
Mectron's Innovation Management: Structural and Behavioral Analysis

Alexsandro Souza de Lima^{a1}, José Roberto de Paula^b and José Henrique de Sousa Damiani^c

^aInstituto Tecnológico de Aeronáutica – ITA, Brazil

^bInstituto Tecnológico de Aeronáutica – ITA, Brazil

^c Instituto Tecnológico de Aeronáutica – ITA, Brazil.

Abstract. This work aims at identifying the practice of innovation by Mectron – Engenharia, Indústria e Comércio Ltda., a Brazilian firm of the aerospace industry. The efforts are made in order to provide an overview of the company. Its organizational structure is also analyzed in order to provide a framework under which the innovations practiced by the organization can be observed. The attempts to understand the company's innovative vocation come to focus on the investigation of firm's attributes related to innovation. Conclusions are taken concerned the adherence of the firm's structure and behavior to the literature review. The authors are Master of Science students at Instituto Tecnológico de Aeronáutica (ITA). Overall guidance was provided by their research advisor, Professor José Henrique Damiani, PhD. The research was undertaken with the authorization of Mectron, and the authors counted with the direct collaboration of the company's systems engineering manager, Cel Eng Pelson de Souza Pinto, who provide most of the information collected and here exposed. The views expressed by the authors do not necessarily represent those of Mectron. The concepts adopted alongside this work concerning innovation are based on the Oslo Manual.

Keywords. Innovation, strategic management, technology.

1 INTRODUCTION

The objective of the present work is to identify, based on the literature related to the technology and innovation management, structural and behavioral aspects that foment innovation in the scope of Mectron – Engenharia, Indústria e Comércio Ltda, a Brazilian company performing in the aerospace industrial area.

A literature review is provided, seeking to establish the theoretical basis upon which the company's structure and behavior are analyzed. In the sequence, the authors expose elements that compose the history of Mectron and its organizational

¹Instituto Tecnológico de Aeronáutica, Vila das Acácias, 50, 12228-900, São José dos Campos, SP, Brazil, Tel +55 39473836, Email: limaceae@gmail.com

architecture; in addition to that, Mectron's mission statement, vision and quality policy are showed, on an attempt to characterize the company according to its principles and values.

After that, the work exposes the environment in which the company exerts its activities. At this point, the intention is to comprehend how the company and its environment influence each other. Then, it's made an attempt to demonstrate how the company performs innovations and how these innovations are disseminated to the market.

Finally, the authors analyze the information collected, attempting to identify any adherences from Mectron's structure and behavior to the theoretical expectation foreseen in the literature review.

2 LITERATURE REVIEW

The present section aims to expose the theoretical basis upon which the company's structure and behavior will be further analyzed in chapter 5. The concepts used throughout the work emanate from the following approaches.

2.1 Strategic Management

According to Rocha [11], strategic management refers to management techniques, evaluation and respective tools conceived to help companies in strategic decision making.

Strategic decisions are taken, as any kind of managerial decisions, concerning occurrences in organizations' lives. However, what distinguishes strategic management processes from others is the nature of the events about which decisions are taken. As a rule, strategic management processes are more complex than daily ones, as purchase, production, maintenance, storage, sale, etc.

The strategic benefit is characterized by the attainment and/or maintenance of competitive advantage, in the light of determinants of competitiveness.

2.2 Competitive strategy

The concept of competitive strategy emanates from the relationship between the Organization and its environment. On one hand, the environment represents a conditioning to the Organization's activities. On the other hand, the environment offers important opportunities.

Porter understands competitive strategy as actions that aim to create a defendable position in an industry, in order to successfully confront competitive forces, getting a superior return on investments. The same author also establishes that "competitive strategy is a combination of the ends (goals) for which an organization is striving and the means (policies) by which it is seeking to get there" [5].

2.3 Competitive advantage

According to Saloner, Shepard and Podolny [12], the competitive advantage is divided into two main categories: position based and competency based advantages.

Position based advantage reflects the condition of the company in terms of remaining in the market as one that does not have a competitor who can break that position of dominance. That position seems to be enough in order to guarantee superior incomes, even though the firm is not endowed with superior capacities.

The competency based advantage is characterized for endowing the company with a capacity where it enjoys market recognition. The company is seen as the best amongst its competitors in the performance of certain activities. In this point of view, the competitive advantage is reached when an organization is able to get resources and to offer products and services with superior quality, inferior cost, or in lesser stated period than competitors, or is well succeeded in those three aspects. However, these factors can be modified throughout the time.

