

**DEVELOPMENT OF NEW PRODUCTS IN A VETERINARY CHEMICAL COMPANY**

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**Abstract**

*Demands for greater work capacity and increasing competition in various sectors of Brazil economy, is leading to urge of making techniques and processes continuously efficient. Within moderns business, the development of new products and processes is highlighted as differential in environment competitiveness at organizational and global levels. In Brazil, although these are becoming more frequent, studies on the development process of new products has newness conceptual in implementation of the economic sectors/large industrial. This shows the need for research that takes into consideration the factors considered impactful addressed by business institutions and practices used by them in the development process of new products. Thus, this study has an interest in presenting the process of new product development in a company that*

*operates with veterinary chemical products. Study is aimed at identifying the responsible factors for the prominent business success and financial of products developed by that company.*

*Keywords: Development of New Products, Innovation, Research and Development, Veterinary Chemical Products.*

## **INTRODUCTION**

Demands for greater work capacity and increasing competition in various sectors of Brazil economy, is leading to urge of making techniques and processes continuously efficient. For many authors as Clark and Fujimoto (1991), Wheelright and Clark (1992), Clark and Whelwright (1993) and Cusumano and Nobeoka (1998), the process of development of new products has outstanding importance in achieving competitive advantage by organizations. The enterprises which have a specific sector for this purpose, with superior performance against competitors, are more likely to survive in a competitive and dynamic market.

According to Churchill and Peter (2000), development of new products and processes is differential emphasis on organizational competitive environment. Enterprises that do not work and not aim at the development process of new products are outdated, obsolete and tend to lose market share to competitors that are ahead with products and processes. To Jonash (2001), the process of new product development should enable a cooperative between sectors within the organization. Thus, the entire process of new product development needs to be balanced so that the flow of services, products and information can go without inconvenience and loss of time in the different sectors and areas of the organization. For the author, the process of new product development should be guided and determined by the value added to the product. This process will elapse in the activities as the primary goal which should be stressed in order to generate value.

In Brazil, although the focus on new product development is becoming more frequent. This shows the need for research that takes into consideration of the factors considered impactful by enterprises and of the practices used by them in the development process of new products. Thus, this study has an interest in presenting the process of new product development in an organization that operates with the veterinary chemical products, in which, aim is to identify the factors responsible for the prominent of business success and financial of products developed by the company. This study uses the case study research method and is structured in topics beyond of this introduction: theoretical framework about the process of developing new products, methodology, the case study, and the final considerations, besides the references.

## PROCESS OF DEVELOPMENT OF NEW PRODUCTS

The concept of innovation, invention and development of new products within organizations is a complex process that requires systematic support of senior management. Drucker (2002) discusses innovation as resulting improvement coming from the learning process and practice of the deliberate and organized search for changes.

For Clark and Fujimoto (1991) and Wheelright and Clark (1992) the process of product development has characteristics specific to each organization, generally divided into five phases: Concept Generation, Product Planning, Engineering and product testing, process engineering and pilot production. However, these phases often overlap and interact continuously instead of being performed sequentially, due to the need to production; build and testing in different project activities.

To Fonseca (1998), the process consists of four steps: (1) development of the concept, which involves determining the market potential, establishing including potential competitors, technical and financial feasibility; (2) planning of product development, which involves identifying the departments that will be affected including, establishing the contributions of each department and schedule; (3) development of the design of product, the prototype and the model developing; (4) Development of the pilot production and start of analyzing the impacts of the possible problems of this final phase of the new product.

As Gavira et al (2007) points out, Schumpeter was the pioneer in studies quantifying of the potential economic gain of business in the development process of new products. For the author, the innovation leverages financial gain, accelerates economic growth, delivers competitive advantage against competitors and maximizes the value-chain to all involved in the business.

In a market environment, constantly more competitive, dynamic and intense, to the organizations which invest in innovation arise better conditions face this turbulent market, creating competitive advantage against competitors. Also, Clark and Fujimoto (1991) stated that the process of product development can be defined as the means in which a company transforms your techniques, market information, and opportunities, in products which aimed a higher commercial feasibility, economic and financial for the business. Thus, this process of product development can be analyzed as a set of tasks performed in a logical sequence in order to develop a good or service that has market value. Although, it may seem a simple process, the process of new product development is very complex and involves constant changes between steps, within a systematic process.

