22nd International Conference on Management of Technology
Science, Technology and Innovation in the Emerging Markets Economy
April, 14th to 18th | Porto Alegre | Brazil

THE DIFFERENT INNOVATION CAPABILITIES OF THE FIRM: Further remarks upon the Brazilian experience

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Further remarks upon the Brazilian experience

Abstract: Innovation is considered by many researchers the inevitable outcome for the very survival of the firm. Nonetheless, the focus of most research on innovation is on the ability of firms to deliver new technological items to the market and develop new technological process. As important as this approach is, it does not fully explain the reason why some firms sustain better competitive position even when not having a high technological output. We argue that the firm is better understood as a combination of certain capabilities and innovation must be seen not only through the technological capabilities approach. The purpose of this paper is to analyze the firm's innovation through four capabilities that can be found in any firm: development, operations, management and transaction capabilities. We use 44 Brazilian companies to exemplify and demonstrate that the firm's innovative performance is affected by these capabilities rather than solely technological. The companies belong to representative industries in Brazil and encompass different technological intensities as in the OECD classification. The data was collected on visits, interviews and secondary data. The results show that, besides technological capability be an important component in the innovation, other capabilities explain why firms differ and perpetuate overtime.

Keywords: Technology Development, Operations, Management and Transaction, Capabilities; Capability Predominance, Innovation.

1. INTRODUCTION

Innovation as means for the firm's success and survival is an issue that has already been taken for granted in the academic discourse. If one does a quick research on an academic data base will find that most research on innovation has focused on product and processes technological innovations. Within this argument firms succeed when they are able to develop their technological capabilities (Lall, 1992, Bell and Pavitt, 1995; Kim, 1999; Afuah, 2002). While these features may be desirable, some industrial firms do not stand in the technological frontier nor have their main efforts on developing technological capabilities. Yet, they do have economic performance which allows their continuation over time as well as what Schumpeterian would recall, extraordinary profits. These observations open up some theoretical questions remaining to be answered. Is innovation only an attribute of firms that have a well developed technological capability? Why do firms with low technological capabilities innovate, grow and are profitable? In order to answer these questions it is necessary to have a clear understanding of the economic agent: the firm.

While the firm has been studied by different lenses (Marshall, 1898; Coase, 1937, Williamson, 1985; Penrose, 1959; Wernerfelt, 1984, Barney, 1991, Nelson and Winter, 1982; Dosi 1988), the essence of it remains unchanged over time. That is, the firm continues to be an economic agent that produces and transact goods and services in order to meet the needs of another economic agent, the consumer. On the one hand, it is a repository of knowledge (Winter, 1991) and operates through certain capabilities and routines (Penrose, 1959; Richardson, 1972; Nelson and Winter, 1982). On the other, it is an organizational arrangement that must operate efficiently aiming at reducing transaction costs (Coase, 1937; Willamson, 1985).

In this sense the firm is both a technology and a transaction agent. If one is looking for a more complete picture in an attempt to go beyond the questions proposed by Coase (1937) "why do firms exist?" and Nelson (1991) "why do firms differ?", to an understanding of "why some firms perpetuate?", one should combine both of these approaches. From these two perspectives we draw our capability-based model divided in a set of four capabilities that can be found in any industrial firm: development, operations, management and transaction capabilities. These four capabilities represent a *technological diver* and a *business driver.* In other words, the firm's efforts to develop and operate technological ventures, as well as its ability to coordinate an array of internal relations turns its outcomes into economic transactions to fulfill market gaps. Development, operations, management and transaction capabilities are present in all firms, however they vary according to industrial and sector specificities, position in the supply chain, as well as market positioning of the firm.

Through this view, the firm's role transcends the simple allocation of production factors as the neo-classical economists would portray. After all, the firm is an agent responsible for the allocation of knowledge. Innovation results from these complementary and integrated capabilities and the innovative firm can be justified through the predominance of one of the four capabilities. This helps explaining why many firms in developing countries grow and perform well even though they are not primarily creators of technology. The purpose of the paper is to analyze what are the characteristics of the innovative firm in the Brazillian industrial context.

This paper is organized as follows: section 2 addresses the firm and the innovation capabilities; section 3 explains the research procedure; next, we present the results; and finally, in section 4 we discuss our findings and future studies.

