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LEAN

PROJECT MANAGEMENT PAPER

BY

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Introduction

This paper explores the principle of Lean Manufacturing as applied to project management processes. This will be an introduction to the advantages of applying Lean tools and techniques to Projects. It is time for the world of projects to reap the same kind of benefits that Lean has achieved for manufacturing - maximize value and minimize waste.

Objectives

Proper use of Lean techniques will result in cutting waste in your projects, producing greater customer satisfaction and improved profit margin. This will be accomplished by examining how companies like Toyota and Motorola achieved excellence through the Lean methodology.

The goal of this paper is to provide participants with an understanding of how using Lean principles can help ensure project success. The objectives are:

- Identify the five principles of Lean
- Discover how Lean principles can be applied to project management
- Determine the various kinds of waste that exist in projects

Issues

How important is time and money for a project manager? Wouldn't it be nice to wave your wand and bring your schedule and budget back in line?

A Lean Project Management toolbox might very well be the answer. Numerous surveys and studies have documented that nearly half of all projects are behind schedule and/or over budget. While the Lean Project Management toolbox is highly valuable, it is not a magic wand. Rather, it requires a disciplined approach to examining all the activities throughout the entire project life cycle.

Only a thorough process analysis will identify how the process is actually handled and identify inefficiencies. Too often people think that the way they have done it in the past is the best way to conduct the process. Understanding each process step will identify waste and non-value added process steps, which have become an accepted and unquestioned part of the process over time.

Lean Principles

Lean is a business philosophy, not just a tool set or method for improvement. This business philosophy was derived from Toyota experiences and in particular from its Toyota Production System (TPS). The focus is on reducing waste in all business processes. The result is reduction of cost and lead-time as well as an increase in quality.

Lean Manufacturing – Toyota Production System

Following the 1973 energy crisis, Toyota was the only Japanese firm resisting by working efficiently and effectively. The company managed to overcome this crisis by deploying a culture of empowerment. Toyota employees were embarked in a continuous improvement journey and were working to drive inefficiencies out of work processes. Results are reduction of manufacturing lead-time and costs as well as improving quality and customer satisfaction.

This is a study of the automobile industry (Womack, J. P., Jones, D. T. & Roos, D., 1990) that introduced this business philosophy lean production for the first time to the western world. The Toyota success story base waste elimination has since kept all industries enthusiast about the lean approach.

It was also a breakthrough step from mass production to lean production, from a push system to a pull system.

Lean Manufacturing Benefits

“Lean manufacturing uses less of everything compared with mass production - half the human effort in the factory, half the manufacturing floor space, half the investment in tools, half the engineering hours to develop a new product in half the time. Also it requires keeping far less than half the needed inventory on site and results in fewer defects.” (Womack, et al., 1990. p. 256)

The typical short-term improvements are:

90% Inventory reduction

90% Lead-time reduction

35% Productivity/Capacity increase

15% Quality improvement

60% Floor space reduction

20% Cost reduction

10% Value added/person

25% Improved profit margins

5% Overall effective efficiency

Principles of Lean Thinking

Over the years, Womack and Jones refined their strategy and published in 1996 Lean Thinking: Banish Waste and Create Wealth in Your Corporation. They provide in this book a set of management principles, tools, and best practices designed to identify and eliminate waste in

work processes and increase efficiency. The goal is to help organizations achieve operational excellence.

To be Lean is to provide what is needed, when it is needed, with the minimum amount of materials, equipment, labour, and space.

The book Lean Thinking introduced five core principles:

1. Specify value in the eyes of the customer

The first lean principle is to specify value. Womack and Jones (1996) define value of a product or service as “a capability provided to a customer at the right time at an appropriate price, as defined in each case by the customer.” (Womack & Jones, 1996, p. 353) Value is stated in the customer's word. The challenge here is to focus on what the customer is willing to pay.

2. Identify the value stream for each product

A value stream includes “all the actions, both value added and non-value added, currently required to bring a product from raw material to the arms of the customer or through the design flow from concept to launch.” (Morgan, 2002). First we need to create a value stream map that reflects the current state of the process being treated. This map is then analyzed for waste and value creation, and a future-state map is created, which represents how the process could and should operate.

We generate then an improvement plan, which will enable the transformation from the current state to the future state.

Rother and Shook (1999) in their Learning to See have developed a powerful technique to map value stream which facilitate the identification of wastes and allow process improvement. A sample of a Learning to See map is shown below.