The process of new product development involves many areas of organizations such as Quality, Marketing, Operations, Research and Development, Engineering, Finance and

Juridical. This multidisciplinary feature causes a conflict between the aims of each company sector in the process of development of new products, difficult to definition of goals and responsibilities between the areas (Consoni and Quadros, 2002). Also, according to Khurana and Rosenthal (1997), due to these multidisciplinary approaches, many organizations which are developing planning strategies and new products, have initial dispersed and few results. This inconsistency can be observed in the initial cancellation of new products due to the fact that they are outside the company's strategy, by presenting irrelevance front to other projects and still late introduction of new products.

For some authors, such as Brown and Duguid (2002), from a certain stage of the development project, the organization may be considered as an orchestra conductor of involved areas with the new products development. It is from this moment that needs the use of organizational decision-making processes to assist and coordinate activities, to minimize and even prevent conflicts between areas in the development process of new products.

As shown in the table 1, to Henderson and Clark (1990), the various forms of innovation in products and processes can be classified as: incremental, modular, architectural and radical.

Table 1. Forms of innovation in products and processes

<b>INNOVATION FORMS</b>	<b>CHARACTERISTICS</b>
Incremental Innovation	Changes only in design of a product and/or process already established. An important feature is that development occurs at specific components.
Modular Innovation	The architecture of the product and/or process remains unchanged, while new concepts are developed, fundamental design of new product development.
Architectural Innovation	Recompose the interactions between the components of a product and/or process, sparking new relationships in the system as a whole.
Radical Innovation	It's modified the components, interactions, design and architecture of all parts of a product and/or process.

Source: Henderson and Clark (1990)

As stated by Clark and Wheelwright (1993), development activities for new products can be classified as to structural form, as shown in the table 2.

Also, as Rozenfeld et al (2006) affirm, although there are many ways to classify the types of projects to develop new products, the table 3 shows a range of use, based on the degree of change that the project demonstrates in relation to the previous projects.

Table 2. Structural forms of activities products and processes development

<b>STRUCTURAL TYPE</b>	<b>CHARACTERISTICS</b>
Functional Structure	Each functional manager is responsible for planning, control and management of resources and activities for developing new products carried in its functional area.
Project Structure	Responsibility for the planning, control and management of resources and activities for developing new products are distributed around projects and project managers.
Structure Matrix "lightweight"	Employees are distributed in each specific area under the responsibility of a functional manager and a person responsible for managing the design of new product development.
Structure Matrix "heavy weight"	Employees are distributed in each specific area under the responsibility of a functional manager and a person responsible for managing the design of new product development. It is similar to the lightweight structure, with the difference of the authority which is delegated to the project manager in new product development are equivalent and/or above the functional managers.

Source: Henderson and Clark (1990)

Table 3. Types of change in new projects based on previous projects

<b>TYPES OF PROJECTS</b>	<b>CHARACTERISTICS</b>
Incremental projects and derivatives	Create products and/or processes that have marginal changes compared to existing designs. An important feature is that they require fewer resources than other types because they are based on projects already undertaken.
Projects of next generation platform	Involve significant changes in the products and/or processes, without the introduction of new technologies and materials. An important feature is that they represent a new package of customer solutions.
Projects radicals (Breakthrough)	Involve major changes in the products and/or existing processes, creating a new category of products in which are incorporated new technologies and/or materials.

Source: Rozenfeld et al. (2006)

It is possible to note that depending on the criterion, the classification type of the project changes for the types of classification of Henderson and Clark (1990), Clark and Wheelwright (1993) and Rozenfeld et al. (2006). The ability to plan and control the process of development of

new products strategically depending on the type of classification justifies the importance of relevance in defining the stage/step where is the process of development of new products.

For Toledo (1993), the performance of the process of product development is influenced and often determined by the resources and investments employed, as the training of the technical engineering, investment in research and development (R&D) for team training in process new product development, financial availability, technical achievement for the prototyping, use of equipment and access to information technology.

## **METHODOLOGY**

The problem of this study is about the development process of new products in the chemicals industry. For Gil (2002), the search procedure and data collection can be performed in various sources such as people, articles, printed or digital documents, literature, experimental research, ex-post facto research, observation of facts etc. Therefore, the research conducted in this study can be classified as qualitative and interpretative, based on interviews with personnel of a company. This research investigates the facts set in a real context, using primary data, obtained in order to study the process of new product development.

