American Journal of Engineering Research (AJER)
e-ISSN: 2320-0847 p-ISSN : 2320-0936
Volume-7, Issue-5, pp-225-230
www.ajer.org
Research Paper Open Access

Product Development Process Management : An Analysis Performed On A Company Branch Metalurgico Located In The South Of Santa Catarina

Vilson Menegon Bristot[1], Leopoldo Pedro Guimarães Filho[1], Kelvin Somara Simon[1], Aron Cardoso Fabre[1], Vilmar Menegon Bristot[2], Simone Milioli Da Luz[3], Márcio Vito[4]

[1]*Departamento de Engenharia de Produção – Núcleo de Estudos em Engenharia de Produção - NEEP / Universidade do Extremo Sul Catarinense - UNESC, Brasil*
[2]*Instituto Federal de Santa Catarina - IFSC, Brasil*
[3]*Faculdade SATC, Brasil*
[1]*Departamento de Engenharia Civil - Universidade do Extremo Sul Catarinense - UNESC, Brasil*
Corresponding Author: Vilson Menegon Bristot

ABSTRACT: *The market is undergoing transformations that form a new dynamic context for organizations. Therefore, developing products is one of the key processes for competitiveness in manufacturing. The increase of the clients ' requirements and the complexity of production processes required of companies a greater attention to the development of products. The objective of designing products is to satisfy the customers needs and improve the company's competitiveness on the market. The work presents the basic concept for the development of new products, steps and implications for production in addition to highlighting the intrinsic features of the product. This is a case study that shows the current configuration of the procedures followed in the company studied and considered during the development stages of a new product assessing each step and the opportunities for improvement. Is covered, so a project to improve the current process whereas variables that impact heavily on the whole process making the process more flexible and structured according to the development to be done.*

KEYWORDS -*Competitiveness. Product development. Improvement of the process. Metallurgist.*

Date of Submission: 27-04-2018 Date of acceptance: 12-05-2018

I INTRODUCTION

Currently, the market undergoes transformations that form a new dynamic context for organizations and in particular for the brazilian industry, therefore developing products is one of the key processes for competitiveness in manufacturing. Several factors such as competition, technology, reducing the life-cycle of products and more demanding consumers make companies seek agility, productivity and high quality.

The degree of uncertainty at the beginning of the product development process is high and it is precisely in this step that selects the most amount of constructive solutions. Decisions between alternatives early in the development cycle are responsible for much of the cost of the final product, and the cost of modification increases throughout the development cycle. Therefore, note that it is essential that a search for the biggest and most important product information and/or aspect that may impact on the same.

Currently, the most valuable assets of a company are the information, knowledge and, above all, the ability to meet the consumption needs in the moment in which they arise. The use of information technologies contributes to the integration of the sectors of the Organization, through the knowledge of individuals and of the equipment used, promoting, therefore, positive results in the development of projects that involve enterprise-wide. The success of the project of a new product is linked to the effectiveness and efficiency of your development process, since the ability to design quickly and quality is a decisive factor for survival in the market. The integration and speed in product development projects are key elements in the assessment of the competitiveness of enterprises (SELHORST JUNIOR, 2008).

The increase of the clients ' requirements, the complexity of production processes has reached the product development process, because the products have become increasingly diverse in the number of shapes and number of components. Reduce development errors, inserting elements to ensure the robustness of the product, and finally, the alignment of the requirements of the consumers with the characteristics of the product are ways to guarantee the success of the development process of product.

It can be said that the success of a company is directly related to the ability to meet or exceed customer expectations, becomes therefore a challenge in itself, to develop products that can compete in price and quality.

II LITERATURE REVIEW

Develop a product means making an idea can be materialized in the form of a physical good or service to be provided. In this way the product development Process (PDP) consists of activities planned, coordinated and controlled, which aim to make the goal of creating a new product can be achieved (AXE and TOLEDO, 2008).

The true new product development is the process of transformation of business opportunities into concrete products (TROTT, 2012).

In General, develop products boils down to a set of activities through which seeks, from the needs of the market and of the possibilities and technological constraints, and considering the competitive strategies and the company's product, get project specifications of a product and of your production process to manufacture is able to produce it. Product development is considered a business process that is increasingly critical to the competitiveness of companies, especially with the increasing internationalisation of markets, increased diversity and variety of products and the reduction of cycle life of the products on the market. It is through this process that the company can create new products more competitive and less time to meet the constant evolution of the market, the technology and the requirements of institutional environment (ROZENFELD et al., 2006).

