

PROJECT MANAGEMENT IN THE PRODUCT DEVELOPMENT CYCLE USING LEAN THINKING CONCEPTS

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Abstract. *In this work it is shown the proposal of a management in the project activities system using lean thinking concepts where values are attributed to each activity verifying its impact on the final user. The technology, at a first moment involves high investments as much of organization with private capital, as well as public financing. However, these investments in a variety of products do not reflect high cost and high prices, necessarily. A competitive market became the final user/customer more demanding once the perceived quality is not more a competitive differential, but an intrinsic characteristic of the product. So, the management activities of technological products development are essential to update technologies and analyze risks, simultaneously. This condition can be the product more competitive reducing the "time to market". The role of management project in the design process development can be compared to the manufacturing processes management, using the approach of the lean thinking, which it is attributed values to set of processes or activities inherent to the product development cycle. These values can be economical, functional or/and perceived or be desired by the final user. The definition and specification of perceived value by final user/customer can to reduce activities that does not added value during the information flow but to have influence in the product final cost.*

Keywords: *Project management; value added; lean thinking.*

1. INTRODUCTION

This article aims to critically analyze the paper of the lean thinking in the project management in the product development cycle. The basic problem is: the use of the lean thinking backwards benefits for the projects management in the product development cycle. The analysis of the lean thinking in the process of product development reveals as a new study possibility. The lean thinking has been argued in the scope of the manufacture (the production in itself); however, the lean process has its beginning still in the phase of product development, and is in this area of performance that is intended to develop the discussion. The projects management in the products development also is a relatively new subject and is presented in a sector full of innovations. For the new products development, it has necessity of the presence of the management so that if they can control in efficient way the risks gifts and thus increase the success possibilities. Morgan and Liker (2008) detaches that the lean product development is supported in three systems: qualified staff, tools and technology and processes, and these three systems if unfold in the 13 principles of the Lean System of Product Development. Nowadays, the society is living with constants changes and has permanent necessity of update; it has not more as to only act on the intuition basis. The society changes from industrial age to information age. To survive and to prosper, the organizations need to modify its products and services constantly. The projects are the way by which these innovations are accomplished. How much bigger the change, more innovations and more projects appear (Verzuh, 2000). With the globalization, time and space had lost importance (Probst, 2002). This makes with that each time more individuals and organizations are capable to acquire new knowledge. Each time is more necessary to get the information certain and know to use it with an adequate form. In this context use the projects management in the products development cycle starts to be a competitive differential for the organizations.

2. PROJECT MANAGEMENT IN THE PRODUCT DEVELOPMENT CYCLE

According to Project Management Institute - PMI (2004), the projects management are an integrator enterprises. The integration of the project management demands that each process of the project and the product are

adequately associated and connected to other processes to facilitate coordination. These interactions between processes many times demand compensations between requirements and project objectives. The use of the project management in the product development process makes with that if it can apply its main stages in the product development that are: planning, application, analysis and control. The project life cycle defines the phases that connect the beginning of project to its end.

During this cycle is defined which tasks are essential to the project, which are the deliveries of each one of the phases and the form that must be made, be analyzed, be evaluated and be controlled, who is responsible for each stage and each task, beyond the control forms, evaluation and approval of each one of the phases. Figure 1 shows the sequences of the phases in the project life cycle.

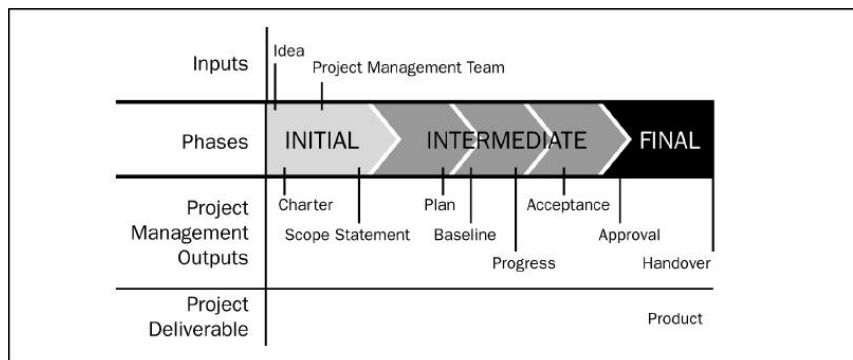


Figure 1: Typical Sequence of Phases in a Project Life Cycle (PMI, 2004)