2. THE FIRM AND THE INNOVATION CAPABILITIES

Since neoclassical economics, the firm was seen as a "black-box" where resources were allocated in order to produce goods and services through price mechanisms regardless of how this process took place within the firm (Demsetz, 1997). Beyond this perspective, two main approaches to the firm were developed, the *coordination based approach* and the *capabilities based approach*.

The *coordination based approach* (Coase, 1937; Williamson, 1985; Penrose, 1959; Chandler, 1977) analyzes the firm as an agent of planning and co-ordination of production and transactions under the direction of a manager. Is this view, the firm arises when the entrepreneur decides to organize internally certain transactions that were once available only in the market. Penrose (1959) and later Chandler (1977), emphasize the role of managerial and administrative structures in the planning and coordination of internal resources in order to achieve efficiency and growth. The invisible hand of the market coordination makes room for the visible hand of management in the allocation of resources (Chandler, 1977). This approach is important because it underscores the role that the manager has to coordinate the resource allocation and reduce transaction costs, but places little emphasis on market dynamics and firm's capabilities to constantly innovate

Following a Schumpeterian tradition, the *capabilities approach* describe what the firm can do and how it seeks change and innovation in order to guarantee its continuity over time (Schumpeter, 1934; Richardson, 1972; Nelson and Winter, 1982; Lall, 1992; Bell and Pavitt, 1995). In this view, the firm is a result of multiple sources of knowledge responsible for carrying out specific routines in order to deliver goods and services. This is achieved through the firm's capabilities; fundamentally those capabilities to develop new goods and produce them on a commercial scale. If the emphasis of the first approach is in the efficiency to cost reductions through internal organization and administrative structure, the second focus on the creation of value through knowledge (Madhok, 1996).

Every firm is the result of a technological synthesis that will be in the foundations of its business relations. To produce and transact depends on two drivers: a *technological driver* and a *business driver*. The technological driver is the one that leads to the development of new products and their subsequent production. This driver is supported by development capability and the operations capability. Firms that have further developed these capabilities

are technological leaders, because their performance will depend mainly on the technological vector.

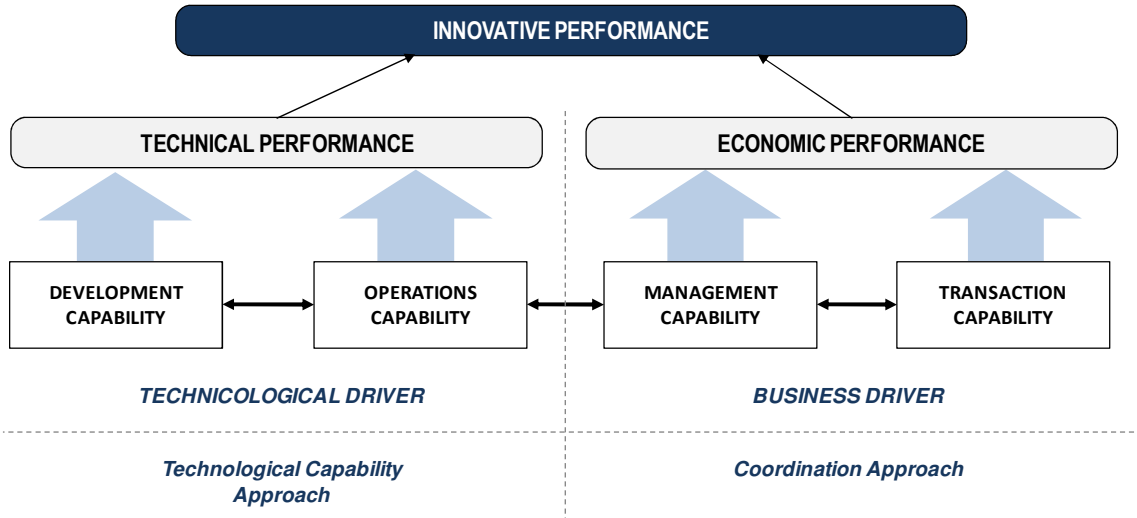
In addition to technological driver, any firm requires a business driver. It is through this driver that the firm performs two important functions. First, to integrate the different areas of the firm, and second, to take its goods and services all the way to the market to be transacted. The integration of different areas of the firms is realized through the management capability. Transaction capability deals with the activities related to the way the firm interacts with the market, be it customers or suppliers.