Mundim (2002) adds that product development is one of the most complex processes and that relates to virtually all other functions of a company. Claims to develop products, information and skills are required of members of all areas, characterized as an activity in principle.

Characterization of the product development process

Mundim (2002), States that the product development process is composed of a large number of activities that involve from the identification of new ideas and needs of the market until the launch of the new product.

The Division of the process in steps is a didactic simplification, since, in practice, steps can occur in parallel, and there are interactions between different stages. The parallelism of activities is one of the foundations of Concurrent Engineering. As a simplification, the definition of the steps of the PDP is purely arbitrary and dependent on the appropriateness of the type of process or the author considered (MUNDIM, 2002).

Second Rozenfeld et al. (2006), the PDP, compared to other business processes, it has several special features. The main features that differentiate this process are:

- Auto level of uncertainties and risks of the activities and results;
- Important decisions must be taken at the beginning of the process, when the uncertainties are even higher;
- Difficulty of change initial decisions;
- The basic activities follow an iterative cycle of type: generate alternatives-Build-Test-Optimize;
- High volume generation and Manipulation of information;
- The information and activities come from various sources and areas of the company and supply chain; and
- Multiplicity of requirements to be met by the process, considering all phases of the life cycle of the product and its customers.

A feature very specific organizational development activity is that each project can present problems, difficulties and very particular historical IE, development activity is not a routine activity, as financial or production processes. The volume of incoming information in the process of information processed and passed on is relatively high, varied and complex. The information input, such as market requirements, legal requirements, certification requirements, skills and competencies of the company and your network of suppliers etc., are quite varied and come from a variety of sources both internal and external to the company. It should not be forgotten that the requirements to be considered relate to all clients at all stages of the product life cycle (design, manufacture, distributors, users, service personnel, product recycling etc.) " (ROZENFELD et al., 2006).

Rozenfeld et al. (2006), although at the beginning of the PDP are defined the main constructive solutions and product specifications. This is where are certain materials and technologies to be used, the manufacturing process, the constructive manner among others. Although there is the possibility to walk through the process with workarounds, essential and Central definitions are determined at the beginning.

Normally, it is argued that the alternative choices that occurred early in the development cycle are responsible for about 85% of the cost of the final product. That is, all other definitions and decisions to be taken during the development cycle, after the initial stages, 15% of the cost. In other words, after the definition of materials, technology, manufacturing processes and main constructive solutions to the remaining development team: determine the tolerances of the parts, build and test the prototype, choose suppliers, the arrangement of supply chain partners and the physical arrangement of the production, marketing, technical assistance among others. And these definitions, when compared with the previous ones, exerts less influence on the final cost of the product (ROZENFELD et al., 2006).

The importance of management of PDP

According to Rozenfeld et al. (2006), the demand for changes in products, and in its applications and uses, has increased very intensely, justifying greater concern with the efficiency and effectiveness of product development. And this performance depends on the PDP management.

On the other hand Axe and Toledo (2008), claim that the effective development of products has become a core competency and has differentiated customer-focused companies of other companies. The different environments in which businesses must operate has become highly competitive, and as a consequence many organizations have strived to meet the environmental demands. Based on this, some experts have identified the product development as of fundamental importance for the survival of organisations.

The development should seek something more than cost and technical performance of the product. Are also desirable conditions for competitiveness: the quality of the product to meet the different customers ' requirements; placing the product on the market as soon as possible for appropriate utilization of the window of opportunity, anticipating from the competition; and, yet, the manufaturabilidade (ease of producing and assembling) of the product and the creation and strengthening, each project, the skills required for product development in the future (ROZENFELD et al., 2006).

Are possible reductions of over 50% at the time of release of a product, when the project issues are identified and resolved in advance, reducing the number of subsequent changes and manufacturing times and responding to the needs of the consumer and therefore generating competitiveness. It is important to consider the "effect" of increased cost due to changes or alterations during the development process. It is estimated that the delays to find and fix the problems as the project progresses to production, an increase in the cost of change, which grows in geometric progression of 10 reason every stage passes (ROZENFELD et al., 2006).

Baxter (2003), States that if there is a delay in development, this being for any reason as errors in the development or even delay of process, surpassing the time, development spending will be larger and this can compromise the anticipated profits. In addition, the delay in the release of the product can affect the cash flow of the company.

