THE INTEGRATION OF LEAN MANAGEMENT AND INNOVATION

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Abstract

Lean management and innovation are two driving forces of today’s business success. However, with fundamentally different concepts, some aspects of lean management may negatively affect a company’s capability to be successful with certain types of innovations. The aim of this article is to analyse the impact of lean management on innovation potential of the company. Their basic strategy of enhancing the innovation potential of enterprises that use lean management. More detailed addresses issues lean product development.

Key words: Lean Management, Innovation,

INTRODUCTION

European Commission document [1] defines innovation as “renewal and broadening the range of products and services and the associated markets, creating new methods, technologies and methods of production, supply and distribution, introduction of changes in management and organization of work, the improvement of working conditions and increase skills workers. Innovation generally offers new solutions to the problems caused by changes in the business environment, the requirements of customers in technological development, globalisation, and the other activities of today.

There are many variations of explanatory lean principles. According [4] principles are:

1. Specify value from the standpoint of the end customer by product family.
2. Identify all the steps in the value stream for each product family, eliminating whenever possible those steps that do not create value. Make the value-creating steps occur in tight sequence so the product will flow smoothly toward the customer.
3. As flow is introduced, let customers pull value from the next upstream activity.
4. As value is specified, value streams are identified, wasted steps are removed, and flow and pull are introduced, repeat this process again and continue it until a state of perfection is reached in which perfect value is created with no waste.

Lean” has come to mean an integrated, end-to-end process viewpoint that combines the concepts of waste elimination, just-in-time inventory management, built-in quality, and worker involvement -- supported by a cultural focus on problem solving. Can such practical principles be applied to innovation, or would élán’s structure and discipline snuff out the creative spark that underlies the birth and development of great ideas? Can lean co-exist with innovation. [3].

IMPACT OF LEAN ON INNOVATION

The key concepts in lean culture, lean design, lean supply chain management, and lean human resource management are compared with the key contributors or hindering factors to innovation culture, different types of innovations, and creativity.

Characterized by early optimisation and uncertainty reduction, lean management represents a typical technical process [3]. Being rigid standardized, and constrained to productivity, it places goals and guidelines, leaving less room for creative thinking and innovation. Analyse the impact of lean management on innovation potential of the company. Their basic strategy of enhancing the innovation potential of enterprises that use lean management. More detailed addresses issues lean product development. While the continuous improvement initiative in lean is likely to have a positive impact on incremental process innovations, the lean culture to reduce slack, risks, and variability is expected to have a negative impact on a company’s culture to foster innovations. This leads to the first proposition and the summary of comparisons, as shown in Table 1 and Table 2. [3].

Presupposition 1: The lean culture of reducing slack, risk, and variability has a negative effect on a company’s innovation culture

Presupposition 2: Standardization and DFM in lean design has a negative effect on a company’s radical innovation capability, revolutionary innovation capability, and architectural innovation capability. Value Analysis: Current customers’ requirements are exclusively followed to assess value in product design. Non-value adding activities are eliminated.

Presupposition 3: The lean value analysis has a negative effect on a company’s capability to successfully deal with radical innovations and disruptive innovations.
Table 1. Lean Culture vs. Innovation Culture

| Reduction of slack: The lean concepts promote the reduction of any slack, or under utilized design resources, within the environment to eliminate waste. | Extra time and design resources are needed to facilitate innovation |
| Reduction of risk: The lean concepts promote the reduction of any risks or potential failures that can result in necessary corrections | Identifying any forms of risk as a negative can prevent innovation from being achieved |
| Reduction of variability: The lean concepts promote the reduction of variability to achieve product quality at relatively low costs. Extra time and design resources are needed to facilitate innovation | Variability is necessary to account for uncertainty in the system. Uncertainty is a major source of creativity. Preserving variability fosters innovation |