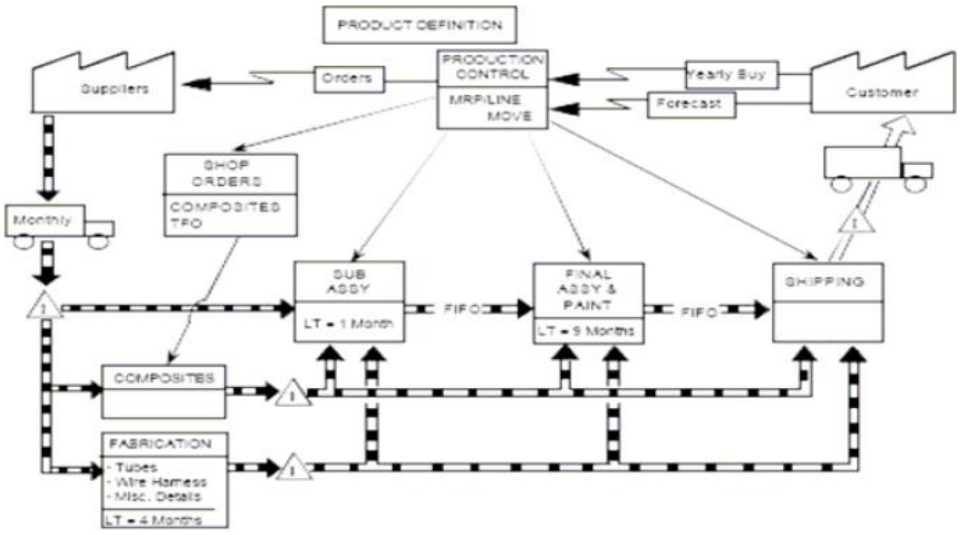


Figure 1. A Value stream map for a product.

3. Make value flow by eliminating waste

Once the value is defined and the value stream is identified, the step here is to create continuous flow by eliminating backflows, scrap, rework and interruptions. No stoppages, no waste is the central tenet here. In analyzing value streams, work will fall into one of three types:

- Value-Added Work: Those works are essential changes to product/service. You would look at maximizing this category as there are providing customer value (Form, Fit, Function).
- Value-Enabling Work: Value-Enabling Work is a category that has potential for elimination in the future (with identified improvements) but can't be eliminated immediately. There are necessary to run the current process. Technology, environment, culture require these activities. You would look at minimizing this category of work.
- Non Value-Added Work: Non Value-Added Work can usually be eliminated quickly and is not dependent on improvement of other areas. This is the work nobody needs and it is pure waste. You would look at eliminating this category of work.

All of the waste (“pure” or “necessary”) in a process can be classified as one of the following 7 types:

- Over Production: Producing more than is needed before it is needed
- Waiting: Any non-work time waiting for approval, supplies, parts, etc.
- Transportation: Wasted effort to transport materials, parts, or finished goods into or out of storage or between processes
- Over Processing: Doing more work than is necessary (customer requirements) or double work
- Inventory: Maintaining excess inventory of raw materials, parts in process or finished goods
- Motion: Any wasted motion to pick up parts or stack parts, also wasted walking
- Defects: Repair or rework

4. Let the customer pull the flow

The challenge here is to avoid delivering value before the customer request it. Also you should not provide to the customer more than the agreed initial scope. In manufacturing, we let the customer pulling the flow by means of a Kanban system. Kanban allows the implementation of a just-in-time system. It uses cards to signal the need for an item by triggering the movement, production, or supply of a unit.

5. Continuously improve in the pursuit of perfection.

The final step is pursuing perfection which would lead the transformation to a lean culture. The pursuit of perfection implies process improvement is endless. We should constantly question the value of all activities. Obviously, we would certainly not achieve perfection, but we must constantly strive to get closer.

Common Causes of Project Failure

Real Life

Project Manager's world is about focusing on the product, focusing on the team, keeping the customer happy. Project managers face here a serious challenge. In addition, they have to deal with a matrix organization, with people that they don't have power on.

Project management processes and the lean six sigma tools kit would certainly help project managers become more efficient by focusing on value added activities and limiting processes variation. In real life, project managers overlooked the following:

- Establish real Customer Value:
- Set up a scope baseline control to avoid our baseline to creep.
- Build a communication plan to streamline the information flow
- Assess stakeholder needs and get internal stakeholder commitment
- Define Project Value Stream

When those previous factors get overlooked then project wastes start building. What happen if we are not collocated with our customer? Then it could be really difficult to establish real customer value. If we allow our customer to redirect our project team member then we would end up with scope creep.

Normally, our project management plan should describe the project value stream. The Work Breakdown Structure would decompose end deliverables into value-added work package and value-enabling work package. The precedence diagram network would make the value flow. First it is recommended to have an unconstraint approach. The project manager would then negotiate with the customer to which extent planned milestones could be pulled but customer target milestones. If we accept up front customer's constraints without any proper practical and logical planning effort, we would then certainly start building wastes and increase cost.

