

Lean Supply Chain Management Analysis of 8 Types of Wastes: Cause - Effect & Solution

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Abstract

A supply chain is a chain of supplies - is the network of all the individuals, organizations, resources, activities and technology involved in the creation and supply of a product, from the delivery of source materials from the Supplier to Manufacturer to Distributer to Wholesaler to Retailer and Eventually Delivery to the End User or Consumer. **Lean** is the concept of efficient manufacturing/operations that grew out of the **Toyota Production System** in the middle of the 20th century. Since then, "lean" which was started as an important concept, in the world of manufacturing first, has thrived in to other fields such as Supply Chain Management (SCM). **Lean management** is an approach to managing an organization that supports the concept of continuous improvement; a long-term approach to work that systematically seeks to achieve small, incremental changes in the processes in order to improve efficiency and quality by eliminating or minimizing the process waste and maximizing the value of the product or service to the customer. In this article we shall discuss 8 types of wastes in the entire value stream of supply chain and analyze **Cause - Effect & Solution** for improving Supply Chain Efficacy.

Keywords: Supply Chain, Supply Chain Management, Value Chain, Value Stream Mapping, Lean, Wastes.

1. Introduction

A supply chain is a Chain of Supplies - is the network of all the individuals, organizations, resources, activities and technology involved in the creation and supply of a product, from the delivery of source materials from the Supplier to Manufacturer to Distributer to Wholesaler to Retailer and Eventually Delivery to the End User or Consumer.

Supply Chain Management (SCM) is the Management of a Network of Inter-Connected Businesses involved in Receipt of Inputs, Processes and Delivery of Finished Goods or Services Required by the End Consumer. Supply Chain Management spans all Movements and Storage of Raw Materials, Work-in-Process Inventory and Finished Goods from Point of Origin to Point of Destination at Consumption.

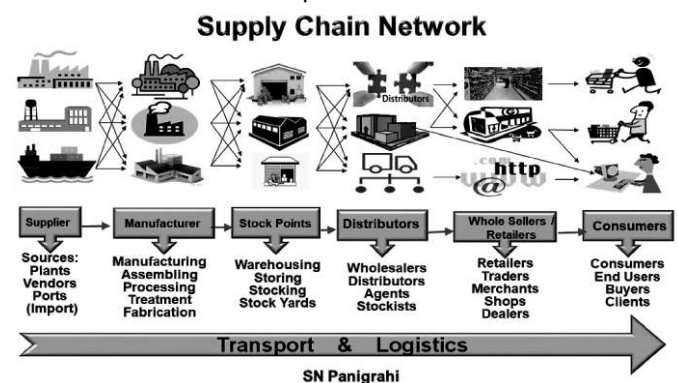


Figure 1 : Supply chain network

Supply Chain Management (SCM) can be defined as Management of the Supply Chains as an Integrated Process of Acquisition and Management of Flow of Supply of from point of origin to point of consumption and Delivering Further Value Added Output to the Next

Level Point of Consumption (like from supplier to manufacturer to wholesaler to retailer and to final consumer) by Balancing Supply and Demand with Optimal Management of Resources with the objective of establishing relationships for Maximizing Value for Mutual Benefits on Economically, Socially and Environmentally Sustainable basis. (As defined by the Author SN Panigrahi in his Article "Value Insights into Supply Chain" Published in Aug'2010 issue of MMR - IIMM).

2. Lean Principles

Lean is the concept of efficient manufacturing/ operations that grew out of the **Toyota Production System** in the middle of the 20th century. Since then, "lean" which was started as an important concept, in the world of manufacturing first, has thrived in to other fields such as Supply Chain Management (SCM).

Supply chains generally are over imposed with Value Chain which refers to the process in which businesses receive raw materials, add value to them through production, manufacturing, and other processes to create a finished product, and then sell the finished product to consumers. A Lean supply chain focuses on adding value for customers, while identifying and eliminating waste—anything that doesn't add that value in the supply chain. The focus is on reducing waste in the entire chain of supplies resulting in reduction of cost and lead-time as well as an increase in quality of delivery.

