THINK INDIA JOURNAL

ISSN:0971-1260

Vol-22-Issue-10-November-2019

Productivity Improvement Through Lean Adoption In CMMI Appraised IT Services Organization In Bangalore

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Abstract-Despite continued improvement in quality, CMMI-appraised organizations have faced challenges over the past few years despite regard to improving turnaround time. This is due primarily to the changing customer needs and ever-evolving nature of the market. The goal of this article is to provide a methodical approach to optimizing turnaround time and enhancing consumer business value through Lean Transformation. Lean transformation focuses on approaches at the organizational level that try to change the conventional mentality of software development and maintenance practices to adapt to the Agile way of working. In contrast, Lean Management approaches are attempting to produce easily shippable goods on schedule with increased business value and appropriate quality and quantity. Lean adoption has gained increasing prominence in IT organizations since the benefits were realized. A case study from a CMMI appraised IT services organization in Bangalore was considered with a focus on productivity enhancement by Lean transformation.

Introduction-

More and more IT companies have begun the process of Lean Transformation in recent years. Organizations have recognized the need to rapidly implement the Lean way of operating Lean transformation is a method of turning the organization's structure and culture into Agile. It's all about people's radical change of mindset. Methods of Iterative and Incremental design began with evolutionary project management as early as 1957. The development of adaptive software emerged in the early 1970s.Seventeen software developers gathered in 2001 to discuss the principles for light weight design and published the Manifesto for Agile Software Development together. In 2011, the Agile Alliance produced the Guide to Agile Techniques (re-named Agile Glossary in 2016). This is an open source guide to the meanings of various practices, positions, and ceremonies related to Agile. It also addresses the different elements, inferences, definitions and practitioners ' observations principles around Lean cultures.

I. Lean Transformation – the Agile way

"Lean Transformation" is the practice of refactoring the enterprise to unlearn the conventional way of working and embrace the Lean way of building code socially. Ultimately, it's all about working as a team, creating backlogs, and delivering easily shippable goods of business value to customers on a regular basis. This tests quality rather than efficiency. The Lean Transformation strategies are initiated from the point of knowing where we are now to where we want to go. We need to remember two key aspects when planning the transition strategies. Next, we need to have a clear understanding of the core

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values of the organization.We must be consistent about our ability to accept changes. The more we design a system, the harder it becomes to change in order to become more predictable. Meanwhile, the higher the adaptability design, the less predictable the system becomes. The second aspect to be addressed is the customer's business interest. Organizations should be clear on goals when planning the transition plan. Specific understanding is required as to whether organizations should concentrate on building consumer business value or satisfying commitment. In February 2001, numerous delegates produced the Manifesto for Lean Software Development. There are 4 Agile Standards and 12 Agile Principles.

1) *The Agile Values*

   a. Communicating face-to-face, transparency, collaboration on detailed documented processes, templates, tools.

   b. Software for working on detailed documentation and reports.

   c. Consumer experiences rather than the effort spent on contract negotiation d. Responding to requests instead of implementing a detailed plan

2) *The Agile Principles*

   a. Gaining customer satisfaction and enjoyment by early and regular delivery of potentially shippable goods is the top priority.
   b. Exhibit versatility even at a later stage of project implementation in embracing transition.
   c. Constant production of potentially shippable goods with an emphasis on shorter iterations.
   d. All project participants must work with improved communications and partnerships. Provide confidence in the ability of the group to move forward.
   e. Establish a system of engagement and coordination through face-to-face contact.
   f. Working technology is the key performance metric of understanding the project's progress.
   g. Both project participants need to adapt to the Agile way of working to ensure a steady pace of operating and generating business value that meets standards.
   h. To give him more flexibility, a constant focus on technical / non-technical skills and good design is a must.
   i. The closer we get to closing in on the few highly valuable features that offer the greatest business value for consumers, the more we optimize the bucket of work not completed. Infect, this technique is truly an art and all participants should master it. The best in class technicalities & innovations comes from self-organized teams.
   j. Teams introspect on the areas at pre-defined frequencies that can enable them to become more efficient. To deliver more business value, it helps them to adjust, optimize and fine-tune themselves.