We have a good project management plan so why are we in trouble? We have to re-plan the project and finally we face schedule and budget overruns. Let's discover now how Lean principles can be applied to project management processes.

Current State of Project Management Value Stream

Value

We specify value in project management by identifying objectives, deliverables and requirements. We define also here acceptance criteria. Value or end result of the project is what the customer is truly purchasing. It is stated in the customer's words and comes directly from the customer. Initial requirement may not be clear at first, but must be established through close customer contact and establishing a good working relationship. A statement of work or a requirement document is not the end state, but just one of the items that makes up customer value. If value statements are in conflict, the project manager must work with the customer to resolve that conflict. To avoid building up wastes from the beginning of the project, the project manager must therefore establish close client relationship and good communication.

Value Stream / Flow

Value Stream is a critical area for the project manager. Many of the “things” that take place in the project may very well be outside their span of control, especially in a strong matrix organization. The current state project management value stream could be mapped and analyzed in order to eliminate waste in processes, make the remaining value added flow and move project management processes towards the future value stream state. The future state would show short and rational response to customer expectations for new products or services and change requests.

By analogy to the physical material that flows through the manufacturing process, we can assume that it is information that flows through project management processes.

As the information flows through this process, project management activities performed add value to the information. It would transform initiating inputs data into deliverables such as scope statement, project management plan, risk register, etc.

We would inevitably also build wastes depending of the level of accuracy of initial product scope and business data. If we apply the seven manufacturing waste categories to information, we would end up with the following table:

	Wastes	**Description**

	Transportation	Communication failure in between processes, multiple & complex sources
	Inventory	Excessive information, inadequate configuration management, complex retrieval system, work in progress
	Over Processing	Scope creep, overtime unplanned, excessive approvals, resources overloaded, excessive reviews, hand-offs, producing intermediate deliverables, too many iterations, unnecessary data conversions, excessive verification
	Defects	Rework, poor estimation, conversion errors, inaccurate information, inappropriate design verification, unclear acceptance criteria
	Motion	Searching for information, required manual intervention, lack of direct access, no collocation
	Waiting	Information pushed too early, information unavailable, no work being done, stop & go activities
	Over Production	Signoffs, Too many details, unnecessary information, redundant activities, over-dissemination, pushing rather than pulling information

In particular for project management processes, unplanned overtime waste can come from an uncontrolled scope change or also called scope creep. This is the consequence of adding new functionalities without assessing the impact on the project objectives and without getting a formal approval from the steering committee and/or the customer. We can imagine situation where the customer is bypassing the project manager and addressing scope change requests to project team members ending into scope creep. To avoid such a waste, the project manager must

manage customer's intimacy. Possibly, an extreme improvement would be that the project manager collocates with his customer.

Additional inspections waste would improve the performance or the end result but not the process delivering the result.

Continuously eliminating those wastes are at the heart of adopting a Lean Project Management approach. Project managers need to learn to see them by putting together a value stream map such as the one below.

Figure 2. Future Lean State of the Project Value Stream

Flow

The ideal flow is to have the product or service move through the value steam without interruption. You should remember to begin from the end of the value stream.

The Lean Aerospace Initiative (LAI) suggest factors to apply to a product development value stream maps to move them towards a lean state. Those factors are listed hereafter and could be apply to a project management value stream:

1. Remove redundancy, simplify, and standardize
2. Create continuous flow of information
3. Minimize information handoffs
4. Balance reviews and responsibility
5. Improve communication systems

6. Implement integrated product and process development
7. Maximize concurrent processing

By getting into this lean state, the organization would improve its project management organizational maturity by eliminating the wastes identified in table N°°° while doing due diligence regarding planning and controlling value-enabling work.

Pull

By adding out-of-scope functionalities, you can expect that it will negatively impact your project triple constraint. If you make more work than required at a certain time, it will be pilled in waiting to be expedited to the next step. You should also avoid here to execute project management activities in a batch. Indeed, if there is any product change request then you would end up with obsolescence and therefore waste.

Perfection

Senior management support is critical here. They must set the standard and lead the transformation to a Lean culture. Middle management and project managers must constantly question the value of all activities, asking questions like why are we doing this, is this signature really necessary, etc.

People essential to create a lean culture

People are the keystone of any continuous improvement initiative. To detect the problems and wastes is one necessary thing, but it is not sufficient to improve the performance of the organization. For each dysfunction, a solution needs to be implemented. This second stage is the most complex one because it mainly rests on the human capacity to create and innovate.

Whatever the improvement required, the capacity to mobilize and involve personnel in this action is fundamental. The transition to a lean organization requires a change of culture and from all a new way of thinking.