The way the company develops products or better, your product strategy and how it organizes and manages all development is to determine the performance of the product on the market and your speed, efficiency and quality of the development process. That is, the PDP, performance depends on the management and management (ROZENFELD et al., 2006).

The management of the development process is quite complex because of involvement with most of the areas and functions of the company because the information flow is considered high. The frequent changes in customer requirements, the available technologies and the regulations that apply to products also contribute to increase the complexity of this process (ROZENFELD et al., 2006).

What differentiates companies with excellence in product development is the pattern of coherence and consistency throughout the development process, including the strategy, organizational structure, the systematization of activities, the technical skills the approaches to problem-solving, learning mechanisms and the type of dominant culture. In General, we can say that the consistency in the various dimensions of product performance developed i.e. technical performance, quality, cost, among other things, release would be a consequence of consistency in the Organization and in product development management (ROZENFELD et al., 2006).

The development strategy also comes to translate business goals, usually more extensive, detailed character requirements, such as: time for new product introduction, development costs, capacities and definition mix productive. This strategy would comprise not only a vision of short and medium terms, related to the creation of new generations of products, but mainly, the identification and development of critical capabilities so that the company can continue having a effective development in the future (ROZENFELD et al., 2006).

But the development strategy is not sufficient for the performance of the process, she must guide and be complemented and operationalized by a large set of approaches and management factors. In short, generally companies with excellence in product development have a template for the product development process, which features strong consistency in its entirety and have a strategy and operational management of the project development properly articulated (ROZENFELD et al., 2006).

Innovation and the development process

According to Trott (2012), companies must be able to adapt to innovation and progress if they wish to survive the market.

"" ... don't innovate die, "wrote Christopher Freeman (1982) in your famous study on the economics of innovation. Of course, companies that have established themselves as technical and market leaders demonstrate ability to successfully develop new products. "" (TROTT, 2012)

They work with the knowledge of their competitors, inevitably, will hit the market with a product that changes the basis of competition. The ability to change and adapt is essential to our survival in the market.

Management of innovation and new product development process

Companies need to anticipate the future and develop new products that will enable your competitiveness for decades to come. For many people, new products are the results of the process of innovation in the process of new product development (DNP) is a subprocess of innovation. Innovation management includes conditions that need to be mobilized to ensure that the Organization as a whole has the opportunity to develop new products (TROTT, 2012).

Develop new products comprises the management of disciplines involved in DNP being that these developed their own perspectives that are deeply influenced by their experiences of involvement of new products from a perspective manufacturing i.e. analyze how can manufacture more efficiently the product in question. Marketingmanagement, on the other hand it should analyse in a different way: I would try to understand customer needs and how companies could provide them better. Produce what the customer wants, may or may not be possible or profitable.

Based on the statements of Motta (2001), it can be said that the technological innovations are both products of science as a social structure. Modernization brings the premises, efficiency, quality and productivity, which in some ways impose a burden to society as a whole, and the results of such transformations as information and automation, of course, ends up leading to a cost great social as the reduction of jobs, technological exclusion and access restricted to the part of the consumer market, restoring thereby the criteria of who wins and who loses.

Second Gobe et al. (2004), overcoming the expectations of consumers, through innovative products and services, ensures competitive advantages and allows companies occupying leading positions in highly competitive markets. Warns that the constant market changes, require attention on issues related to competitiveness, and that in this scenario, the organizations must be endowed with creative decisions, whether strategic or operational level.

III THE COMAPANY

The company's metallurgical branch studied and started its activities in 1995 in a small Shack with only 10 collaborators. Today is present on the market for more than thirty years and is a national leader in the manufacturing of their products. Has a constructed area of 10,000 m² and produces about 500 tons of pieces per month and employs more than 200 employees.

IV METHODOLOGICAL PROCEDURES

This is an analysis conducted in an enterprise of foundry and machining in order to check the conformity of the current process and what you can improve or to change in order to achieve the minimisation of possible errors in product development, caused for information about your disability.

In this way, a study was conducted taking into account the procedure and the method that the company adopts for the development of products and based on literature adopted in order to suggest improvements when appropriate with the goal to change the method currently adopted, making the process faster and more accurate, because currently at some points do not have satisfactory results.

The development can be considered external or internal. Inner is that development which you want to add a new item to the company's product mix and the external is the one requested by the client, i.e. a special product that will be provided exclusively to him.

