UNIT 15: MODERN PRODUCTION MANAGEMENT TOOLS

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15.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- explain the basic concept of Just in Time (JIT) Manufacturing
- explain the concept of Total Quality Management
- explain different ISO 9000 Series
- describe Poka Yoke- characteristics, levels and classification of Poka Yoke
- explain the concept of Kaizen

- describe Business Process Reengineering (BPR)
- explain the concept of Supply chain management
- describe Enterprise Resource Planning (ERP)

15.2 INTRODUCTION

In this unit, we are going to discuss the concept of Just in Time Manufacturing, Total Quality Management, ISO 9000 Series, Poka Yoke, Kaizen, Business Process Reengineering (BPR), supply chain management, and Enterprise Resource Planning (ERP). Proper implementation of these concepts can play an important role in the production of any goods or in the delivery of any service. In fact, these concepts can lead to effective production process or service delivery process.

15.3 JUST IN TIME (JIT) MANUFACTURING

Just-in-Time (JIT) is a relatively new concept initiated by Taiichi Ohno, Vice President of Toyota linked with the worldwide oil crises in the year 1973. Henry Ford's mass production system and the American Super Market greatly influenced Ohno's Just-in-Time manufacturing concept.

JIT is basically a concept applied throughout the organisation and aims at producing output with minimum lead time, at minimum cost and attempts to eliminate all kinds of waste and non-value activities and variances continuously. JIT helps in planning and implementing production activities in a smooth and integrated process to produce the components needed for subsequent activities. These components are produced from raw materials received from suppliers and processes within the firm.

JIT encompasses the following functional areas within an organisation:

(i) Product design and development

(ii) Structure of the organisation as suited to the objective of optimum output at optimum cost in the shortest lead time.

(iii) Human resource development activities such as work distribution, job description, job evaluation, compensation and flexibility.

(iv) Forecasting customer needs and market demand

(v) Planning, organizing, monitoring and controlling

(vi) System design and system improvement

(vii) Layout planning and equipment selection

(viii) Warehousing activities

(ix) Quality control, quality measurement and quality assurance

(x) Healthy relationship between the supplier-company-customers

(xi) Financial activities such as budgeting, costing and reporting

(xii) Material handling, transportation and distribution

(xiii) Performance evaluation

Objectives of Just-in-Time Production Process:

(i) To gain competitive advantage

(ii) To improve responsiveness to the customers

(iii) Proper production planning

(iv) To achieve perfection in quality

(v) To attain minimum lead time

(vi) To reduce waiting time

(vii) To avoid wastage

(viii) To introduce flexibility

(ix) To aid in human resource development

Principles of Just-in-Time Production Process:

(i) Continuous improvement

(ii) To attain perfect quality at source

(iii) Waste management

(iv) To develop team work

(v) To undertake process simplification

(vi) To attain visual control

(vii) To take care of the customers' needs

(viii) To produce according to the customers' demand

Just-in-Time Implementation Program:

(i) Evaluation of JIT program

(ii) Top Management commitment

(iii) Cultural change

(iv) Developing mission and preparing the program

(v) Education and training

(vi) Action plan

(vii) Performance evaluation of the JIT program

15.4 TOTAL QUALITY MANAGEMENT (TQM)

Total Quality Management (TQM) guides the coordinated actions of the people, machines and information to identify and fulfill customer quality requirements. TQM is applied to many stages of the Industrial Cycle which are listed as follows:

(i) Marketing

(ii) Engineering

(iii) Purchasing

(iv) Manufacturing

(v) Mechanical

(vi) Shipping

(vii) Installation and Product Service

Benefits of Total Quality Management (TQM):

(i) Customer Satisfaction oriented benefits

(a) Improvement in product quality

(b) Improvement in product design

(c) Improvement in production flow

(d) Improvement in employee morale and quality consciousness

(e) Improvement in product service

(f) Improvement in marketplace acceptance

(ii) Economic Improvement oriented benefits

(a) Reduction in operating costs

(b) Reduction in operating losses

(c) Reduction in field service costs

(d) Reduction in liability exposure

Fundamental Factors affecting quality covered under Total Quality Management (TQM):

(i) Market

(ii) Money

(iii) Management

(iv) Men

(v) Motivation

(vi) Materials

(vii) Machines and equipment and mechanization

(viii) Modern information needs

(ix) Mounting product requirements

Quality Control Activities during product life cycle covered under Total Quality Management (TQM):

These can be classified into the following three categories:

(i) New Design Control

(a) Selling quality products

(b) Engineering quality products

(c) Planning quality products

(ii) Incoming Material Control

(a) Buying quality products

(b) Receiving and inspecting quality products

(c) Manufacturing quality parts and products

(iii) Product Control

(a) Inspecting and testing quality products

(b) Shipping quality products

(c) Installing and servicing quality products

In this context, the concept of Six Sigma may be cited. Six Sigma is a disciplined data-driven approach and methodology for eliminating defects which amounts to driving towards six standard deviations between the mean and the nearer specification limit in a any process (manufacturing/transactional) of products/services. A six Sigma defect is defined as any flaw that inhibits the attainment of customer expectations and specifications. It aims at process improvement and reduction of variation through its application.

In the above context, the concept of Statistical Quality Control (SQC) may also be mentioned. It is the application of statistical techniques to accept or reject produced products as well as to control the entire production/ service delivery process of such products so as to maintain quality.

