

# *Lean Manufacturing Techniques to Improve Project Management*

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**Abstract** — *In today's organizations, project management has become a central way for undertaking several of the company's activities. One of the increasing and most significant concerns with projects is that, projects are behind schedule, over budget and show unsatisfactory performance. In the last decade the manufacturing industry successfully improved quality and productivity, by using the concepts of lean thinking. This project explores the relevance of lean concepts in project management and how lean concepts can improve project management.*

**Key Terms** — *Lean Manufacturing, Lean Project Management, Project Management and Project Manager.*

## **INTRODUCTION**

In today's modern organizations such as services, constructions, manufacturing and others, they often take some of their activities in form of projects. Several of these projects are destined to be delayed, overrun costs, and not deliver on time or within allocated budget, having great effects on the overall business of an organization. Delay in projects means delay in product manufacturing, definitely missing market opportunities, which affects company's position in market.

To address the abovementioned problems, a new perception of project management may lead to new ways that can improve project performance. In the manufacturing environment, for example, improvements in productivity and quality have been made through the implementation of lean manufacturing techniques. It could be interesting to investigate how these techniques can aid a company's project management.

Even though, project management is a field, which is relatively different from manufacturing management, some activities are similar; like product development where creativity is required. It is also connected to more slack and freedom in work activities, which are temporary and unique, and are performed by teams with clearly defined individual roles. There are also other common characteristics between manufacturing and projects for example; both are performed by people, are constrained by limited resources, both, are planned, executed and controlled.

The principles of lean manufacturing are well established and are widely used not only in automotive industry, but also in other industries, and in different contexts. That's why the main purpose of this research is to examine to what extent the techniques related to lean manufacturing are relevant and useful in project management.

## **PROJECT STATEMENT**

In today's organizations, project management is the primary way to undertake some activities. Even in non-project driven organizations, commencing of work activities in the form of projects is a common practice.

Project Management involves ambiguity and uncertainty, but will be interesting to explore the possibilities to implement new approaches focused on improving project management performance. Lean Manufacturing can be applied to knowledge work that is characterized by task uncertainty and ambiguity with positive results. The relevance of lean techniques for project management will be explored in this research work.

## Research Objectives

The objective of this research is to explore the possibilities of using lean manufacturing techniques in project management for improving project productivity.

- Demonstrate how to reduce cycle time in projects.
- More effective utilization of resources.

## Research Contributions

The contributions that this research project will accomplish are the discovery of some Lean Manufacturing Techniques that could be applied to project management. This will result in improvements in the Project Management process. Also, integrating lean thinking in project management can improve project productivity; avoid time and economic losses resulting in overall savings.

## LITERATURE REVIEW

Traditionally, projects had a beginning and an end, and required a timeline, a few resources, and some money. In many cases, projects today are assigned to a senior leader, who's told to make it by a certain date and to use existing resources and budgets. There might be a specific set of deliverables, some discretionary budget and a reasonable time frame. Sometimes companies engage a professional project manager (PM) only during times of crisis or when senior leaders realize that they're in over their heads. Project Management is the planning and organization of an organization's resources in order to move a specific task, event or duty toward completion. Project management typically involves a one-time project rather than an ongoing activity, and resources managed include both human and financial capital [1].

A project manager will help define the goals and objectives of the project, determine when the various project components are to be completed and by whom, and create quality control checks to

ensure that completed components meet a certain standard.

As projects differ from each other, there will be variations in the resources, tools and methods needed to accomplish project activities. However, there are common elements critical to success of any project like, focus, discipline and communication. The model for successful project management requires a disciplined approach to methodically plan tasks, monitor and manage activities and resources, communicate, and track results. Due to the breadth of change required in a lean initiative, a clear understanding of Lean concepts, involvement, support, and commitment are required by all those either directly or indirectly affected by the initiative. The Project lifecycle (see Figure 1) encompasses critical elements necessary to support the success of the project; guidelines exist at each phase in a project [2].



**Figure 1**  
**Project Lifecycle**

As organizations identify opportunities for growth and improvement, successfully managing activities to realize these opportunities is critical for achieving results and benefits. Effective project management starts with the application of key principles and tools in order to increase the likelihood of success of the initiative, regardless of whether the intended improvements are focused on strategy, products, processes, or technology [2].

Effective project management is supported by proven guidelines and principles. These can be applied to any type of project, such as those focused on implementing lean management practices, to those focused on launching new

products, developing new drugs, and even those focused on software development and system's implementation. These and other types of projects, while differing in their objectives, resources, and required activities, all have components common to the definition of 'project' and will benefit from the same effective project management principles. Effective project management becomes more challenging as project complexity increases due to any number of factors such as project design, scope, and reach. The Principles of Lean (see Figure 2) present a further challenge due to its cross-functional involvement and scope [2].

