An empirical study of new product development in a small company: case study of a veterinary firm

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Abstract: This paper discusses a proposal of structuring of a new product development (NPD) process in a small company producing veterinary medicines. The purpose of this new structure is to enhance the company's competitiveness in the regional market where its products are sold and to create new market opportunities for the development of new products. The company in question has currently has a new product commercially available, in addition to two other products not yet on the market. The company's strategic objective was to design its NPD process by dividing it into four well-defined stages: creation of ideas, definition of the concept, development, and launching of new products. This paper describes each of these stages, as well as the difficulties the company encountered in the implementation of this NPD process, namely: its lack of technical competencies and investments, and the achievement of a balance between its technological level and the requirements of the product. The paper concludes that, although it is vital to have a NPD process, this process must be lean and low cost in order to be effective in small companies such as the one where this empirical study was conducted.
Keywords: small company, product development, veterinary products

1. Introduction

The agribusiness has sharply increased in the past decade in Brazil. Currently, it corresponds to 27% of the GDP and employs 37% of the work labour in the country. Producers have put a strong effort to export their products. Therefore, companies have had to enhance quality and productivity and at the same time reducing their costs in order to be competitive. In this context, a number of organisational practices have been introduced, such as implementing quality assurance systems, restructuring production systems, and implementing new product development (NPD) process. These initiatives have been particularly important in the market of veterinary products and medicines. In this sector, agrochemical industry has invested in new tecnologies for product development that reduce environmental impact and comply with regulatory legislature, offering both effectiveness and profitability.

If this competitive scenario is difficult for large companies it is much harder for small and medium enterprises within veterinary industrial sector. In many cases, small companies are compelled to sell their products in marginal markets since they do not have financial and human resources for developing innovative products, enhancing organisational practices, or improving production systems.

It is in this scenario that this paper focuses. It aims at presenting an introduction of a NPD process in a small company that produces veterinary products and medicines. From the past five years, the company has tried to modernise itself technologically and organisationally. In order to achieve that, it has established partnership through technological co-operation projects, despite the difficulties of a small company to do so. Firstly, it has implemented a strategic planning and conducted a SWOT (Strengthens – Weakness – Opportunities – Threats) analysis. Although the SWOT and a marketing analysis have indicated that the company has a relatively stable market position with regard to one of its principal products, it could be threated by the possibility of new competitors. In addition, new governmental regulatory restrictions have been introduced in the country relatively to the principles in the product formulae. Then, the company has decided to develop new products that could respond to the market as well as to substitute its current products.

In this sense, this paper describes this on-going initiative. The study has been based on current literature on NPD including its application on small-sized enterprises. A case study approach was employed to conduct the research. It aims at answering a question on how to structure a NPD process in a small company. Data were collected primarily by active observation, since one of the authors was directly involved with the implementation. Archival documents were other source of evidences used. Those sources were reviewed and analysed to identify and validate data. Finally, the paper explores the stages of the NPD process in the small company as well as it discusses the experienced difficulties to implement this process.

2. Theoretical background on new product development

The development of new products has been highlighted as a key factor in increasing competitiveness both at a company and a national level. Among the benefits from the development of new products, CLARK & WHEELWRIGHT (1993) stress the improvement in the market position and the organisational enhancement. In order to achieve those benefits, a company must structure and manage its NPD process effectively and efficiently. However, the boundaries of what consists a product development system is not very clear. It is a vast field of knowledge that can be seen from different perspectives, as pointed out by CHENG (2000). The product development system consists of a series of processes within which activities can be grouped into three main dimensions (CHENG, 2000): 1) Product development assessment (performance assessment and identification of success factors); 2) Strategic: company/project level (development process and work organisation); and 3) Operational: project level

(development process and teamwork). Basically, those dimensions can be viewed at both strategic and organisational levels.

The strategic level comprises the alignment of company objectives and goals, considering the business particularities, with the set of development projects to be developed. These are compared with the company product development capacity in terms of the needed resources. Moreover, it is also an attempt to articulate the market necessities with the organisational and technological competencies in order to allow the continuity of company business (CHENG, 2000). In this case, the term usually employed in the literature is portfolio management (see MEYER, 1997; COOPER et al., 1997a; 1997b; 2000).

