Study Manual on

SUPPLY CHAIN MANAGEMENT



SUPPLY CHAIN MANAGEMENT

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ABBREVIATIONS AND ACRONYMS

ABC	Activity Based Costing
ABC	Inventory Classification based on value and Dollar worth
CEO	Chief executive Officer
CRM	Customer Relationship Management
CSR	Corporate Social Responsibility
EBQ	Economic Batch Quantity
EDI	Electronic Data Interchange
EOQ	Economic order Quantity
ERP	Enterprise Resource Planning
IDF	Independent Demand Forecast
KPI	Key performance Indicator
MRP	Material Requirement planning
QDM	Quantity Discount Model
QR	Quick Response (Speed Based Philosophy)
ROI	Return on Investment
SCM	Supply Chain Management

GLOSSARY OF TERMS

Demand	Request backed with readiness to pay
Design	structural Construct and ecstatic outlook
Innovation	New invention or discovery /application
Innovation Diffusion	The rate a new discovery expands and is accepted

Investment	Input of a resource e.g. money for profit or return
Offering	Company product or service brought in for sell
Quality	Ability to conform to standards or meet expectations
Price	A traded off for want
Product	Anything that is offered to the market to meet want/need
Production	Creation of utility (goods or services
Pull Production	Production triggered by customer demand
Push production	Production in anticipate of demand
Resource	inputs – money, men, material, machines, management
Services	Are intangible, inseparable, variable and perishable products

COURSE TITLE

SUPPLY CHAIN MANAGEMNT

CHAPTER ONE

SUPPLY CHAIN AND SUPPLY CHAIN MANAGEMENT

1.1 The Concept of Supply Chain

A supply chain is a network of partners who collectively convert a basic commodity (raw materials e.g. zinc) upstream into a finished product (downstream) e.g. roofing sheets that is valued by end users/customers who manage return at each stage. Each partner in the supply chain is responsible for a process that adds value to the product in the chain. Here, a process is the transformation of inputs in the form of materials and information into outputs in the form of finished goods and services.

1.1.1 The Structure of the Supply Chain

The supply chain is a structured system. It has the

a. Upstream element
b. Production element
c. Downstream element

Each of the streams has a network of partners that add value to the system before it gets to other partners.

The upstream refers to the basic activities required to gather or extract the raw materials from their state of nature and moved to the conversion centres as production inputs (raw materials)

The downstream element sees to the conversion and distribution of the processed goods to hands of the final consumers. Activities in the downstream sector include – transportation and distribution,

warehousing, inventory, quality control and assurance, advertising and sales.

1.1.2 Supply Chain Management (SCM)

All the processes of the supply chain need to be planned, coordinated and managed to bring desired results. This is the concern of supply chain management.

From these therefore, we say that Supply chain is the planning, and controlling of all the business processes from end-customer to raw material suppliers- that link together partners in the supply chain to serve the needs of the end –customer.

From this definition, we note that planning is a process of setting aside ahead of time strategies to achieve set goals. It defines how much of each product should be bought, ordered, stored, distributed or sold per day, month etc.

Supply chain management is the process that plans, networks and integrate business activities to create seamless process flow of goods and services to achieve sustainable business growth through synergies. Supply chain creates net value, builds competitive infrastructure for optimal benefits of all network partners.

Let us take other definitions of the subject matter:

a The Institute of Supply Chain Management states " It is the design and management of seamless, value added processes across organizational boundaries to meet the real needs of the customer.

b The Supply Chain Council " managing supply and demand, sourcing raw materials and parts, manufacturing and assembly, warehousing and inventory tracking, order entry and management, distribution across all channels and delivery to the customer.

c The council of supply chain Management professional " the planning and management of all activities involved in sourcing and procurement conversion and all logistics management activities. Importantly, it also includes coordination and collaboration with channel partners which can be suppliers, intermediaries, third party service providers and customers.

In all, it must be noted that the supply Chain exists for the purpose of providing excellent customer service.

1.1.3 Elements of Supply Chain Management

Supply chain management involves other activities like – Planning, Transportation, Inventory Management, Procurement, distribution and quality control. Each of these activities play to ensure channel members play well to satisfy (create value) the end users. Supply chain firms must master the five key elements to avoid bull-wipe effect on the chain. The elements are:

a. Plan
b. Source (Procure using approved vendors)
c. Make (transform or manufacture for the customer
d. Deliver (make the goods/service available to the consumer)
e. Return. (Feedback and reverse logistics – empties, rework etc)

Here, to **plan** is to set in advance what to do when to do and how to do it. E.g. planning is required to control inventory and manufacturing

process. They match supply with aggregate demand by developing actions using analytical tools (SAP and or ERP). To procure what is planned is called **"source"**

To plan with is sufficient for production is "make" i.e manufacture with is required by the customer and other members of the chain (partners). To attain acceptable service levels by delivering on time and target (lead time is called delivery. With these, it is imperative for firms in the supply chain to keep eye on demand variations to avoid bull weep effect along the chain. This can be done through use of analytical tools like SAP and ERP.

1.2 The Objectives of a Supply Chain

Supply chain management in both service and manufacturing operations aim at providing excellent customer service. The manufacturer ensures products conform to customer's requirements while service providers are on their toes to deliver excellent services to the customer. Because, the customer is the one that brings the money (return on investment)

1.3 The Challenges of Supply Partners in Nigeria

Like other partners in the supply network, service providers in Nigeria supply chain network suffer some challenges that have hindered rapid development of the industry. Among such challenges are – Process integration has been a daunting challenge. To integrate or coordinate requires rapid information sharing, Yet most network partners do not have the ITC and financial capacity. Note, we have been using the term " process integration" This means sharing information and coordinating resources to jointly manage the supply chain process but this is a big challenge to many firms in supply chain.

Process integration is a challenge because it requires proper training and preparedness, willingness of partners in the chain, trust (process risk and security), cultural change, compatible information system and competent partners.

Others are:

a. Cost of doing business in Nigeria. Prices for raw materials, labour, equipment have tripled over the past years. Exchange rate gone high and cost of money (interest rate) gone higher. These economic fluctuations posse great challenges to supply chain partners in Nigeria.

b. Harsh economic policies (Taxes, tariff and other associated charges) These have weakened their capacity, have posed great challenge to supply chain partners in Nigeria as they have very low financial capacity.

c. Lack of trust among supply chain partners. Growth in business is engendered by trust. Where lack of it, there is is no relationship. This is a challenge as there are personalized service providers who may not join hands to growth bigger capacity due to lack of trust.

d. Also is the challenge of low technical and technological capacity. Most of partners do not have the capacity to connect to internet, Electronic interchange (EDI) and other world–wide-webs (WWW) where information are shared amongst partners.

e. Low/poor risk bearing capacity. Most partners have no risk plan management to keep them ahead of risks and uncertainties that surround the supply chain, e.g. they have no succession plans in place to cope with undesirable occurrences.

f. Unstable market and demand trends. There has been constant change in technology, taste and demand. This has caused disruptions in the chain as most partners are not in total control of the trends that shape the market. Also may not have the technology to manage and cope with variations in the market place.

7.4 Self Test Question

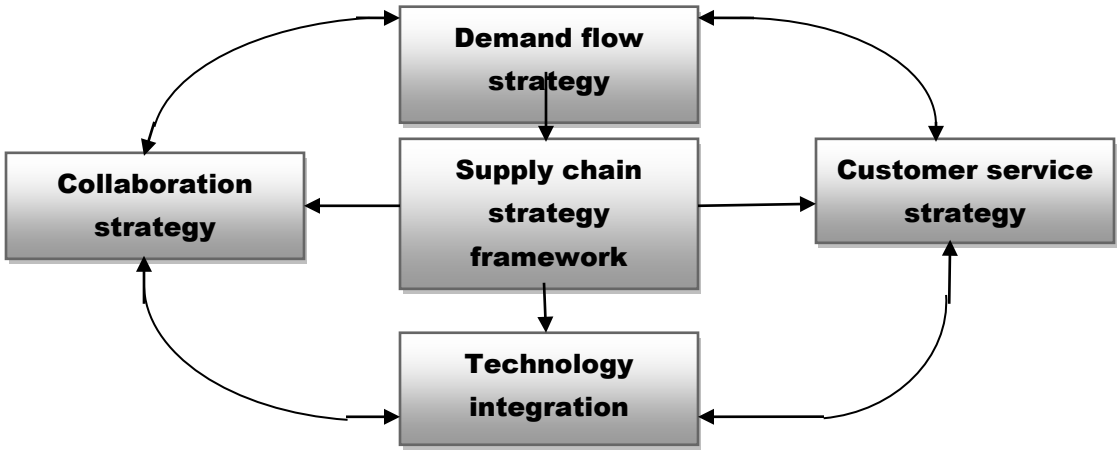
1. What is process integration. What are the challenges of process integration among supply chain partners in Nigeria
2. List and explain any four (4) supply chain processes you know

CHAPTER Two

SUPPLY CHAIN STRATEGY

2.0 Introduction

Firms in supply chain have ways they carry out business to remain competitive than opposing each other in the network. The way they do these is born out of their cooperative and mutual efforts. Hence, there is cooperation and not completion among channel members. Among the strategies they adopt include the expression in Fig, 8.2. Supply chain strategy will have a major impact on creating value for a company and its supply chain partners. An effective supply chain strategy may be formulated to meet the needs of the market and integrate them with technology to generate the highest level of customer satisfaction while delivery the highest value to the share holders supply chain strategy is based on collaboration strategy, demand flow strategy, customer service and technology integration strategy discussed as under.



