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Improving Logistics System by using Lean Manufacturing

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Abstract:
The Logistics system plays an important role in any manufacturing industries. this paper highlights the role of logistics for Casting component. using the SCOR model i.e it shows the movement of component from supplier supplier's to customer customer's. having a close look about the movement of the component. I found that still there is many problem in the logistics system due to which there is increased in the transportation cost, hence this paper focuses on the some drawbacks and how by improving such drawbacks we can improve the logistics system. By observing the movement of the component and implementing various methods we have improved the logistics system, implementing Kaizen and 5S leads to reduce the wastage which was due to transportation, hence lean manufacturing result in reduced in the wastage, improve the productivity and efficiency of the logistics system.

Keywords: Logistics, the SCOR model, Kaizen, 5S, lean manufacturing.

I. INTRODUCTION

Organizations adopt numerous business improvement methodologies to improve business performance. Logistics as well as supply chain management has been regarded to be the crucial factor for the companies to obtain competitive edge. In fact, logistics as well as supply chain management has received attention since the early 1980s, yet conceptually the management of supply chains is not particularly well understood, and many authors have highlighted the necessity of clear definitional constructs and conceptual frameworks on supply chain management. In this paper, we provide a tutorial on the current research of operations management of logistics and supply chain. We first clarify the conception of logistics and supply chain management in this paper, which defines the scope of our related research papers. The core of this paper is that we provide several hot issues in this field with examples to show how these researches contribute from different research angles. Finally, we conclude the paper with the insights obtained from our analysis and future study directions in this field.

II. CONCEPTION AND SCOPE

2.1. Logistics. Logistics is the management of the flow of goods between the point of origin and the point of consumption in order to meet some requirements, for example, of customers or corporations. The resources managed in logistics can include physical items, such as food, materials, animals, equipment, and liquids, as well as abstract items, such as time, information, particles, and energy. The logistics of physical items usually involves the integration of information flow, material handling, production, packaging, inventory, transportation, warehousing, and often security. The complexity of logistics can be modeled, analyzed, visualized, and optimized by dedicated simulation software. The minimization of the use of resources is a common motivation in logistics for import and export. Note that the above definition of logistics is not unified, although it might be indeed, in current environment, a commonly acknowledged one. For example, Council of Logistics Management (now renamed as Council of Supply Chain Management Professionals) referred to logistics as "the process of planning, implementing, and controlling the efficient, effective flow and storage of goods, services, and relate information from point of origin to point of consumption for the purpose of conforming to customer requirements," which includes inbound, outbound, internal, and external movements and return of materials for environmental purposes. As we can see, the concept of logistics focuses on the product flow, which is the meaning by which this word has been translated in Chinese. It also puts emphasis on the activities of handling product, which include the storage, transportation, distribution, and packaging and processing. Although business logistics involves many activities, the traditional research of operations management on logistics mainly relates to the fields of logistics facility, transportation, and inventory planning.

2.2. Supply Chain.
Compared to "logistics," there appears to be even less consensus on the definition of the term at operations level as well as higher level approaches. For instance, total quality management (TQM) and quality managem "supply chain management." Kathawala and Abdou [1] point out that SCM "has been poorly defined and there is a high degree of variability in people's minds about what is meant." Nevertheless, we present a rather widely adopted definition, which is given by Mentzer et al. [2]. which is rather broad, not confined to any specific discipline area, and adequately reflecting the breadth of issues that are usually covered under this term: "Supply chain management is defined as the systemic, strategic coordination of the traditional business functions and the tactics across these business functions within a particular company and across businesses within the supply chain, for the purposes of improving the long-term performance of the individual companies and the supply chain as a whole." The terms of "logistics" and "supply chain" are usually comparative in academy and industry, since both of them are closely relevant to the product circulation during its whole life cycle, and both have been regarded as the central

unit of competitive analysis of model management science. Generally speaking, supply chain is a more broadened conception with a wider range which can involve other similar subjects, such as network sourcing, supply pipeline management, value chain management, and value stream management [3-5] In addition, we can see that the conception of logistics has no relationship with organization, which is the opposite of supply chain, since supply chain is made up of multiple organizations, usually companies. An important issue in supply chain management is that companies will not seek to achieve cost reductions or profit improvement at the expense of their supply chain partners but rather seek to make the supply chain as a whole more competitive. Hence, the contention that it is supply chains, and not a single company, that compete is a central tenet in the field of supply chain management.[6]. .Accentual research methodology for supply chain management is game theory (and also incentive theory for the scenario of incomplete information)..