2.4 Diversification, competences and competitive coherence

For the traditionalist and neoschumpeterian theoreticians, the enterprise is seen as an organism in continuous growth, as observes Britto [1]. In accordance with such a conjecture, the company is “constrained” to grow, that is, it has to reinvest productively the generated profits. The company constantly searches to disseminate its product in the market, and propagates its efforts by proper resources or externally financed.

In such a context, diversification allows the company to surpass the limits of its markets, as well as enhances its business capacity. There are lots of factors that can pressure the firm in the direction of the diversification. However, they shall be considered under the aspect of the original scope, and thus be grouped and distinguished between endogenous and exogenous factors.

As Britto [1] comments, the companies can be understood as organizations endowed with specific abilities, evolving with the time as a consequence of internal learning processes learning. Those learning processes, added to the capacity of the firm of being adaptable to the changes that happens in the conditions of its environment, exacerbates the knowledge accumulation processes significance, since they are able to modify the company’s original abilities.

3 METHODOLOGY

The authors have examined the literature, in a search for the basis upon which the company’s characteristics would be evaluated. Then, the authors contacted some Mectron’s managers. At that first meeting, the steps throughout the research would be carried out were established, and the confidential level was set.

The participants of the meeting have reached an understanding concerning the formularization of a questionnaire, which would be submitted to Mectron’s Chief Systems Engineer (CSE).

The company has also supplied the authors with an electronic copy of its institutional portfolio [4], which contained Mectron's history, as well as the description of its products. Relevant information could be acquired from the examination of that, providing support to the present work.

The methodology adopted throughout the research also involved the accomplishment of three interviews with Mectron's Chief Systems Engineer, Mr. Pelson de Souza Pinto. Mectron's CSE answered to a series of questions, adding fundamental topics by his own. His contribution for this work was crucial.

4 Results

The previous chapter exposed the procedures adopted for the conduction of the research and consequent collection of information. The following section presents the data collected, according to the methodology previously described.

4.1 The company

Mectron acts in the development and manufacture of intelligent weapons, sensors, avionics and aerospace equipment [4]. Its portfolio inserts the company in the restricted market of technological innovation in the defense area [10]. This insertion makes Mectron one of the most important enterprises in the Latin America defense market.

Currently Mectron has its organizational structure framed in order to cope with its needs, aiming at the flow of information and the managerial skills of each one of its constituent sectors.

The products are distributed among three business-oriented departments, called Business Unit (BU), according to the nature of each product. Each BU is managed by a project manager, which reports directly to the Council of Directors (CD). The CD is formed by the five owners of the company.

The Business Units take charge of the development of the products. The Missiles and Space units group the products by similarities, whereas the Sensors unit makes it by activity. The three business-oriented units are supported indistinctly by the industrial department, in what it refers to production. The decisions tend to be decentralized in each one of the units, and the hierarchy is moderate.

The company's work force is about two hundred employees. Four of them are PhDs, twelve are MDs and twenty are post graduated, besides forty collaborators with university graduation. This total corresponds, approximately, to thirty eight percent of its work force with some level of superior education. Fifty two percent of Mectron's personnel are directly connected to R&D.

4.2 Mectron and the market

Mectron competes mainly in terms of product differentiation. In the standpoint of one of the company owners, Mectron sells research and development in accordance with the customer's needs, and this concept fits to all its products [7].

The company is the only organization in Latin America endowed with technology for the production of intelligent missiles and airborne radars [8]. This situation guarantees the monopoly of the activity in the Brazilian market and, moreover, enhances the credibility of the company among international customers [10].

As cited in [4], the company is technically able to perform projects, development and production in the areas of Aerodynamics, Propulsion, Control and Guidance, Digital Processing of Signals, Analogical and Digital Electronics, Microprocessors (embarked software), Radio-Frequency, Materials, Structural and Thermal Calculation, Electro-Optics, Pyrotechnics and Fine Mechanics.

4.3 Innovation

In 2006, Mectron won the FINEP prize of Technological Innovation, in the small/medium enterprise category, carried out by Fundação de Amparo à Pesquisa do Estado de São Paulo – FAPESP, a Brazilian governmental Foundation that supports research and innovation. The prize was granted thanks to Mectron's performance on R&D, devoted to the aerospace sector [3]. This award has recognized the commitment of the company concerning innovation.

Carrying on the discussion about innovation, we have observed at the ambit of the company that, referring to effective contracts, the innovation is requested for the proper customer, through the contractual requirements. Moreover, throughout the development, the necessity of process innovation may arise, as it becomes possible to identify better and easier ways of developing the products. The model of development adopted by Mectron is based on the product life cycle approach, easily found in the concerning literature.