In the context of project management, the project manager needs to involve his project team in planning activities.

They know that anyone else the work content and the constraints.

This teambuilding approach would certainly prevent the creation of waste.

If the project manager was to force its project team to commit to milestones fixed by the customer, we could expect to have rework, low moral, and high employees' turnover.

Empowering employees is also crucial in developing and cultivating a human-friendly and supportive environment.

Conclusion

We could wonder to which extent a Lean Project Management tool box could help us.

Well, first you need to perceive your project as a value stream. Value stream mapping can be an important tool for project management processes improvement. Then you need to ensure that the value is specified from the customer point of view. Project managers must also address those wastes by founding the best possible environment for its project team members. He will have to involve functional managers and to sensitize them so to eliminate wastes and to ensure project success. Finally, the project manager must manage customer's intimacy. Possibly, an extreme improvement would be that the project manager collocates with his customer.

Therefore I advocate the following roadmap:

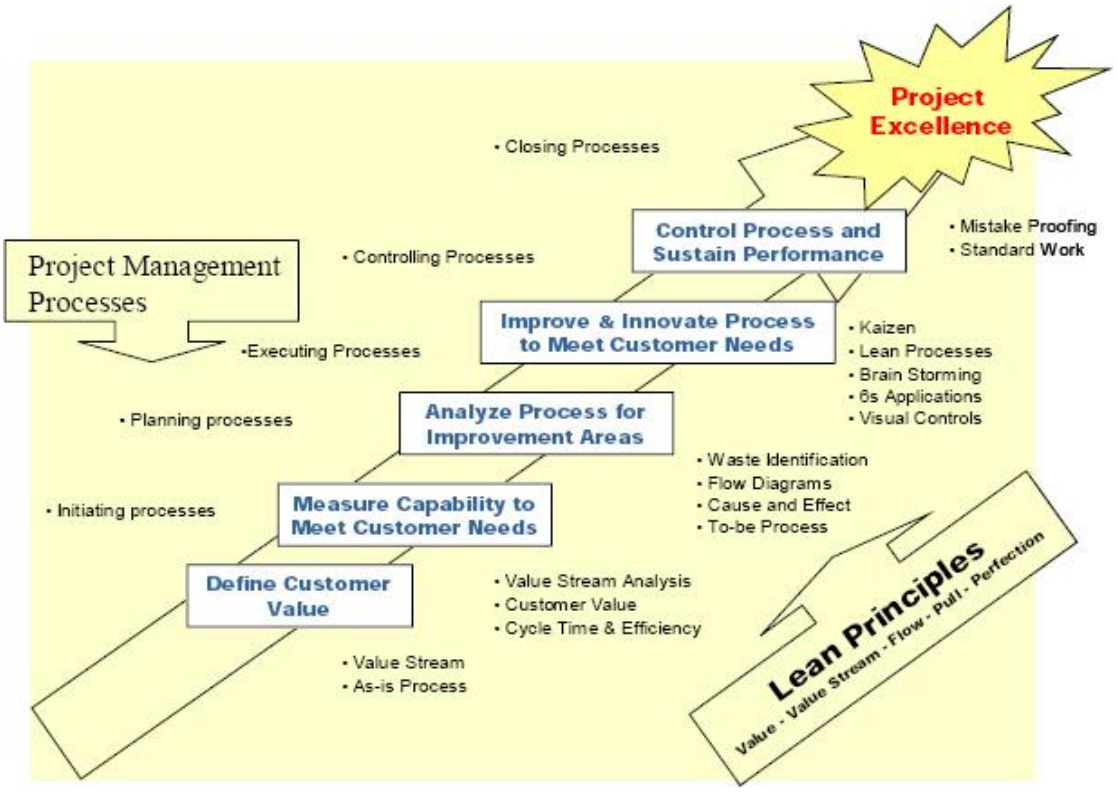
- Establish your Project Value Stream
- Value from Customer's perspective
- Eliminate every waste possible
- Work to develop Customer loyalty

Lean PM Tool Box

The flowchart below illustrate a possible Lean Project Managent tool box. It reconciles the project management process group model based on the PMBOK framework with the Lean principles described in this paper. One could consider here Lean and Six Sigma principles as a common methodology to reach excellence in projects. We will have project management processes and those must be carried out with a certain level of excellence. But at the same time, we need to deploy Lean principles to early define the value in the customer's word.

One would expect to see project managers collaborating functional managers to determine and measure capabilities to meet customer requirements. Value added and value-enabling activities would flow triggered but customers need.

Continuous improvement of project management processes will ensure that you maintain an acceptable level of performance. Ultimately, this will lead to project excellence.



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