The organisational level is relative to the specific project development, i.e. it is responsible for the development in a sense of executing and managing product development. This level concentrates efforts in the managerial aspects of the development as well as in the application of methods and techniques that support the development process (e.g. design of experiment, failure analysis, etc.). In this sense, there are different but similar development frameworks such as the "funnel model" by CLARK & WHEELWRIGHT (1993) and the generic structure of stage-gate proposed by COPPER (1993).

The literature points out a number of companies that apply the funnel model or the stage-gate. Nevertheless, most research to date into the development of new products has been based on the practices within large, industry leaders. Examples are large companies such as Natura (NASCIMENTO & MARX, 2001) and Sandvik (SANTOS & PASCHOARELLI, 1998). Specifically in the case of the stage-gate and its variants the following companies have adopted it (PHILLIPS et al., 1999): Bombardier Aerospace Group, Kodak, General Electric, Lucas Industries plc, Rolls-Royce plc, and Motorola. However, it is worth observing that there is a gap in the literature in terms of the use of those development models in small companies.

2.1. A brief overview of product development in small companies

The literature points out some attempts to structure NPD in small companies, e.g. for software development (RAUTIAINEN et al., 2002). Besides this kind of initiative, the literature offers examples in small high-technology firms. For instance, MEYER & ROBERTS (1986) looked at the strategies adopted for small technology based companies, while YAP & SOUDER (1994) carried out an interesting study of small high-technology electronics firms in the USA. The authors identified several differences between how NPD should be managed in small and large companies, including source of technology, organisational structure, management style, product and markets characteristics and entry strategies. Nevertheless, despite the existence of those sources, the literature search for this work has not identified specific cases for the development of veterinary products.

3. Research methodological approach and methods and techniques adopted

One of the most common categorization of variables involved in a research project is by dividing the research methods and data between a qualitative or quantitative approaches (GODOY, 1995). In the case of this work, qualitative approach has been adopted. It employs descriptive results instead of predictive models and uses inductive rationale (MAYS & POPE, 1996).

Concerning the scope of this research, the present research project presents characteristics of an action research approach (see THIOLLENT, 1996), since one of the authors was directly involved with the studied company. However, it was decided that this research project should be categorised as a case research (see YIN, 1994; VOSS et al., 2002). The rationale is because this research project was not methodologically planned as an action research, although it did have intervention. In order to characterise a project as an action research the researcher must considering a specific action research planning phase (COUGHLAN & COGHLAN, 2002).

This project intends to investigate a unit of analysis (NPD process) within the context it is in (small company). Therefore, the relevance of this study is a result of the need of a small company to structure its processes, particularly the NPD process in order to become competitive, as a necessity pointed out in the theoretical background of this paper.

Concerning its objectives, a research can be classified as exploratory, descriptive, or explanatory (GIL, 2002). The present work is exploratory since it is an initial study that aims at better formulating the problem of structuring a development process in a small company.

For data gathering, it was not necessary the use of interviews, common in case research (YIN, 1994), due to the narrow relationship of one of the authors with the company. Besides this, the involvement enabled to access company archival documentation in order to conduct a document analysis using various sources not yet analysed (GIL, 2002), such as technical reports, memos, meeting minutes, etc. The data analysis followed the inductive logic, where the rationale is from the specific to the general nature (ANDRADE, 2002). That means an attempt to develop theory based on specific data of a particular study in order to reach general understanding and from this to develop a theoretical model. Table 1 presents a methodological summary of the present research project.

4. Case study – structuring NPD

The company is within the industrial sector of animal health care (veterinary), i.e. the market within the Brazilian agri-business. This sector currently presents the main characteristics of technological development. The recent gains in terms of productivity have conducted this Brazilian sector as one of the most competitive in the world. Brazil has today the largest live stock being one of the most exports of cattle meat in the globe. In the year 2002, the Brazilian exports reached more than US$ 1 billion (FOLHA DE SÃO PAULO, 2003).

Concerning the industry of animal health care, modern technologies and services have conducted the producers to invest in new product development not only to fulfil market internal needs but also to adapt to the requirements and demands from the external market. The current demands of the international market in addition to the changes in the behavioural of Brazilian consumers have lead the producers to put efforts in a more effective quality and sanitary control of the live stock. This has also lead to new standards of structure and relationship within the cattle meat supply chain.