All of these four capabilities contribute to the firm's innovation (Zawislak et al.; 2011, 2012). These authors point out that the sources of innovation go beyond the development capability. That is, firms with weak development capabilities may have superior performance if they have advantage in one of the other capabilities (operations, management, or transactional). These findings help explain why firms from emerging countries, where technological innovation is less frequent, can succeed in the marketplace.

Within this approach, firms necessarily require a minimum of four capabilities, but superior performance depends on the predominance of one of them. The following four capabilities and their relation to the innovative performance of the firm are presented in Figure 1.

FIGURE 1

Firm Capabilities for Innovative Performance



Development capability

Development capability (DC) involves imagining and building new value solutions to be transacted in the market. These new value solutions can be translated into new

technologies or new products. DC is responsible for leading the process of technological development defined here as the broad process of conscious application of knowledge to solve concrete problems of the market.

The DC is initially drawn from the classical definition of Technological Capability, which is the ability to generate and manage technical change through the use of knowledge, skills and experiences. According to Lall (1992), the DC is responsible for creating, adapting and developing new technologies that enable the firm to differentiate itself from its competitors. It is usually (but not always) substantially different from the skills needed to operate technical systems. As noted by Bell and Pavitt (1995), there is a distinction between technological capabilities and production capability. They point out that while the former is made up of knowledge and skills to create and change the technology, the second is the set of knowledge and skills to use the technology.

According to Afuah (2002), DC is the ability of the firm to use technological resources (patents, skilled engineers, stock of knowledge in the form of databases, specialized units, licenses, etc.), methods, processes and techniques to develop and sustain an innovative offering. It will mainly be defined and constrained by the skills, experience, and knowledge of the personnel in the R&D department (Nelson, 1991). It is pivotal for firm to gain advantage over their competitors over time (Rush et al., 2007). Firms with advanced DC tend to be more innovative and thereby achieve higher levels of performance (McEvily et al. 2004).

Operations capability

Imagining and developing new products are key activities for firms to survive in the market. However, any firm should be able to turn the technological outcome into set of operations in order to produce in a commercial scale. This is achieved through the Operations Capabilities (OC). OC is the ability of the firm to produce products with quality, reliability and competitive cost. Studying the OC of the firm is essential to understand the different variable that guide the decisions on the production technologies to be used, capacity and systems as well as production planning and control (Skinner, 1969, Hayes and Pisano, 1994; Wart et al. 1998). According to Miller and Roth (1994), the operational capabilities typically include aspect such as quality, cost, efficiency, delivery, responsiveness and flexibility.

Importantly the there is a difference between operational capability and development capability. While the DC deals with constantly changing technologies, the operational capability leads mainly with routines, stability, efficiency and standardization, because those

are features required to make products. Change in this capability mainly happens based on "learning by doing". That is, the operations capability is inadequate to generate technical change, which is developed and managed by the technological capability (Bell and Pavitt, 1995). Paradoxically, OC influences the DC once it is part of the technological base from which the path dependent trajectories will lead.

Management capability

In addition to DC and OC any firm needs a set of skill that allows it to integrate all internal capabilities in a coherent way. Management capability (MC) was noticed and raised in importance, especially with the emergence of the large companies in the early twentieth century. Through planning and coordinating businesses, managerial work has been identified as critical to the growth of firms (Taylor, 1911; Fayol, 1949; Penrose, 1959; Barnard, 1966; Mintzberg, 1973; Chandler, 1977). MC allows the firm to coordinate and integrate different areas in order to achieve economies of scale and scope necessary to compete in national and international markets (Chandler, 1977).

Salomon (2009) argues that the managerial capabilities are shaped by human capital, social and cognitive development with which managers build, integrate and reconfigure tangible (technical and operational) and intangible (technical and economics) resources. Trott (2008, p. 119) notes that "the task of all managers is to improve their operation – otherwise they are supervisors and do not justify their job title". By planning and coordinating, MC contributes the firm's efficiency by improving the use of resources and anticipating shortages (Lazonick, 1992).