### Lean Principles

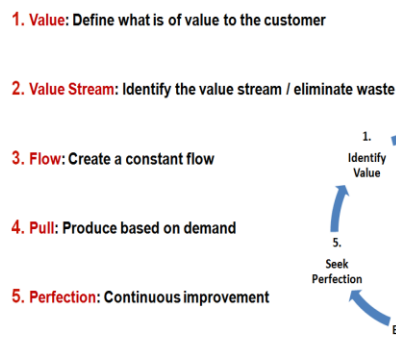


Figure 2  
Lean Principles

## METHODOLOGY

This study is mainly conceptual and exploratory based on a limited empirical foundation, consisting in the analysis of all lean techniques and their possible applicability to project management. The best method identify to be adopted in this study was to review the literature on both; 1) lean thinking and 2) project management and thereafter, investigate the state of the art practices in project management. Thus, it can be classified as conceptual and exploratory research, which tries to find appropriate answers to research questions.

An alternative research design would have been to perform a more in-depth case study method, for instance, of a firm applying lean thinking in project management. This would have provided a

greater insight into the actual lean practices that are used in project management; their advantages and disadvantages. However, the limitations to find a company that can be used as case for this study make this option impossible at this moment. Further, the thesis aims to answer both 'what' and 'how' is related lean thinking to project management. In order to accomplish the aim, it was decided that the analysis of all lean techniques would be an appropriate research design for this study.

After an analysis of all lean techniques, it can be determinate which could be applied to project management and how. Various forms and a format will be created. These forms and format will be created with the purpose of developing some tools that will help the project manager to apply lean techniques to their project managements. Once the literature review is completed and desired empirical data is gathered, a systematic analysis will be performed.

This research has a dual purpose, to wit, exploratory and descriptive. It is exploratory as, so far, there has been little research on integrating lean thinking in project management. This research is intended to develop ideas that can be used further for a more systematic study and will hopefully provide a direction for future research in this area. Furthermore, this thesis provides concepts of Lean Project Management (LPM), referring to different areas related to lean thinking, which establishes an understanding of applying lean in project management. In term of these, research is descriptive as well. However, the exploratory purpose dominates the study.

This project design is based on a qualitative approach. It was considered that qualitative measures would be more useful for analytical reasoning in order to arrive at the results. Furthermore, the qualitative approach was chosen because research is based on evaluating, comparing and linking the concepts of lean thinking and project management to develop a new methodology.

Science is fundamentally a rational activity and is based on logical reasoning. There are two distinct logical systems, which are considered important for scientific research, inductive logic and deductive logic. In induction, one starts from observed data and develops a generalization, which explains the relationships between the objects observed. On the other hand, in deductive reasoning one starts from some general theory and applies it to a particular instance. This project is based on deductive reasoning, starting from concepts of lean and then applying those concepts to project management.

## **RESULTS AND DISCUSSION**

Since this project is primarily conceptual and exploratory, this chapter presents a theoretical analysis of the concepts of lean against concepts of project management. Within the concept of "specified value", we can see that if we add activities that provide value to the project these activities will be ones that the customer is willing to pay and likewise add importance and/or relevance to the project. Also, the eliminating activities that are unnecessary turn the project in one that we can save resources time and improve efficiency of the project. Identify activities that add value act in the whole project including identifying customer requirements, sorting and validating the functions and capabilities that are value to the customer. These activities that add value to the project eventually crops the scope of the project. We can see that several authors within the project management body of knowledge establish that reducing the project scope to those set of activities that are of value to customer add value in the long term to the project. In a comparative manner it differs from product value analysis, expected monetary value analysis and cost based scope management suggested in PMBOK Guide [1]. A value specification of the project reduces the project scope to a set of those activities that are essential for customer, reducing time, increasing the project effectiveness [3].

The second concept is to "Identify the Value Stream", there is a tool by the name of "value stream mapping" (VSM) that facilitates identification of value adding and non value adding activities along the value stream. VSM is a method to create a picture of the project process; whole set of activities, starting from planning, execution and project delivering. The goal of VSM is to identify the flow information, materials and process, helps to visualize the process in order to eliminate activities in a more efficient way and eliminate non-value adding time. Both is different from network diagrams used on project management because use different symbols and steps. Project Management network diagrams are use to measure time and resources versus VSM that is useful for identifying waste and if can be properly applied in projects. However, the VSM concept focuses on the whole organization different in projects [4].

