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Sustainability and Innovation Capabilities in an Innovation Award Winner Company

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ABSTRACT

The stimulus for economic development is innovation. The constantly quest of new ways to deliver value results from the need for competitive advantage. The introduction of social and environmental perspectives in the economic debate has made emerge a new element that turned to influence the strategy of companies, besides generating a new competitive scenario: the sustainable development. It is clear, therefore, the increasing requirement for firms to incorporate environmental issues in their processes. Companies face, so, a new paradigm, where innovating and considering the sustainability of the process is crucial to remain active and competitive in the market. This paper aims to identify the influence of the environmental dimension of sustainability on the innovation capabilities of a company. A case study was conducted with a company that won the Brazilian Innovation Award in 2013, due to a sustainable project. The results show that the environmental dimension is a determining factor for the arrangement of the company's innovation capabilities. It is suggested then an order of importance of the company's capabilities to achieve innovation through sustainability: (1) management; (2) operations; (3) transaction and (4) development.

1. Introduction

The main objective of a company is to obtain positive results and be, thus, economically feasible. The efficient application of the knowledge of the company as a response to a society that faces challenges of increasing degrees of difficulty is what brings it development, thus, it brings positive economic performance^[1]. In order to achieve competitiveness, that is, positive performance, firms pay attention to the technological changes and turn to the needs and expectations of the market. In

this sense, a company with positive economic performance is that one that gains competitive advantages.

The literature agrees that the stimulus for economic development is innovation^[2]. Innovations emerge when the economic agent, in the figure of the entrepreneur or specific organizational unit, as in the case of research and development (R&D) departments, discovers new combinations of factors of production that, once in the market, bring extraordinary profits to the innovator^[2]. The need to constantly seek new ways to offer value is due precisely to the search for competitive advantage.

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Innovation is then perceived as resulting from a complex process dependent on a set of capabilities that, although they may be dispersed within the company structure, may still be in line with their strategic requirements^[3]. Based on this approach, Zawislak et al.^[4] developed a model that presents innovation as a consequence of the arrangement of four capabilities: development, operations, management and transaction.

However, the introduction of a social and environmental perspective in the economic debate has led to the emergence of a new element that has influenced corporate strategy and created a new competitive landscape.

Companies, NGOs, individuals and society now turn their attention to sustainable development – goals and actions that lead to sustainability, so that quality of life can be attained at the moment and survival for future generations guaranteed. Considering that resources are scarce and limited, economic development has been seen as dependent on sustainable development. As a consequence, it is perceived, from the use of natural environment factors in theoretical models that discuss business strategy, the increasingly emergent requirement of firms to incorporate the environmental issue in their processes. Hart^[5] points out that limitations created by the natural environment, such as ecosystem degradation and resource extraction, can create discontinuities that affect firms' resources and capabilities. Companies are thus faced with a new paradigm, where innovation is necessary to remain active and competitive in the market, and, at the same time, consider the sustainability of processes is essential for business success.

In this sense, the present work aims to identify the influence of the environmental dimension of sustainability on the innovation capabilities of a company.

Next, the literature on innovation, capabilities and sustainability will be reviewed. Section 3 explains the method used for data collection and analysis. Subsequently, the results are presented and discussed. Finally, the final considerations are presented.

2. Background

2.1 Innovation Capabilities

The literature on innovation agrees that in order to achieve it, companies must establish an arrangement of complementary capabilities^[3,6,7,8]. In 1972, Richardson^[9] coined the concept of skills as knowledge, experiences and skills of the company. Christensen^[7] presents the term as the ability to organize resources and direct activities towards strategic objectives. For Dosi, Nelson and Winter^[10], the

importance of understanding capabilities lies precisely in the fact that the term represents the expression of what the company knows how to do, such as producing cars or computers, or flying from one continent to another. The term capabilities is found in the literature under different approaches.

From the perspective of human resources, capabilities appear to support the continuity of the company, since it is necessary to reorganize them, so that a successor group maintains the life course of the business^[11]. Penrose^[11] emphasizes that the company is more than a simple administrative unit; it is also the collection of productive resources, on which the decisions of administration use rest. Barney^[12] argues that many companies may possess the same physical technologies, but one that presents the best organization among its social resources, culture and tradition will be able to fully exploit this technology for its strategic implementation.

The approach of distinctive competencies^[13], when presenting the idea that companies operate below the level of their real capabilities, suggests that there are factors, competencies, that distinguish the functioning of companies. Incentives, communication, leadership and decision making are suggested as factors influencing the fluid flow of a company's operation^[13].