To Godoy (1995), the qualitative study does not seek measurement through statistical tools and data analysis. It aims to seek to understand the phenomena from the perspective of the participants in the study situation by obtaining data described. According to Berto and Nakano (2000), the qualitative work aimed at bringing theory and facts, in the interpretation of single or isolated events, reaching results that enable individualized comparison between the cases. Thus, in this study carried out a systematic analysis of the development process of new products through the application of a structured interview with the professionals responsible for the management and development of this system, as well as some management-level employees directly associated with the process. The study takes into account material/information provided by the organization to be analyzed, as tables, operating results, charts and bibliographic materials for the study of the topic about development process of new products. Through this methodology, it seeks to clarify issues relating to research problem, and thereby expose a systemic analysis, trying to present the key benefits, difficulties and problematic in the development process of new products.

## **THE CASE STUDY**

The Brazilian company, which was studied in this work, is considered one of the largest and most modern veterinary chemical companies, also working in the selection and breeding of Creole horse and cattle dairy. The group's history began in 1987 and was based on innovation, technology and human resources. The first factory was set up in a rented house in Ribeirão

Preto, in the interior of São Paulo, and the place had about 500 square meters. Currently, the company stands in the ranking of SINDAN (National Union Products Industry for Animal Health), with two manufacturing units dedicated to animal health and focusing on pesticides, another in Cravinhos, interior of São Paulo and another in Uberaba, in the state of Minas Gerais. Recently, the company entered the market for agrochemicals with the inauguration of the plant in Uberaba-MG with total area of 200 thousand square meters and estimated production capacity of 100 million liters per year of insecticides, fungicides, herbicides, spreaders and mineral oil. The plant meets all national and major international certification standards from Ministry of Agriculture of Brazil, as Livestock and Supply/MAPA, Good Manufacturing Practices/GMP, Food & Drug Administration/FDA, International Organization for Standardization/ISO and European Union Drug Regulatory Authorities/EUDRA (Ourofino, 2012).

The industrial park is composed of a unit of biological and a unit of veterinary pharmaceutical industry which generates drugs solids, tablets, semisolids, liquids, defensive injectable for animals and hormones for animal reproduction. The structure also has a lake of volume capacity of 7 million liters having total area of 2,800 square meters and an average height of 2.5 meters. In the lake are created several types of fish, such as tilapia, pacu, peacock bass, patinga, curimba, matrinxã, tetra painted catfish, piracanjuba, piraputanga, tambaqui, carp, big head, curimba, piauçu, piraputanga, tetra, Japanese carp and mantrinxã (Ourofino, 2012). The company works directly in the productive chain of the agribusiness sector, which is formed by various business units among them: Animal Health, Animal Genetics and Pesticides. Much of their activities can be classified as a chemical manufacturer in the classification in the National Register of Enterprises/CNAE, Brazilian Institute of Geography and Statistics/IBGE.

The company has its own department of research and development (R&D) equipped with laboratories for the development of formulas, search technology at universities and research institutes, quality and validity assessment and production inputs from living organisms demonstrating its concern with the generation of technological innovations.

To Henderson and Clark (1990), due to the range of products, the company has developed his portfolio in a matrix with four types of product innovation: incremental, modular, architectural and radical. The new product development accompanied the growth stage of the organization, namely, as the company has been developing the creation of new products, his degree of innovation has gradually increased.

According to Clark and Wheelwright (1993), the activities of new product development as the company develops, can be classified as Structure Matrix "lightweight". This classification occurs because the employees are distributed in each specific area under the responsibility of a

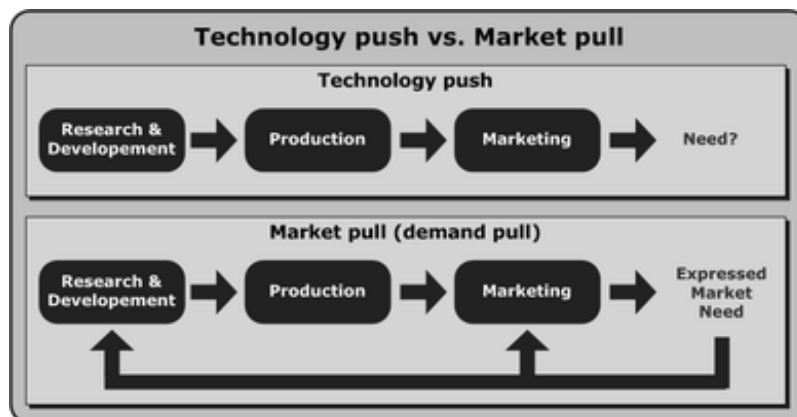
functional manager and a person responsible for managing the design of new product development.

