy.

In this context, **innovation** in this company is analyzed within the framework described by Oslo Manual. Product innovation is present within the operating customization capabilities and through small changes in the process it is possible to meet various market segments, where customer's needs significantly alter the functionality of the component. Process innovation comes in three capabilities: improvement, innovation and responsiveness, and according to the type of innovation it is evident the plant requires flexibility in processes. Marketing innovation is supported by innovation and reconfiguration capabilities. Reconfiguration let achieve innovation through interaction with customers, existing needs to be identified and even the possibility of detection of future needs that customers have not yet realized, but that certainly will be demanded. Innovation capability supports marketing innovation because the radical change experienced during the process had as a result a bigger market share. Finally, operational cooperation capability supports organizational innovation. The plant is highly vertical integrated but at the same time its production process depends on specific component suppliers. Table 1 is the crossroads of key operational capabilities and the main types of innovation found at firm 1.

Table 1: Crossroads of key operational capabilities and the main types of innovation at firm 1.

Operational Capability	Type of Innovation at Firm 1			
	Product	Process	Marketing	Organisational
Improvement	-	Yes	-	-
Innovation	-	Yes	Yes	-
Customization	Yes	-	-	-
Cooperation	-	-	-	Yes
Responsiveness	-	Yes	-	-
Reconfiguration	-	-	Yes	-

4.2 Firm 2: Automotive

Firm 2 is the flagship company of manufacturing bus chassis in Latin America. In total 18,000 employees worked in this group. The company was founded in 1949, its main unit has 4,000 direct employees and is responsible for supplying component and final products to domestic market and abroad. The firm goes beyond the responsibility to produce because it also develops parts and components. The company works with Pull system of production and the customization capability and its high technological process supports the company's competitive advantage.

Today the company has a very good reputation, because the company has shown the capability to meet customer requirement. In doing so, the company adapts its processes, allocates the most skill workers and develops the proper routines. In the process of developing new designs and customization, it is very frequent to create new parts and components, some devices have been patented.

4.2.1 Operational improvement

The company has groups and programs within the operational area that are focused on continuous improvement in operations and processes. This operational process let the company achieves an important competitive advantage, basically in cost reductions and quality improvement. Many incremental changes are implemented by these groups where the main point is to achieve standardization, while making changes in the design process of new products. Efforts in this area are aimed to reduce setup time and costs. At the end of the process, there is great flexibility, which was a result of small and constant improvements suggested by these working groups. This flexibility provides a large number of customizations.

4.2.2 Operational innovation

This capability rarely occurs, however, the last radical change of processes, generated great impact on market. Based in this radical change that affects the market environment,

customers started to place orders with a new standard. This new trend increases drastically the sales of the company.

4.2.3 Operational customization

Company's R & D develops new devices taking into account the customer's need. Thus, process at the company has a high level of customization, and this is possible because the equipment and process flexibility which generally are located at the final stages of the product line. Despite the plant operates under a high level of technology, it processes demand very skill workers to perform efficiently.

4.2.4 Operational cooperation

Cooperation with suppliers is a very important issue. Managers indicate that cooperation agreement provides an important competitive advantage. Most partners are local and take part of the process development, this partnership let suppliers to offer new products and make suggestions. The interaction between the areas is also high. The company has a school, where all employees follow technical training before they start activities in the plant. During the course workers are trained in all processes under the supervision of specialists in each area. On average, 72 "students" are constantly in training, where a mini-factory simulates all the equipment, processes, procedures and other skills necessary to perform an excellent service.

4.2.5 Operational responsiveness

The responsiveness capability is supported by flexibility of processes and equipment, and good partnerships with local providers. Several indicators are always monitored, such as service time, lead times and standby time. Here it is important to remark that responsiveness have to be complemented with appropriate actions. Thus, customer's requirements play a key role to define what to do.

4.2.6 Operational reconfiguration

The first contact that company has with customers is in the shopping area, which daily some relevant topics are discussed with the production department. The pull production system, in which the production depends on the customer's request, demands a high degree of alignment between different areas and good understanding of the real market needs. In general, the company tried to have a good degree of alignment between the corporate strategy and the environmental market.

