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Role of Production in SCM-Key Aspects

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ABSTRACT

Supply chain management is the flow of materials with in a company, inflow in form of raw materials from vendors and production flow till finished goods. There are strategies in SCM where, the crucial role is played by SCM to turn up company in to profits. Logistics, people management also play very critical role. In this paper we discuss about real time problems faced in a real time manufacturing company case study and where production planning cycle playing key role in prediction of SCM.

Keywords:— *Production flow, SCM, Logistics, Planning*

I. INTRODUCTION

The term Supply chain Management and Logistics are often confused terms. However, logistics is a component of supply chain management it manages the activities of after markets such as packing, transport etc. The totality of organisation evokes the metaphor of an interrelated web rather than linear chain, gives insight in to why SCM is so complex.

Background

Grind well Norton, a part of SAINT GOBAIN Abrasives Division, a fortune 500 company. Saint-Gobain $ 20 Billion French Conglomerate are the global leaders in Abrasives, Insulation and Fire reinforcements, Flat Glass, Industrial Ceramics, Pipes, Containers & Building Materials. It has 300 consolidated companies in 37 countries.

Products

Grindwell Norton Limited, Saint-Gobain Abrasives produces various ranges of abrasive products to give complete solution for hand tool market, furniture & decorative market, paint removal and laminate boards making, auto after services.

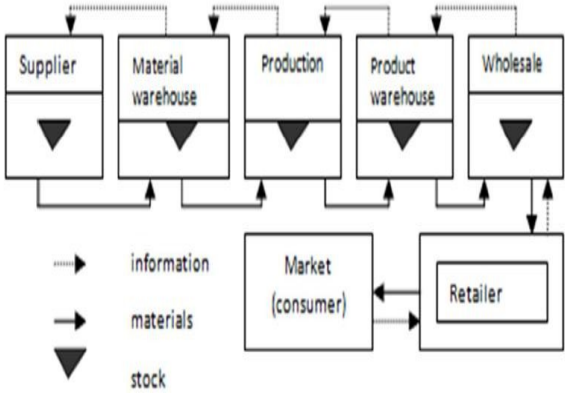

Figure 1: Process flow in any manufacturing company

Production also cares about inventory management. The most important factors in managing independent inventory include:

1. Optimization of fast-moving stock,
2. Proper definition of safety stock,
3. Reduction in excessive inventory.

Suitable inventory management under conditions of demand forecasting should focus on proper customer service, control of current and future demand and minimization of costs connected with maintaining and replenishment of stock.

II. Literature Review

Brent D. Williams et al.[1] Purpose – The purpose of this paper is to provide a review of inventory management articles published in major logistics outlets, identify themes from the literature and provide future direction for inventory management research to be published in logistics journals. Design/methodology/approach – Articles published in major logistics articles, beginning in 1976, which contribute to the inventory management literature are reviewed and cataloged. The articles are segmented based on major themes extracted from the literature as well as key assumptions made by the particular inventory management model. Findings – Two major themes are found to emerge from logistics research focused on inventory management. First, logistics researchers have focused considerable attention on integrating traditional logistics decisions, such as transportation and warehousing, with inventory management decisions, using traditional inventory control models. Second, logistics researchers have more recently focused on examining inventory management through collaborative models. Originality/value – This paper catalogs the inventory management articles published in the major logistics journals, facilitates the awareness and appreciation of such work, and stands to guide future inventory management research by highlighting gaps and unexplored topics in the extant literature.

"*A Review of Inventory Management Research in Major Logistics Journals Themes and future directions"*

Kot S et al.[2] Efficient management of supply chains consists in particular in ensuring possibly highest quality of customer service and striving for minimization of the costs generated by flow between the links. Typical cause of constantly increasing costs is excessive inventory levels throughout the chain. The reason for this situation is maladjustment of the level of supply to the level of demand in the market, which results in surplus stock. The starting point for reduction in inventory levels is forecasting of demand in the market through market prognoses in cooperation with all the links in the supply chain. Therefore, in the aspect of demand forecasting, the character of data flow and the type of cooperation between the links is essential.