The identification of business opportunities, from the perception of market needs, also happens within the ambit of the company. For instance, Mectron has established, years ago, with proper resources, a line of products for the medical area: BioWare EEG-2008, for the diagnosis of epileptic crises and BioWare PSG-2008, for the diagnosis of sleeping diseases. Recently, the company submitted to FINEP a project, referring to the development and manufacture of a transponder. There's no production of this kind of equipment in the Brazilian market, and the company has recognized this opportunity to deal with it. However, this type of development represents only a small part of the company's productive effort.

4.4 Diffusion of Innovation

Concerning diffusion of innovation, it was possible to be seen that the commercialization of the products developed by the company is restricted, basically, to the contracting customer. The company has not still implanted a specific strategy to spread out the collection of products already developed. Due to the strategy of growth adopted so far, is not possible to invest in necessary publicity, aiming the diffusion of the products among international markets. However, this reality tends to change. According to Rogério Salvador [2], Commercial Director of Mectron, the company has plans to catch private resources, in order to become able to offer its products overseas. This is part of the company's expansion plans.

The company is known world-wide due to its contracts with the Brazilian Armed Forces. Specialized magazines in military technologies have contributed massively to this spreading, moved for proper publishing interests, as they collect and diffuse information regarding Mectron and its products.

4.5 Management

The company shows managerial flexibility, as it adjusts its organizational structure in order to face actual scenarios. If there is much development and little production, all manufacturing activities rely on the industrial division. When a production peak occurs, the business unit directly involved takes care of its own production.

Mectron practices a very high degree of profit reinvestment. According to Pinto [8], this practice provides the necessary push towards technological leadership and quality improvement. The infrastructure (also laboratories and equipment) is the main focus of those resources.

The company is seeking for external financings, with the purpose of developing new products. The intention is to act in a classical manner, commercially speaking, in the sense of identifying business opportunities to produce articles of continuous consumption, therefore supplying the market. The Studies and Projects Financier - FINEP is one of the Brazilian institutions in which this financing has been requested. Moreover, the company revealed the interest of going public. Doing so, Mectron would be able to apply for financing provided by BNDES, The Brazilian Economic and Social Development Bank. BNDS participates as shareholder in such projects. Rogério Salvador, Commercial Director of the company, declares that IPO is part of the company's expansion plans, on the purpose of spreading its expertise in aeronautic technology to different markets [13].

5 ANALYSIS

In the previous chapter, we exposed the information collected throughout the research. The present one endeavors to analyze the facts in the light of the literature review exposed in chapter 2.

It was perceived that Mectron performs product innovation pushed by exogenous influences. Its proper business orientation seems to be responsible for that. The company sees itself as an entity that commercializes research and development solutions, with capacity to meet the requirements stipulated by the contractors.

On the other hand, it was possible to identify that there is place for endogenously motivated innovations, inspired by observation of market needs. The company has done it in the past already, as it was commented in 4.3, and Mectron seems to be motivated to operate in this manner again, since the company has manifested the intent of going public in order to rise external financings, making use of its expertise in aerospace industry for the development of new complex products.

The research allowed verifying a strong inclination of the company to learning.

Mectron usually incorporates in its productive processes techniques developed internally, absorbed throughout previous developments. This characteristic allowed inferring that the endogenous innovations are widely focused on improvement of the productive processes.

It was also possible to identify that Mectron self-perception of its competitive advantage inhabits primary in its core competences. Corroborating with the displayed in Saloner, Shepard and Podolny [12], such a view seems to affect the way the company perceives its opportunities. The search of external investment for new products, a novelty in the history of the company, indicates the disposal of the firm to profit on its own abilities to act in new businesses, from the perception of market chances.

On the other hand, it has been perceived, however, that the body of knowledge that Mectron possesses locates the company even more distant from its competitors, especially when speaking about Brazilian industrial scenario. For that reason, Mectron's competences reinforce the positional competitiveness of the company, as they make the company become closer to a monopoly in the market where it performs, in terms of capacities.

This interrelationship between the competitive advantages of the company meets what is theoretically foreseen in literature. The easiness of new concepts and processes incorporation presented by Mectron fortifies the interaction between positional and competency-based advantages. As the company learns, it goes further in its position and becomes more distant from the other companies. This learning capacity, in its turn, contributes very much to make competency-based advantages sustainable.