Supply Chain Strategy Framework

2.2 Collaboration Strategy

Opportunities for collaboration among business partners will vary depending upon the organization's perspective role in the supply chain. The three main types of collaboration are as follows:

a Manufacturer /Supplier Collaboration: By collaborating with suppliers, manufacturers will derive benefits in activities such as product development, order fulfillment and capacity planning.

b Manufacturer/customer Collaboration: The opportunities of collaboration between manufacturers and customers are focused on demand planning and inventory replenishment. This approach ensures that the customer requirements are met efficiently.

Collaboration with Third Party and Fourth Part Logistics Providers: The collaboration of companies with 3rd party logistics providers focuses on jointly planning logistics activities. It also gives the company the added advantage of better packaging. The 4th party logistics organization is one of the intermediate stages along the logistics spectrum that combine the benefits of outsourcing and in sourcing.

2.3 Demand Flow Strategy

Traditionally, in supply chain management, the key focus and scope has been in managing flow of goods from suppliers through the manufacturing and distribution chain to the customer. The key in demand management is the continuous flow of demand. Information from customers and end users through distribution and manufacturing to suppliers. Customers can never be totally predictable but then a good demand flow strategy enables the company to simplify their supply chain operations.

Customer satisfaction level is directly propositional to the service provided by the company. Formulating a customer service strategy

involves addressing 3 steps, namely, customer segmentation, cost to serve and revenue management as explained below:

a **Customer Segmentation**: A company has decided on the segment it wants to target for a particular commodity. It can decide not to have a homogenous market which is unacceptable.

b **Cost to Serve*:*** It is important to obtain an impartial assessment of whether the things that the customers want are feasible for the company. It is also important to determine the kind of support needed from the suppliers or are other parties in the supply chain. Finally, it is required to project the cost of the support system and its feasibility of execution.

c **Revenue Management:** Determination of the appropriate response to the identified needs and expectations of each customer segment must be completed. In short, the response which maximizes the firm's profitability and growth should be determined.

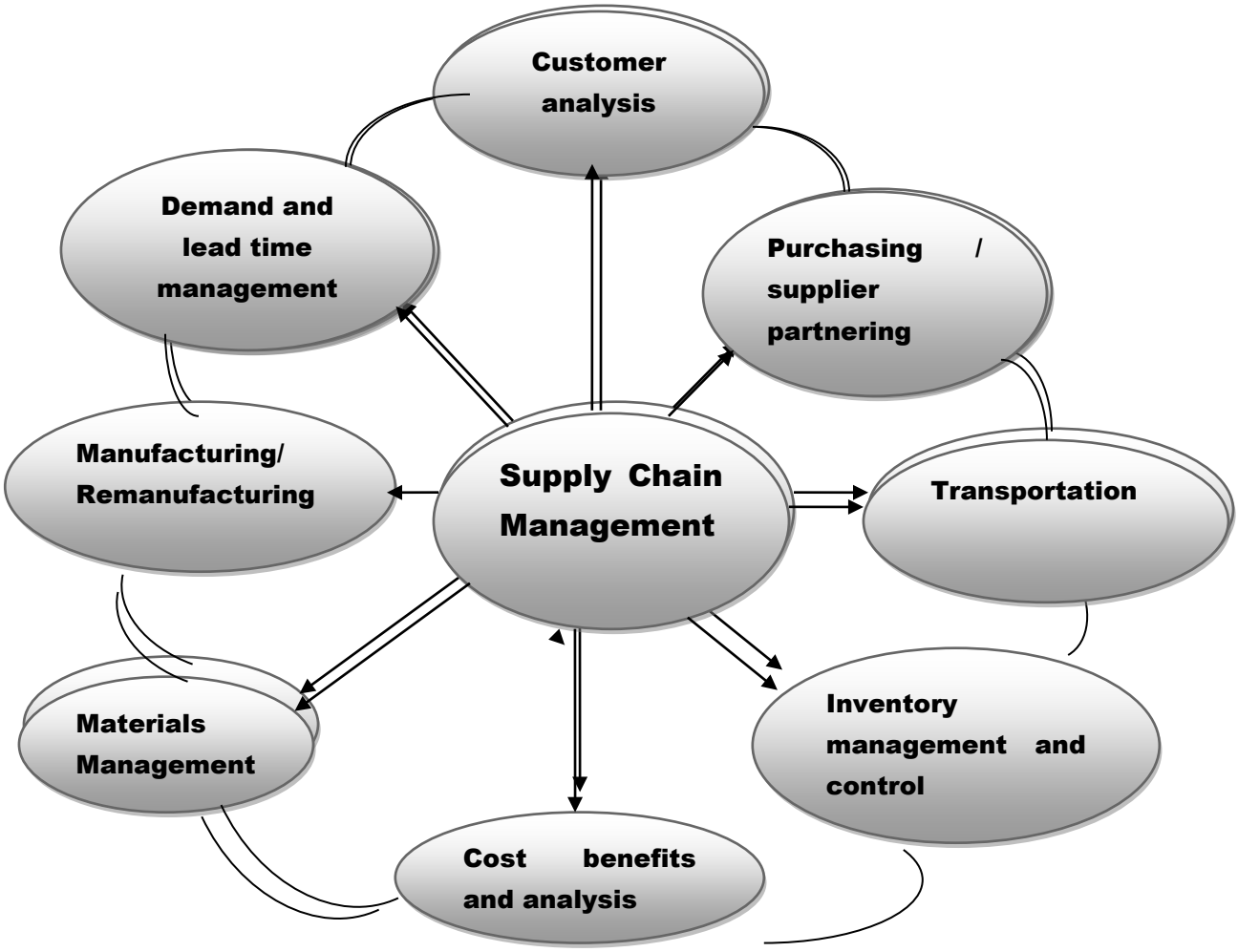
2.4 Technology Integration Strategy

Development in Information Technology (IT) enabled the integration of business information systems, both horizontally and vertically among and across supply networks. A number of IT-based supply chain information management tools are now available to provide intelligent decision support and execution management.

Among such are the internet that cut across organizational boundaries, the intranet that work within organizations. Also are the www that is global to all supply chain firms. These technologies make avalanche of information readily available to partners. Also are Whats app, E-mails,

Face-book and other soft ware accessories that make decision taking easy e.g. the ERP and more

The main SCM approach today deals with the integration of all elements of a customer service focused organization.



Integrated Supply Chain Management Approach

2.6 CPFR (Collaborative Planning Forecasting Replenishment)

Definition: Collaborative Planning, Forecasting and Replenishment (CPFR) is the sharing of forecast and related business information among business partners in the supply chain to enable automatic product replenishment.

Function: CPFR is designed to improve the flow of goods from the raw material suppliers, to the manufacturer, to the retailers' shelves. It also is designed to quickly identify any discrepancies in the forecasts, inventory and ordering data so that problems that can potentially damage sales or profits can be corrected at a very early stage.

Sales history, sales projections, raw material availability, lead times and other important business information are shared between the manufacturer and business partners. The information is then integrated, synchronized, and used to eliminate excess inventory and improve in-stock positions making everyone in the supply chain more profitable.

2.7 Self-Test Questions

1 Supply firm adopt various growth inducing strategies in their areas of operation. List and explain any four (4) of such strategies.

