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## **Lean Implementation challenges in Discrete manufacturing Industries**

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### **Purpose:**

Objective of this study is to understand the Lean implementation challenges in Discrete manufacturing Industries. Discrete manufacturing has its own challenges due to its inherent nature of High variety low volume business scenario. This has brought with it lot of waste historically, creating challenge for Safety, quality, delivery and cost. Lean manufacturing is the one of the key philosophy which is helping organizations to shell off waste and staying very efficient and competitive. This paper attempts to study lean implementation challenge

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### **Research Method**

This paper is based on review of contemporary literature covering Generals, books, websites and informal interviews with subject matter experts.

Literatures, Books, journals, periodicals and internet articles were referred to collect the theoretical explanations of strategy.

### **Introduction**

Let's start our discussion by understanding what is meant by discrete manufacturing.

(Wikipedia, 2013): defines, **Discrete Manufacturing** is the production of distinct items". This means we can distinguish one product from another as against process manufacturing where it's not possible to do.

To elaborate further Business dictionary has a very interesting definition (Webfinance.inc, 2014) it says, discrete manufacturing is the process where we have an output which could be

counted in numbers, which has serial numbers and is measured in terms of units instead of weight or length.

Some of the products which can be considered as discrete products are

- TV, Bicycle/ motorcycle, Automobile, Furniture
- Home appliances, Machines, ATMs, Watch, Pen etc.

What are the characteristics of these products?

- The products are easily identifiable
- They are standard products/parts
- They can have a unique number
- Each of them can be made of one or many similar items coming together
- Process deployed for manufacturing these discrete parts is not continuous. The process can be started or stopped at will.
- These products can either be high volume, low complexity products or very low volume but high complexity products. Each requiring completely different manufacturing strategy.
- They can be assembled or dismantled.
- To a large extent they can be reworked individually..
- They can be made from parts, sub-assemblies or final assemblies.

### **What is lean all about?**

Lean is all about different thinking (Goerke, 2013); it's the continuous process of maximising customer value by minimising waste.

Toyota developed this philosophy during 1950 to 1980s primarily but as a principle it is still evolving as it's challenged every day. It is the fundamental way that that Toyota views its world and does business. It can be briefly summarized through the two pillars that support it

- 1) Continuous Improvement (Challenge Everything)
- 2) Respect for people (Provision of Employment Security)

This is based on not just accepting but actually embracing change.

The philosophy is based on 14 principles which are divided into 4 categories as described in Toyota way.

1. Philosophy
2. Process

3. People and partners
4. Problem Solving

Lean manufacturing is systematic elimination of wastes and removal of non-value added activities from the company's process. There are eight types of waste targeted by lean methods which are

- Defects,
- waiting,
- unnecessary processing,
- overproduction,
- movement,
- inventory,
- Transportation
- unused employee creativity and complexity.

As narrated by (Womack & Jones, 1996), Lean is based on 5 fundamental aspects

1. Specify value: Value is defined from the point of view of the and it means something for which the customer is ready to pay.
2. Identify the values stream: Identify the process, functions and actions necessary to convert or transform input in to output. Map them together to form a chain, eliminate waste within the chain.
3. Create flow: make a continuous flow i.e. seamless production
4. Create Pull: Let the customer demand define the 'pull'. Pull must originate downstream and gradually work its way upstream the logic being that the subsequent station must pull from the preceding station what it wants, when it wants and only as much as it wants.
5. Pursue perfection : Continuously improve the flow

Common tools used in lean manufacturing are

- Kaizen;
- 5S
- Cellular lay out
- Heijunka
- Andon Boards
- Total Productive Maintenance (TPM)
- Cellular Manufacturing
- Just-in-Time Production

Companies involved in lean manufacturing undergo a paradigm shift from old 'batch and queue' mass production to product aligned 'one piece flow' pull production. In batch and queue mass production large quantity of goods are produced in advance depending upon customer requirements while in one piece flow the production activities are arranged in such a way that processing activities take place immediately adjacent to each other so that the flow is continuous.

### **Theoretical Framework**

Lean believes in single piece flow. Some of the advantages of single piece flow are stated here:

- Single piece flow improves the company's profitability
- It converts raw material to finished product without delay hence companies can serve their customer much faster
- It requires fewer resources for storage and transportation
- Problems which were hidden behind the waste of batch production are brought to the surface
- As the production is based on single piece flow, it reduces risk of rework, rejection, obsolescence and damage.
- It makes organization flexible to adapt to the changing market environment.

About one fourth of plants in US tried to implement the whole lean system. When companies implement several or all of these lean methods to gain world class status several outcomes consistently result like

- reduced inventory,
- decreased material usage,
- optimized equipment,
- increased production velocity,
- reduced complexity and
- enhanced production flexibility enabling the implementation of a pull production
- just-in-time oriented system which lowers inventory and capital requirements. JIT delivery and low inventory are considered the primary element of lean system

### **Discrete manufacturing Characteristics**

Discrete manufacturing companies operate under complex operating conditions.

- Pressure to innovate the products continuously basis due to short life cycle of the product at the same time technology upgrades forces the same.
- Continuous engineering changes coming from product up gradations etc. Broad variety of product variations and custom orders.
- High operating costs to small batches restricting many a times to operate the processes economically.
- Dispersed assets and resources. Tough competition. (Kuhmonen, et al., 2002)

Discrete has certain inherent limitations such as

- Build to forecast
- Mostly multi stage production or manufacturing
- Built in batches
- Pressure of capacity utilization
- Manpower utilization
- Complex planning involving multiple stations , stages or some time locations
- Complex supply chains
- Low volume in many cases
- High variety
- Challenges of real time information from shop floor (Kuhmonen, et al., 2002)
- Multi-level BOMs
- High skill set required
- Low to high set up times
- Multiple set ups
- Generally high material and low value addition component
- High lead time

### Discrete Challenges

Let’s evaluate Lean implementation challenges in Discrete manufacturing after evaluating lean and discrete manufacturing characteristics

Lean Requirement	Discrete manufacturing challenges
Single piece flow	Requires Economic batch quantity for bringing production cost down
Requires stable demand	Depends on forecast
Suitable for High volume low variety	Required to survive in Low volume high variety business scenario
Build to Order	Build to stock
Works good for stable products	Has quite varying product life cycles

Strong in factory premise. Built on principal of visibility	Has quite complex supply chain local, global and in-house production. makes it quite challenging to manage visibility of process
Built on single planning points	Has multiple planning points
Works on Takt time	Works on delivery schedules
Works on load levelling	Challenging to level the load due to high variety and low volume scenario.

### Conclusion

Lean without any doubt gives the organization a cutting edge to stay competitive in market. It has been proven in many implementations that it works well if supported by strong management commitment. As it originated from Automobile industry, it definitely has quite many success stories to prove its strength in high volume manufacturing but low volume discrete sector is still having many challenges to overcome. ERP companies are trying to overcome these limitations by supporting with technological solutions but inherent nature of discrete manufacturing does makes it quite challenging to overcome.

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