It is noteworthy that, unlike the Operations Capability which is embedded in technical knowledge applied in routines, the management capability requires a wide range of abilities to be applied flexibly in problem-solving (Langlois, 2003).

Transaction capabilities

Finally, closing the set o capabilities needed to the functioning of the firm, there is the transaction capabilities (TC). TC are essential in a sense that any firm will need to transact its products in the market in order to simply continue to exist. Thus, no matter how good a firm can be in all three prior capabilities, if the firm does not transact in the market it does not justifies itself as an economic agent.

Transactions capability is represented by a set of abilities, knowledge and routines that the firm develops aiming at reducing its marketing cost, trading, logistics and distribution, among others, that is, transaction costs (Zawislak *et al*. 2012). TC also links the firm to its external environment, both through purchasing or selling. Moreover, this capability is also a key factor to analyze the market signals and alignment of the firm's offerings with the customer needs and expectations.

Firms without transactions capability are incapable of understanding the demands of consumers, nor can transact in the market at the lowest possible cost. Therefore, for most firms that are endowed with development capability to create new products and services, will also need the transactions capability to be economically viable.

The same was mentioned by Teece (1986) and, even if important contributions have been made since then (Argyres, 1996; Madhok, 1996; Langlois, Foss, 1999; Argyres; Liebeskind 1999; Williamson, 1999; Mayer; Argyres, 2004; Leiblein; Miller, 2003; Jacobides, Winter, 2005; Mayer and Salomon, 2006; Argyres; Mayer, 2007; Argyres, 2011), further research is needed to achieve its definition and its subsequent consolidation.

Assessing the innovation capabilities of the firm

The previous discussion of the conceptual limits of each of the four capabilities is the basis for identifying different types of indicators (development, operations, management and transaction). The development capability (DC) follows the tradition of Lall (1992), Bell and Bell and Pavitt (1995) and Iammarino et al. (2002). For these authors, firms have three levels of DC: basic, intermediate and advanced. The basic level is that minimum to which the firm operates in the market; the intermediate level features all the activities that the firm makes to improve the products and services it already does; the advanced level is an attribute that the firm has to develop different products and services (this is an evolution from simply improving existing products and processes to creating singularity).

The indicators herein used for operations capability are a contribution of Skinner (1969) and Hayes, Wheelwright (1984), and the production types of Chandler (1990). In this paper, the indicators of OC are identified through three main production orientations: scale production, scope production and a mix of both. Scale production focuses on cost reduction as a result of the large amount of production, scale-intensive industries are generally innovative process in order to reduce their costs. Are included in this first group, traditional industries such as food, beverages, textile products and footwear. Scope production refers to the benefits

that the firm reaches of the complementarity production (two or three products). The production mixed covers both types of production.

With respect to indicators of management capability, the studies of Barnard (1966), Penrose (1959), Mitzberg (1973), Chandler (1977) and Zawislak (2012) have been analyzed. They stress the role of management. Therefore, an indicator related to managerial skills is considered important in this capability. For the purpose of this paper, firms' management capability have been classified in one of the three: family (basic management), family-professional (management that advances to the professionalization) and professional (the highest level of management).

Transactional capability is directly related to the ability that the firm has to transact with their suppliers and customers. This concept is formed by the transaction costs theory (Coase, 1937 and Williamson, 1985, 1999) and progresses until the work of other authors who advance on the development of this concept (Teece, 1986; Argyres, 1996, 2011, Madhok, 1996; Kotabe, 2002; Mayer and Salomon, 2006; Zawislak et al. 2012). The indicators related to this capability are marketing activity, supply chain and the mixture of both. Table 1 shows the indicators of the four capabilities that used throughout this study.