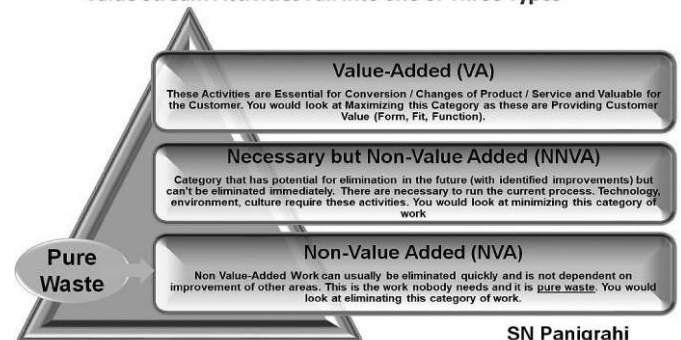
According to Womack and Jones, there are **Five Lean Principles: Define (Identify) Value, Value Steam Mapping, Create Flow, Establish Flow and Pursuit Perfection.**



Figure 2: Lean Principles

In lean, processes are configured so that they include only activities that add value to the item and ultimately to the customer, termed as **Value Added (VA)**- with everything else seen as waste. There are two forms of waste - firstly there is necessary waste, called **Necessary but Non-Value Added (NNVA)** - whereby the activity does not add value to the end product but is necessary for the process to function or for the business requirement - secondly there is **Non-Value Added (NVA)**activities that in no way necessary is treated as Pure Waste - which consume resources, increases cost or lead time as a result, but doesn't add any value. That means Any Activity or Features that **Doesn't Add Value** to the Product or Service, from the Point of View of the Customers and also not required by the Business.

Value Stream Activities Fall into one of Three Types



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In order to Improve Efficiency, Effectiveness, Profitability and Optimize Resources, Lean methodology demands the elimination of any aspects of the process, material, effort, or expense that add no value from the customer's perspective. When *Waste* is removed, only the steps that are required to deliver a satisfactory product or service to the customer remain in the supply chain process. Lean Management consists of a set of tools that help to identify and eliminate waste.

3. Eight types of Wastes

The 8 Wastes (Abbreviated as **Down Time**) are as follows

8 Wastes : Down Time		
D	Defects	• Efforts Caused by Rework, Repair, Scrap and incorrect Information
O	Over-Production	• Producing More than is Needed or Before it is Needed
W	Waiting	• Wasted Time Waiting for the Next Step in the Process
N	Non-Utilization of Talent	• Under-Utilizing People's Talents, Skills and Knowledge
T	Transportation	• Unnecessary Movements of Products or Services
I	Inventory	• Excess Products and Materials being Produced or Procured
M	Motion	• Unnecessary Movement by People
E	Extra Processing	• More Work or Higher Quality than is Required by the Customer

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Now let's discuss for each of the Waste in the Supply Chain analyze the **Cause - Effect & Solution**

1. Defects

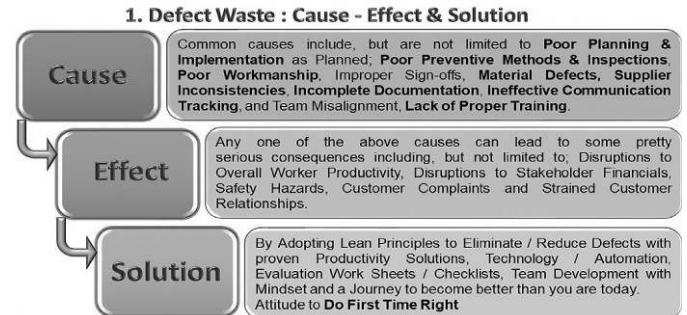


Defects involve scrap or material that is thrown out or reworked...and much more. Concessions may be made to a customer or Discounted-sale pricing may be used so defective material can be sold. In addition, the quality control system that must be put in place for an out-of-control process has **high inspection costs.**

Every bit of scrap Costs Money and Time - Money for the Materials, Resource to pay staff, Utilities etc to do it again, but also means that you have to push another planned job back in the queue in order to get the rework out! It's all cost and less cash for the business.

Paperwork (including electronic) tracking for defects and waste removal isn't free. Defects that actually reach the customer can cause greater pain, with loss of not only that customer, but many others from viral

word-of-mouth dissatisfaction. Some experts estimate defects have a 10x negative impact on a company - **Waste Related to Costs for Inspection of Defects in Materials and Processes, Customer Complaints and Repairs / Rectifications**



Tip: Evaluating the impact of some defects can be done by multiplying the cost of the scrap by a factor of ten. The resulting number can be viewed as a rough measure of the cost to your business or to your customer.