Focused on the type of **innovation**, the creation of new product is present within the operational customization, which enables the company to meet a wide range of specificity required by the market, affecting significantly the final product. Process innovation is supported by two capacities: operational improvement and operational responsiveness. Marketing innovation is supported by operational innovation, because even if other operational capabilities are not in the list, the plant has experience that its new process let it create new market needs. Finally, in operational cooperation and operational reconfiguration was founded as supporting organizational innovation. It is due some new managerial method are required to guarantee supplier cooperation and good performance of the management system. Table 2 show the crossroads of key operational capabilities and the main types of innovation founded in firm 2.

Table 2: Crossroads of key operational capabilities and the main types of innovation at firm 2.

Operational Capability	Type of Innovation at Firm 2			
	Product	Process	Marketing	Organisational
Improvement	-	Yes	-	-
Innovation	Yes	-	Yes	-
Customization	Yes	-	-	-
Cooperation	-	-	-	Yes
Responsiveness	-	Yes	-	-
Reconfiguration	-	-	-	Yes

4.3 Firm 3: Furniture

The plant of this company is one of the most modern unit that produces MDF boards in Brazil, it is situated in the State of Rio Grande do Sul. Its founder told in the interview, he saw a great opportunity in the Brazilian capacity to supply raw materials. Then, taking advantage of this opportunity and after evaluation of the project feasibility, the firm 3 was founded in 2000, and started operation in 2003. The plant is totally automated and works in a continued production process, which is triggered by customer orders (pull production system).

Today, the firm 3 has the flexibility to produce a wide number of MDF pattern and hundreds of thousands square meters of boards per year. In order to be in a state of the art status, the company does not hesitate in buying the most updated technology, professional training program or any required resource. The owner thinks that the success of this plant is based on its evolution capability. The firm 3 works in a sustainable process, its corporate strategy takes into account economical, social and environmental issues.

Being the unique plant in the region, it supplies MDF boards to several states in the south of Brazil, as well as other countries (Uruguay and Paraguay). In 2006, the plant doubled the production capacity and now the situation is not different, because of the growing demand there is a project to increase the production capacity. Brazilian markets (real estates and furniture) are growing and the owner expects a sustained trend for next years.

4.3.1 Operational improvement

Following the point of view of Swink and Hegarty (1998), the firm 3 has experienced limited improvements. Because of the natures of the product it is not possible to make to important improvements. Improvements are caused by changes in components, customer priority, volume orders and product specificities. Basically, improvements are related to learn how to manage and combine the plant's production capacity and the level of flexibility. In order

to get it, employees are regularly trained in Europe. Thus, combining the plan and crew, the firm 3 develops a unique set of skills, process and routines.

4.3.2 Operational innovation

The manager is always focused on innovation and any change in the MDF-board industry; those will be analyzed and probably adopted. In doing so, every three or four years the company adds on a new production line, modifying its capacity and demanding new trained people, as a consequence new skills, processes and routines are developed. But in general innovation is not developed in the company.

4.3.3 Operational customization

The industry of MDF-Boards is very standardized; customers already know in advance the set of patterns and colors available at the plant. So, in order to fill out some customer requirements, few little changes are possible (patterns, board structure and color tones).

4.3.4 Operational cooperation

The firm 3 is a plant highly vertical integrated, all component and raw material are developed inside. Despite the fact that even though firm 3 has its own forest plantation, the plant deals with forest product suppliers. In addition, the owner owns a logistic firm, that provides logistic services and a real estate firm, which demands MDF boards permanently. So, the operational cooperation is required basically from some suppliers in Europe (advisement and maintenance) and some local suppliers (forest product and preventive maintenance).

4.3.5 Operational responsiveness

The operational responsiveness capability is present in firm 3, being focused on any variation of the MDF board industry, the company is ready to adopt and apply any change in the input (raw material, skills, technology) or output (customer requirements) that could affect the

production process. Thus, the cooperation capability supports process and organizational innovation.

4.3.6 Operational reconfiguration

This operational configuration capability is based on two approaches: “reconfiguration” (Teece et al., 1997), and “agility” (Swink & Hegarty, 1998). This meaning is related to the capability to align the organization’s operations strategy and its market environment. Firm 3 has shown the capability to identify any variation in the market environment and also the appropriated reaction. The owner defines this as evolution capability.