"Theory of inventory management based *on demand forecasting".*

S. L. Adeyemi et al.[3] Inventory constitutes the most significant part of current assets of larger majority of Nigerian manufacturing industries. Because of the relative largeness of inventories maintained by most firms, a considerable sum of an organization's fund is being committed to them. It thus becomes absolutely imperative to manage inventories efficiently so as to avoid the costs of changing production rates, overtime, sub-contracting, unnecessary cost of sales and back order penalties during periods of peak demand. The main objective of this study is to determine whether or not inventories in the Nigeria Bottling Company, Ilorin Plant can be evaluated and understood using the various existing tools of optimization in inventory management. The study methods employed include the variance analysis, Economic Order Quantity (EOQ) Model and the Chi-square method. The answer to the fundamental question of how best an organization which handles inventory can be efficiently run is provided for in the analysis and findings of the study. Consequently, recommendations on the right quantity, quality and timing of material, at the most favourable price conclude the research study.

"Inventory *Management: A Tool of Optimizing Resources in a Manufacturing Industry A Case Study of Coca -Cola Bottling Company, Ilorin Plant"*

Rachel Q. Zhang et al.[4] This paper develops and tests a simple procedure for establishing stocking rules for a multi-component distribution center that supplies spare parts for an equipment maintenance operation. Our basic formulation seeks to minimize inventory investment subject to constraints on average service level and replenishment frequency. We simplify this formulation by classifying parts according to a new ABC methodology and applying heuristics to the classical *.Q; r /* model that lead to closed-form expressions for the stocking parameters. Our numerical results show that: (1) the proposed ABC scheme does not introduce large errors provided that it is done in a manner that reflects the key parameters in the model, and (2) any of a number of simple reorder point heuristics can provide the basis for an effective spreadsheet implementable system for controlling inventory in a complex multi-component environment as long as the service level is checked against the exact formula.

"*Spreadsheet Implementable Inventory Control for a Distribution* Center*"*

Yves Caseau etal[5]; Inventory management is a key problem in several industries, (car renting, storehouse space renting, etc.). It consists of managing a given fleet of equipment in order to satisfy requests to use it. When requests exceed the stock of available equipment, a decision has to be made, either to subcontract some requests to another provider or to purchase new pieces of equipment. The main difficulty lies in the fact that a subcontracted request must be subcontracted for all the duration of the request. For example, if a subcontracted car is rented to a given customer, this customer will keep the subcontracted car for all the duration of the rental. In this paper, we propose a set of benchmark problem instances, derived from real-world inventory management problems.

Gunnar Ebner et al. [6], Manufacturing companies have historically had an on-off relation with technology. Most have aggressively adopted traditional technologies such as Enterprise Resource Planning (ERP). However, they have been slow in adopting recent digital technologies such as big data analytics, real-time order confirmation, Web-EDI among others. Moreover, most have adopted technologies

to varying extent creating a connectivity gap in their operations. We believe digital technologies will help manufacturing companies in eliminating this gap. Our research and project experience indicate that by adopting digital tools, manufacturing companies can cut costs by as much as 30% by enabling savings on capital costs, labor field force among other key cost elements.

Musonda Kasondae et al. [7]., Human resources is the backbone of any system and the key enabler for all other functions to effectively perform. This is no different with the Immunization Supply Chain, more so in today's complex operating environment with the increasing strain caused by new vaccines and expanding immunization programmes.

"The people factor: An analysis of the human resources landscape for immunization supply chain management".

III. Problem Definition

Any company inherently calls for having good supply chain management through accurate planning stage wise and having good inventory control systems from Raw material to finished goods. The current practice is very fragile when it comes to Production line.

IV. Research Methodology

In this paper we made a research of practical case study of production control in manufacturing company(s) which had following gaps.

4.1 Case (I) Grindwell Norton

Tools used in studying the production planning are BIN card system Optimizing the stock levels at all OSM site, Transaction processing system 5S Gemba study Optimizing the ERP system to make it more user friendly Redefining the BOM & MAKER code corrections Bar Code implementation

Gemba study:

Japanese word literally "real place", used in business process improvement context to refer to place where value is added, such as manufacturing area or a workshop.

A related term, "Gemba kaizen", is used in Japanese process improvement initiatives to "continuous improvement on the shop floor", where production takes place.

5s:

1. Sort
2. Set in order
3. Shine
4. Standardize
5. Sustain
6. Safety

Bin card system:

A document that records the status of a good held in stock room. A typical retailing business with a large stock room will use a bin card to record a running balance of stock on hand, in addition to information about stock received and notes about problems associated with that stock item.It is a element in perpetual inventory system. Inventory status of a product at any moment.