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2. Over Production



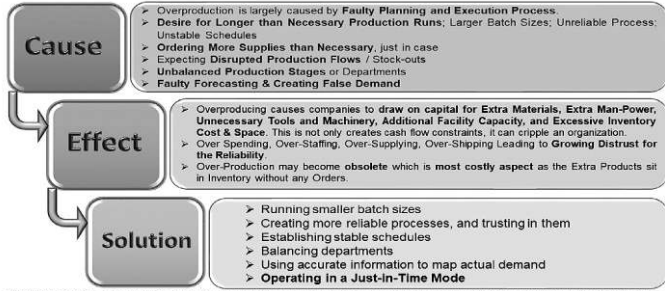
Overproduction is

- **Making something too soon,**
- **Making too much of something (greater Volumes), or**
- **Making something faster than is needed.**

It unnecessarily **consumes time, effort, money, materials and resources** that could have been better spent elsewhere, leaving your organization with the burden and logistics of dealing with **excess inventory, Product Damage** from warehouse stocking and removal, defects introduced by high-speed Processes, strain on human Interaction with Machines.

The problem is, **"the customer may want 10 items, for instance, but we will produce 20 items and store them....."**. **Producing something at the Wrong Time or in Unnecessary Amounts.**

2. Over-Production Waste: Cause - Effect & Solution



Tip: Implementing Lean practices and or principles is a continuous journey. By taking small steps and working together with other Lean champions, your company will benefit and will see continuous improvements.

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3. Waiting



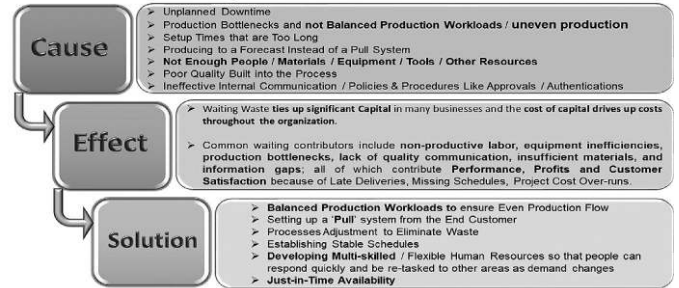
Waiting: When work in progress and goods are not being worked on, they sit there waiting - waiting for the next process. This is typical of traditional 'Batch and Queue' methods. **Waiting means that product is costing the company money and not adding value.**

Waiting involves **delays to process steps**, often extending customer lead time. This may include waiting for authorization from a superior, even though the authorization is a rubber stamp rather than critical input. It can involve inefficient changeovers, poor communications, large batch processing, and uneven workstation loading.

- **Parts or Assemblies waiting in queues for the next step in the operation**
- **People Waiting for Authorization / Approval / Other Procedural Aspects, Waiting for Material, Equipment or Tools to Perform their Operation**
- **Finished Products waiting to be Shipped or Sitting in Stores**
- **Idle Equipment / Equipment Breakdowns**
- **Vendor / Third-party Company Delays / Logistical Delays**

Waiting for people or services to be delivered (time when people, processes or equipment are idle)

3. Waiting Waste : Cause - Effect & Solution



Tip: One of the greatest steps one can take toward improving profits and reducing costs, is to remove all elements of waiting-waste from all business departments, processes

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4. Non-utilized Talent

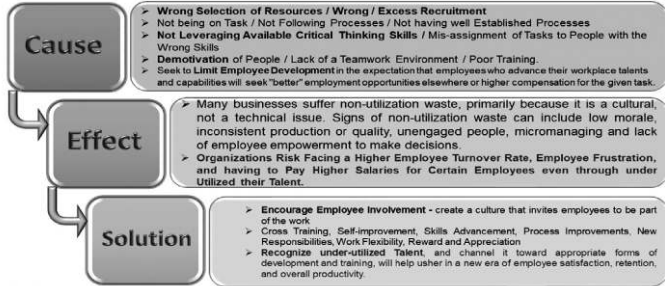


Not fully utilized people represent the waste of talent present in many organizations. Because operators are close to their processes daily, they can often recognize problems or opportunities that staff or superiors just don't see, but the workers may never be asked for their input. They may also have outside talents that aren't formally part of their assigned jobs, but could be of use. The recommendation? **Value people for their brains, not just their brawn.**

Non-Utilized Talent is a key waste described in the lean manufacturing ideology. This waste pertains to the loss or incomplete use of human capability and resources within a production process.