TABLE 1

Innovation capabilities indicators

Capability	**Indicators**	**Authors**
Development Capability	Basic Intermediate Advanced	Lall (1992) Bell e Pavitt (1995) Iammarino, Padilla-Pérez e Von Tunzelmann (2008)
Operations Capability	Scope Mix Scale	Hayes and Pisano (1994) Wart et al. (1998), Chandler (1990)
Management Capability	Professional Family- professional Family	Penrose (1959); Barnard (1966), Mintzberg (1973), Chandler (1977), Zawislak et al. (2011, 2012)
Transactions Capability	Marketing Mix Supply chain	Coase (1937), Williamson (1985, 1999, 2002) Teece (1986), Argyres (1996, 2011), Madhok (1996) Langlios and Foss (1999), Cannon and Hamburg (2001), Kotabe (2002), Mayer and Salomon (2006), Zawislak et al. (2011, 2012)

3. RESEARCH PROCEDURES

The aim of this research is to advance on the construction of an emerging concept by examining evidence obtained from 44 companies interviewed. To enlighten the characteristics that each capability has to generate innovation, an exploratory study was used. Given our exploratory proposal, we found similar characteristics for each of the capabilities.

The companies' interviewed are located in the Brazilian state of Rio Grande do Sul (RS), which, in 2011, accounted for 6.65% of Brazilian GDP (FEE, 2012). First, we selected 100 companies which are representative industries of the state. Then, the framework was tested by interviewing managers and directors of 10 companies. Finally, we interviewed 44 more companies which are of representative industries, selected by state region. The sample was constituted as follow in Table 2.

TABLE 2

Number of companies based on OECD classification by industries

OECD Classification	Number of Companies
High-Technological Intensity	*4*
Eletronics	2
Pharmaceuticals	2
Medium-High-Technological Intensity	*7*
Machinery and equipments	5
Motor vehicles	1
Chemicals	1
Medium-Low-Technological Intensity	*11*
Rubber and plastics products	4
Metal products	4
Refined petroleum products	1
Non-metallic mineral products	2
Low-Technological Intensity	*22*
Food products, beverages and tobacco	8
Textile, textile products and footwear	9
Wood, pulp, paper	1
Furniture	2
Other manufacturing	2
Total	*44*

Data was collected in four stages. First, information was collected from secondary sources (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. The interview was structured as shown in 'Appendix - Research Instrument'. Thirdly, we visited the firms' facilities. While visiting it, 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.

The analysis of results 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 industries. We used the OECD classification (2005) to arrange groups of companies. In each group all four capabilities are presented and described.

4. RESULTS

Companies' capabilities have been classified in one of the three options for each indicator for each capability. Table 3 shows this classification.

Technological Driver

To understand how firms work through their development and operations capabilities in order to achieve technical performance, and as a result, innovative performance, the processes they carry out have been analyzed.

Development Capability

Development capability has been identified through the technological capability approach. Most companies of high technological intensity, following OECD classification (2005) do have an advanced technological capability. In that sense, these companies have a formal structure for research and development, as well as continuously work on new product development. As in Brazil cooperative R&D with universities is not as popular as in developed countries, these high technological companies are the ones to engage in such activity. These companies also strongly invest in high-technology equipment aiming at achieving process efficiency. Nonetheless, even belonging to an industry of higher technological intensity, some companies present a basic development capability, where no formal R&D has been identified, and only basic improvements are applied in their products.

TABLE 3

Companies capabilities' classification

	Technological Driver						Business Driver					
	Development Capability			Operations Capability			Management Capability			Transaction Capability		
Classification	**Advanced**	**Intermediate**	**Basic**	**Scope**	**Mix**	**Scale**	**Professional**	**Family-professional**	**Family**	**Marketing**	**Mix**	**Suppply chain**
High-Technological Intensity	**3**		1	**1**	**1**	**2**	**3**	**1**			**2**	**2**
Eletronics	1		1	1	1		2					2
Pharmaceuticals	2					2	1	1			2	
Medium-High-Technological Intensity	**1**	**1**	**5**	**4**		**3**		**2**	**2**	**2**	**1**	**4**
Machinery and equipments		1	4	3		2	3		2	1	1	3
Motor vehicles			1	1				2		1		
Chemicals	1					1	1					1
Medium-Low-Technological Intensity	**3**	**3**	**5**	**4**	**4**	**3**	**6**	**4**	**1**	**1**		**9**
Rubber and plastics products	1	1	2	1	1	2	1	2	1	1		3
Metal products	2	2		2	2		3	1				4
Refined petroleum products			1			1	1					1
Non-metallic mineral products			2	1	1		1	1			1	1
Low-Technological Intensity	**2**	**10**	**10**	**3**	**7**	**10**	**8**	**5**	**9**	**13**	**2**	**7**
Food products, beverages and tobacco	1	4	3			8	4	2	2	4	1	3
Textile, textile products and footwear	1	5	3	3	3	3	2	2	5	6	1	2
Wood, pulp, paper			1		1		1					1
Furniture		1	1		1	1		1	1	2		
Other manufacturing			2		2		1		1	1		1