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II. Various Agile methods

The Agile Manifesto includes the idea of several Agile methodologies already in practice, such as:

a. Extreme Programming
b. Scrum
c. Lean
d. Kanban
e. DSDM
f. Crystal
g. Feature Driven Development
h. Adaptive software Development
i. Pragmatic Programming
j. Behavior Driven Development
k. Agile unified Process
l. Test Driven Development

The Agile Transformation focuses mainly on Extreme programming, Scrum, Kanban & Lean in this case study.

a. Extreme Programming

Extreme Programming or XP is one of the methodologies for software development that aims to improve software quality against changing business needs frequently. Kent Beck conceptualized extreme programming while working on the Comprehensive Compensation System for Chrysler. Some of extreme programming's fey elements include practices such as pair programming, code simplicity and clarity, building features only when needed, etc. This concept has taken the name "extreme" since during implementation or execution the beneficial practices are taken to an extreme level. In Extreme Programming Explained (1999, ISBN 0-201-61641-6), Kent Beck also expanded on this in depth.Extreme programming techniques continue to evolve by taking further insights from experience-accumulated knowledge into account. Kent Beck introduced more Lean Values and Practices in the second edition of Extreme Programming Explained (November 2004), which are well distinguished between main and corollary practices. Complex programming highlights the success of the team. In a highly collaborative environment, key stakeholders such as customers, program managers, and cross-functional teams are working together. One of the main assumptions that the cost of implementing change is mostly constant while implementing Extreme Programming practice.There are a lot of ways to do this. However, few ways to follow:

- Smaller Sprints
- Optimize development
- Focus on continuous customer feedback
- Early bug fixing, minimizing rework costs
- Delivering customer-friendly products

Some of Extreme Programming's key steps are as follows:

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- Just have a very simplified design to code the functionality. It can be redesigned if required
- Unit test cases need to be derived even before coding activities and it needs to continue to run constantly. They are automated and help in the early elimination of flaws.
- Another concept of pair programming in turn helps in programming and review.
- Integrating and testing takes place several times a day during the Continuous Integration process
- Integrating a basic feature into a production system. This can be optimized or improved as needed, instead of opting for large scale approach

b. Scrum

The term "Scrum" came from a Harvard Business Review (1986) paper. The researchers Hirotaka Takeuchi and Ikujiro Nonaka compared the highly performing cross functional teams with the Scrum formation used in the game of Rugby. Scrum has been widely used to handle complex work since the early 1990s. The definition of Scrum is the separation of large chunks of work into smaller groups and the analysis and implementation of task execution along the journey. The approximately 70 million project teams across the software industry used Scrum as the way to work, according to the 12th Annual State of Agile survey. In the meantime, Scrum practices have taken into consideration other support functions such as sales, business teams, HR & IT. We are facing similar challenges and expect Scrum to help them work quickly and overcome the challenges. Scrum is one of Agile's implementing styles. Agile is a set of principles and rules that work out how teams work together and work in a timely manner. It has been demonstrated that Scrum provides stakeholders with many benefits such as increased productivity, increased employee satisfaction, improved team dynamics and faster time to market.

c. Lean

If an organization needs to be lean, customer value and processes must be understood to be constantly optimized. The goal is to process a high-quality optimized waste that is close to zero. An approach to Lean Process Improvement can help an organization in the following ways:

- Removing waste
- Improving productivity
- Reducing cost
- Improving customer satisfaction
- Improving margins
- Reducing backlog

d. Kanban

Originally, the word Kanban came from Japan. It translates roughly into a Visual Card. Kanban is a visual card used to trigger a task primarily. In their relay systems, Toyota used

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the Kanban system to stabilize the flow of elements in their production lines that are just in time.