In conversation with employees, understand that the process happens as follows: the commercial fills the data from a form (Form 01-request for product development) and forwards to the engineering sector for the Engineering coordinator performs the critical analysis of the input data. Being everything as the form is forwarded to the Department of methods and processes. If it is not right, returns to the mall to check the data populated again.

From the moment the form arrives at the stage of methods and processes, it goes thru all the coordinators of each production sector: engineering, foundry, machining and painting. Each Coordinator analyzes the data and verifies the feasibility of developing the product by annotating the runtime in each process along with the degree of difficulty and forwards by the form to the responsible. With all the information noted,

responsible for costs that data to a spreadsheet fills in for Excel automated, named Simulator. With the data entered in the worksheet, it is possible to get the cost of manufacturing and, consequently, the selling price.

The time for compliments these steps varies from two to three days. Today, for the commercial sector and with your customers is not a satisfactory outcome in respect of the time for a budget, which also occurs, eventually, when working on an item that already has an official price on your competitor most of the time you don't get a competitive price.

Internal development happens simply filling out the form and subsequent forwarding of a sample of a competitor, without conducting a market research to see if there really is demand for the product, or even a search in order to identify the main competitors and prices that the market will, in order that in the process of elaboration of costs is analysed the feasibility of the development of this new item. Therefore, the company will develop any tooling, and will manufacture a lot and may not succeed in sales, as it will present a higher price than practiced by competitors, or, for lack of information on development, not answer the technical requirements of the customer, thus interfering in the functionality of the product. This process generates an extra cost, resulting in damage to company that should review the development process to achieve the necessary changes in order to develop properly the product with competitive price.

The proposal for the implementation of this work to the external development is that when the form is forwarded to engineering, considered the data input by the Engineering coordinator and forwarded directly to the responsible for costs, and This should receive a training by the Coordinator of engineering with the help of the coordinators of each sectors, with the goal of empowering that person and makes her able to identify all the time and degree of difficulty of each sector. With this eliminates the passage of the form for all the coordinators of each sector, as the daily flow of budgets is considered big and as the company has a line of standard products, developments compared to each other have great similarities, the feasibility analysis can be made only by a person.

In the survey of machining process today if determines the times based on knowledge of machine operators, i.e. is not a given need being which adds a percentage on that time being considered safety margin.

The proposal is to adopt a simulation program for the real-time implementation, eliminating the chance of mistakes in the process. There have been performances of two programs with low cost to company, but was not adopted for lack of interest on the part of the employees of machining process.

For internal development, which is the one that you want to add a new item to the company's product mix, the suggestion is that before anything is accomplished a field research with a minimum number of customers to check whether they use the item and If you are interested. After that, identify its suppliers and which prices, because second Rozenfeld et al. (2006), point a ferments which is essential to the development of new products is the analysis of the economic and financial viability of the project. The analysis of the economic feasibility means estimate and analyze the prospects of financial performance resulting from the project, and it is important to have a base of estimated price to be sure it is average the market practice, and if the amount of profit generated is enough for this development, as the main element that justifies the existence of a company is generating profit.

It is desirable that the main technical requirements are identified that can interfere with your functionality, so that it is easy to optimize engineering and or change the product, once Trott (2002) and Motta (2001) state that the innovation is necessary for the product.

It is extremely important to also take into account another important tool that is pointed to by Baxter (2003), creativity, he claims that she is the heart of the project. Currently, with the stiff competition, there is little scope for reduction in prices, the competition based only on prices becomes increasingly difficult. It remains then another weapon, the use of creativity to promote differentiations in the product, something that the product of the competitors do not have. So it is of utmost importance to identify the technical requirements of the product to promote optimizations to reduce product costs, without affecting the functionality of it.

Subsequently, all data must be sent to engineering and, if possible, with two samples of different manufacturers. Rozenfeld et al. (2006), claim that early decisions are responsible for about 85% of the cost of the final product, with that noted that the more information at the beginning of the process makes it easier for engineering can better analyze, and take the right decisions before starting prototyping or production of the product.

The results of the changes suggested will be analyzed through a chronological analysis, which is nothing more than a technique of logistics that deals with the time required for the completion of processes, is a tool that has as main objective to analyze the times of each step in the process, and enables the understanding of how much time is being effectively used in the tasks. In this way will be timed the initial process of the budget until the final price for the commercial, in the current process and will later be done even in process with the changes suggested in order to make a comparison between the process current and new. In addition, it will be measured the degree of performance and agility with the employees involved in the process, since there was an increase of information that will facilitate the development, requesting to involved that assign the notes before

and after so that you can perform a comparison of the process. This to allow to analyze the feasibility of the implementation of the proposals.