1 Why do firms in supply chain collaborate? What are the possible dangers in these forms of collaboration?

2 What role does TRUST play in International Supply Chain?.

CHAPTER NINE

PLANING AND BUDGETING IN SUPPLY CHAIN EFFICIENCY

3.0 Introduction

Supply chain organizations draw efficiency and survive from planning their activities ahead of time. This time scale arrangement keeps them ahead of disruptions that may occur in the chain. Planning is a tool these organizations adopt to compete favorably in adverse and harsh market environments. Here, they allocate resources by way of financial budgets.

3.1 The Concept of Budget

According to the Chartered Institute of Management Accountants (1996), “A budget is a financial and/or a quantitative statement prepared and approved prior to a defined period of time, of the policy to be pursued during that period of time for the purpose of attaining a given objective. It may include income or receipts, expenditure and the employment of capital” A Budget is a plan of income and expenditure over a given period of time - Atkinson, Kaplan and Young (2007), The Budget is a vital part of the planning process. In fact, it can be said that the Budget forms the first stage of the planning process. This plan covers a period of time i.e. one year or more (Atkinson et al, 2007).

Lucey (1996), Alderton, (2004), Branch, (2006) agree that “A budget is a plan expressed in money terms. It is prepared and approved prior to the budget period and may show income, expenditure, the capital to be employed. A budget may be drawn up showing incremental effects on former budgets or actual figures or be compiled by zero bases budgeting”.

Lucey, (2009) went on “A budget is a quantitative expression of a plan for a defined period of time)”. A budget can be made for a family, business, organization as a whole (master Budget), Government etc, Jhigan (2011), Atkinson, Matsumura and Young (2009), Anderson and Narus, (2009).

Due to the fact that an organization is made up of various departments (Cost centre) or operating functions, e.g. Marketing, Operations etc, there are various budget types to cover these units, e.g. Marketing budget, Production budget, Advertising budget, Transport and Logistics budget etc. Also, there are various Models of Budgeting. Each suited for its purpose. Hence, today’s budget is a cash flow management tool for Managers in the various departments of the organization. These departments are cost centers in accounting terms as each unit manages it own income and expenditure over the financial period Walter, (2010). It helps to create cost awareness for all employees.

3.2 Elements of Budgeting and Budgeting Mechanism

Budgeting is the setting of expenditure levels for each department in the organization. It is an activity that estimates and allocates resources to achieve targets over a given period (financial year) (Harvard Business school 2010)

Budgeting is a means of translating the overall objectives or the organization into detailed, feasible plans of action. B udgeting is a process of making plans for the future and implementing the plan and monitoring to ensure activities conform to the plan. Achieving this requires management support. .

3.2.1 **Budgeting Mechanism /Process**

This is an integral part of the planning process and control (Lucy 2009). The budget process requires also an articulated reporting system. The journey in developing an implementable budget requires planning, effective management and collaboration to reach the desired destination (Danielson and Fuller, 2000). Budgetary mechanism calls for developing:

a A clear organizational structure
b A working operational plan
c Standardization of processes e.g. developing detailed time table etc.
d Appointment of a budget committee

Beside these, the budget undergoes these phases:

a Draft budget drawn up by the budget holder (consults cost centre heads)
b Revised budget after consultations
c First budget to the committee
d Revised and amended to accommodate negotiations and agreements
e Final Budget is approved and put into use (meeting of minds)

3.2.2 **The Budget Committee**

The budget committee is a management group responsible for establishing a budgeting policy and for coordinating the preparation of budgets. The budget committee is a group that coordinates, create and maintain fiscal responsibility for the organization. These executives are brought together to work and prepare the master budget (The Economist, 2010, vol. 243ch). The committee may include: the managing director (MD) and other heads of department. It further

includes Supply Chain, Marketing, Logistics, Transportation, Procurement, Chief finance officers (accountant)

The committee review and approve departmental budgets. They play key rsole in the demise and survival of supply chain organizations by ensuring staff and management keep to the standards. They keep track on organizational budgets to ensure smooth operations and fiscal solvency.

3.3 Functions of the Budget Committee

The budget committee has the fiduciary responsibility to prepare and maintain the firm's financial viability. (Jhingan, 2009).

Above all, the roles of the Budget committee include:

a Act as advisory committee to the chief executive
b Direct the executives on budgetary matters
c Educate budget holder on their budgets
d Receive and examine supporting budgets, amend and approve budgets
e Consider the requests for budget revision during the year.

3.4 Forms of Budget in Supply Chain

a The Master Budget (operating and financial)

According to Lucy (2009), a master budget is the summary of all the departmental budgets. It is expressed as a profit and loss account and balance sheet. It is a one year planning document for the firm encompassing all other budgets. It coincides with fiscal year of the firm and it can be broken into quarters, months.

The master budget has two parts namely operational budget shows all the incoming/generating activities of the firm including revenue and expenditures. The result is a budgeted income statement (Allan and Harkimer, 2012). The financial budget is made up of three parts namely: cash flow budget, the balance sheet and the capital expenditure.

The cash budget expresses cash in and out flows, expected borrowing and investments on monthly basis. None of cash items like depreciation are ignored in cash flow budgets.

Other forms of budgets are Supplementary Budget; Sales Budget; Production Budget; Capital Budget and Marketing Budget

3.5 Functions of a Budget

Supply chain firms use budgets to take decisions, plan and allocate resources. The decisions include:

a Pricing system
b Capital acquisition
c Labour cost and
d Financial control

Also, the budget helps the firm to provide feedback on liquidity efficiency and profitability. To be above to use these feedback implies that one must know the fixed cost and variable costs of operations. Also, the contributory margin of every activity in the operation.

As opined by (Akinson and Hagger, 2013) a budget is an accounting plan for a specific time period. It normally serves two purposes namely:

a Quantifying the objective of the enterprise e.g. departmental profits and productivity

b Provides a basis for control (financial, labour and resources) by acting as a measure for performance evaluation.

c Planning and control

Table 8.1 the roles of a budget – planning and control

1. Developing long term strategy and short term plans
2. Developing Master Budgets
3. Identifying organizational objectives and short term goals
4. Measure and asses performance against budget
5. Re-evaluating goals, objectives, strategies and plans.

(Note 1, 2, 3 are for planning. 4 and 5 are for controls)

In all, a budget serves to coordinate the many activities of an organization.

3.6 Self-Test Questions

1 Why do supply chain firms develop budgets?. What are the possible challenges to this exercise?

2 Explain the term, Master budget. What are the compositions of a master budget for a procurement firm in Port Harcourt?

3 List and explain the compositions of a budget team. What management roles do they perform in a supply chain firm?

CHAPTER FOUR

OPERATIONS MANAGEMENT IN SUPPLY CHAIN

4.1 Introduction

Operations management is the process whereby resources or inputs are converted into more useful products. Although the terms operations management and production management are similar in meaning, there are two points of difference. This term is more frequently used where inputs are transformed into intangible services.

4.2 Manufacturing System

A system is defined as a relatively complex assembly of physical elements characterized by measurable parameters. To model a system, we need:

a To define the system's boundaries or constrains.

b To predict, through the system parameters its behaviour in response to excitations and disturbances.

c Models are used to describe how the system works

From the above definition of a system it is clear that a system will have clear boundaries and also the output of the system can be gauged with the help of different input parameters to system. A manufacturing system inputs materials, information, workers and energy to a complex set of elements known as machines or machine tools, which can be characterized. The materials are processed and gain value.

Manufacturing system outputs may be either consumer goods or inputs to some other process.

4.3 Role of Production in Business

Business is defined as the activity of providing goods and services involving financial, commercial and industrial aspects. Production, is the transformation of raw materials and operational inputs into “outputs” that, when distributed, meet the needs of customers. Hence, production play a very important role in the overall business scenario as it basically deals with the manufacturing of the goods, which are in turn provided for the customer to fulfill their needs.

4.4 Mass Production System

Mass production can be defined as, manufacture of goods on a larger scale, a technique that aims for low unit cost and high output. In factories, mass production is achieved by a variety of means, such as division and specialization of labour and mechanization. These speed up production and allow the manufacture of near-identical, interchangeable parts. Such parts can then be assembled quickly into a finished product on an assembly line.

4.5 Lean Manufacturing

Lean manufacturing is a business initiative to reduce waste in manufactured products. This waste may be from the production process or from any part of the organization. The basic idea is to reduce the cost systematically, throughout the product and production process, by means of a series of engineering reviews.