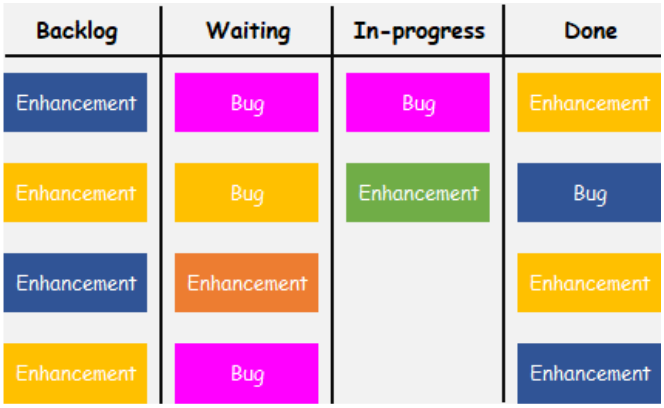

Figure 1 Sample Kanban Board

There is a set of rules provided by Toyota for the effective implementation of Kanban:

- Customer processes take items in a specified quantity as specified by Kanban
- Seller produces items in the specified quantity and order as specified by Kanban
- Unable to move items without Kanban
- Each Kanban should always be followed by object
- Errors and incorrect quantity should never be moved to the next stage.

A Kanban board has only four distinct phases in the case of a computer maintenance lifecycle:

- Backlog
- Work in Progress
- QA
- Done

IIITRANSFORMATION OBJECTIVES

The aim of driving Lean Transformation is to enable the company with a strong cultural shift towards embarking on aLean way of working. Ideally, this should lead to improved project performance with qualitative benefits.

Many organizations have embarked on the Lean Transformation journey and have taken advantage of such initiatives successfully. There are many studies on the quantitative advantages of organizations moving towards Lean that have been mentioned. Some of the key factors that significantly impact success or failure in Lean Transformation are areas such as dedication to management, attitude of workers, servant leadership, infrastructure, resources, and environmental setup. Key steps to execute the process of transformation include:

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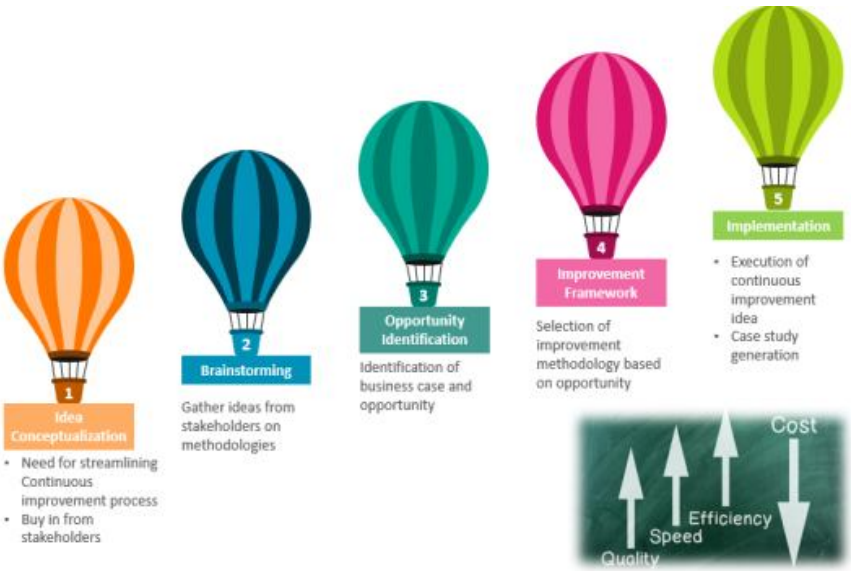

Figure 2 Transformation Journey

IV. Building Agile Governance &Agile Center of Excellence

The staff of the Agile Center of Excellence is a community of dedicated people. They have e xpertise and skills specific to them. Their primary role is to demonstrate the role of leadership and drive the journey of the Agile Transformation.

Figure 3: Building Agile Governance & Agile Center of Excellence

The staff of the Agile Center of Excellence is a community of dedicated people. They have e xpertise and skills specific to them. Their primary role is to demonstrate the role of leadership and drive the journey of the Agile Transformation.

Lean management is often accomplished at system level where these various programs communicate with larger business goals. At the level of the plan, the company filters more complex strategic goals down to individual tasks that yield tangible results. Lean governance

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is required even at portfolio level to promote effective management to meet strategic business goals.

V. Overall Governance

To monitor the evaluation of the transformation journey at a defined frequency, the overall governance model is needed. It involves different types of stakeholders.