Itami and Roehl^[14], when presenting the invisible assets approach, consider these as the most important resources for the company's long-term success. Consumer confidence, brand image, distribution control, corporate culture, and managerial skills are configured as the information resources, called by Itami and Roehl^[14] as invisible assets. Invisible assets are as essential to the efficiency of the operation as the company's most visible assets, which are conventionally defined as people, products, and capital.

Richardson^[9] argues that firms should specialize in activities for which their capabilities offer competitive advantage from the specific skills approach. These activities should be conducted by companies according to appropriate capabilities, or in other words, with appropriate knowledge, experience and skills. Following the same idea, Teece et al.^[15] point out, based on the notion of dynamic capabilities, the need for firms to integrate, construct and reconfigure internal and external competencies to deal rapidly with environmental changes.

According to Nelson and Winter^[16], being able means gathering the necessary requirements for the execution of routines, these being the central theme of the evolutionary theory of these authors. For Dosi, Nelson and Winter^[10], routines are units of organized activities with a repetitive character and can be understood as fundamentals of a

company's capabilities.

Zawislak et al.^[4] argue that the expressions of the abovementioned approaches refer to the same concept, that is, specific capabilities that the company creates and uses strategically to identify market gaps to be filled with new value offers. In this sense, Zawislak et al.^[17] present a model of interrelated capabilities, divided into two drivers: technological and business, which lead the company to an innovative performance. The first driver represents the accumulated experience of the company in technical changes and in productive processes, referring, respectively, to the capability of development and the capability of operations. The second driver denotes the adjustment of organizational and transactional routines, referring, respectively, to the management capability and the transaction capability.

Contrary to the view that perceives innovation as coming from products and processes, the authors argue that the two technological capabilities - development and operations - are not enough to ensure high performance in a competitive market. The capabilities of the business driver - both management and transaction - are the essence that ultimately gives the company the look of an innovative, organized firm^[17].

Development capability refers to the firm's ability to interpret the current state of the art, absorb and ultimately transform a given technology to create or transform its operations capability and any other capability, in order to achieve higher levels of technical and economic efficiency^[17].

Operations capability is understood as the ability to execute a given productive capacity through a set of daily routines based on knowledge, skills and technical systems over a certain period of time^[17].

Management capability, in turn, refers to the way the firm transforms the technological result into a coherent operational and transactional arrangement^[17].

And, finally, transaction capability relates to what a firm does in practice to reduce its marketing, trading, logistics, and distribution costs, i.e., transaction costs^[17].

Hart and Dowell^[18] argue that proactive firms realize that managing their interactions with the environment occurs through capabilities, which include stakeholder relationships, learning, and continuous innovation. Thus, by identifying the characteristics of their capabilities, it is possible to understand how innovation occurs within each company. For the present work, the key elements of each capability will be used to establish the intended relationship between innovation and sustainability, focusing on its environmental dimension.

2.2 The Environmental Dimension of Sustainability and Competitiveness

Like innovation, sustainable development has been seen by companies as a fundamental tool for them to remain active in a competitive market^[19]. Therefore, their actions should not only focus on innovations, cost reduction or increased sales, but rather on bringing sufficient benefits capable of mitigating the negative impacts that their productive activities may have on the environment, on society and its stakeholders^[20]. In other words, in order to continue to operate in a competitive market, companies must be sustainable and generate value added for shareholders and society^[19], in a way to reconcile competitiveness with healthy economic development. Sustainability thus becomes an essential prerequisite for the success and survival of companies.

Sustainability is only achieved if it is an integral part of the organization's strategy. Sustainability must be deeply embedded by companies so that the cost-benefit of the actions performed is perceived by all the spheres involved. For that, a company must establish clear objectives and strategies to achieve them, from the definition of vision and mission of easy understanding to all^[20]. In this way, it will be possible for the company to make decisions that will reflect the three dimensions of sustainable development: economic, social and environmental^[21].

Under an economic focus, the concern with sustainability arises from the discussion of how to sustain growth in the long run given that the production function of capital now also incorporates natural resources^[20]. Addressing the division of the dimensions of sustainable development, Agenda^[21,22] discusses the need to incorporate more environment and development into the center of political and economic decision-making in the countries. It is argued that decision-making systems in place in many countries tend to separate economic, social and environmental factors from policy, planning and management, where they should in practice be fully interconnected.