4.6 Agile Manufacturing

Lean manufacturing is very good at doing the things that can be controlled. Agile manufacturing deals with the things which can*not* be controlled. Agility is the ability to thrive and prosper in an environment of constant and unpredictable change. Agility is not only to accommodate change but to relish the opportunities inherent within a turbulent environment. Some of the reasons for the fact that the manufacturing paradigm is changing mass production to agile manufacturing are:

a Global competition is intensifying

b Mass markets are fragmenting into niche markets

c Cooperation among companies is becoming necessary, including companies who are in direct competition with each other.

d Customers expect low volume, high quality, and custom products.

e Very short product life cycles, development time and production lead times are required.

f Customers want to be treated as individuals.

4.7 Quick Response Manufacturing (QRM)

In today's world of competitive environment, one of the key success factors for manufacturing firms is speed-not only speed of delivery, but of concept, design and production. New opportunities open for those manufacturing firms, who can get products to market before the competition and success hinges on the ability to move quickly.

Quick response manufacturing (QRM) is a companywide strategy to cut lead times in all phases of manufacturing and office operations. It can bring the manufacturing fir's products to market more quickly and secure

its business prospects by helping to complete in a rapidly changing manufacturing arena.

QRM will not only make the manufacturing firm more attractive to potential customers; it will also increase profitability by reducing non-valued-added time, cutting inventory and increasing return on investment.

Benefits of QRM for the Manufacturing firm

a Decreases the manufacturing costs
b Increases the market share
c Fills customer orders faster
d Boosts product quality
e Introduces new products rapidly
f Eliminates waste and inefficiency
g Secures the manufacturing future of the firm.

4.8 key Concepts in Lean Manufacturing

As we have already seen, Lean manufacturing is a concept which looks very simple but its actual implementation would become difficult if certain basic concepts are not understood properly by an organization going for the implementation of Lean Manufacturing.

This chapter will give an idea about such basic concepts which an organization should have, before they can implement lean manufacturing. These concepts can be enumerated as follows:

a Continuous flow
b Standard work
c Value stream

d Value added activities

e Pull Production

4.9 successful Lean Introduction to Supply Chain

Some of the key approaches to make lean successful throughout the supply chain of a manufacturing company are listed below:

a The manufacturing company has to be fact based and not just rely on rhetoric about the improvements to be gained.

b The manufacturing company has to be willing to share information at a very detailed level to help the suppliers see the savings potential.

c The manufacturing company has to demonstrate a commitment to the long-term with its implementation of the lean strategies and not just a 'flavour of the month'.

d Most importantly, the manufacturing company has to give its suppliers manufacturing company and the suppliers are in it together and the benefits work both ways. The manufacturing company helps its suppliers and they are more willing to work with the manufacturing company on issues. Both parties see that from a competitive standpoint, lean is their key differentiator.

e The manufacturing company should demonstrate the potential benefits of lean not only for their own company but also for all their suppliers (and also for the other customers of the suppliers, if possible), covering both the bottom line and service points of view.

4.10 Basic Elements of Lean Manufacturing

Lean is about doing more with less: less time, inventory, space, people and money. Lean manufacturing (also known as the Toyota Production System) is, in its most basic form, the systematic elimination of waste-overproduction, waiting, transportation, inventory, motion, over

processing defective units-and the implementation of the concepts of continuous flow and customer pull (the difference between mass production and lean production is highlighted). The following five areas drive lean manufacturing/ production:

a Cost

b Quality

c Delivery

d Safety

f Morale

4.11 Stages of Manufacturing

Various stages of manufacturing are shown in figure below:

MANUFACTURING STAGES

Craftsmanship

↓

Mass Production

↓

Just –in-time Production

↓

Segmentation of Marketing

↓

Niche Marketing

↓

One to one Marketing

↓

Mass Customization

Stages of manufacturing

a Craftsmanship

This form of production is seen as the simplest form of production where one person is the manufacturer, marketer and seller of the product. This one person offered customized goods and services to his customers as per their demands. This offering was conceived on the basis of customized attention.

b **Mass Production**

Mass production simply means production of standardized goods and services at low costs. This kind of system involves interchangeable parts, specialized machines, division of labour, economies of scale.

c Just-in-time Management

JIT concept is: Produce and deliver finished goods just in time to be sold, subassemblies just in time to be assembled into finished goods, fabricated parts just in time to go into subassemblies, and purchased materials just in time to be transformed into fabricated parts.

d Segmentation of Markets

Segmentation basically is the division of the market into segments or clusters, where each segment has people having similar wants and needs.

e Niche Markets

A niche market is a group of people having very distinct and common set of needs. It is a sub-segment within a segment.

f One to One Markets: Here the consumer expects personalized attention at all times. His needs are very unique and may or may not be

well articulated. One of the objectives in this type of manufacturing is customer retention.

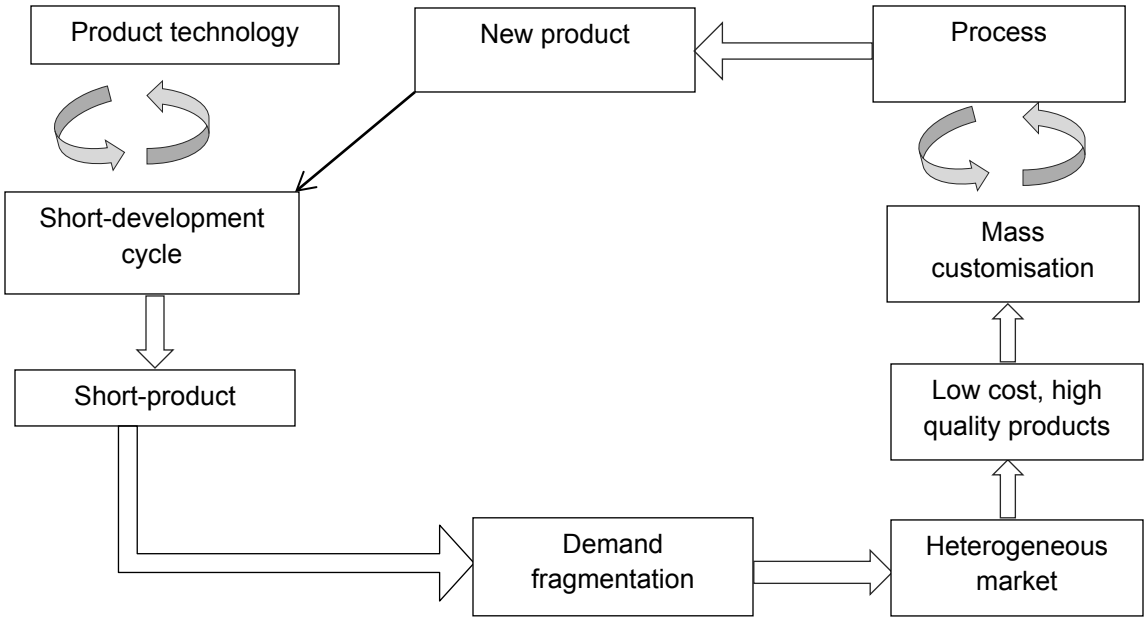
g Mass Customization

Mass customization aims to provide goods and services that meet individual customers' requirements with near mass production efficiency. Mass customization is about giving consumers a unique end product when, where and how they want it-most importantly and essentially at a price they are willing to and able to pay.

4.12 Different between Mass Production and Mass Customization

Mass Production	Mass Customization
Market	**Market**
Homogeneous markets	Heterogeneous market
Stable demand	Demand fragmentation
Long product life cycle	Short product life cycle
Long product development cycle	Short product development cycle
Product	**Product**
Long runs	Lot size of one
Inflexible production	Flexible production
Make to inventories	Make to order
Results	**Results**
Economies of scale	Economies of scale & economies
Focus on the process of production	Customer focus
High cost of variety	Low cost of variety

4.13 Diagrammatic Representation of the System of Mass Customization



System of mass customization

4.14 Outsourcing

There are various definitions for outsourcing in the corporate world. Following are a few definitions of outsourcing:

a An arrangement where one company provides services to another company that would otherwise have been implemented in-house.

b Outsourcing is the transference to third-parties, the performance of functions once administered in-house.

c Sub contracting work to another company.

d Occurs when one company hires another company to manage, maintain and run some portion of its business.