Companies of medium-high technological intensity industries presented an unexpected performance in relation to their development capability, as the majority of them have only basic development capability. This could be an effect of an emerging economy context. Companies of such classification generally make minor adaptations and amendments do products and projects, mainly as per clients' request or to keep up with market trends. However, there are examples of medium-high technological intensity which have intermediate or high development capability. Accordingly, the intermediate have some structure for R&D but outsource it when it is of higher complexity; and the advanced have a full innovation program focused in new product development.

Although the majority of medium-low technological intensity firms have basic development capability, there is a balanced classification between basic, intermediate and advanced technological capability. The basic ones, as the other technological intensity classifications, usually only make minor improvements in its products as per clients' requests or on market demand. The intermediate development capability firms although usually only make this same type of improvements, may also have casual projects for products and processes improvements. The advanced development capability ones have formal R&D structure, where they continuously work on product e process development; as well as participate on government funding programs for innovation; and have targets for patent registration.

Regarding the companies of low technological intensity industries, as expected, presented a very low number of firm classified as advanced development capability. They have formal R&D structure and systematic related activities. The other companies are balanced between intermediate and basic development capability. The intermediate ones invest in equipment of better technology to improve their processes, discuss new projects, copy and adapt existing products, and aim at continuous improvement of their processes. The basic development capability firms may have laboratories structure; however, they are basically used to perform product quality control. The main changes on their products come from new materials presented by their suppliers, or from samples of competitor products brought by clients to be copied.

Firms of lower technological intensity work in general with final products for retail. They are more focused in adapting their products then in creating new ones. Industries of this classification, such as shoes and textile products follow fashion trends, which means research

and development, are performed as part of their operation. Companies of medium-low technological intensity, to be able to deliver the products according to clients' requirements, need to have deeper technical and scientific knowledge than the lower intensity ones. This characteristic is a reflex of their position in the supply chain, where most companies work on a business to business system. Firms of higher technological intensity, that is, medium high and high, must have an even higher technical and scientific knowledge in order to provide clients' orders. In these industries is evident the user-producer relations.

Operations Capability

The other half of the technological driver or the technological capability approach encompasses the operations capability. Firms have been classified by their operations capability in one of the three classifications: scale production, scope production, or a mix of both. Among high technological intensity companies, there's been a balance between the three classifications, although the majority works on a scale production orientation. In that case, companies produce only a certain type of product or one brand. When their production is scope oriented, they produce only on client orders. When there's a mix of both orientations, companies produce by batches, but may also personalize its products according to clients' requests.

In firms of medium-low technological intensity industries, there has not been found any case of mixed production. Companies either work on scale or on scope. When their production is scope oriented, companies produce once clients have put their orders. They produce customized products and do not work with supply inventory, but rather, produce on a just in time system. The firm working on scale produces commodities or products that are sold on retail, and therefore, they may have inventory of finished products.

The production orientations are balanced again in the medium-low technological intensity companies. As the companies of other classification, when they work on a scope approach, they produce only after a client's order, and do not stock finished products. They also produce customized items and work with just in time and kanban systems. Companies working on scale have their own brand and sell their products on retail; therefore, they may stock finished products. Some also work on a continuous production system. Firms mixing scale and scope production orientations produce usually after a client's order, but may also keep some inventory for safety. And, although they produce standard products, they are flexible in adapting it when requested by clients.

As expected, companies of low technological intensity industries are oriented, on their majority, to scale production. They usually produce the finished product, and not some part which will be assembled by other firm; therefore, they make their products available on wholesale and retail. These products usually may not suffer any changes or be personalized. Just a few companies produce by scope, after a client puts his order. When the low technological intensity firms produce their items on a mixed production orientation, they produce according to sales forecast, in that sense, they do not wait to produce only if they have a client order, neither make large finished products inventory. Some, despite having standard products, may also personalize them on clients' orders.