ERP:

Usability of ERP software has come to tipping point & "big two (oracle & SAP) are racing to make changes to their user interface as smaller, agile and more user friendly ERP software companies are biting

in to their market share. The tires of also widely known as

1. Data
2. Business/logic
3. Presentation layer

ERP in inventory reporting helps the front end customer in accuracy data compilations of reports, data managing.

BOM:

Bill of materials is completely a list of components making up an object or assembly. It is a part of material requirements planning.(MRP).

Bar Code Mechanism

This mechanism scans the label on the material and gives the product code details, which even records the previous data.

Just-in-time (JIT) production is a concept to reduce work in process with respect to a continuous configuration of the product. Barcode and RFID identification can be used to identify work items in process flow. For locating the products additional requirements must be considered to ensure not only presence of work items but also knowledge of whereabouts of these items. This is a mandatory condition in flexible production lines with paralleled work positions for single steps of production.

4.2 Factors Influencing SCM

There are several factors that influence SCM

1. Vendors
2. Logistics
3. Transport
4. Material
5. Production planning
6. Sustainability etc.,

So far research done in all factors except production planning.

Discussing on current issues in industries, companies and their requirements to run in profits apart from standards maintained by any industry they need to take care of raw material too. Flow of material in this case study is

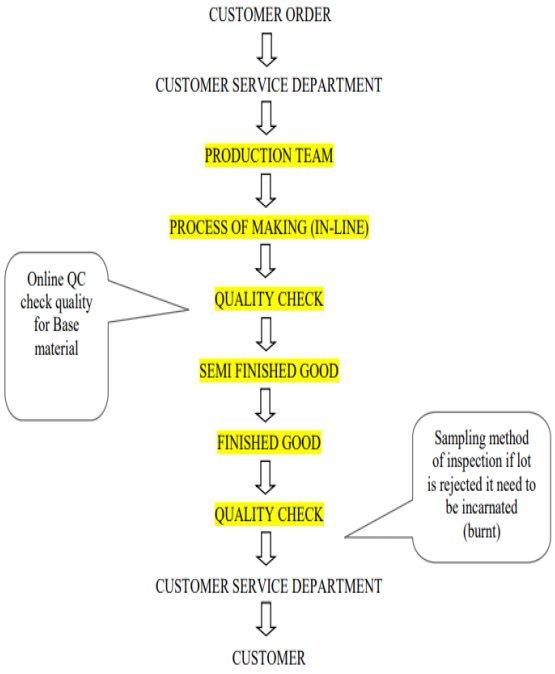

Figure 2: Flow diagram of sequence of operations in company (Abrasives product)

The highlighted part in Figure 1 comes under intermittent process in order to serve customer. The maximum time period for product to get accessed depends on PUSH or PULL system.

Table 1: Push Vs Pull system time period

Parameters	PUSH SYS-TEM	PULL SYS-TEM
TYPE	MTS	MTO
DAYS	30	10-15

The increasingly global and complex nature of supply chains carries elevated risk of costly disruptions caused by a variety of unpredictable factors – natural disasters, industrial accidents, political shocks, etc. At the same time, an intensifying emphasis on efficiency has removed nearly all the slack from most firms' supply chains. In response to both pressures, many managers have been diversifying their supplier networks – fearing that relying too much on any one supplier would enhance exposure to potential disruption, and would also grant that supplier a dangerously advantageous bargaining position in price negotiations.

Product costs can be inflated by poorly managed supply chain expenditure are listed below

- Excessive transportation costs
- Procurement costs
- Inventory and storage costs
- Waste in the supply chain
- Inadequate inventory management
- Poor forecast accuracy

4.3 Findings/Outcomes

1. Movement of forklift in shop floor has decreased(saving fuel costs)
2. Due to space management i.e., segregation (good/rejected/salvage) placed in designated areas 5s in shop floor increased.
3. Due to more visibility production planning improved and reports generated in no time.
4. Internal OTIF(on time in full-service) improvement from 55% to 81% & Service level index from 88% to 93%
5. This is a dynamic process.
6. Bar code system improved accountability and cycle of production
7. SCM cycle now moves freely without any disturbances due to production delays.

4.4 Further Scope/Horizontal Deployment (Case 1) :

- These methodologies should be applied to all OSM sites for getting the WIP ONLINE
- Same can be horizontally deployed at In house for other RM's like Grains, formulations etc
- Extended at In house stores, like stocking items across at a divisional level
- Can be deployed for maintaining spares for maintenance dept.
- The bin card system can be deployed at all OSM sites for easy access of the material.
- Bar code system.