As we can see above, there are various definitions for outsourcing, but as rightly put by Mr. Arun Shourie, “It is not outsourcing but it is partnership”. Outsourcing means partnership between the company and the vendor or the service provider. The service provider has to meet the

requirements of the company; he has to comply with the standards set by the company. The company has to meet the requirements of its customers, on the basis of which they set certain quality standards for the vendor.

4.15 Self-Test Questions

1 What do you think are the roles of production in business?

2 Explain the doctrine of agility in operations management in SCM

3 Are there vital elements in lean manufacturing?

4 What is a system and concept of manufacturing system?

CHAPTER FIVE

INFORMATION TECHNOLOGY FOR SCM

5.1 Introduction

Computers were first developed to aid the military during World War. It were introduced commercially in the early 1950s. The first types of information systems were used to improve efficiency in operational processes. This helped organizations to reduce costs in areas such as staff levels and general expenses. Typical examples of systems development during this time were:

a Customer billing

b Inventory control

c Payroll

d Accounting

5.2 Concept of Information Technology

There are several reasons why information technology is considered to be useful to us. The three most common reasons are:

a **Data Transfer:** The transfer of information and data from one location to another via a transmission medium. The most prevalent form of message switching is the electronic mail (e-mail). Today, e-mail is quickly becoming a primary communication method for both personal and business use.

b **Information Retrieval:** With the increase in technological developments around the world, most business places now have computers to aid them doing certain task. For example, most businesses have moved from the traditional method of storing data or files in filling

cabinets and towards storing the data on computers. Information retrieval therefore is recovering stored data from a particular storage medium.

c **Machine and Process Control:** Computers are now being used in several institutions and factories to do certain jobs which human beings may not be capable of handling. For example, in the making of aluminum sheets a computer is used to monitor the thickness of the sheets and report on the task at hand. A human in place would be subjected to certain chemicals and radiations which would distort or shorten his span and also be more prone to making error.

5.3 IT Tools for Business

5.3.1 Project Management

The systems here offer features for scheduling, tracking, monitoring and reporting activities within multi project environment. These can be used for:

a Working more effectively
b Coordinating and managing projects more efficiently
c Saving time and money
d Completing projects on time and within budget
e Getting projects done more quickly and intelligently

5.3.2 Computer Aided Design/Computer Aided Manufacturing CAD/CAM)

These are computer tools for design and manufacturing. CAD allows for 3-dimensional design of parts using computer programs; CAM translates such designs into actual products. These systems include mass memory for data processing and storage, inputs for design creation and output devices for converting stored information into drawings and reports.

5.3.3 Computer Integrated Manufacturing (CIM)

Computer integrated manufacturing refers to the integrated use of computer aided techniques in manufacturing. This includes CAD, CAE, CAM, etc. but the term is interpreted in a variety of ways by suppliers of CIM solutions, the main requirement of CIM is a central shared database that may be accessed by the different disciplines deployed during the manufacturing brings together many aspects of the business process such as production, sales, financial management and distribution. The object of CIM is to increase efficiency by integrating all the facility's data management systems.

5.3.4 Manufacturing Execution System (MES)

Manufacturing execution systems primarily consist of one or more modules used to track inventory and production and to insure and document the proper execution of manufacturing processes. These modules are usually interfaced with an ERP system to receive order information and to return order progress. They are designed to enhance the integration between the business systems and the factory control systems. Such systems include workstations at locations throughout the factory for timely updates of manufacturing and material transactions. Most often, the application of these systems improves the visibility, accuracy, and verifiability of production and inventories resulting in company profits.

5.3.5 Management Information Systems (MIS)

Management information system is a computer system usually based on a mainframe or minicomputer, designed to provide management personnel with up to date information on an organisation's performance /

business activities, e.g. inventory and sales. These systems output information in a form that is useable by managers at all levels of the organization: strategic, tactical, and operational. A good example of an MIS report is an annual report for a stockholder (a scheduled report).

5.3.6 Decision Support System (DSS)

Decision support system is an automated management information system. It is an application for analyzing large quantities of data and performing a wide variety of calculations and projections. There are 2 major categories of DSS: enterprise wide DSS and desktop DSS. Enterprise wide DSS are linked to large data warehouses and serve many managers in a company. Desktop single user DSS are small systems that reside on an individual manager's PC.

5.3.7 Expert Systems (ES)

The concept of expert systems evolved around 1975. Expert systems is a computer application based on artificial intelligence which attempts to duplicate the ability of human experts to perform a specific task. Expert systems require a knowledge base, a facts base, and a rules base. For example, insurance underwriting or investing which frequently employ case-based reasoning or semantic analysis.

5.3.8 Knowledge Management (KM)

Knowledge management is a concept in which an enterprise gathers, organizer, shares and analyses its knowledge in terms of resources, documents, and people skills. Knowledge management involves data mining and some method of operation to push information to users.

KM involves capturing organizing, and storing knowledge and experiences off individual workers and groups within an organization

and making it available to others in the organization. The information is stored in a database called knowledge base and is used to enhance organizational performance. Two of the most common ways are: (i) documenting individual's knowledge and (ii) disseminating through manual or a database, using such tools as groupware, e-mail, and the internet that facilitates communication.

Knowledge mapping (mind maps) is a learning method similar to outlining that consists of drawing out circles and connecting them with lines. Back to top learner centered instruction is an instructional process in which the content is determined by the students' needs, the instructional materials are geared to the student's abilities, and instructional design makes the students active participants.

5.3.9 Enterprise Resource Planning (ERP)

Enterprise resource planning is an information technology industry term for integrated, multi-module application software packages designed to serve and support several business functions across an organization.

An ERP system is a strategic tool that helps the organization improve operations and management by integrating business processes and helping to optimize the allocation of available resources. The systems are typically commercial software packages that facilitate collection and integration of information related to various areas of an organization such as finance, accounting, human resources, inventory, procurement, and customer service. By becoming the central information centre of the organization, ERP systems allow the organization to better understand its business, direct resources, and plan for the future. The systems enable the organization to standardize and improve its business

processes to implement best practices for their industry. ERP is a concept. The popular ERP packages in the market are SAP, oracle financials, BAAN, PeopleSoft and JD Edwards.

5.3.10 Customer Relationship Management (CRM)

Customer relationship management is a set of methodologies, software and usually Internet capabilities that help an enterprise manage customer relationships in an organized way. It includes all business processes in sales, marketing and service that touch the customer. For example, an enterprise might build a database about its customer that describes relationships in sufficient detail so that management, salespeople, people providing service, and even the customer can access information, match customer needs with product plans and offerings, remind customers of service requirement, know what other products a customer has purchased and so on. In contrast to customer care, customer relationship management tends to be used to deal more specifically with the integration of all business functions with each other.

5.3.11 Supply Chain Management (SCM)

SCM is the process of optimizing the delivery of goods, services and information from supplier to customer. It is a set of business processes that engages a trading partner community in the common goal of satisfying the end customer. Functionally, SCM encompasses enterprise resource planning; manufacturing, warehouse and transportation management systems; and business intelligence and analysis.

This is an electronic alternative to the traditional paper chain, providing companies with a smarter, faster, more efficient way to get the right product to the right customer at the right time and price. SCM combines

the power of the Internet with the latest technology, enabling participating suppliers to access up to date company information and enabling companies to better manage and track supply and demand.

5.4. Evolution of SCM Systems

Over the period of time various new concepts and models evolved. IT has played a key role at each stage of the evolution. We will now describe the various phases of evolution discussing the role of IT at each phase. Figure 6.4.1 shows the evolution of SCM systems.



Evolution of SCM systems.

5.4.1 Manufacturing Requirement Planning (MRP)

Manufacturing Requirement Planning is a process used to calculate the amount of raw materials necessary to manufacture a specified number of products. MRP uses the bill of materials from the engineering drawings or CAD techniques such as attribute assignments. MRP has evolved into material resource planning, which includes both materials and financing.

Role of IT: At this phase IT was used for processing data with the main purpose of reducing the processing time. The priorities or major requirement at that pint of time were consistency, speed and accuracy.

5.4.2 Manufacturing Resources Planning (MRP II)

MRP II is a method for the effective planning of all resources of a manufacturing company. Ideally, it addresses operational planning in dollars and has a simulation capability to answer “what iif” questions. It

is made up of a variety of functions, each linked together, such as business planning, sales order entry, sales & operations planning, master production scheduling, BOM & routing, material requirement planning, inventory control, rough-cut capacity planning, capacity requirements planning, shop floor control, cost management, purchasing management, accounts receivable, sales analysis, accounts payable, general ledger. The use of the term MRP II has been dropped in favour of the term ERP in recent years and is therefore not included in this year's questionnaire to suppliers. However, for those wishing to obtain MRP II functionality, the above functional list may be used to identify those products that comply with the definition.