Considering that the companies, during their trajectories, turned mainly to the economic and social dimensions, Hart^[5] argues that, in the future, it is inevitable that their strategies and competitive advantages are also increasingly involved with the environmental dimension of sustainability – he studies it under the concept of natural resources based view. In 1995, the author presented the concept based on three interconnected strategies that allow the company to develop competitive advantages, such as pollution prevention, product management and sustainable development. However, fifteen years later, in 2010, the author revisits his own theory in order to enhance it. Thus, the strategy of sustainable development, because it

is considered too general to evaluate the company, is divided in the strategies of clean technology and base of the pyramid ^[18]. Table 1 presents the details of each strategy presented.

Table 1. Conceptual framework of the natural resources based view

Strategy	Environmental Driving Force	Fundamental Resource	Competitive Advantages
Pollution Prevention	Minimization of emissions, effluents and waste	Continuous improvement	Low cost
Product Management	Minimizing product life cycle costs	Integration of stakeholders	Anticipating competitiveness
Clean Technology	Promote advances	Disruptive change	Future position
Pyramid Base	Satisfy unsatisfied needs of the poorest	Incorporated innovation	Long-term growth

Source: adapted from Hart & Dowell (2010, p. 9).

According to Hart^[5], there are two ways of articulating the pollution prevention strategy: controlling pollution by equipment and preventing the emission of polluting gases, effluents and waste from processes of replacement of polluting or toxic materials. In this way, the company has its costs reduced in the long term, which gives it competitive advantage ^[5].

The product management strategy, in turn, focuses on minimizing the costs of the life cycle of the products together with nature and the company. To this end, environmental costs, raw materials extracted from the nature and production processes should be evaluated. In this way, it is possible to verify the impacts of the company's products on the environment, in order to allow it to analyze the continuity of manufacturing of certain products in the future. Identifying the impacts, one must exclude businesses that generate risks to the environment, redesign production systems and develop new sustainable and viable products for the company and the environment ^[5]. From the perception of the stakeholders, the company also ends up achieving competitive advantages.

The clean technology strategy comprises reducing the use of materials and energy consumption in production processes that aim to meet human needs without, however, depleting the resources of the environment. The essential element of this strategy is the identification of which firm's capabilities are associated with the effective commercialization of clean technology in order to guarantee it a competitive advantage ^[18].

The strategy of the pyramid base, in turn, is to alleviate the poverty of the world's poorest citizens. According

to Hart^[5], it is up to companies to reorganize processes between societies and countries where their products are consumed with those where they are produced and impact the environment in favor of that consumption. Companies develop interest in the pyramid base strategy from the identification of potential competitive results and institutional pressures. To address this strategy, the concept of embedded innovation then emerges, emphasizing the need for firms to build business together with poorer communities, rather than just marketing low-cost, large-scale products ^[23].

Hart^[5] points out, finally, that companies must prepare themselves with quality of production and awareness for the preservation of the environment so that they can remain in activity.

If, in 1995, Hart emphasized the importance of incorporating the environmental issue into business strategies in the near future, we realize that this moment has come. After revisiting the 1995 paper, Hart and Dowell^[18] conclude that interlinked environmental strategies remain a field of research to be explored. Thus, in 2015, two decades after the definition of these strategies and in a period where innovation is a fundamental factor for the survival of companies in the current competitive scenario, the present work seeks to unite two then considered essential factors for success, by identifying the influence environmental issue in a company's innovation.

3. Methods

The present study has an exploratory nature, adopting as a method the single case study. According to Yin^[24], the great advantage of using the case study is the possibility of relying on varied evidences, such as in-depth interviews, documents and observations. Yin^[24] also highlights the relevance of a case study in seeking to clarify a set of decisions and why they were taken, how they were implemented and with what results. From this perspective, Roesch^[25] argues that the in-depth interview is the fundamental technique of qualitative research.

Therefore, for the present study, an in-depth interview was conducted based on a semi-structured qualitative questionnaire, applied to the majority partner of the company Marina Tecnologia, as she supervises all the company's processes. In addition to the interview, the documents used for analysis were also obtained through the company's website, as well as institutional sources, so that the company itself provided additional information documents.

The case analyzed refers to the company Marina Tecnologia which, by changing its production process aiming

to introduce sustainable practices into the routine of the company, won the National Innovation Award in 2013 in the category of Technological Innovation Project in Micro and Small Companies. Initiative of the National Confederation of Industry (CNI), in partnership with the Movimento Brasil Competitivo, and support from the Financing Agency for Studies and Projects (Finep) and the Ministry of Science Technology and Innovation (MCTI), the National Innovation Award pays homage to companies that invest in product, process and management innovation. The Prize is considered the most important instrument of stimulation and recognition of innovation in Brazil.