III. RESEARCH METHODOLOGY

Survey instrument Shah and Ward (2003) identified 21 management practices that are associated with lean systems. It is apparent that the list includes practices ent programs are included as two different practices. However, the literature suggests that the quality programs are practices within a TQM approach (Ahire et al. ,1996; Rahman and Bullock, 2005). We identified 13 out of 21 practices as the lean practices:
(1) Reducing production lot size;
(2) Reducing setup time;
(3) Focusing on single supplier;
(4) Implementing preventive maintenance activities;
(5) Cycle time reduction;
(6) Reducing inventory to expose manufacturing, distribution and scheduling problems;
(7) Using new process equipment or technologies;
(8) Using quick changeover techniques;
(9) Continuous/one piece flow;
(10) Using pull-based production system/Kanban;
(11) Removing bottlenecks;
(12) Using error proofing techniques/Pokayoke; and
(13) Eliminate waste.
We used four criteria to measure the operational performance. These criteria are quick delivery compared to the major competitor, unit cost of product relative to competitors, overall productivity and overall customer satisfaction. These measures were derived from several criteria, which have been conceptualized and used in previous empirical studies of lean manufacturing and supply chain management (Tan, 2001; Shah and Ward, 2003). Perceptual data were used in which respondents were asked to evaluate the company's performance against the major competitor in the industry. This approach was used to minimize the possibility of bias from subjective answers.

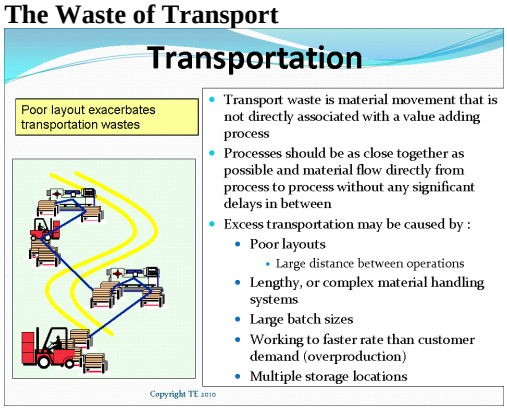
3.1) What Exactly is Waste?

The simplest way to describe waste is as "Something that adds no Value." Our customers would not be happy to pay for any action that we take that does not add value to what they actually want and nor should we be. Would you be happy if you received a bill in a restaurant that included a meal that was prepared in error? No; you would argue and demand that it was removed from your bill; yet if you buy a product in a store the price that you pay will contain costs that you would not want to pay. Would you want to pay for the machine operators wages whilst they sat idle waiting for a delivery, or for the rework processes that had to be undertaken because the machine was incorrectly set, or even for storing your product for three months before it was delivered to the store? These wastes are included within the cost of your products, either inflating the price you pay or reducing the profit of the company.

3.2) Why Remove Waste?