Role of IT: At this phase in addition to the basic requirement of consistency, speed and accuracy the focus changed to MIS (Management Information System). The priorities or major requirement at that point of time were on the scope and the modular structure. At this point of time Database Management System (DBMS) and partially the Relational (DBMS) was used for data management.

5.4.3 Enterprise Resource Planning (ERP)

ERP was the major business buzzword of the 1990s and we have already discussed the concept of ERP in detail above.

Role of IT: At this phase, in addition to all the requirements above, the primary focus changed to planning capabilities and the high-level integration (in E-ERP) with external entities. Integration platform provides a base for all IT application by maintaining master tables. For example, item master, supplier master, company master etc.

5.4.4 Supply Chain Management (SCM)

The ERP concept was further taken to a new level with the SCM and CRM concepts.

Role of IT: IT played a key role in SCM for optimization (use of Algorithm), simulation and analysis capabilities, and also integrated data mining tools for the industrial application.

Functional roles of IT in SCM can be summarized as:

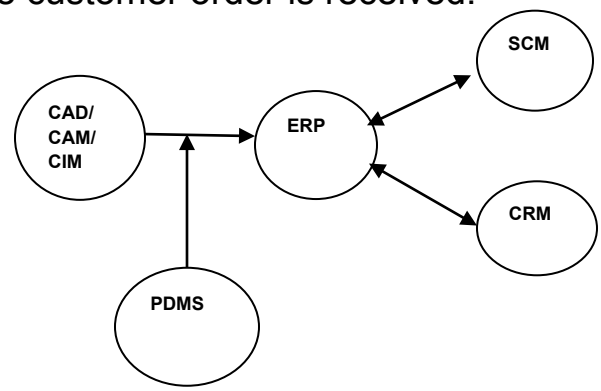
a Transaction execution

b Collaboration and co-ordination

c Decision support

Today the ERP, SCM and CRM systems are integrated with third-party applications to provide enterprise-wide business solutions.

The model below shows the role of IT in the overall business today with special reference to SCM. While CRM generates the orders, SCM starts after the customer order is received.



Role of IT in SCM

5.5 Self-Test Questions

1 What is management information system in a typical operational system?

2 Give your explanatory framework of the concept of information technology

3 Discuss the IT tools that are relevant in business operations

CHAPTER SIX

LEAN SUPPLY CHAINS

6.1 Introduction

Corporate organizations that are involved in product and manufacturing activities are interested in reducing costs, eliminating wastes of all forms of resources to achieve optimization in business. Thus there is the need for adoption of production or manufacturing strategy that would enable them to achieve the objectives of eliminating wastes and reducing costs. Based on this, the need for application of a concept known as lean production becomes very obvious and necessary.

6.2 Defining lean production

Lean production is a business concept and initiative that aims to reduce costs of production or manufacturing of products. It further aims to eliminate all forms of waste both in material, finance, human, etc. resources. This can be achieved when there is a sound engineering review so as to achieve reduction in production and manufacturing. This is because the basic concept is to systematically reduce cost during the product and production process. This is because most costs are assigned in the process of product design.

Thus at the system engineering time, requirements for every product are reviewed in tandem with the marketing and customers representatives. The essence of that review is to eliminate the most costly components but yet achieve a standard and quality product. In lean production, the cardinal aim is to attempt add value and yet reduce those things that do not add value but rather add waste. The concept of lean production or

manufacturing originates from Toyota Production Systems (TPS) developed by Toyota between 1948 and 1975 which was initially called Just-in-time production aimed to eliminate waste.

6.3 Basic Concepts in Implementing Lean Production

For lean production to be implemented by firms or production firms, there are basic concepts for implementing the lean production which are:

a **Continuous flow concepts:** This means that there must be continuous flow of raw materials till to the finished products. This means that the processes of processing raw materials to the finished goods stage should be continuous and that there should be no form of stoppage or delay. Stoppage or delay defeated the concept of lean production. Again what could cause the delay would be wasting time in between as such leads or has added to the cost of production for that particular product being produced.

b **Standardized work concepts:** To implement lean production concept, there must be sound updates and improvement in the processes. That is, the layout, work methods and work sequences must be very efficient and effective. This step therefore comprises improving on work done and maintaining the improvement. All are geared towards elimination of wastes.

c **Value Stream concepts:** This means all the actions that are necessary to bring a physical product by going through the production processes. This begins when the raw materials are accepted after being delivered by the vendor and the materials go through the production process till the product is delivered.

Furthermore in value stream activities, there are necessary activities that must be included if the aim is to achieve lean production. Those actions are: the raw materials must be delivered by the vendor and the necessary organizational procedure followed to receive those materials from the vendor by the organization using them. Furthermore, the loading of the raw materials on the production line must be perfectly done with creating waste and there must be proper manufacturing or production of the products or goods. Also the set for producing a particular product must be well done. Having done that, there must be a proper way of removing the finished products from the production line and the packaging of the products.

d **Value added activities concepts:** Value added activities are those activities that are being carried out which would add value to the products at the end. It comes in diverse forms ranging from the machines that convert the raw materials to the final finished goods or products. Apart from value activities, there are also non valued activities (NVA) which are those activities that do not add value to the finished product. This NVA includes movement of the semi-finished goods from one machine to another.

Such activities must be avoided because instead of adding value, they are adding cost, thereby defeating the lean production philosophy. However, there are some NVA activities that are not avoidable such as checking the quality procedures, at various production stages checking the quality of what is produced though does not add value, but is a necessity process that cannot be avoided because the organization must be sure of what it is offering to the public.

e **Pull production concept:** Under pull production concept, it means that production and purchasing activities are based on receiving of signals from the flow process. It further means that materials are only supplied when required to avoid stock-pilling of inventories without immediate usage. This further shows that activities are carried out when such is required. It does not encourage waiting time and the advantage is reduction on production cost which at long run reduces the cost of the final product. Under the pull production concept, materials availability depends on the right time needed, thereby creating no room for inventory storage. But the challenge hare is where there is no standby vendor or existing vendor relationship; this may take some time of getting a competent vendor that can supply on demand and consequential effect is added increase in the cost of the product at the end.

6.4 Lean Production Driven Basic Areas

Lean production is the production concept of the 21st century that originated from the soil of Japan by Toyota known as Toyota Production System which became operation as early as between 1948 and 1975. The major concern and focus of lean production is actually doing more with less resource such as inventory, space, people, time, money, etc. maintaining quality and standard. It further aims at elimination of waste that is associated with over production, transportation, waiting, inventory, motion, etc. Its focus further includes continuous flow and customer pull. Based on this, lean production is driven by five basic factors which are:

a **Cost:** Its primary objective is to reduce cost of production, cost of raw materials and all kinds of wastes that would trigger cost at the long run.

That is why it advocates for continuous flow of operations or productions without any form of stoppage that would attract and aggravate costs at the end.

b **Quality:** It further focuses to achieve quality irrespective of doing more with less, yet without reducing standards. When quality drops, that would amount to low patronage. That would also amount to inventory storage, thereby tying funds that ought to have been used for operational activities.

c **Delivery:** Since the aim is reduction of costs, and elimination of wastes, lean production aims to maintain lead time. That is, delivering at the appropriate time as programmed. Late delivery implies increase in cost and may some have effect on patronage. Customers are not interested in delaying supplies and they can readily switch over to firms that keep to lead time. It is also important to state that delay in delivery amounts to incurring more cost due to the fluctuation in the market forces of demand and supply.

d **Safety:** In as much as lean production is being pursued, it is equally important for workers to be safe while operation. This therefore concerns the engineering designs and processes that are involved in the course of designing the process. Therefore both the mechanical, electrical, software engineering process must be able to design the process to guarantee safety of the workers at the long run.

e **Morale:** Morale here deals on what keeps the workers happy. Since lean production also focuses on time reduction and effective utilization of the available time, it means that workers will not spend much time on production. The Just-in time concept which is also part of lean production will be a boaster in keeping the morale of the workers very

high. Also lean production has concern for people; therefore necessary motivational strategies will be put in place to ensure that workers are very happy while on the job.