The analysis of the interview was based on the technique of Content Analysis, which comprises a set of communication analysis techniques and aims to overcome uncertainties and enrich the reading of collected data [26]. In order to systematize the analysis of the collected data, Table 2 was elaborated with the key elements of each capability and the environmental strategies, from the literature.

Table 2. Elements of research analysis: innovation capabilities and environmental strategies

Environmental Strategies	Key elements of Innovation capabilities
Pollution Prevention: minimization of emissions, effluents and waste	Development Capability: absorption, application, adequacy of knowledge and technologies in products and processes.
Product Management: minimizing product life cycle costs	Operations Capability: routine, preparation, firing, control and process efficiency.
Clean Technology: promote advances	Management Capability: planning, control, decision, integration and coordination of the different areas of the company.
Pyramid base: satisfy unsatisfied needs of the poorest	Transaction Capability: relationship with the market, purchasing, sales, distribution, logistics, after-sales.

4. Results

In order to verify the influence of the environmental dimension of sustainability on the company's innovation capabilities, the collected data are analyzed based on the conceptual scheme previously proposed. Firstly, the company's history and its organizational structure are briefly described, so that the sustainability aspects of the company's capabilities are discussed.

4.1 The Company

The company Marina Tecnologia, founded in 2003, has as main objective to serve the oil and gas, sanitation, au-

tomotive and food industry, through the supply of rubber components such as bushes, cushions, connectors and accordions. The company currently has 25 employees and control of capital fully exercised by the family owning.

The company is located in Rio Grande do Sul, which is characterized by being the largest rice producing state in Brazil. By identifying the waste and damage to the environment caused by the burning of the rice hulls, residues resulting from the improvement of the beans that will be commercialized, the company realized an opportunity.

The husk of the rice is rich in silica, essential element to the composition of the rubber. With rubber being the main product of Marina Tecnologia, the green silica passed from waste to the raw material for the company. From this change, the company won the National Innovation Award, in the category of Technological Innovation Project in Micro and Small Companies. The project developed by the company involved research, development and manufacture of rubber seals applied to the oil and gas market, with thermal, chemical and mechanical resistance.

4.2 The Environmental Dimension in the Company

The company Marina Tecnologia articulates its capabilities from the vision of developing basic research combined with the creation of innovative and sustainable products through the integration of academic, practical and market knowledge.

The company's knowledge base comes from constant trainings, universities, customers, and order specifications. From the visit to the company, it is evident that sustainability permeates its processes and gives it competitiveness against its competitors.

In relation to pollution prevention, the company presents a system of monthly measurement of generated waste. The company seeks to keep within the adequate range of waste generation, since the excess is destined to the landfill and, therefore, incurs the cost of storage and also the lifelong responsibility of the company on the disposed product.

In order to reduce the use of materials and energy consumption, the company presents a constant development of clean technologies. From the notion of 3R's - reduce, reuse and recycle - the company is able to achieve advances that give it competitive advantages. The company reuses the leftover rubber used in certain processes and, through micronization (ultrafine milling of products), is able to reuse it as raw material for new products. The micronized rubber also serves to make carbon called carbon black, which is usually made from petroleum. Based on its technological advancement, the company started to

produce its own carbon black from the reuse of a raw material that was previously discarded in the environment. The company uses these leftovers, also, in the production of products destined to the final consumer, created from technical partnerships and that, often, do not contemplate their target market. Such a situation occurs when some material cannot be micronized because it contains other elements or cannot be transformed into carbon black. The end products originated from these partnerships are sold with sustainable appeal and include, for example, pan rest and glass coasters.

In order to reduce costs, the company identified an opportunity through so-called product management, along with the use of clean technologies. The company understands that production requires the use of electric power and that the more it is produced with less energy, the greater the gain of the company. Changes in its production process allowed the company to reorganize the use of its machines to take advantage of the useful area of heating and less use of energy, and consequently, the environmental impact generated. In this way, the mold in which formerly were made 30 pieces at a time, arranged horizontally, was modified to make 120 pieces at a time, arranged vertically. This change in the process was patented and presented to the customer as an improvement that led to a reduction in operating costs. In other words, the redesign of part of the process reduced the leftover rubber, reduced the electric energy used, reduced its environmental impact by reducing solid waste and brought a competitive advantage to the company by reducing costs. The solid residue that still remains from this process is then micronized for use again.