V ANALYSIS OF THE RESULTS

It is expected that, with the amendments suggested in the external development minimizes the time of implementation of the budget, bringing agility to the process and, in addition, obtain the lean cost and need for that in cases of heated negotiations can be confidence in the process, once you have accurate data. It is expected even with the Elimination of the forms for all the coordinators of the process, that they can have tranquility in the execution of other activities.

With regard to market research to obtain all information relevant to the development process and the prices of the competition, delete the errors that are intrinsic to the current process that result in around 15% of developments, causing losses for the fact to develop all the necessary tooling and end up not selling the product does not meet the technical requirements and/or higher price than the competition.

VI CONCLUSION

The present work had as objective to analyze the process of developing a metallurgical company that is located in the southern state of Santa Catarina. The company in question follows a model for this process, but in some places does not bring satisfactory results to the commercial sector and also to their customers, this was done with the study to amend some points of this existing procedure, with the purpose of establishing an improvement in the process.

The business world has passed in recent years by several transformations resulting from natural movements of economic cycles, as new market segments, new business models and technological advancement within the reach of all. Some factors are therefore the path for a business to prosper in this scenario is the ability to adapt, greater agility, and trends facing planning project management strategies to achieve the goals set out.

Companies have realized that there is a need to develop a set of skills and tools to deal positively with the changes and the best solution to this need has been managing projects assertively.

Every company searching every day improvements and optimization in your production process, in order to reduce costs and stand out against the competition. The proposed improvement in the development process "provided the company, reducing the time of preparation of budget, preparation of the lean cost and minimizing errors in the process due to lack of information. It is up to the Organization to accept the proposal and deploys it.

Study this theme is extremely valid and of utmost importance, because, in addition to providing a greater insight about the process, bring systematization and alternatives to be considered so that the decisions do not suffer setbacks, as well as providing greater flexibility in the process and in relation to decision making.

REFERENCES

[1]. BAXTER, Mike. Projeto de produto: Guia prático para o design de novos produtos. 2 ed. São Paulo: Edgard Blucher Ltda, 2003. 260 p.

[2]. GOBE, Antonio Carlos; MOREIRA, Júlio César Tavares; PERROTTI, Pietrangelo Pasquale; PEREZ, Maria Clotilde; CARRAMENHA, Paulo Roberto Campana. Gerência de Produtos. São Paulo: Saraiva, 2004. 258 p.

[3]. MACHADO, Marcio Cardoso; TOLEDO, Nilton Nunes. Gestão do processo de desenvolvimento de produtos: Uma abordagem baseada na criação de valor. São Paulo: Atlas, 2008. 147 p.

[4]. MOTTA, Paulo Roberto. Transformação organizacional: A teoria e a prática de inovar. Rio de Janeiro: Qualitymark, 2001.160p.

[5]. MUNDIM, Ana Paula Freitas. Desenvolvimento de produtos e Educação Corporativa. São Paulo: Atlas, 2002. 183 p.

[6]. ROZENFELD, Henrique; FORCELLINI, Fernando Antônio; AMARAL, Daniel Capaldo; TOLEDO, José Carlos; SILVA, Sergio Luis; ALLIPRANDINI, Dário Henrique; SCALICE, Régis Kovacs. Gestão de Desenvolvimento de Produtos: Uma referência para a melhoria do processo. São Paulo: Saraiva, 2006. 542 p.

[7]. SELHORST, Junior. Análise comparativa entre processos de prototipagem rápida na concepção de novos produtos: um estudo de caso para determinação do processo mais indicado. Dissertação de mestrado, Curso de Pós-Graduação em Engenharia de Produção e Sistemas – Centro de Ciências Exatas e de tecnologia, Curitiba: Pontifícia Universidade Católica do Paraná, 2008.

[8]. TROTT, Paul. Gestão da inovação e desenvolvimento de novos produtos. Porto Alegre: Bookman, 2012. 621 p.

Vilson Menegon Bristot. "Product Development Process Management : An Analysis Performed On A Company Branch Metalurgico Located In The South Of Santa Catarina"American Journal of Engineering Research (AJER), vol. 7, no. 5, 2018, pp.225-230.