6.5 The Fundamentals of minimizing cost and maximizing profit in lean production

The relevance of lean production system appears very obvious when its impact to maximizing production is economically understood. Thus, the aim is to have an engineering system that is so designed to minimize cost in the process of production and consequently maximize profit. This happens when the fundamentals that are key factors in production are well galvanized. These key fundamentals of minimizing cost and maximizing profit in lean production anchor on proper utilization of man (labour), materials and machines (equipment) otherwise known as the three M's of manufacturing, be it lean or otherwise. Therefore when man (labour), materials and machines are well balanced in lean production, the result is very great to the organizations advantage. When such is well galvanized, the results will be as follow:

i. There will be maximum utilization of man, both skilled and unskilled (labour).
ii. There will be smooth flow of materials, man and machineries.
iii. There will be achievement of optimal module size-cellular and/or plant.
iv. There will be minimum total manufacturing cost of production in terms of products produced.
v. There will be reduction of investments in terms of stock-pilling inventories.
vi. When man (labour) is skilled, labour requirement will be reduced.
vii. The equipment (machines) which are very productive will be utilized.

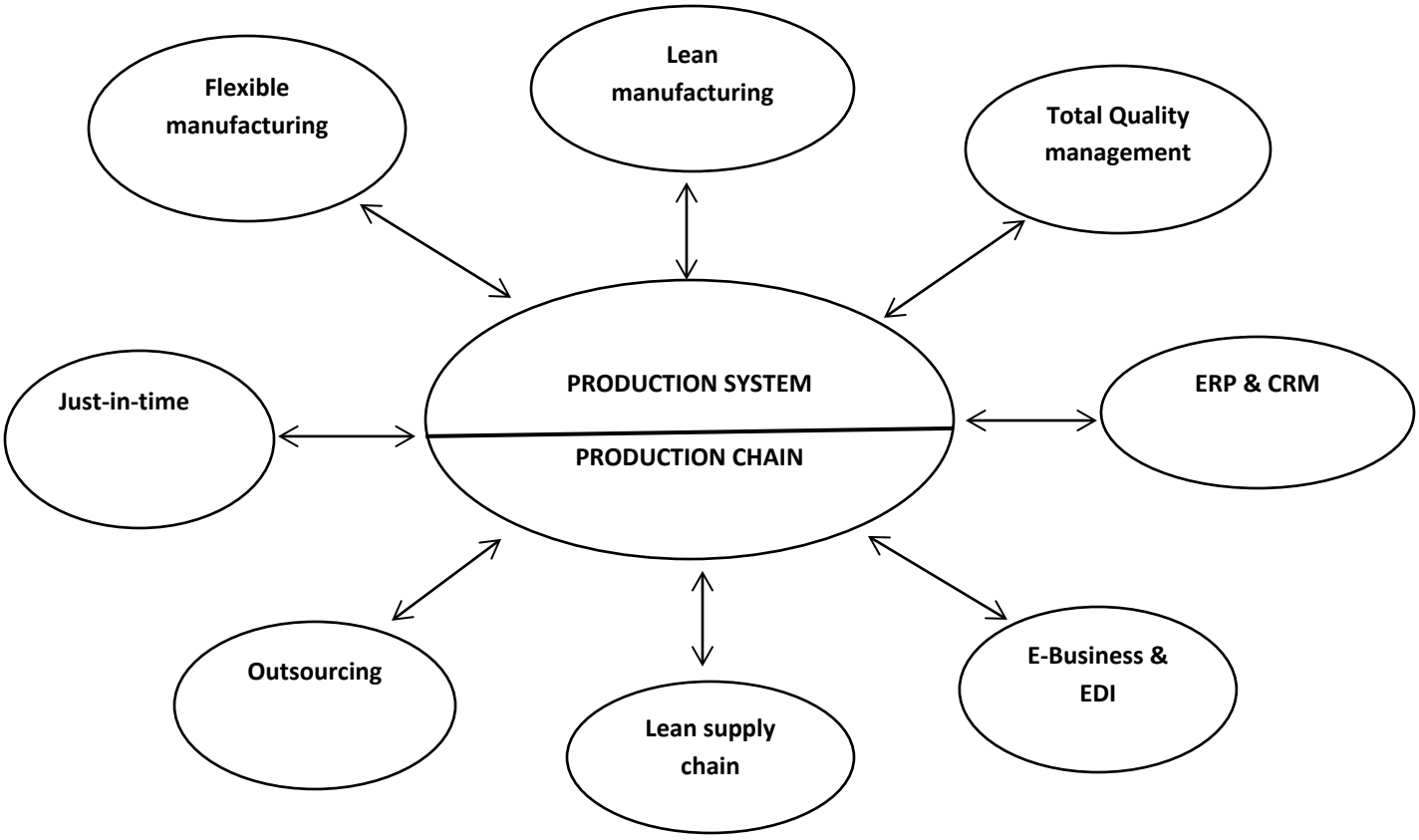
viii. There will be little or no acquisition or purchase of machines which are not productive.

ix. Such guarantees flexibility based on market forces of demand and supply.

x. There will be more revenue since the areas of waste have been completely controlled.

As a matter of purpose, lean production focuses on waste elimination, continuous flow of work and customer pull and being cost effective; that is, reducing cost as much as possible.

6.6 Lean Production System



SOURCE: SUPPLY CHAIN MANAGEMENT: CONCEPTS & CASES: [Altekar R.V. 2013:118]

The above diagram shows the components of lean production system. The entire concept of lean production is a Japanese strategy aimed at continuous improvements of goods and services in the course of production so as to be able to satisfy the customers. Leading companies make use of various strategies such as fast product development, partnership with suppliers, improved customer relationship, etc. in the course of pursuing lean production philosophy and ideology.

Apart from the above, looking at the diagram, the lean production system further makes use of flexible manufacturing, total quality management, lean manufacture and the usage of Just-in-time. Raw materials and enterprise resource planning to achieve their objective. To further ensure a continued production chain, materials are timely sourced based on the usage of outsourcing strategy, application of lean supply chain and electronic businesses to ensure proper coverage.

6.7 General Characteristics of Lean Production

Since lean production is a business concept that aims to reduce waste, cost of production and yet maintain quality in the drive towards satisfying the customers, it has several characteristics. Such are:

a Activities which do not add value (NVA) are eliminated via the process of continued improvements.

b It focuses on continued improvement of process and not on the outcome or results of the above value chain.

c It has a lean production mindset which is concept, way of thinking and culture not techniques nor the latest management tool.

d There is continuous product flow which is achieved through physical rearrangement and system structure and control mechanisms.

e There is pull-production/Just-in-time inventory control.

f It makes use of just-in-time processing.

g It makes use of minimal inventories at each stage of production process.

h The layout of the system is based on product flow.

I It aims at total quality control.

j Uses team work strategy with multi-skilled workers.

k In lean production, production is based on orders and not forecast an there is flexibility.

6.8 Advantages of Lean Production to Corporate Organizations

Lean production is a new business concept that originated from Japanese soil and spear-headed by Toyota company. It is spreading very fast and many production companies and corporate organizations are adopting the concept. Therefore, the new philosophy has the following advantages which are:

a It reduces waste by about 80%.

b It further reduces production cost by about 50%.

c Lean production reduces or decreases production cycle.

d It is a strategy to reduce labour while production is still on the increase.

e It does not allow stock-pilling of inventories.

f It increases customer service level.

g It achieves higher quality of products.

h It accumulates higher profits of the firm.

i The system is flexible and capable of reacting to sudden market changes.

j It is capable of increasing the organizations current capacity.

6.9 Lean Supply Chain Processes.

Lean supply chain is defines as an organizational activities that have a direct link with the upstream and downstream flows of several activities like products, services, finances and information that work in synergy towards reduction of costs and waste according to Vitasek et al.(2005:21). In his contribution, Jung et al. (2007), stated that the management of lean supply chain process is a process that is aimed at eliminating waste and NVA (non0value-adding) activities from the overall value stream in the supply chain.