It must be necessary pay attention to distinguish the project life cycle from product life cycle. Depending on the product type, the project life cycle is part of the product life cycle, as shown in Figure 2.

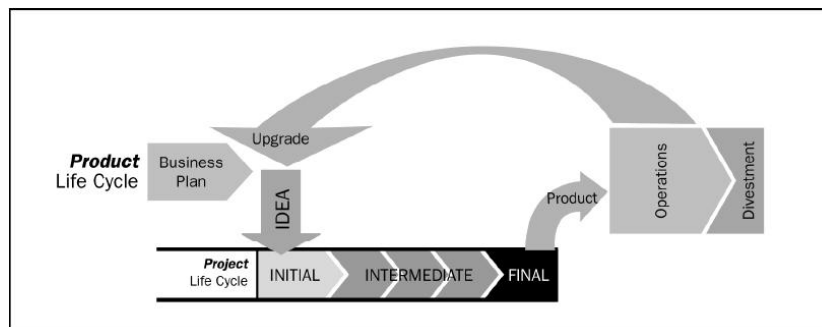


Figure 2: Relationship between the Product and the Project Life Cycles (PMI, 2004).

A point that intended to be analyzed is the use importance of the product development management. In accordance with Kerzner (2006), “applying the principles of the project management to the new products development, a company can produce more articles in lesser time, with inferior costs and potentiality high levels of quality, thus satisfying the customers’ necessities”. Already in this justification it can be noticed that the main concept appears of the lean thinking, that it is to prevent loss, either of time, costs and quality, that defines making more with less, as it can see ahead.

The project management has its paper in the product development. Verzuh (2000) detaches that the product design has the same characteristics of a project. The product design is a project itself, and, therefore, it presents a great chance to apply the project management. The project management to estimate and to optimize the project effect. According to Kerzner (2006) this improvement in the project performance through the management, creates conditions to increase the customers’ confidence, perfecting the relationship. This definition finishes being the base of the products development, which, as Rozenfeld *et al* (2006) “(...) is a process for which an organization transforms information of market chances and possibilities techniques into information for the commercial product manufacture.”

To analyze better the paper of the projects management in the product design process one intends to use the vision of process management, that is used so that the companies reach optimum performance and arrive at the success through interrelated activities. So that if it can reach to this objective, it must be known all the involved in each one process and what each activity adds of value. The “*Grupo de Engenharia e Análise de Valor*” (GAV) of the Federal University of Santa Catarina (UFSC) defines the process as: “process management is the definition, analysis and

continuous improvement of the processes, with the objective to take care of the customers' necessities and expectations".

Processes are jointed of coordinate activities that have objective to produce product or service for one determined customer. The processes must occur of synergic form. Synergy, according to Houaiss Dictionary, is "joint action (...), aiming at to get a better performance of what that one demonstrated separately." The analysis of the lean thinking in the product process development wants to demonstrate that it is capable to lead better reach productivity and effectiveness in the organizations. The efficiency in the process management, as the case of lean thinking, demands evolvment of all the levels. Joining the different talents, adding it the different abilities, styles, cultures and different formations gives a competitive differential that has as goal the success and the accomplishment of the established goal, through the collaborative work is generated.

Below a model of maturity in processes is presented, divided in five levels, attempting against itself for the level of optimized process, in which it is inserted analysis of the lean thinking.