Non-Utilization Waste is the waste of human potential, often the most costly waste of all. It occurs when management is too separated from the role of employees and managers view themselves as the sole resource for organizing, planning, assigning, controlling or improving work processes. When the role of employees is to simply follow directions without question, non-utilization waste is bound to happen.

4. Non-utilized Talent Waste : Cause - Effect & Solution



Tip: Employees at any level can offer valuable insights about the job they perform every day. They witness first hand certain inefficiencies and understand how it can be improved. Do not let this feedback go untapped

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5. Transportation



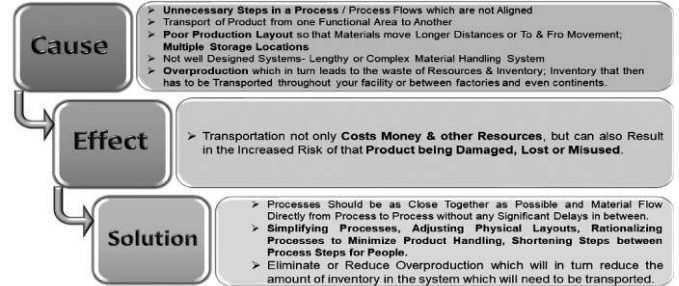
Transportation Waste deals with Unnecessary or Extra Movement of Products that is **Not Directly Associated with the Value Adding Process**. From a customer perspective, **Transport Adds NO Value to the Product**, as it is not being physically transformed. Transportation does not make any transformation to the product that the consumer is supposed to pay for.

Transport waste in manufacturing can include the movement of Raw Materials, Tools, Inventory, Equipment or End Products more than is absolutely necessary to achieve the production goals.

In fact, transportation can sometimes even reduce value. The more times a product is transported, the more likely it is subject to mishandling and damage. Even cosmetic packaging damage may cause customers to reject product.

Conveying, transferring, picking up, setting down, piling up and otherwise moving unnecessary items

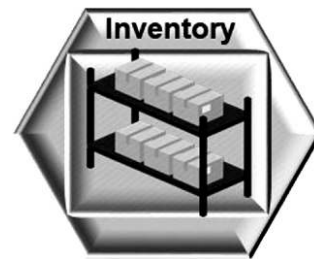
5. Transportation Waste : Cause - Effect & Solution



Tip: Layout should be changed as per the principles of lean manufacturing, create value streams and make that value flow at the pull of the customer, that will result in huge savings in time and money

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6. Inventory



Inventory is the **Raw Materials, Work In Progress (WIP) and Finished Goods** stock that is held, we often hold far more than is required to produce goods and services when the customer wants them using Just in Time (JIT) principles. Also Capital Goods not in use or Obsolete Items are kept in Inventory.

The waste aspects of holding large amounts of inventory are many:

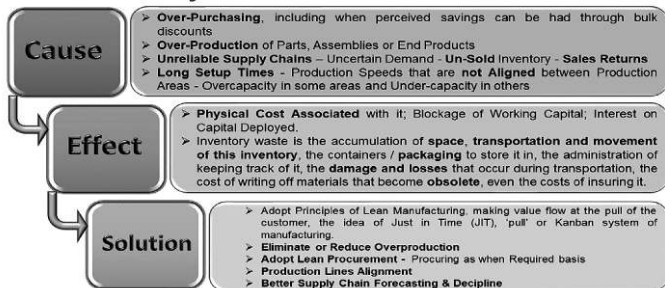
- **The product made may not be what the customer ultimately wants.**
- **The product may go bad or become obsolete before the customer purchases it.**
- **The inventory may contain large blocks of nonconforming product that slipped through quality control.**
- **Holding inventory costs money (estimate 20 to 30 percent carrying cost).**
- **Tying up money in inventory limits opportunities to use funds elsewhere.**

Excessive supplies, materials or info for any length of time (having more on hand than what's needed)

Inventory may be in the form of **Raw Material, Work in Progress or Finished Goods**.