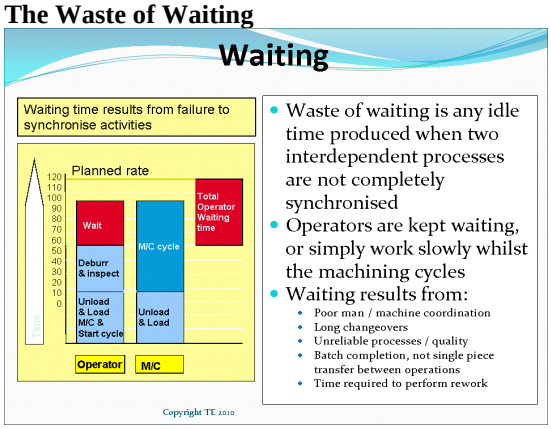
Your companies Profit is your selling price less your costs, no matter how you think about the selling price it is very much dictated by the market not by yourself. If you charge too much then your customers will go elsewhere, even if you charge too little you may lose customers as they will perceive there may be something wrong with what you are offering. Therefore the only way you have to improve your profits are to reduce your costs; this means removing all elements of waste from your processes.[7] In addition to improving your profits you will find that waste has a major impact on your customer's satisfaction with your products and services. Your customers want on time delivery, perfect quality and at the right price. Something that you cannot achieve if you allow the 7 wastes to persist within your processes.

The Waste of Transport



Transportation is a waste and costs you money. Transport is the movement of materials from one location to another, this is a waste as it adds zero value to the product. Why would your customer (or you for that matter) want to pay for an operation that adds no value? Transport adds no value to the product, you as a business are paying people to move material from one location to another, a process that only costs you money and makes nothing for you. The waste of Transport can be a very high cost to your business, you need people to operate it and equipment such as trucks or fork trucks to undertake this expensive movement of materials.

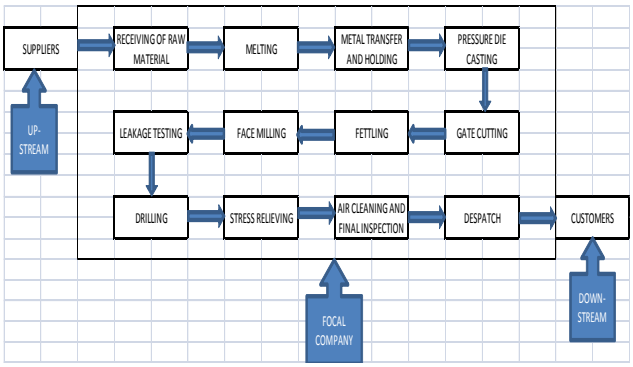
The Waste of Waiting



Eliminate the waste of waiting to make your processes smoother How often do you spend time waiting for an answer

from another department in your organization, or waiting for a delivery from a supplier or an engineer to come and fix a machine? We tend to spend an enormous amount of time waiting for things in our working lives (and personal lives too), this is an obvious waste. The Waste of Waiting disrupts flow, one of the main principles of Lean Manufacturing, as such it is one of the more serious of the seven wastes or 7 mudas of lean manufacturing.[8]