Mectron has a flexible organizational structure. In conformity with what is stated in section 4.5, Mectron usually adapts partially its structure according to the different productive moment faced. The company adjusts itself in order to fit its purposes.

However, despite that demonstration of flexibility, the company does not behave according to a small innovative company model, established by the entrepreneur's "creative genius". It was evidenced, throughout the conduction of this work, characteristics that have allowed categorizing Mectron as a large-size company, which runs itself close to a systematic and routine management of technology and innovation model.

6 CONCLUSION

In the present work, the authors have sought to answer how Mectron Engenharia, Indústria e Comércio Ltda is structuralized and how it is positioned in the market, in view of the strategic management of innovation approach.

The company was characterized according to its history and its organizational architecture, as well as its guiding values, exhibited in its declaration of mission, vision and quality policy, that last one constituting the company's body of values.

After that, the authors described the environment in which the company exerts its activities and in what manners that environment influences the company and the other way around. The authors attempted to demonstrate how the company

performs innovations and how those innovations are disseminated into the market. The authors have also commented about some strategies used by the company in order to manage its business.

Finally, the authors accomplished an analysis of the collected information, verifying the adherence of the investigated characteristics to the theoretical expectations foreseen in literature. Therefore, it was possible to conclude that the company presents structural and behavioral characteristics directed to the routinely practice of innovation.

7 REFERENCES

- [1] BRITTO J. Diversificação, competência e coerência produtiva. In: Kupfer, David; Hasenclever, Lia (Org.). *Economia Industrial*. 7 ed. Rio de Janeiro: Elsevier, 2002. Cap. 14, p. 307-343.
- [2] FARIELLO Danilo. Ação do futuro. **Sala de imprensa**, 5 Sep. 2006. <http://www.dba.com.br/06a_p.asp?Id=312>. Accessed in: 13 Oct. 2006.
- [3] FINEP. Prêmio FINEP Sudeste já tem vencedores. Prêmio FINEP de Inovação Tecnológica 2006. <http://www.finep.gov.br/premio/noticias/noticia_65.htm>. Accessed in: 20 Nov. 2006.
- [4] MECTRON. Portifólio Institucional. São Paulo, 2006. 1 CD-ROM.
- [5] NICOLAU Isabel. O Conceito de Estratégia. **ISCTE**. Lisboa, Instituto para o Desenvolvimento da Gestão Empresarial, 2001. Disponível em: <http://213.13.125.90/portallizer/upload_ficheiros/01-01_Isabel_Nicolau.pdf>. Acesso em: 2 dez. 2006.
- [6] OECD. Manual de Oslo: proposta de diretrizes para a coleta e interpretação de dados sobre inovação tecnológica. Brasília: FINEP, 2004.
- [7] OTTOBONI Ju. O Brasil namora mercado internacional de mísseis. **Gazetaweb.com**, 06 Oct. 2006. <<http://gazetaweb.globo.com/Canais/Supermaquinas/Noticias.php?c=1807>>]. Acessado em: 29 Oct. 2006.
- [8] PINTO P S. Entrevistas concedidas a Alexsandro Souza de Lima e José Roberto de Paula. São José dos Campos, 27/28 Sep. 2006.
- [9] PIRES HF. Inovação Tecnológica e Desenvolvimento da Cibercidade: O advento da Cibercidade. Geografia – UERJ. Artigo publicado nos Anais do Simpósio Internacional Cybercity 2003, São Paulo, 2003. <<http://www.cibergeo.org/artigos/CYBERCITY2003.pdf>>. Accessed in: 29 Nov. 2006.
- [10] PRNEWswire DO BRASIL. Bovespa e Finep promovem o 5º Fórum Abertura de Capital. Bondenews. São Paulo, 12 set. 2006. <<http://www.bonde.com.br/bondenews/bondenews.php?id=3090LINKCHMd=%2020060912LINKCHMop=mercado>>. Accessed in: 12 Nov. 2006.
- [11] ROCHA W. Gestão Estratégica. Fipecafi. São Paulo, 1999. <http://www.fipecafi.com.br/public_artigos/wellington/GestaoEstrategica.pdf>. Accessed in: 2 Dec. 2006.
- [12] SALONER G; SHEPARD, A; PODOLNY, Joel. Administração Estratégica. Rio de Janeiro: LTC, 2003. 275 p.
- [13] YOKOI Y. A caminho da bolsa. **Revista Capital Aberto**. São Paulo, ano. 3, n. 38, Oct. 2006. <http://www.acionista.com.br/mercado/artigos_mercado/111006_capital_aberto.htm>. Accessed in: 12 Oct. 2006.