In any of these three forms of inventory, if it hasn't been sold, it is **cash that has been tied up into the material**, which the customer hasn't bought yet- These results in a massive drain on the cash flow.

6. Inventory Waste : Cause - Effect & Solution



Tip: These wastes are heavily interlinked with **Over-Production & Transportation**

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7. Motion



Similar to transportation, but **Motion refers to movement of operator and equipment**.

Motion Wasted in lean manufacturing is the **increased motion of machinery or a person due to an inefficient manufacturing process**. Wasted motion increases the amount of wear and tear on both workers and machinery, therefore decreasing its lifespan or ability to work on at a manufacturing site.

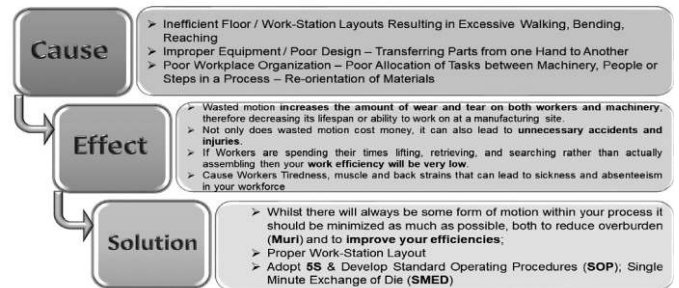
Think of the fact that operators moving around, searching and finding things cannot be adding value. Same too with equipment - if you are spending time lumping equipment around, you cannot be using it to add value and make money, plus the chances of damage increases.

Examples: Walking; Reaching; Lifting; Lowering; Bending; Stretching or otherwise unnecessary moving

Even small non-value-added motion can be very costly. Think of an extra twist of the wrist on every item many times a day that leads to a repetitive motion injury, with lost-time and disability costs.

Unnecessary movement that does not add value (movement that is done too quickly or too slowly)

7. Motion Waste : Cause - Effect & Solution



Tip: Movement is not work, but it costs you time and money; so look to Lean Tools to help you **reduce and eliminate excessive motion from your processes**.

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8. Excess Processing



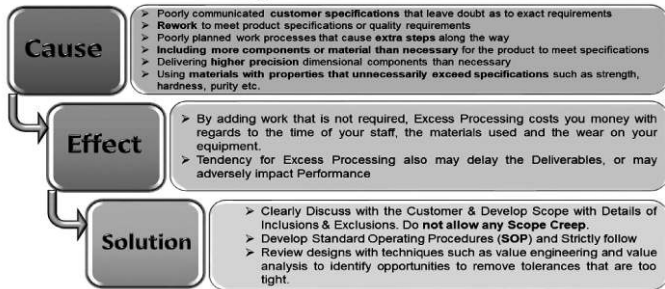
Excess Processing is about completing work for the customer, which is **more than the customer really wants**.

Excess Processing is **adding more value to a product than the customer actually requires** such as

- Painting areas that will never be seen or be affected by corrosion.
- Over polishing an area that does not require it.
- Tolerances those are too tight.
- **Excess Processing Waste can occur in the office as well as manufacturing areas**. Producing more detailed reports than necessary in order for one report to satisfy many users is one form of office over-processing waste.

- Not getting clear customer requirements and specifications creates excessive processing and possible repairs and re-processing.
- Excess processing might be **extra steps in a process, unnecessary customization, inefficient routings** and other things not necessary or valued by the customer.
- Organizations may want to provide the shiniest, most sparkly widget, but anything beyond a customer’s spec is non-value-added, or muda.
- **Unnecessary Processes and Operations Traditionally Accepted as Necessary, but Customer Doesn’t want**

8. Excess Processing Waste : Cause - Effect & Solution



Tip: Examine your process routes, are you using expensive processes where there are simpler cheaper methods?

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4. Conclusion

Lean supply chain management requires businesses to examine every process in their supply chain and identify areas that are not adding any value but using efforts and unnecessarily resources, which can be measured in monetary terms, in time, or resource consumed. The purpose of such exercise is to eliminate waste in the Supply Chain. To be Lean is to provide what is needed, when it is needed, with the minimum number of resources, optimal use of materials, equipment and space. The analysis can improve a company’s competitiveness, its customer service, and the company’s overall profitability.

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