In the Manufacturing World the "Flow" refers to the flow of materials and the obstacles are in form of queues and batches. Projects are different and flow in projects can be in many different forms; in projects flow can be the flow of information, data, specifications or instructions. These terms of a project concept the flow is applicable to the project process and will be a flow as long as an obstacle affects the flow. There is always a flow in project as long as there are no obstacles that interfere with the process. The continuity of work in a project is achieved by rationalizing the project processor adopting overlapping approach or eliminating obstacles using rapid decision-making [3]. The eliminations of obstacles create flow in project process. This increases the chance to complete the project in time while using fewer resources, thus achieving efficiency and timely delivery. By increasing the efficiency demonstrate good management and excellence project performance.

In manufacturing the concept of "Pull" have two elements; the first is to let the customer pull the product from the company instead of pushing the product to the customer and the second is that the application of this concept goes into each activity

upstream to produce or deliver material, product or service until the downstream customer demands it. Traditional project scheduling techniques, CPM and PERT, represent a push system. This intends that every activity is pushed by its predecessor. In this push approach the output and end time of preceding activity determines the start of the next activity [1]. The first element helps in a project because its start a project by the customer demands. Because the project will start to produce actually what the customer required, this improves project effectiveness. The second element of pull focus in creating pull between project activities, which eliminates the gaps which eventually affects both effectiveness and efficiency of the project.

The final concept in lean is “Perfection” that is continuously improving the process. Inside this concept there is a discipline by the name of Quality Management, in the PMBOK Guide, provides a coverage of the comprehensive topic of Total Quality Management (TQM); mentioned that continuous improvement provides iterative means for improving quality of process [1]. There are two elements of continuous improvement, standardization and visualization of process. The first element is to standardize the process, in manufacturing the process improvements happened in cycles the repetition makes possible to improve the process on continuous basis, this is also possible because productions lines process remains the same for long periods of time. In projects is different the process is iterative not that repetitive, but once a project is standardized it is possible to achieve continuously improvements. The second element of continuously improvements “visualization” is to graphically visualize the process. Toyota continuously improve its process by making process transparent to employees, all employees can see everything [3]. This visualization of process is introduced as one of organic integration plan, in which argues to develop a shared understanding within the project; an organic integration plan visualizes the process and logical steps. These kinds of visualization of process improve the individual participating in improving

project process [3]. The concept of continuous process improvement in projects can be achieved by standardization of process and by making a shared understanding of process [5]. This concept means continuously repeating the first four concepts; these concepts interact with each other leading toward improvements by eliminating waste, increasing effectiveness by the elimination of delays thus increasing efficiency.

## CONCLUSIONS

The results of this study indicate that all concepts of lean thinking are relevant to Project Management in specific kinds of projects. A possible explanation for this might be that projects are different from each other and some of the projects, are very much similar to production processes. This makes many of the production concepts relevant in such projects. Therefore, the kind of project determines the relevance of lean concepts in Project Management. The lean concepts, therefore, need to be interpreted with caution for their use in Project Management.

Using the concepts of lean thinking to determine their relevance for project management, it is interesting to note that all five concepts of lean are relevant to Project Management in specific projects. The activities in projects are similar as well as different from production activities; this is because of the different kinds of projects. The use of some concepts seems to be a challenge for their use in Project Management, whereas, some concepts of lean are found to be similar to concepts from within the Project Management body of knowledge. It can be concluded that projects with a production nature are very suitable for the introduction of lean concepts. At the same time some of the concepts have to be interpreted with caution when they are used in project management.

The problem with projects is that, projects are behind schedule, over budget and do not deliver the required quality. The purpose of study was not exactly to resolve these problems. However, the purpose was to explore the possibilities of

integrating lean and project management to identify if some of the problems of projects can be resolved by using lean concepts. The findings of research enhanced our understanding of lean and Project Management practices, and design the management activities to apply the lean concepts in a project organization.

Therefore, it seems that, application of lean ideas in projects can help on projects. The lean concepts can reduce the use of resources and time, which are two measures of project success. Lean is a way of thinking, unless employees adopt the new way of thinking lean will not be attained. There is, therefore, a definite need to make sure that all employees are engaged and involved in the process of introducing lean. Furthermore, it is important to be aware of the fact that large investment of time, effort and resources will have to be made in order to be successfully being able to introduce and apply the lean concepts.

This study set out with the aim of exploring the possibilities to integrate lean concepts in Project Management, and how the concepts of lean can improve the productivity of projects. To really understand the true relevance at specific level, more specific projects have to be studied. Further quantitative investigations are needed to estimate the actual effect of lean concepts on organizational productivity.

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