Another example of the relationship of product management and use of clean technology is the reduction of the use of soap, which prevents the rubbers from sticking during production, through changes in the process. In this way, identifying its impacts on the company and on nature, the chemical formulations and internal logistics were modified to reduce the amount of soap and water used in the production process. With this, the company has reduced its environmental impact as well as its cost. In addition, the use of silica from the rice husk as a raw material—a project that gave the company the National Innovation Award - is also another example of success.

In relation to the concept of pyramid base, the company understands that the residents of the place where its production is located do not perceive significant impacts of the company's operation. The interviewee reports, however, that in the past, there was an issue with carbon black, since black soot from the productive processes ended up reaching the houses of the population. Following the community's request, the company quickly altered its

processes to minimize such emissions.

It is concluded, then, that the company's four environmental strategies involve, in different ways, the company's four capabilities, which are analyzed in more detail in the section that follows.

4.3 The Environmental Dimension and Innovation Capabilities in the Company

Based on the interview, one can see that the search for incorporating the environmental dimension of sustainability into the company culture is a constant effort of management capability. With sustainability defined as a fundamental premise for its operation, the company has it as a priority when developing products and, in addition, is always attentive to the market, which can provide you with ideas from the exchange of knowledge.

The company points out that changes in operations capability, i.e. in the processes where the waste is found, end up generating innovations that are often joint with the customers, since they are made based on the orders placed.

However, the company also emphasizes that for the customer to realize the value of the change, the cost reduction must be clear. The importance of transaction capability then arises. Sustainability is not yet a justifiable factor by itself, according to the interviewee, and it is the company's role to prove the benefits to its stakeholders. For Marina Tecnologia, however, the environmental issue may overlap with costs. Often the company chooses to focus its development capability on products that are sustainable and can thus add more value.

As a consequence, the level of the company's development activities is superior to those of its competitors, precisely because of the constant search for innovations. The company's competitors do not micronize and discard most of their waste in landfills. They are considered precarious in the sense of generating waste, so that little attention is devoted to the development of processes that are less aggressive to the environment. Such scenario makes Marina Tecnologia's dedication to the environmental issue be seen as a differential, allied to the consequently reduced operational cost.

In relation to the productive waste that the company seeks to avoid, the company concentrates its productive efficiency in the existence of machines and labor. The interviewee reported that where there is only process automation, efficiency is 100%, whereas manual processes generate only 40% efficiency. It should be noted that this fact can be considered a national standard on the low quality of the workforce in the sector. In order to increase efficiency more and more, the interviewee pointed out that the company's operations capability is guided by the pull

system of production, so that it is produced according to the request, with zero stock of raw material or product and with a lead time fast. The company also emphasizes that its suppliers have sustainability certificates, such as ISO 14000, which it does not yet have, but intends to have, and that its relationship with suppliers is based on tradition, given that they work with commodities.

In an arrangement of transaction and development capabilities, it can be seen that the differential of the company against the competitors is its cost and the specific application of some materials, as is the case of the silica of rice husk as raw material. Given the investments to improve its processes and technologies, the company ends up developing sustainable products, which generates cost savings and, thus, guarantees competitive prices, according to each market. In the automotive market, the company competes for price, already in the oil and gas market, the company presents exclusive products, in order to add more value.

In concordance to the theory previously discussed, the company understands by innovation creations and changes that bring financial benefit. The company cited three examples of innovations (1) use of rice husk silica - new to the world; (2) development of oil and gas rings (FFKM) - new to the market; and (3) use of zeolites in rubber - new raw material for the company.

It is clear, therefore, that environmental strategies are responsible for the main innovations generated by the company. In addition, it is found that these innovations also promote team growth, positive financial return and long-term business growth.

5. Conclusion

Based on the analysis of the collected data, it is possible to perceive that the environmental dimension of sustainability is a determining factor for the arrangement of the innovation capabilities of the company Marina Tecnologia.

The company prioritizes as essential factor to its progress and the search for innovation, among the four strategies, pollution prevention in the first place, clean technology in second, product management in third and finally the pyramid base. It is suggested, then, the order of the importance of the capabilities for the company to achieve innovation through sustainability: (1) Management Capability; (2) Operations Capability; (3) Transaction Capability and (4) Development Capability.

The management capability appears before the others, since it guides the business decisions based on the environmental question, which guides the vision of the

company and what makes it organize its internal structure so that it operates in an innovative and sustainable way. The operations capability comes in second place, since it is where real waste occurs, which the company constantly seeks to reduce. Without the right planning of the operation, sustainability is not achieved. Third, there is the transaction capability, considering the fact that the market has to recognize the financial benefits of the changes and then develop – based on the development capability - according to market demands.

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