Table 1. Research classification.

Typology	Classification
Nature of variables	Qualitative
Scope	Case study
Objective	Exploratory
Interpretative approach	Inductive
Data gathering techniques	Direct and indirect documentation Participative observation

In this context, the investigated company has tried to modernise technologically and organisationally from the past 5 years. In order to achieve that, it has established partnership through technological co-operation projects, despite the difficulties of a small company to do so. In addition, the company needs to have a better knowledge of its market, identify commercial opportunities, and enhance its productive process.

4.1. Company profile and market analysis

The investigated company is a small firm that employs 20 people and produces veterinary products and medicines with an annual sales of US$ 500 thousand. As earlier mentioned, its target market is the live stock, through a division of animal health care. Firstly, a survey of the Brazilian live stock was conducted in order to identify potential markets and in which regions have the largest live stock. This could enable to identify information that allowed to define the commercial strategic actions for its products. Distribution data of the live stock in terms of counting and percentage for each state and region was obtained. As an example, the Brazilian state that has the largest live stock is in the state of Mato Grosso do Sul with almost 13% of the total live stock in the country. Hence, this survey provided a detailed map of the live stock distribution for each state, administrative regions, and cities.

The company then analysed the previous work and identified what parts in which its products were below the commercial potential (e.g. Mato Grosso do Sul) and other states and regions where the company did not commercialise its products (e.g. Pará). This analysis has lead to a customer segmentation by defining different types of customers: commercial representatives (customer A), large scale distributor (customer B), and low scale distributor (customer C). Table 2 shows the main characteristics and requirements for these three types of customers.

4.2. Preliminary requirements to structure the NPD process

Before starting to structure its NPD process, it was necessary to fulfil some requirements in order to do so. With respect to the portfolio management, it was not necessary to put significant efforts, since the company does not have an extensive product portfolio. Nevertheless, in order to develop products that were aligned with its strategy was necessary to conduct a strategic planning.

Therefore, a SWOT analysis was carried out. Firstly, a market analysis was carried out to define aspects of company competitive positioning, basically referred to its main product. Then, the strengthens, weakness, opportunities, and threats were developed. Table 3 illustrates the main results from this analysis.

The analysis showed in Table 3 indicated that the company has a relatively stable market position. However, this position is in thin ice since there is a possibility of new competitors entry in the market in addition of having only one commercially strong product. The direct competitors offer the products that the company has currently been developing and conducting comparative tests. The competitor products act aseptically and do not have a cure agent, preferred by the customer. Those products accelerate the process of cure, reducing the time of returning to health of a new-born cattle.

Another important point in the SWOT analysis is the commercial credibility that enables the company to have a wide access to suppliers and negotiate better deals. This also can be seen from the financial agents which offer credit with lower interest rates, when needed by the company.

In addition, the company uses the SWOT data in the strategic planning periodically in order to relate that information with its action plans and corrective and preventive actions. As can be noted in Table 3, there are strengthens, weakness, opportunities, and threats related to NPD. Therefore, the company has decided to structure its NPD process, described at the following section.

4.3. Development process

The NPD process was structured in four stages, namely: idea generation, conception definition, product and process development, and launching. Ideas are linked to the SWOT analysis mainly based on company market position. The necessity of increasing product mix was evident as well as to surpass the competitors. However, despite the relevance of those, they do not assure idea generation. Hence, at

Table 2. Characteristics and necessities of customer groups.

Customer A	Customer B	Customer C
Strengthening partnership	Profit margins	Customer personal relationship
Deal with customers B and C	Batches varying quantities (medium and large)	Small quantities
Demand specific conditions of product promotion by region	Short time delivery	Specific conditions of logistics and transport
Require worthwhile commissions	Competitive prices	Competitive prices
Do not have products in stock but request directly with customers B and C	Low stock	Stock for their own necessities

Table 3. SWOT analysis.

