

# A Comparison Between Lean Implementation and Critical Chain Management

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**Abstract**—Lean is managed by visual controls that warn and reflect the performance of any process in a firm and the value that is making. Visual controls that can help decision makers or even improvement seekers; to optimize their decisions based on real inputs from those controls and measures which are supposed to be managed with discipline and precision to lead to the targeted “lean” culture and what makes the culture cultivating throughout the process of getting lean is the “reward system” that is complementing the lean culture to sustain the cycle of improvement. However, many tools have been generated from lean systems as a continuous improvement for the lean itself by many experts and scientists. However, one of those outcome tools is the Theory of Constraints (TOC). TOC is enclosing the common idiom "A chain is no stronger than its weakest link" as a new management paradigm. This means that TOC is always looks at the weakest link in the chain, and by extract the max out of that constraint to improve the delivery of that chain. However, TOC has been developing over years and producing some operations management initiatives such as the Critical Chain Project Management (CCPM).

**Index Terms**— Lean, theory of constraints, critical chain project management

## 1 INTRODUCTION

The lean idea is about reducing waste represented in time and cost. This has been even more developed further to draw a culture of creating value. In addition, the lean spreads to always seek for improvement at any level and at any point of time. It goes to transportation, inventory and storing, production, scheduling, quality controlling, waiting and any process that leads to the business chain of creating value.

Lean is managed by visual controls that warn and reflect the performance of any process in a firm and the value that is making. Visual controls that can help decision makers or even improvement seekers; to optimize their decisions based on real inputs from those controls and measures which are supposed to be managed with discipline and precision to lead to the targeted “lean” culture and what makes the culture cultivating throughout the process of getting lean is the “reward system” that is complementing the lean culture to sustain the cycle of improvement.

However, many tools have been generated from lean systems as a continuous improvement for the lean itself by many experts and scientists. However, one of those outcome tools is the Theory of Constraints (TOC). TOC is enclosing the common idiom "A chain is no stronger than its weakest link" as a new management paradigm. This means that TOC is always looks at the weakest link in the chain, and by extract the max out of that constraint to improve the delivery of that chain. However, TOC has been developing over years and producing some operations management initiatives such as the Critical Chain Project Management (CCPM).

CCPM is mainly known for managing projects through some new techniques and deviations from the other project management tools, for example, Critical Path Method (CPM) and Project Evaluation and Reviewing Technique (PERT). CCPM goes to “good is enough” solution instead of seeking for optimality. However, CCPM uses buffers to monitor the performance of a

project progress instead tracing schedule timings and deadlines. In CCPM, the consumption of buffers is the key indicator to judge on the health of a project, which is totally different approach from other project management approaches.

## 2 ELEMENTS OF LEAN IMPLEMENTATION

The lean implementation starts with a discipline and willingness from management cascading down to the first line worker. After having such desire to go lean, it is very essential to know where does the firm stand, and that by visual controls which help in the future of the company for performance monitoring and improvement. After that, the future desired system has to be determined in line with preparation for the infrastructure required to acquire such system. Following that is the sorting of priorities and precedents that have to be addressed throughout the implementation process. And for such conversion to lean systems; checkpoints and milestones have to be determined for the maximization of the project control.

## 3 CCPM AND TOC ELEMENTS OF IMPLEMENTATION

Both CCPM and TOC are concentrating more into on the micro elements for a specific process. For example, TOC implementation has to be done upon the configuration of system's constraints and planning to extract the most out of the constraint to leverage a potential improvement for the organization. On the other hand, CCPM with regards to Goldratt's Strategy & Tactic (S&T) implementation guide is enclosed by 3 basic elements:

1. Build
2. Capitalize
3. Sustain

The implementation starts with a vision for the project to achieve and a full breakdown for the above three building blocks for the project. It includes the design for the project network and the time durations for each task including buffer sizing for each of those tasks. It goes also to how the execution will start and how it will end manifesting the owners and the reporters of the project.

## 5 COMPARISON BETWEEN LEAN MANUFACTURING, CCPM AND TOC

While CCPM is against assigning more than one task to a given resource in the firm at a given time; then, the utilization of that resource is not optimal. And that could be due to the principal philosophy of CCPM of "good is enough". However, a study had been conducted by McCollum and Sherman in 1991 for around 64 tech firms revealing that matrix organizational structure for multitasking of resources (i.e. R&D personnel) have such a positive impact on two critical indicators return on investment (ROI) and sales growth, which is against the CCPM approach for resources management.

However, the sum of buffers can reflect the completion of specific processes not a complete process, where which contradicts with the lean perspective of the whole picture of creating value throughout the journey. In addition, dealing with uncertainties in CCPM by estimating buffer with one third of the task duration does contradict with the lean concepts of eliminating waste, where such surplus or shortage in the buffer can lead project out shootings and deviations.

In contrast, which is essential, lean does deal with systems and a larger landscape for improvement, whereas CCPM can fit for managing project regardless of what is the value of tasks and jobs being done under that project. Lean is more into a room for improvement whereas CCPM more into a tool to get a specific goal done (i.e. time completion and duration savings).

## 6 COMPARISON BASED ON APPLICABILITY

In 2009, a mega project was taking place at the Civil Aviation in Saudi Arabia. It was about corporatize or privatize the whole organization starting with business units like air navigation services and all airports. The project was designed to have a Project Management Office (PMO) to deliver on time deliverables. However, in such a project, the lean management will more favorable to manage this conversion instead of adapting CCPM. And this very obvious because of the redesign and reengineer of the whole process of making the business works. The Business Process Reengineering (BPR) was taking the lead in making this conversion along with Balanced Scorecard to monitor the progress of goals achievement. Moreover, due to the different scenarios and regulations changes for corporatization set up, a plenty of top management decisions were fluctuating around the project, which makes it very difficult for the CCPM to manage such variability.

This year, a fast food chain of restaurants was looking for utilization enhancement for its workers inside the restaurants. However, a Linear Programming (LP) model was developed to

maximize the utilizations along with method and time study conducted to achieve the desirable targets of utilizations.

In contrast, a factory for manufacturing trucks was working on a project to determine the Standard Time (ST) for producing one unit of truck named (T28). And the finding was that it takes 133 hours of labor and machine working to produce one ready to sell truck. And that figure was not achievable all the time.

However, CCPM can make tremendous improvements to manage the project of producing the T28 truck within time limits by adding such as feeding and resource buffers. Moreover, one of the bottlenecks to the SD was the multitasking of resources, which can very compatible with CCPM implementation.

## 8 DISCUSSION

It can be concluded that lean management does deal with creating value over the entire processes of a given organization, whereas CCPM and TOC is more focused on how to manage time durations and uncertainty of projects. However, it has to be taken into account that the uncertainties of project durations and on time deliveries are originated from some sort of inadequate management practices, which is not covered by the CCPM and TOC approaches.

In contrast, lean management does articulate around the discipline of the people as well as the stability of the processes of the organization. However, lean implementation will have a greater impact on the organization as whole whereas the CCPM and TOC can have distinguishing and remarkable outcomes for tasks completion and project health monitoring.

## REFERENCES

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