Considering all firms interviewed, it has been identified that their majority is classified as basic development capability and are scale production oriented. Most companies of high technological intensity industries have advanced development capability and scale oriented. Interestingly, firms of medium-high technological intensity have opposite characteristics, as they present basic development capabilities and produce, on their majority, by scope. Either the medium-low or the low technological intensity firms have, mostly, basic development capability. However, while the medium-low technology companies work on scope or mixed production, the low technology firms produce mainly by scale.

Business Driver

To understand how firms work through their management and transaction capabilities in order to achieve business performance, and as a result, innovative performance, the processes they carry out have been analyzed.

Management Capability

Management capability has been identified through the business decision-making approach. Most companies of high technological intensity (OECD, 2005) do have a professional decision-making. Even family, business' owners, participates in decision-making, the management of the company is professional. These companies have a formal structure to manage the business, as well as a board of directors. In Brazil, these companies are part of multinational groups or are family businesses in the second or third generation. In this case the family business, the founders participate the board of directors. Nonetheless,

even belonging to an industry of higher technological intensity, some companies in electronic industry presents an external dependency on decision making.

There is a balanced classification between familiar and professional decision-making in companies of medium-high technological intensity. Some companies present a structure of decision-making based on the group of managers and directors, while other companies have centralized decisions on their owner. In Brazil, most companies of medium-high are machinery and equipment companies. These companies as well as other industrial sectors there are many small and medium enterprises (SME). Firm size may be an influence factor the type of management. It seems that small business deals with less complex management problems. As the business grows, it has to a management structure more complex and less centralized in the owner in order to solve more complex problems as well. According to this finding, it is possible to explain the existence of examples of medium-high technological intensity companies which are in transition from familiar decision-making to professional decision-making.

Most companies of medium-low technological intensity have a CEO who makes the decisions. Most respondents reported that the CEO of their companies make decisions together with their managers through regular meetings. On that basis, these decisions are supported by a body of managers or by an administrative council. Furthermore, there is a public corporation in our sample and one company that the CEO hired a consulting to carry out their strategic planning. Most of these companies manufacture for other companies (business to business) and not to the final consumer (business to consumer).

Unlike the companies of medium-low technological intensity, firms of low technological intensity belong to industries that produce for the consumer (B2C). Therefore, these sectors are characterized by the need to internally manage the distribution and sale of their products. In that sense, textiles and footwear are different from other industries within the low technological intensity. Most of companies in textiles and footwear control the sale and have centralized decisions on their owner. Other industries like food and beverage have professional management, however the decision-making passes through the family council.

Transactions Capability

The other half of the business driver encompasses the transactions capability. Firms have been classified by their transactions capability in one of the three classifications: marketing focus, supply chain focus, or a mix of both. In high technological intensity, firms

perform their transactions capability as the industrial sector. Electronics companies are in the middle of supply chain and manufacture for other electronics companies. Pharmaceutical companies have the same position in the supply chain and sell their products through distribution centers; however they invest in advertisement on mass communication and sales promotion in drugstores (point of sale).

Although the majority of medium-high technological intensity firms have focus on supply chain, there is one company in the middle of supply chain that promotes specific media campaign. This type of company supplies raw materials, parts or equipment for other companies or industries. The exception are companies that produce equipment for retail or automotive vehicles. These smaller number of companies have reported that its brands are the difference on market, so they are focused on marketing.

As expected, companies of medium-low technological intensity industries have focus on supply chain. These firms supply raw materials and sell to other companies as builders, distributors, retailers and so on. In this type of business, the transaction capability is focused on negotiation with suppliers and clients. The performance takes place in these negotiations.

As expected again, companies of low technological intensity industries are oriented to marketing. The difference is that tools are being used by companies to focus on marketing. Food, beverage and tobacco industries are focused on selling and distributing their products. In this case, sale and distribution may be owned or outsourced. In other way, furniture and various industries have their transactional capabilities focused on serving consumers through retail stores and local representatives. Furthermore, the textile and footwear industries promote the increase of its transactional capability seeking to strengthen the brand.