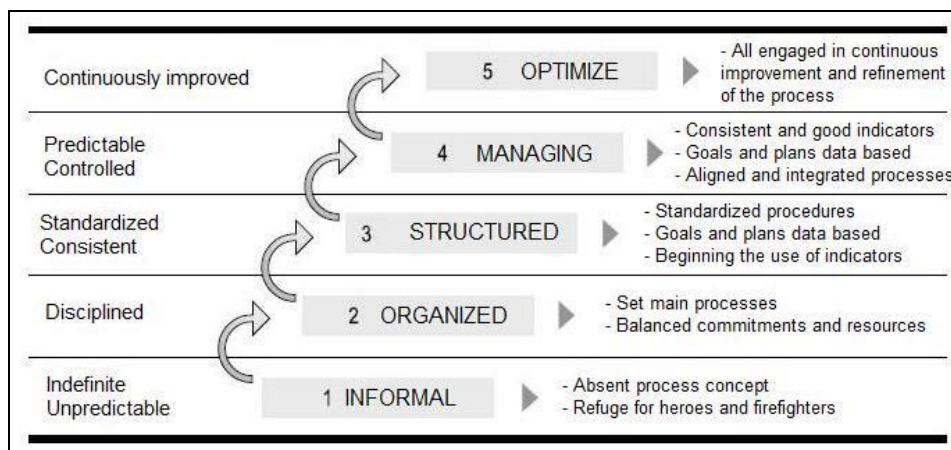


Figure 3: Maturity Process Model. (SIQUEIRA, 2005)

With this becomes necessary to analysis the lean thinking either efficiently applied to the product development, objectifying itself to create products with the specification of value desired for the customers with minimum possible loss. In such a way, areas as knowledge management, innovation, projects methodology, finish becoming distinguishing.

From this scenery and using a critical analysis is proposed the application of the lean thinking in the process management of the product development is a chance to improve this process.

3. THE LEAN THINKING IN THE PRODUCT PROCESS DEVELOPMENT CYCLE

According to Womack and Jones (2004) conceptualization for the lean thinking , "(...) is lean because it is a form to make more with less - little human effort, little equipment, little time and little space - and, at the same time to come more close to offer the customers desire". The lean thinking is an organizational philosophy, of the area of process management, that has as main objective to fight and to prevent loss and this makes with that it has increase of the competitiveness. The lean thinking possess five principles, which are: specify the value with precision, identify the value chain, the flow - to make with that the remaining stages, which create value, flow, pulled production and perfection. Still in according with Womack and Jones (2004), "the lean thinking is a form to specify value, line up in the best sequence the actions that create value, carry through these activities without interruption all time that somebody requests them and carry through them of the best efficient form". Loss indicates problems in the system and finish for adding time and cost to the manufacturing.

Loss in the super production can be found, producing very or advance, it can be of intellectual origin, when an activity that doesn't add value finishes consuming time, or the talent of a person. Also loss can be found in transport systems, supplies above the minimum, waits, either for parts or signoff one-step to give continuity to the production, repairs, and recalls, among others.

It must be remembered that in the analysis of each one of the five cited stages previously it has necessity to look for eliminate the biggest possible number of loss, if it occurs in the manufacture process, in the logistic, at last, in all stages that passes the product, since the definition until the finished product, soon to be it delivers to the customer. Next, can be seen each one of the five stages, aiming at to prevent loss.

The value definition is defined by the customer and fits to the team to take care of in the best form. It is necessary that this definition became better specified so that if can arrive at the customer satisfaction. In this way what it seems to be of interest of a group of customers can not interest to another one. It is transferred then to identify the

product value chain. For Womack and Jones (2004), the value chain is the set of all the specific actions necessary to take a specific product to pass for the three critical management tasks in any business: solution of problems, information management and physical transformation. Figure 4 details these three tasks:

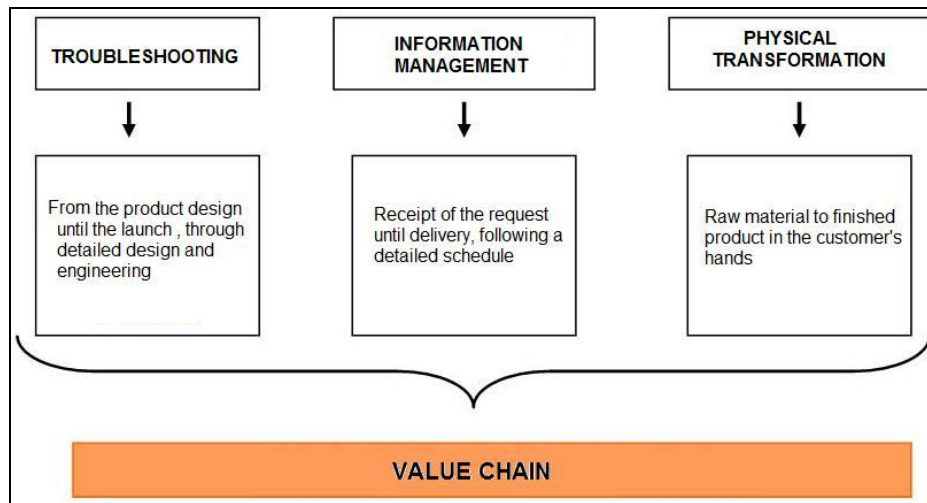


Figure 4: The Value Chain (Adapted: WOMACK and JONES, 2004)

In the identification of the value chain a great amount of loss can be assimilated and at this moment it must be analyzed and be eliminated them.

The next stage is the flow, to make with that the remaining stages flow, focusing the attention in the product and its necessities and not in the organization or equipment. The value flow helps to make with that the process is made systematically and not individually. The fourth step is the pulled production, and this is the main point of the lean thinking. In this stage steady demands are created, making with that the customer pulls the product. Thus the real necessities of the customers are considered, not being pushed to it a product that takes care of it partially. Through the pulled production a continuous flow in the products manufacture creates itself, diminishing itself the open assembly time. Passing for the presented stages, it has reduction of effort, time, space, costs and errors and with this can be offer a product that approaches still more to what the customer really wants, coming to perfection, the fifth and last stage of the lean thinking.

The basic vision of the lean thinking is in establishing focus in each product and its value flow. The product starts to have the central attention of the company and other item, as the proper organization, career plans, among others, pass to be left in according to place. Also it has necessity of specify which activities that really add value to the product and which generate loss in order to increase the value perceived for the customer and to eliminate all loss, optimizing the process. The analysis of the lean thinking in the process management of products development is focused mainly in the value flow, area where it has the creation of much information and generation of knowledge.

According to Machado and Toledo (2008), the information in this phase can be divided in four categories: on the product, managing efforts technician associates to the product, on the project, through the planning of resources, costs, programming, etc., on the processes, informing the form as it will be executed, as a pointer of the direction for the accompaniment of the tasks, and, finally, on the businesses, that relate information of the marketing areas, sales and finances. So, it is the principle of the lean thinking, the value flow in the products process development, that must focus the best form to make with that the information are clear and necessary. In practical of the lean thinking in the products development the information is the main element. The correct identification of value defined by the customer can be the use of the matrix of the quality with approach in the value analysis, the QFD-VA (Quality Function Deployment-Value Analyses), shown in Figure 5 (Silva *et al*, 2004).