IV. DATA ANALYSIS & INTERPRETATION



As shown in the fig., the component is passed through various departments from supplier's supplier to customer's customer. The Supply chain starts with a customer when they order the material, the customer contacts the PPC department (Production Planning & Control), this department along with the production focuses on meeting the customer requirements. the requisition of items includes a a) brief description about the items b) necessary quantity and quality c) desired delivery date. the customer also required to mentioned the urgency and criticality of the items. Once the requisition is received by the stores department, the availability of the item with the stores department is checked. if the items are available in the stores, then it is issued to production for producing finished goods. Otherwise the store department forwards the requisition to the Purchase Department with appropriate remarks. The Purchase Department should identify suppliers which have the capability of supplying the desired goods, if right suppliers are not listed in the record, quotation of the items has to be inverted from various suppliers through tender. Quotations submitted by the suppliers are compared on price, quality, delivery schedule and others parameters, After negotiations with the vendors on one to one basis may be also carried out on price and other terms. Finally a single supplier or more than a supplier is selected and purchase order is placed. Copy of the purchase order is sent to the Stores Department, Accounts Department. Generally, this manufacturing company is having the "M+3" ordering policy, while ordering to the suppliers. C means the immediate following month and the quantity ordered is 100% firm. For other 3 months, mentioned as +3, it is a rolling forecast. with the rolling forecast Receiving of Raw materials- inspections of the quality of items are carried out in the company, The quality Assurance department checks the specification of the raw material, either using manual sampling or by using the Spectro machine, if the quality is not up to the mark then the material is rejected and it is sent back to the supplier. if the quality is OK, once the incoming shipment are checked and satisfactory results are found, the goods are taken to the stores and kept in designated places. A goods receipt note (GRN) is prepared by the receiving personnel and copy is sent to the Accounts Department with suitable remarks for release of payments to vendor The main raw material for kubota i.e Liner and Aluminium Alloys are stored in the shed which is then move to the production department for melting. the Aluminium Alloys are put into the furnace at temp 800 degree Celsius, after 15 mins the molten metal is moved to the machine operator for high pressure casting of the item. Pressure Die Casting- High pressure die casting is used in the company for kubota casting, after the production, the casted item is moved to the quality department where various casting defects are checked, if their is no defects then the item is moved to the Gate cutting, in this all the unnecessary extra materials are removed and then it is passed through the face milling, which is most common method to clean the surface finished. leakage testing- the casted item after face milling passed through the leakage test, the pressurised air is moved into pocket (0.47-0.90 Pa). if the items pressure exceeds above 0.90 Pa then it is rejected. after the items clears the leakage test then it is over for drilling, where drilling is done as per the drawings provided by the customer. Stress Relieving- when the component is passed through all the stages then it is taken into stress relieving, here it is done to soften the materials, as the items re passed through various phases the strength of the items decreases hence to improve its internal strength stress relieving cycle is done, in this phase the component is put into the cycle at a temp 520 degree Celsius for 2 hrs and then the furnace is cooled up to 430 degree Celsius. Once the material regain its hardness, the quality is again checked as per the customer's requirements. Dispatch- the finished goods are again moved to the shed, after that it is loaded in the truck and move to the customer premises, this is movement of the item from Upstream to Downstream.

Problem- Inefficient logistics system:

This paper focus on the inefficient logistics system and how by proper planning and making necessary changes lead to improve the logistics of the company. According to CII logistics, the Logistics is defined as "Logistics is that part of supply chain management that plans, implements, and controls the efficient, effective forward and reverses flow and storage of goods, services, and related information between the point of origin and the point of consumption in order to meet customer's requirements. The logistics plays a important role in manufacturing industry, in the company there is on e loading point due to this the trucks has to wait for a long time, this is the type of waste which is included in the lean manufacturing i.e Waiting time. this time is crucial in the industry as many trucks are there in the company for loading and unloading of the company, due to such instant the logistics waiting cost increases as less number of items are shipped to the customer, due to such delays the customer are not satisfied about the performance.

Solutions:

As the problem stated above is regarding the one point loading centre, by analyzing the impact of the one loading point, By implementing TPM(total productive method) and 5S, we made another temporary point separate for loading and unloading and then compared the two scenario, the lean manufacturing techniques, we have reduced the waste by managing the loading and unloading concluded that by providing two way system we have reduced the waiting time due to this the trucks have easy for loading and unloading. earlier it required 252 min for loading waiting time which is reduced to 76 min which is result is easy, fast and reliable movement of goods in and out of the company. more over the logistics time also decreases as compared to previous method. it will be more efficient if there are more number of loading and unloading points depending upon the size of the company and the number of

trucks visit the company on daily basis. Also the method of transportation is improved by using FTL (Full Truck Load) method, by using this now the truck moves in full load i.e these employees will want to receive full truckloads at their loading point to minimise receiving costs, usually at the expense of increased inventories.

V. RESULT & DISCUSSION

Hence by using the lean manufacturing techniques, we have reduced the waiting time from 252 mins to 76 mins which makes the efficient logistics system due to which the trucks takes less time for loading as well as unloading and hence the material is reached to the customer before due date.

VI. CONCLUSION

Hence by using SCOR model and various techniques such as kaizen, 5S, lean manufacturing etc. we can improve the logistics system of any manufacturing system and also have a better results in customers satisfaction which leads better compete. This paper gives Theoretical as well as practical exposure of the problems and how such problems are solved using various techniques.

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