Therefore lean supply chain processes focuses at maximizing quality and minimizing all unnecessary steps aimed at achieving customer value. That is to say, providing the customers with the expected value needed by them from the produces or the manufacturers. Lean supply chain aims at providing the best quality to the customer starting from the production point till the finished goods and services get to the final consumers at the best time and at the same time minimizing waste in the process of production

a Lean Supply Chain Process

Based on the concept of lean and its focus to maximize quality, minimize waste and at the same time achieve value by timely delivering without losing quality, lean supply chain processes involve the application of the following:

i. **Just-in-time(JIT):** This is when and where all the firms activities are directed towards ensuring that only goods and services which are required by the customers are produced. These activities commence from the procurement, receiving and the production processes of the

raw materials until finished products are made available to satisfy customers.

ii. **Value stream mapping:** This is step process based. It includes the flow of resources (materials, money, etc.); timing of each step, and the wait times for all associate operations. This process identifies waste and ensures that such waste is eliminated.

iii. **Continuous improvement process:** It concerns itself with the continued drive for improvements to maintain the lead time and quality in the lean supply chain. This improvement is focused in all the areas of lean supply chain. When there are new ways to do things, such can reduce cost and becomes an innovative thinking. It further adds value to the product and to lean the supply chain at large.

iv. **The sort process:** The sort process deals with distinguishing the needed tools from the tools that were not needed in the lean supply chain. This again helps to reduce cost and inventory tools that are neither useful nor needed, thereby creating space for the firm for more important things.

v. **The straighten process:** Since lean production does not tolerate any stoppage in the course of production, lean supply chain processes advocates that the materials that are in use must be kept straight where those in operation can have easy access to those resources that are meant for the production without delay. That is to say all operational tools, items, resources, money, manpower and all other logistics arrangements must be made available for easy access. This is to avoid delay, thereby violating leading time, incurring more cost and wasting of man hours, etc.

vi. **The shin process:** This means that lean supply chain process must be well organized, clean and decent to create room for the necessary attraction of prospective customers. This is because there are various values customers attach much importance to. When a customer visit an organization and the entire place is dirty, untidy and unorganized, such has a potential power of discouraging the customer from the onset.

vii. **Standardization process:** Organizations must keep standard if they must remain in business. Therefore lean supply chain must be well standardized that all the key objectives of waste, time management, cost minimization, valued satisfaction and product quality are maintained, lean supply chain will be very successful.

viii. **The sustain process:** In every organization, operational procedures must be maintained and sustained as part of the organizational culture. Therefore in lean supply chain, the procedures of all the activities must be kept, maintained and be seen as an established procedure for every process.

ix. **The flow process:** Lean supply chain does not encourage time wastage, and anything that would delay operations. Therefore there must be material, financial and information flow to ensure that lean supply chain process does not suffer any set back. Furthermore, all the personnel or workers that are involved in one assignment or operations or the other must ensure that they execute on time to actualize whatever standards and targets set.

6.10 Lean Layout

By lean layout, it means using the concepts of lean for something that is bigger and larger than just a process. It is a fundamental key to a lean

factory that focuses at achieving lean. The purpose behind having a lean layout is to be able to have a balance on all operators for high efficiency. The lean layout is usually based on a u-shaped and u-shaped is a basic approach to designing lean layout. The benefit of the u-shape is that it has the ability of getting all the workers or the operators very close to each other in the course of job performance. Furthermore, when application of line balance is being applied, such pool of operators can be used to be able to find efficient interaction among them. However, the u-shape layout often hides the operators from being seen by production managers in the course of production.

Lean layout must not remain static as it is expected to be dynamic, useful for all aspects of operations. Therefore continuous modification is obvious to ensure that the work environment is always ready for adaptation towards meeting the needs of lean process while aiming to meet the customers' needs. When there is a poor lean layout, the implications are very obvious in that such can result to waste of resources and limits movement of operators. The effect of this is that they amount to delays in operations. Therefore every lean layout must have a strong focus on process, people, machinery and materials to achieve optimization.

6.11 Value Stream Mapping

Value stream mapping is a management strategy that is used to analyze the current or present state of things and the designs for a future state to monitor series of event. This series of event take product from the beginning of its production process or activities till the time such gets to the final consumer. The essence of the series of event monitoring is to ensure that there is reduction of waste. It is focused center on those

areas of the organization that add value to the product or the service. It is a flow chart method to analyze the necessary steps required to deliver a product to the customer.

a Reasons for Value Stream Mapping.

i It is to identify and at same time remove such a waste with the value stream.

ii It is further meant to increase the efficiency of a given value stream.

iii It is a program to increase productivity as the effect of waste removal is increase in productivity.

iv It is an avenue to identify anything that would reduce quality of the finished products.

v It is further a strategy to create a leaner operation.

vi It is a strategy used to achieve continuous improvements on lean production process.

vii It is an effective tool of communication for organizational changes in culture.

viii. It is a strategy decision makers use to visualize the current state of the process and where waste are occurring from.

6.12 Usage of Value Stream Mapping In Various Fields

a Supply chain and logistics: In the field of supply chain and logistics, it is used to eliminate waste and costly delays at various points, in the course of achieving finished products for ultimate usage by the consumers.

b Service industries: The service industries also make effective use of VSM in the area of improving value. It is also used to locate waste in the activities to be carried out for customers.

c **Health care sector:** The relevance of VSM in the health sector is very obvious. It is therefore used as an improvement strategy on the necessary steps that are required towards better treatment of patients to achieve cost-efficiency, high quality treatment and time appropriation.

d **Software engineering development:** VSM is used in software engineering development to dictate inefficiencies in software development. This starts from idea generation to implementation stages which also include feedback loops and network.

e **Manufacturing:** It is used in manufacturing firms to locate wastes. This is done by careful analysis of each stage of material handling and information flow. The lean method of production is rooted from the VSM concept in 1950 at Toyota. Today lean manufacturing and production has virtually spread to industrialized nations of the world.

f **Use of VSM in office and administration:** In office and administration, it is used to discover wasteful steps and to improve on the service provided in a business to her customers.

6.13 Necessary Information about the Use of VSM

a This concept purely developed from lean methodologies.
b It makes use of substantial investments of people and time to do it.
c Where it is not applied appropriately and wisely, it will lead to waste and therefore become wasteful in itself.
d It must require team members who are skilled in carrying out VSM at its advance level.
e It takes days, weeks and months to carry out some projects involving mapping.

f Potential value of the work must be determined before conducting or introducing value stream mapping (VSM).

6.14 Lean Production Schedules

Lean production as already known is a business concept that has its root from Japanese soil aimed to reduce cost, eliminate waste, towards ensuring that quality is maintained in the course of satisfying the consumer's need of goods and services. Based on the above, lean production schedules are based on seven principles.

However, lean production schedules is defined **as** the process of preparing the work to be done and then releasing the work to be executed to manufacturing operations. That is to say that there must be job or work schedule which includes what to produce, the time, the processes, the patterns, etc. and then finally gets manufacturing to be in process of manufacturing as scheduled. Lean production schedule makes use of rules for effective production and the seven principles which are:

a Lean Production Principles:

i. Thus the first rule for lean production schedule is that no work should be scheduled if such cannot be completed.

ii. Furthermore, the capacity and materials for the execution of the work must be available.

iii. There must be development of continuous flow wherever such is possible.

iv. Inventory stock-pilling is not permissible as just-in-time principle is operational.

v. Customers schedule should be sent only on production process.

vi. Production volume should be leveled via releasing and withdrawing small consistent increments of work based on the pace of work.

vii. The production mix level should be leveled based on the distribution of the production of the different products evenly over time based on the pacemaker process.

b. Facts about Lean Production Schedules:

i. Simple manufacturing system should always be designed.

ii. Recognize continuous improvement in the system.

iii. The lean manufacturing design system should be continuously improved upon.

iv. Decrease the cycle time and have fewer inventories.

v. Capital equipment utilization should be increased.

6.15 Self-test Questions

1 Lean production is a business concept and initiative that aims to reduce costs of production or manufacturing of products. Discuss fully with practical illustrations.

2 The implementation of lean productions is based on vital fundamental concepts. You are requested to discuss these concepts as may be applicable.

3 Lean production is driven by core basic areas. Fully discuss the basic areas and support your discussions with practical illustrations.

4 In the fundamentals of minimizing cost and maximizing profit in lean production process of a manufacturing company, what do you think are the likely benefits for a manufacturing company?

5 With a diagramic model, present a typical lean production system by discussing the various manufacturing systems that are in-capsulated in the entire system.

6 X-ray and discuss what you think are the general characteristics of lean production in a typical organization manufacturing process.

7 Corporate organizations have capitalized on the use of lean production as a new business concept and strategy with its origin from Japanese soil. Critically discuss what you think are the core advantages of this new concept.

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