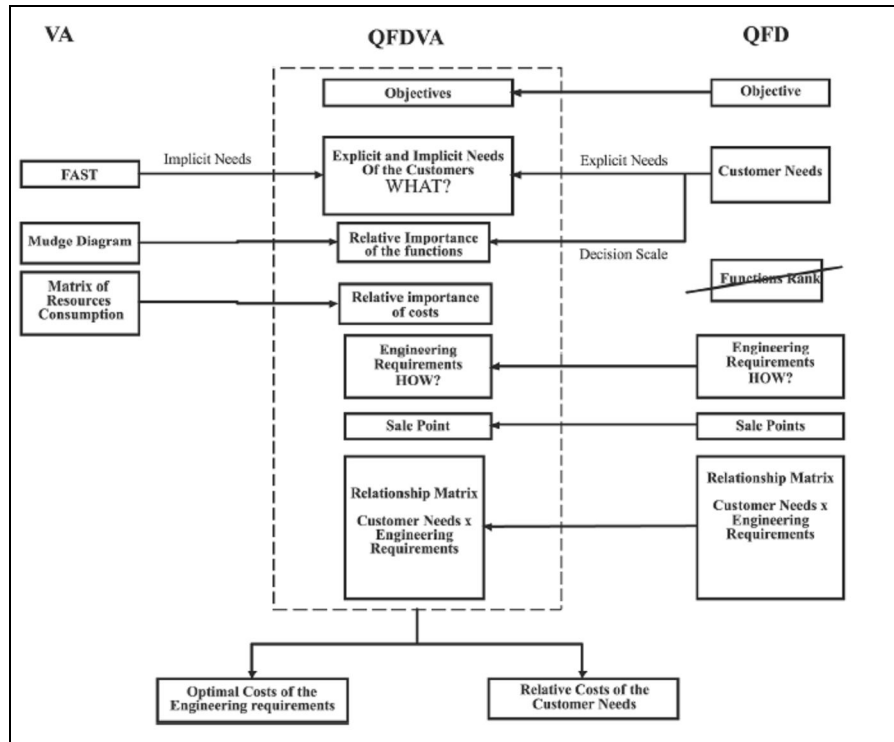


Figure 5: The composition of the QFDVA process (SILVA *et al.*, 2004).

When acting in these two fronts, information valuation and correct value definition, the product design process occurs in optimized way and in the lean thinking parameters, increasing the possibility of success of all projects process. To explain the use of lean thinking, the example used by Silva *et al* (2004) can be leveraged and complemented by seeking to determine which bike is ideal to meet the consumer's needs and desires.

The analysis of the example of developing bikes following the five principles of lean thinking. The first step is to specify the value accurately. This value can be defined through the use of QFDVA proposed by the authors cited earlier. Figure 6 uses the fast diagram to make an initial deployment of one of the requirements desired by the client, to move efficiently. This first principle, the value specification, is the most important because it is the client who will determine the attendance of the real customer needs.