As Rozenfeld et al (2006) propose, the company has the 3 classifications for the types of projects of new product development: incremental and derivatives; next generation platform; and radicals (Breakthrough). This happens because the company develops products and processes that have marginal modifications in relation to existing projects; develops significant changes in the products and processes, without the introduction of new technologies and materials; and develops major changes in the products and existing processes, creating a new category of products which are incorporated new technologies and materials.

The process of developing new products can be made from the needs of consumers by marketing sector and then be developed by the department of R&D. This same process of innovation can occur from the R&D sector and its development and after, being "pushed" to market by the industry of marketing. The difference between the two models is the beginning of the development of new products. In case of to push the technology innovation, as there are no customers who have this type of product needs, a new market has to be created for the technology developed.

According to Figure 1, it can be seen that in the company, the new product development process starts with the market need analysis. Field staff identifies the customer needs and passes this information to the R&D sector that develops new ingredients or formulas. Thus the process can be categorized as "Market-pull" or market-oriented. By performing an analysis of customer needs and products offered by the competition, increases the probability of commercial success of the product developed.

Figure 1. Model Product Development Market-pull



Source: Martin (1994).



The process of developing new products in the company studied has 5 phases: I) Phase of survey to design demand; II) Phase of commercial viability of the project; III) Phase of technical feasibility of the project; IV) phase of official tests; V) Phase of product legalization.

The first phase is stimulated contact with customers in order to find out their needs for products that the company can produce. After this early process of developing new products originated by the marketing industry, occurs a survey of the competing products, an analysis of technical feasibility, of the financial market and an identifying his share of market. The technical development of the new product starts with research of active ingredients on the market and that can be inputs in the production of product. In this third phase, the technologies used are nanotechnology and biotechnology. The Nanotechnology is used to control and direct the formulas, so as to reduce the number of doses and minimize side effects of the formulation of chemistry. And the Biotechnology is used to develop protein and microorganisms. In this phase, several partnerships with research institutions occur to encourage technological development. The fourth step consists in tests and clinical studies, pre-clinical, toxicological, residues, etc., which will analyze the stability and consistency of the formula developed, or if there will exhibit degradation between product production, marketing, storage at every stage and in the consumption itself. In the fifth and final phase, procedures are performed for the legalization of the product with the bodies of sanitary protection and animal life as the Ministry of Health and Ministry of Agriculture, Livestock and Supply.

## **FINAL REMARKS**

Analyzing the development process of new product in a chemicals company, it was identified that process begins with the analysis of customer needs and products offered by the competitors, for increasing the probability of commercial success of the product developed. It has an organizational structure and adequate infrastructure to the development process of new products, with autonomy and speed in decision-making. Also, officials of R&D have great autonomy; despite they are under the responsibility of a manager responsible for managing the design development of new products.

Furthermore, the company selects multiple employees through training, experiencing various areas of the organization, in order to form a team of multi-functional. This learning format helps the organization to form teams with training and experience heterogeneous, favoring the company to develop innovative products with lower cost compared to its competitors. The company has a systematic report, formally organized and stored in a database with the facilities and difficulties of the project stages of new product development. This way of innovation makes the company does not make the same mistakes and failures already

committed avoided, with the systematization of a single database of design steps of new product development.

Several factors contribute to the success of the Chemicals company in launching new products in the market, among which stand out: a variety of sources in the search for discovering customer needs, and heterogeneity of multidisciplinary teams of R&D; incentives for employee participation in troubleshooting; company's active participation in trade fairs and scientific/cultural congresses; intense contact with clients seeking to know and develop products to meet their needs; follow the life cycle of products; partnerships with various agencies and research institutions, constantly seeking develop better products and with lower costs.

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