In the table 3, following the Oslo Manual (OECD, 2005), it is possible to see that some company’s **innovation** are supported by operational capabilities. The production process is technological asset intensive; as a consequence product and marketing innovation are limited. The MDF- board is generally a standardized product and the plant is a technology user and not a developer. It is also important to remark customization capability supports product innovation; improvement, cooperation, responsiveness and reconfiguration capabilities provides support for process innovation; marketing innovation is supported by reconfiguration capability because it has been experienced this capability can affect some markets segments. Finally, some organizational innovations are supported by cooperation and responsiveness capability.

Table 3: Crossroads of key operational capabilities and the main types of innovation at firm 3.

Operational Capability:	Type of Innovation at Firm 3.			
	Product	Process	Marketing	Organizational
Improvement	-	Yes	-	-
Innovation	-	-	-	-
Customization	Yes	-	-	-
Cooperation	-	Yes	-	Yes
Responsiveness	-	Yes	-	Yes
Reconfiguration	-	Yes	Yes	Yes

4.4 Firm4: Footwear

The Firm 4 was founded in 1985 for two brothers, situated at Rio Grande do Sul State. At the beginning, the FIRM 4 was focused on a gap in the children footwear market, but as soon as the company started operations, owners realized that the women footwear market is much more profitable.

Actually, firm 4 has two well known brands in the women footwear market, as any other footwear company with customers in Brazil and abroad, firm 4 needs to be aware of fashion, materials and production trends in the world, as well as to keep a flexible organizational structure to design and produce their own brands for every new collection (Spring-Summer and Autumn-Winter).

The firm 4 is a prize winner company, where the customer's satisfaction is the most important goal to achieve. The company also focuses on employees' professional development. When asked about sustainability, the answer was: the company, through some projects, takes care of social and environmental issues. When asked about the competitive advantage of the company? Owner recognized that the company's competitive advantage depend on the R&D department, because they are capable to transform the available information (suppliers, retailers and customers' suggestions) into new products.

4.4.1 Operational improvement

The manager was clear about this point; he said the operational improvement is part of the company routines. Every new collection demands specific process, skills and routines, and in this learning process new capabilities are developed. For example: firm 4 produces shoes with many details (mix of colors, adornments and other decorations), because of this, processes have to be modified, skill people have to be reallocated and new routines are organized. Any new collection is different and every change is an opportunity to achieve improvement (cost reduction, quality and lead time). Beyond the complexity of a new collection, the company has

the capability to know the appropriate skills, processes and routines to guarantee customer satisfaction.

4.4.2 Operational innovation

The manager indicated that R&D department provides support for the company's competitive advantage, because it has the capability to use the available information (supplier and retailer suggestions, customer trends, fashion trends, and others) to design new collections, process that have guaranteed the success of the company. In doing so, the manager informed that new products and devices have been patented.

4.4.3 Operational customization

The firm 4 has a flexible organizational structure. This is another advantage that let the company to manage the available skill, process and routines to achieve any retailer or customer requirement. The process was described in this way: samples of the new collection are sent to retailers in advance. Most of the time, based on previous experience and customer suggestion, retailers place orders with specific modification (adornments and other decorations). The company has learned how to deal with this situation without affecting drastically average cost, lead time and quality.

4.4.4 Operational cooperation

Cooperation is a very important issue at firm 4. In any collection, retailers always demand specific shoe modifications, and some times these modifications can not be achieved inside the company. So, in order to achieve the requirement and to avoid bottle necks, new suppliers are dealt and some processes are outsourced (logistics, cutting and sewing). It is evident the company has developed cooperation capabilities, which let it to get excellent cooperation agreements, providing support for product, process and organizational innovations.

4.4.5 Operational responsiveness

At firm 4 the responsiveness capability is a key issue. The company has demonstrated it has differentiated skills, processes, and routines for reacting quickly and easily to meet the customer requirements. No matter the required changes in the environmental markets, (inputs or output), the company's will react quickly to guarantee customer satisfaction and loyalty. In doing so, the R&D department has an important role. In general, company shows that the operational capabilities supports all type of innovation.

4.4.6 Operational reconfiguration

The women footwear market is really complex and forecasting is not an easy task. The manager indicates that several years ago, the company was near to bankruptcy. At that time, the firm 4 was able to identify changes in the market environment, but it did not have the capability to react appropriately. Today, they have the capability to make reconfiguration in order to guarantee the alignment between the organization's operations strategy and its market environment. Thus, the company experiences the four types of innovation which are supported by operational capabilities.