4.5 Case Study (II)

Tools used in study of a fibre (scrub) manufacturing are Gemba study(Raw material planning, Production control, Intermittent process) Machine maintenance Services.

Here also as mentioned in above case gemba study has been done and found things like ABC analysis that help in material management, even though it is a automated processing it requires a skilled labour to operate huge machines the processing times to be set, proportion of material to be added are some intermittent works which requires manual intervention. Flow of material is as follows,

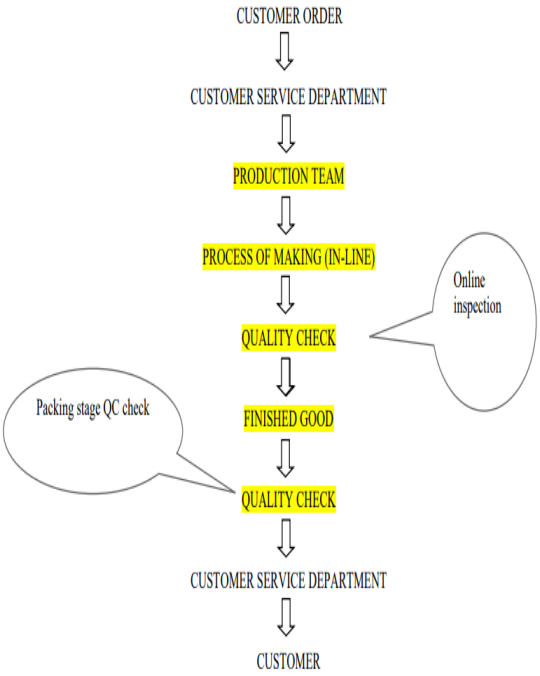

Figure 3: Flow diagram of sequence of operations in company (Scrub)

4.6 Further Scope/Horizontal Deployment (Case2)

This digital chain of data collection and processing can help in several ways.

1. In many cases, if it can speak to you via the IoT, you can control it. Plant machinery can be automatically started, stopped or adjusted to match changes in demand. Truck fleet activity can be optimised to reduce the miles travelled without carrying useful loads (deadhead miles).

2. Status and trend data from critical machinery can be continuously monitored. Problems or outages can be detected as they happen. Immediate repair then ensures minimal downtime.

3. Data can be analysed for signs of impending problems or failure. Preventive maintenance can then be done at the earliest time with the lowest impact to production or logistics (perhaps at night or over a weekend).

4. Raw materials and finished goods can speak too. Via the IoT, they can be connected to let you know how much you have of each article. They can also tell you the location of the stock – in a retail outlet, in a warehouse, even on a truck. The bullwhip effect of excessive safety stocks can become a thing of the past.

5. Accounting becomes more efficient when your supply chain automatically informs you about assets and inventory. Machine status information gathered automatically reduces the need for manual intervention, helping to improve safety at work.

5. RESULTS AND DISCUSSION

Comparing the case studies we derive a statement that for different processes the supply chain varies but basic things in production are common let us discuss them in below table.

Table 2. Over all Case Study Outcomes in View of Production Activities

Activities	Case Study I	Case Study II
Production Time	More(15days Average)	Less(2days)
Processes	Manual	Automatic
Machine Mainte-nance	Required Monthly	Anually
Sequence of Operations	More	Less
Breakdowns	More	Less
Eco Friendly	Yes	Yes
Skilled Level	Low	High

*Assuming other sources are available

Production Team

This term constitute of a team of average 5-6 people who involve in following operations

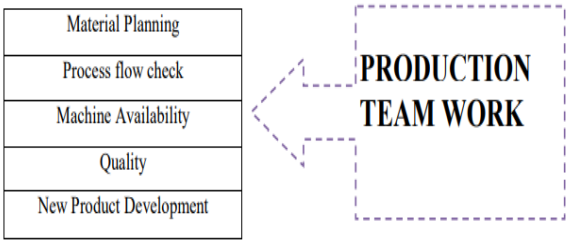

Figure 4: Production team activities

All the activities mentioned above are the most important to handle any company.

VI. CONCLUSIONS

Production process act in between the raw material and finished goods. As process increases SCM gets complicated, thus Minimum processing steps help in maintaining health index of supply chain. Supply chains can benefit from the Internet of Things for increased flexibility, faster reaction times to market changes.

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