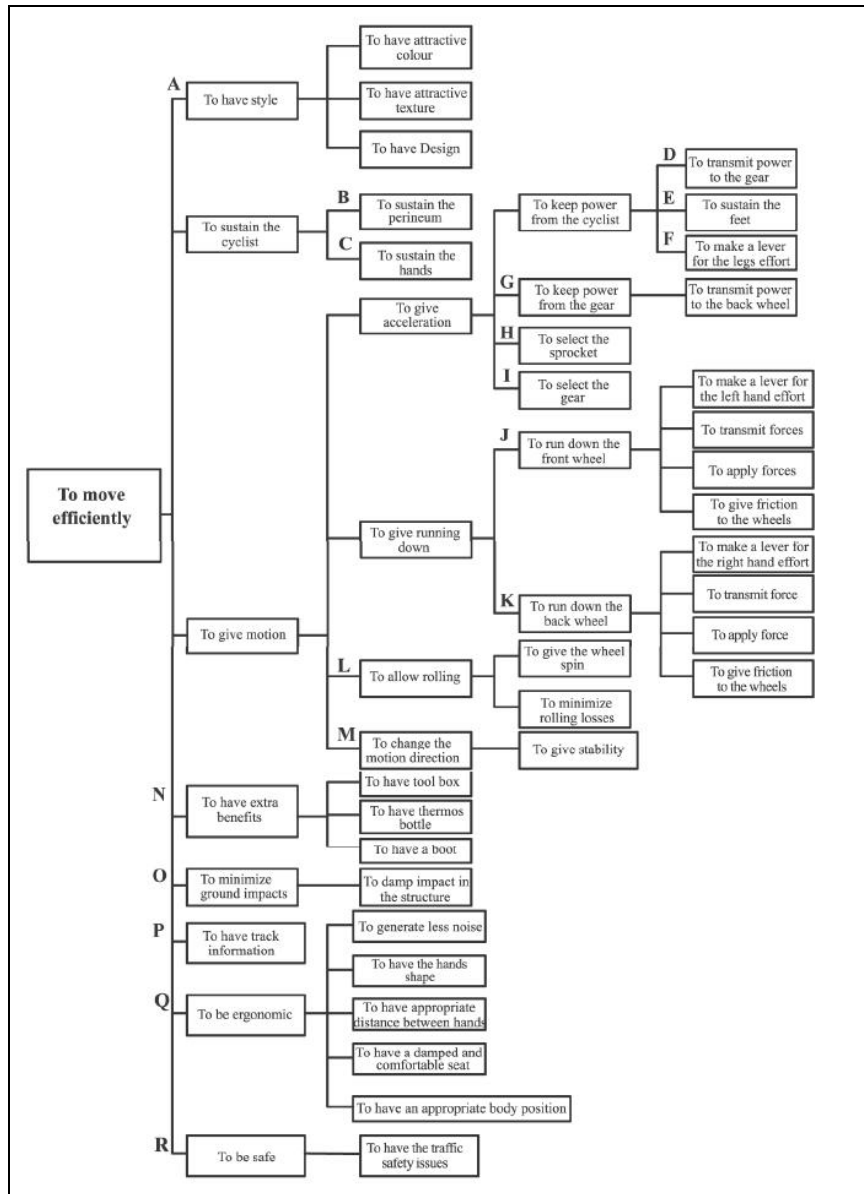


Figure 6: Fast diagram for a bicycle (SILVA *et al.*, 2004).

After this definition there is the need to identify the value chain as the example in Figure 7. At this principle are related to the necessary steps regarding the company to the customer's need is met. Thus it eliminates the steps that add no value to the product. For the example under discussion, a step that could be eliminated is assembly all of the bikes the same way, since, as we shall see, in lean thinking should seek to work with the pull production.

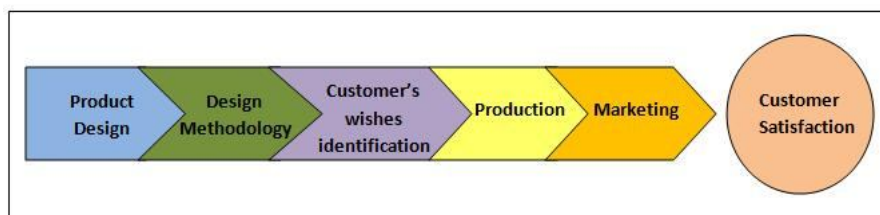


Figure 7: Value Chain Example (Adapted: PORTER, 2009)

Making the steps that really add value to the product flow is the third principle. The flow can be achieved through an efficient project management program, defining all the resources actually required for the design and production of the final product. Project management helps this principle since it is a task that requires planning and coordination assets. The flow can be maintained and effectively coordinated by project management, it is not necessary for production to be pulled, respond to client request (reactive process), contributing to reducing the variability of components, of inventory, lead time, among others. Waiting for client request causes the bike to be produced that is actually requested by the client, without generating an unnecessary inventory of ready products and thus the production is pushed to the client, making it a product he buys is not what he really wanted. The use of pull production causes the satisfaction of client, as the bike desired was handed to him, with all the parameters that he considered important. Acting in the four previous principles becomes possible to achieve the standard of perfection, the fifth principle of lean thinking, implemented all the client requirements.

It should be shown that the use of lean thinking makes in conjunction with the product design methodology and assisted by project management can result in products developed with a focus on customer needs, avoiding the waste of time and resources, both financial as human and material.

4. ACKNOWLEDGEMENTS

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5. RESPONSIBILITY NOTICE

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