Following the Oslo Manual (OECD, 2005), the table 4 shows how the firm 4 develops products, process and organizational **innovations**, which are supported by operational capabilities. This table summarizes the company's capabilities to launch a new collection every season, providing ad-hoc processes and a flexible structure to achieve customer satisfaction. There is a weak innovation in marketing which could be explained by the used of traditional methods and techniques for selling. The company does not have distribution centers. Instead, it sells directly to customers (retailers), as other companies, some outdoors campaigns are performed. In general, new managerial methods are required to adopt changes.

Table 4: Crossroads of key operational capabilities and the main types of innovation at firm 4.

Operational Capability:	Type of Innovation at Firm 4.			
	Product	Process	Marketing	Organizational
Improvement	Yes	Yes	-	Yes
Innovation	Yes	-	-	-
Customization	Yes	-	-	Yes
Cooperation	Yes	Yes	-	Yes
Responsiveness	Yes	Yes	Yes	Yes
Reconfiguration	Yes	Yes	Yes	Yes

5 Discussion and final remarks

Taking into account the main research objective, the study verified the links between the key operational capabilities described by Flynn et al. (2010) and the different types of innovation described in the Oslo Manual (OECD, 2005). As a result, has not been detected clear pattern among the companies. Many similarities and differences were found but there is not strong links or patterns to define regularities among cases.

In general, all types of innovation as well as the different operational capabilities were found in the companies. Some links were identified to show how different types of innovation are supported by operational capabilities. In low technology companies, different types of innovation were found. They are concentrated and required a greater number of operational capabilities to support them. In the high-level technological companies, capabilities are related to each type of innovation. It means the innovation is supported by very specific capabilities.

Following with the comparative analyses of the companies and taking into account the technological level. It is important to remark firms 1 and 2 are high-level technological companies; and firms 3 and 4 are low-level technological companies. It was detected radical innovation in high-technology companies, most of them were marketing innovation type. In this scenario, new possibilities for market expansion were created, including external market. In low technology companies were detected basically incremental innovations which are considered

important for differentiation in local and external markets. Thus, market expansion process does not depend on radical innovation only. So, on one hand, companies with low technological level and incremental innovation can support competitive advantage, better performance and market expansion. However, companies need more efforts to multiply the effect of these incremental changes, which explains the high frequency and concentration of operational capabilities through the different types of innovation. On the other hand, companies with high technological level and radical innovation depend on more specific operational capabilities.

Taking into account similarities, the study present some evidence to think about the cooperation capability supports organizational innovation in all companies. This finding denotes the importance of integration between internal and external areas, where partnerships have an important role and it can provide competitive advantage. Customization capability is also present in all four companies, providing support to product innovation.

Although, all operational capabilities showed relevance for innovation, it appears that in the footwear company, the different types of innovation show a high dependency on operational capability. Probably, this fact is due to the short life cycle of the product that requires frequent changes usually in design and material. It is important to remark the high impact of fashion in this sector.

The findings show that the innovation strategy to compete globally does not follow a standard pattern. This results show consistency with prior work of Flynn and Flynn (2004), in which the authors found that companies organize a set of capability to achieve its strategic goals, in accordance with the industry or country trend where they operate. It is relevant to remark the fact that each operational capability may impact on different types of innovation and companies needs these operational capabilities to support them. This process could be based on strong or weak dependency which means; even if there is a minimal operational capability supporting innovations, companies will required them to achieve a better performance, creating competitive advantages and market expansion possibilities.

6 Final considerations

In general, all different type of innovations and operational capabilities were detected in all four companies, and being in line with the theoretical conclusion, there is evidence to think that innovations are supported by operational capabilities. It is also important to point out that in this study, the degree of dependency, in which every type of innovation depends on the operational capability, is in function of the technological level of the company.

Based on links among the type of innovations and the operational capabilities, in the sample of four companies incremental and radical innovation are achieved, creating specific competitive advantage and possibilities of market expansion, which includes foreign markets and exports.

This study provides insights that could lead new research topics. Particularly, those related to regularities inside specific industries and organized by company, offering a kind of firm's taxonomy. Another insight could lead research to seek for regularities among companies with similar technological level.

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