Table 2. Lean Design vs. Innovation Capability

| Standardization: Use standard process, standard materials, and standard parts in designing new products. Match new designs with existing components and manufacturing methods. Design for manufacturability (DFM): Simplify the product design, minimize the parts count, and standardize parts and processes. Designs need to be compatible with existing manufacturing procedures and processes | Radical innovation: Requires different approaches from the existing ones. Causes increased uncertainty in the work setting; design may not depend on existing technologies Revolutionary innovation: Requires dramatically different design, new machinery, and new skills to render existing technologies obsolete. Architectural innovation: Requires changes to the interactions and linkages between the core concepts and components. Using existing architectural |
| Value Analysis: Current customers’ requirements are exclusively followed to assess value in product design. Non-value adding activities are eliminated. | Radical innovation: May be initially worse in some areas than the existing technology (when a new s-curve starts). Disruptive innovation: Blindly following the requirement of existing customers will lead a company to stumble over disruptive innovations |

STRATEGIES ENCOURAGES INNOVATION IN LEAN COMPANIES

Several strategies that have been proposed are to help a company remain lean while keeping innovation approach. [5], [7]:

**A. Outsourcing Innovation**

For an organization that enforces lean practices, depends on the nature of such organization, it is not necessarily a must to perform product innovation all by its own. One strategy is to simply outsource innovations, especially when there are high risks and development costs associated with the new product design. This strategy can help an organization avoid committing significant levels of in-house resources, such as facility and inventory space, and employee time and commitment. It also helps lower the risks and costs of new product introduction.

**B. Establishing an Independent Innovation Centre**

Concept of Temporal Think Tank™ (T3™) is an innovation tool for lean organizations. To run a T3™ centre, employees who are efficient with cultural change and full of ideas are identified from different departments, and teamed up temporarily in an independent organization. Being led by professional managers, they interact with each other and generate creative ideas for product innovation. They incorporate entrepreneurial thinking to recognize opportunities in the industry, plan how to seize it, and take the appropriate action. Ideas generated from the T3™ centre will be assessed, selected, and suggested to the parent organization on its technology roadmap. After completion of the time in the T3™ centre, which is usually one to two years, these idea champions will return to their original work positions to implement the ideas they worked with in the T3™. Upon returning, they are also expected to bring back the culture and atmosphere of creativities to their home departments. In this way, the parent organization can remain lean without sacrifice innovations that require a lot of “non-value adding” trials and risk-taking experiments.

**C. Lean Innovation System**

Another approach that can be used to reduce the negative effects of lean on innovation is introduced as the “lean Innovation system.” This approach defines the methodical interpretation of the lean principles with regards to product innovation. The lean innovation value system is a mapping system that defines values for an innovation project based on to the R&D facilities to generate product differentiation with reduced resources and waste. In the “leans innovation system,” there are ten principles and three specific steps. The first step, “structure early”,
defines the innovation team, constructs the hierarchy of value in the system, and defines the architecture of the product. The second step, “synchronize easily,” applies value stream mapping and capacity planning to identify the most effective and efficient forms of innovation. The third step, “adapt securely,” defines the continuous innovation of product design to meet the values and requirements of customers. With this strategy, the lean approach could be embedded into the R&D stages. The creation of new ideas in the design stages are no longer deemed as waste, but viewed as value adding to the potential products. It is determined that to meet the needs and requirements of the customer, innovations must be involved. To implement this strategy, a company must change its organizational thinking. Rather than only to identify and eliminate waste and standardize the system, the culture must now promote the need for constant changes. This approach would be beneficial for an organization with the expertise to be innovative, but do not have the resources available to implement a process similar to the T3™.

**D. Innovative Product Development Process**

A technique called “Innovative Product Development Process (IPDP)” can also be adopted by lean organizations to increase its product innovation capability. It is a technique that integrates concepts from Quality Function Deployment (QFD) and the Theory of Inventive Problem Solving (TRIZ) for companies to introduce innovation to their product design process.

As two forces that are driving today’s business for better performance, lean and innovation cannot be separated. Figure demonstrates a simple example. As it shows, if lean and innovation are effectively combined, a company’s total profit will be increased much more as a result of reduced cost, enlarged market size and enhanced customer willingness to pay higher prices for a certain type of products. Just like creativity and structure cannot be separated to create value and ensure growth [8], a good balance between innovation and lean should be achieved. Special attentions need to be paid to the specific types of innovations that are more likely to be hindered by lean management.