5. DISCUSSION

It has been observed that some companies classified as low or medium-low technological intensity behaved as typical companies of higher technological intensity industries. Due to the method used, which is exploratory and still not working with quantifiable indicators, no patters were identified, when firms were segmented by OECD classification. However, we have made some interesting observation. Companies of low technological intensity are the ones tending to follow a pattern, especially in relation to the operations and transaction capability. Their majority use scale production system and have a

transaction capability based on marketing. That is due to the fact that they produce mostly final products.

In that sense, we believe factors such as the type of firm, its profile in relation to its technological specificity, and the way it formalizes its innovative activity are factors that will allow us to identify what does their innovative performance looks like. We also believe that one of the determinants factors for this performance is the relationship between supplier and client. That is, the more the power the client has over the supplier, the less the supplier focus on product, market and management innovation, and the more it is aiming at an efficient process that satisfies their clients requests. That is also closely related to their position in the supply chain.

With this information we may group some features of the capabilities to characterize types of companies.

The Technological company develops new technology, new products and new operational solutions through strong R&D department work. Therefore, products are differentiated and have their value almost automatically perceived by the market. In that sense, the competitive advantage of the technological company is to generate enough knowledge barrier to new entrants. The temporary monopoly in the market highlights two important features: the limited relevance of the commercial department and management focus on innovation instead on costs.

The Operational company acquires the necessary technology in the market and rarely develops it. The product development is under customer´s requirements. Therefore, its organizational efforts are on the operations department. This type of company is focused on searching manufacturing efficiency and internal management of resources and cost. Consequently, products are based on given quality, efficiency, flexibility, and always aim at the lowest cost. The commercial department is focused on buying rather than on selling.

The Managerial company is heavily based on organizational integration and coordination of resources rather than on a specific capability. In that sense, it is a professionally managed company. The complex management problems require complex management solutions. Furthermore, it seems that the large size of these companies influences the market and represents a barrier to new entrants. In this type of company, the product development will be more or less complex, depending on the company industry. The operations are based upon a consolidated and technologically updated productive process and

on the constant pursuit of efficiency. The commercial department with its marketing practices, customer relationship and supply chain management are integrated.

The Transactional company is focused on customer value requirements, such as functionality, brand, style, and aggregated services. Therefore, this company develops products by monitoring market trends and usually searches for the consumer's immediate satisfaction. Consequently, innovations come much more from the commercial department rather than from the technological area. One of the most important parts of its competitiveness lies on supply chain management and on delivery systems. The production can be done in-house or by a supplier.

In sum, typical Brazilian companies in Rio Grande do Sul are primarily focused on production and on the quality of their products. They develop solutions, in most cases, only when requested by clients. Although these products may be new to the company, they are often not new to the market. We observed that companies adopt modern management techniques and tools, but these are not fully applied. Companies still rely on traditional family management predominantly based on a personal hierarchy, or are in the process of professionalizing it. Finally, most companies reported not to have a developed transactional capability.

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).

Appendix

Research Instrument

1. Make a brief description of the company's important facts in its history.
2. Where does the company's knowledge come from?
3. How did the company develop the knowledge and the techniques to do what it does?
4. How is the company's knowledge level compared to its competitors?
5. Make a brief description of the company's commercial strategy.
6. Make a brief description of the relationship with suppliers and purchasing.
7. Make a brief description of the relationship with costumers and sales.
8. What makes costumers buy from you?
9. How is the price determined?
10. What is the company's commercial position compared to its competitors?
11. Make a brief description of the company's strategy.
12. Make a brief description of the company's administrative processes.
13. How are the company's costs compared to its competitors?
14. Make a brief description of the company's productive strategy.
15. Make a brief description of the company's productive process.
16. How is the productive efficiency level compared to the company's competitors?
17. Make a brief description of the development strategy and decision.
18. Make a brief description of the technology development process.
19. How is the company's development activities level compared to its competitors?
20. Give three examples of changes to the company.
21. Give three examples of innovation in the company, referring if they were new for the company, for the sector, for the country or for the world.
22. What kind of outcomes do the innovations generate for the company?
23. What is the company's differential advantage to keep competitive in the market?
24. What are the legal-institutional incentives or constraints for the company to innovate?
25. List in order of importance to innovation the following areas of the company:
Technology, Operation, Management and Commercial. Justify.

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