Table12:Governance model

Meeting Name	Frequency	Participants	Scope
Status review meeting	Weekly	Program Managers, Quality Leads, Agile CoE	Review Agile implementation at project/ program level
Steering committee meeting	Monthly	BU Head, Directors, Program Managers, Quality Leads, Agile CoE	Assess the Agile transformation journey of the BU against plan
Quarterly Business Review	Quarterly	CEO, BU Head, Directors, Quality Head, Quality Leads	Review the progress of organization level Agile transformation journey

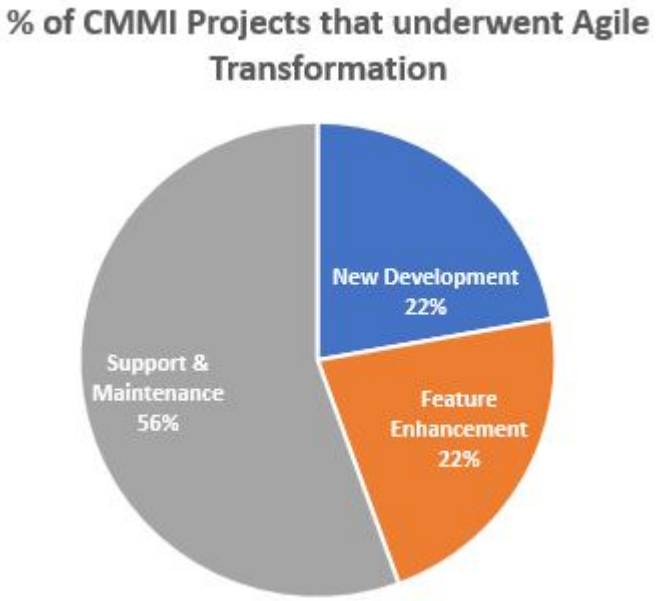

Figure 4: Project Type wise distribution

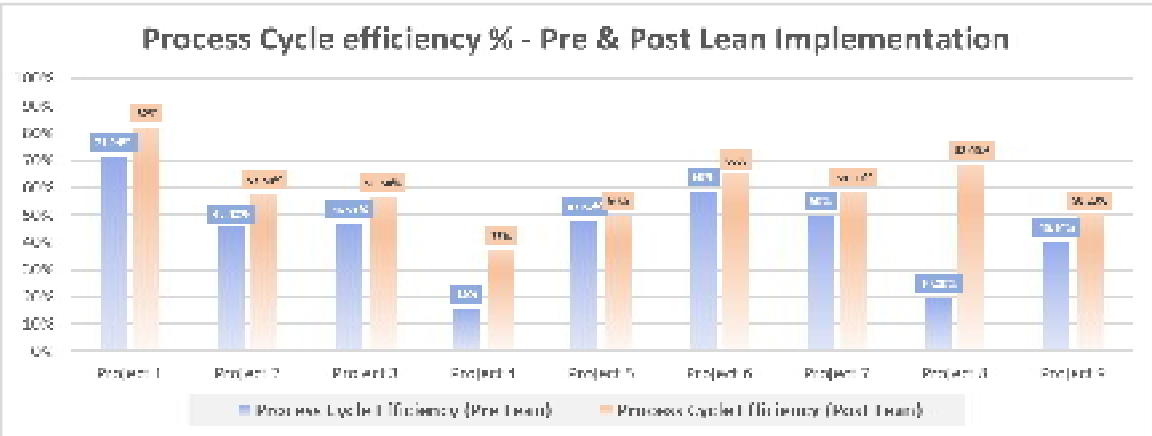

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Figure 5: Pre & Post Lean Process Cycle efficiency

The path through Lean Development resulted in significant qualitative changes across systems and clusters. Some of the quantitative benefits noted below are as follows:

- 32% improvement in productivity in the delivery of bug fixes faster compared to the point before starting the Lean transformation
- The ability of the team to respond to frequent changes in the Sprint backlog improved by 89%
- User story completion turnaround time improved by 28%. This in turn led to quicker market time

In addition to these results, there are numerous qualitative advantages such as:

- Cultural change in groups. Team members have a better sense of control
- Company has been able to build a database of case studies focused on Lean Transformation success stories
- Teams are more self-organized than ever before
- Teams have been able to deliver more business value to the consumer by embracing and applying the Lean way of working. Naturally, by minimizing waste, it allowed more time to spend on meaningful activities that add value to the lifecycle of project. This resulted in increased ability with sustained and better-quality software.

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