While lean thinking focuses on reducing costs, innovations create new business value by transforming original ideas to products or services that satisfy customers’ certain needs, and thus enlarge the market size and strengthen a company’s overall competitiveness. An organization that effectively accommodates both lean and innovation will benefit the most and be competitive in the long term.

**THE LEAN IN PRODUCT DEVELOPMENT**

Lean Product Development can be understood as creating a “product recipe” or set of specifications that are then transformed into a physical product or service. In manufacturing, different raw materials and product parts, or in general physical goods, flow through the Lean Production system.

The essence of Lean is to eliminate waste in all aspects of product development and related processes even before getting the product into production. The term is derived from lean manufacturing. The starting point is the customer's requirements and determine the value added. All others need not satisfy the customer and the customer must pay for it is considered waste. This includes: identification of features of the product with the highest added value, delete items without value and engage customers in product development stages [19]:

- Focusing on the initial development phase, which takes into account many variations, as there is room for optimisation.
- Parallel implementation of activities supported by the communication strategy.
- Optimise the development process and eliminating waste.
- Linking specialists from functional departments in multi professional teams.
- Waste reduction options in the draft.

Since lean business cannot produce “bold” products, the Lean Design and Lean Product Development methods get into concern. Chances to dramatic reductions of costs during the product design are:

- Reduction of direct material costs: platform components and material, simplifying of design, reduction of useless waste, samples, prototypes, etc.
- Reduction of direct costs on experiments and testing simplifying of design - design for lean manufacturing and assembly, reduction of part count, adaptation of product tolerances to operational possibilities process standardizing, etc.
- Reduction of operational costs: minimum impact on reconfiguration of manufacturing processes and systems, modular design, standards for modifications according to customer’s demands, better utilization of manufacturing capacities and human resources.
- Minimizing development costs: platform of design strategies, lean QFD, Six Sigma, etc.
design of experiments, value engineering, and others.

- Acceleration of product development process affects basic lean principles:
- Concentration of development activities: perform the work tasks in the shortest time possible, and minimum moving of project documentation between individuals and departments. That can be achieved with simultaneous solving and strong IT support.

Application of knowledge basis from previous experiences portfolio. It means to make use of appropriate expertise, learn more than until now and update the knowledge base with development-relevant data from suppliers, competitors, customers, and partners.

More “value” in product and process development means:
- shorten time to market;
- to decrease product costs over the entire life cycle
- to better align products’ features with the things the customer values
- to produce higher quality products

Waste in Lean Product Development. Eight categories of waste are similar to those of Lean Production, but not identical (see Figure 1 and 2)

![Figure 1: The Waste in Lean Product Innovation [7]](image)

![Figure 2: Focus on customer value](image)
Fig. 2: Overview of Product development [6]

**Key Lean Product Development Themes [8]:**

- The output of development is reusable knowledge: How to satisfy customers, – How to perform work efficiently and effectively, Validated, lean, capable production value streams.
- Small batch sizes: Knowledge, experiments, design elements.
- Cadence of small, fast learning cycles.
- Pull systems: –Knowledge, customer-driven milestones.
- Distributed project management.
- Visual management.
- Systems Engineering framework.
- Explore alternatives: Increase learning, Manage high risk / high reward alternatives.
- Integrating events instead of quality checks.
- Late concept selection with more knowledge.
- Managing organizational capacity versus demand.
- Project teams “own the business”.
- Team leadership, team design, supplier integration.
- Simple technology to fit team needs and processes.

**CONCLUSION**

According to experts at The Boston Consulting Group (BCG) and Wharton faculty, lean and innovation can indeed complement each other, and it's about time they came together. Lean brings structure and predictability to innovation, and sharpens the distinction between idea generation and the development process, they say. Both share a common goal: to meet customer needs in a cost-effective manner. And lean can help empower researchers and reduce uncertainty in the innovation process itself. [3].

Many people consider Lean and Innovation to be opposing ideas. Some say Lean is about cost cutting and Innovation is about creativity. Both perceptions are incomplete. In fact, Lean and Innovation work well together in achieving both the Great Idea and the Great Process.

**References**


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