Strengthens	Weakness	Opportunities	Threats
• Company credibility; • Recognised product brand; • High quality of the product; • Reputation of company directors; and • Agile decisions	• Non professional commercial exploration; • Doubts concerning large quantities; • Low media exposition; and • Difficult of purchasing the product in some regions	• Brand credibility offer opportunities for new products; • Commercial exploration in states with no penetration; • New proposals for commercial representatives; and • Increase of product demand	• Fierce market competition; • New comers in the market; • Imposition of selling products from large companies; and • Do not fulfil product demand (quantity)

this point, the main source was the market analysis described in the topic 4.1. It is also vital to introduce the practice of idea generation, basically introducing communication channels in order to this occur formally and systematically. This is an action that needs to be further evolved. In other words, this first stage is not fully developed.

The conception development consists of an initial market analysis, in order to verify if the idea is viable. In this stage, customers, competitors, and distributors are mapped to identify products with more commercial potentiality, especially considering the distributors. Technically, this stage develops the main active ingredients to be present in the medicament, also considering the environmental impacts. Costs involved are also taken into consideration in this stage, and the trade-offs between the potential market price and material and production costs as well as the development costs. A case in this stage was the example of the development of the product packaging. The market did not want a spray due to its dimensions (difficult portability in the field) and they were afraid of problems in the valve.

In the stage of product and process development, the product formulae is developed with the assistance of consulting firms and research centres. Many other decisions are necessary such as if the product will be in liquid or other form, and the definition of process specifications, considering not only product production but also packaging. In this stage occur the first experimental trial and tests with animals are initiated. As an example for the product currently being developed, a decision was taken to simply increase the percentile of an active ingredient but with no success. The solution was to combine complementary two other active ingredients resulting in more effectiveness of the product after testing it. After this first trial, other tests are to be conducted, in a larger scale, by selecting customers from the distributors data base. It is also considered the test of other aspects such as viscosity and odour with the assistance of stock breeder specially selected for those tests. If the tests are validated in terms of effectiveness and efficiency, an application for registering the product in the Ministry of Agriculture can be done. This is compulsory in order the product be commercialised. From this phase pilot production can be conducted. Those tests involve a sample of 10% of the production. Physical and chemical tests are carried out as well as field tests and shelf life tests in laboratories accredited by ANVISA (the national sanitary governmental agency). Afterwards, those results are then organised in a technical report to apply for product registration in the Ministry of Agriculture. The company expects to have an answer in 180 days, but is usually more than that.

After getting an authorisation from the Ministry of Agriculture, the product can be traded. The stage of launching and commercialisation includes decisions with regard to the timing to introduce the product in the market, location to introduce the product in terms of market penetration, and advertisement approaches. However, before doing that, firstly it is conducted a preliminary analysis of products that are successful in the market. Then, the product is to be launched in the states with larger market penetration. It is worth mentioning that there is a period with increased new-borns (from September to December). So the new products are to be launched just before that period.

4.4. Experienced difficulties and lessons learned so far

A number of difficulties were experienced such as: the required high investment of this nature, lack of specialised labour in this area, and the (lack of) balance between the technological level required for the product and the existing company level of technology. The level of the investment for a small company is of a magnitude that can compromise the company cash flow. Moreover, the lack of a well-prepared labour also makes the implementation more difficult. In this sense, the company has tried to level its technical knowledge with the product demands. However, the speed is not as fast as they would like to be.

Other aspects such as the time required to register the product and the relative delay in getting a feedback from the ministry and other agencies (e.g. ANVISA) also cause difficulties when conducting the product development. However, those aspects are out of control of the company but the delay does affect a small company.

5. Concluding remarks

Since this work is not fully completed it cannot be considered as conclusive. Nevertheless, some points can be raised as concluding remarks. Firstly, it is necessary to note that, despite the need of having a structured NPD process in place, this process should be low cost and lean in order to be effective for small companies, as in the reported case. Another relevant point is getting access and institutional support through technological and scientific cooperation programmes in NPD involving small companies and universities and research centres. These initiatives can help to minimise the lack of human resources which are scarce in this kind of organisations. Finally, regulatory and governmental requirements should be clear and with terms adequately established (in terms of procedures and time). Otherwise, the actions relative to product launching are practically stopped and, sometimes, can result in a non-viable product development for small companies.

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