15.5 ISO 9000 SERIES

ISO stands for International Organisation for Standardization. It is an international body which consists of representatives from more than 90 countries to provide common standards on international trade of goods and services.

ISO 9000 standards firms to have a quality manual that meets ISO guidelines, document quality procedures and job instructions and verification of compliance by third party auditors.

ISO 9000 series are listed below:

Table 15.1: Objectives/ Tasks of different ISO 9000 series

Standard	Objectives/ Tasks
ISO 9000	This provides guidelines on selection and use of quality management and quality assurance standards.
ISO 9001	It has 20 elements covering design, development, production, installation and servicing. This is applicable for the industries which are doing their own design and development, production, installation and servicing.
ISO 9002	It has 18 elements covering production and installation. This is applicable for the units excluding research and development functions.
ISO 9003	It has 12 elements covering final inspection and testing for laboratories and warehouses etc.
ISO 9004	This provides guidelines to interpret the quality management and quality assurance.

Benefits of ISO 9000 series:

(i) It provides competitive advantage in the global market.

(ii) It provides consistency in quality

(iii) It provides proper documentation of quality procedures and adds clarity to the quality system.

(iv) It ensures adequate and regular quality training for all the members in the organisation

(v) It helps the customers to have cost effective purchase procedure.

(vi) It enables customers to reduce their time and money spent on inspecting and testing products and services.

(vii) It helps in increasing productivity

(viii) It aids in improving morale and involvement of the workers

(ix) It provides increased job satisfaction

Steps in ISO 9000 Registration:

(i) Selection of appropriate standard from ISO 9001, ISO 9002 and ISO 9003 using the guidelines given in ISO 9000.

(ii) Preparation of quality manual to cover all the elements in the selected model

(iii) Preparation of procedures and shop floor instructions which are used at the time of implementing the system.

(iv) Self-auditing to check compliance of the selected model

(v) Selection of a registrar and making application to obtain certificate for the selected model.



CHECK YOUR PROGRESS

Q 1: Which of the following aims at producing output with minimum lead time, at minimum cost and attempts to eliminate all kinds of waste and non-value activities and variances continuously?

(a) Enterprise Resource Planning (ERP)

(b) Just-in-Time (JIT) Production

(c) Supply Chain Management

(d) Green Supply Chain Management

Q 2: Which of the following is not a benefit of Total Quality Management (TQM)?

(a) Improvement in product quality

(b) Improvement in product design

(c) Improvement in production flow

(d) None of these

Q 3: ISO stands for.

(a) International Organisation for Standardization

(b) International Standards Organisation

(c) Time study

(d) None of these

15.6 POKA YOKE

Poka Yoke stands for Mistake proofing. It is a simple technique developed by Shigeo Shingo in Toyota Production system. Usually, it is a less complicated and cost effective concept that aims to

(i) reduce defects from being made

(ii) Highlights a defect so that it is not passed to the next operation.

Quality Control vs PokaYoke:

Shigeo Shingo saw quality control as a three level hierarchy of effectiveness;

(i) Judgement Inspection - Inspectors Inspect

(ii) Informative Inspection - Use of SPC to monitor the process conditions

(iii) Before the fact - Poka Yoke

Purpose of Poka Yoke: Poka Yoke is needed for the following reasons:

(i) Not accepting a defect for the process

(ii) Not Creating a Defect

(iii) Not Allowing a Defect to be passed to the next process

The above processes are carried out in a number of different ways. These ways can be categorized as:

(i) Control: It is intended to take physical action to prevent a defect from occurring.

(ii) Warning: It is intended to alarm or light up to inform that a mistake has been made.

Example: An example of a control type Poka Yoke is one that physically rejects an underweight product on a conveyor. At the same time, a warning type Poka Yoke is one that sounds an alarm such as the one that sounds when one accidentally leave lights on in the car when one removes the ignition key.

15.7 KAIZEN

Kaizen stands for continuous improvement involving everyone in an organization from top management to managers, then to supervisors, and finally to workers. In fact, Kaizen is a customer-driven strategy for improvement. The essence of Kaizen is that the people that perform a certain task are the most knowledgeable about that task consequently, by involving them and showing confidence in their capabilities, ownership of the process is raised to its highest level

Kaizen Philosophy: The essence of Kaizen is that

(i) People who perform a certain task are the most knowledgeable about that task; consequently, by involving them and showing confidence in their capabilities, ownership of the process is raised to its highest level.

(ii) The team effort encourages innovation and change and, by involving all layers of employees, the imaginary organizational walls disappear to make room for productive improvements.

From the above views, Kaizen is not only an approach to manufacturing competitiveness but also all activities related to business, because

its premise is based on the concept that every person has an interest in improvement. The premise of a Kaizen workshop is to make peoples' jobs easier by taking them apart, studying them, and making improvements. The message is extended to everyone in the organization, and thus everyone is a contributor

Kaizen umbrella-concept: The kaizen umbrella-concept covers the following concepts:

(i) Customer orientation

(ii) Total Quality control

(iii) Robotics

(iv) QC circles

(v) Suggestion System

(vi) Automation

(vii) Discipline in the workplace

(viii) TPM

(ix) Kanban

(x) Quality improvement

(xi) Just in time

(xii) Zero defects

(xiii) Small group activities

(xiv) Productivity improvement

(xv) New product development

Constituents of Kaizen: Kaizen comprises of the following constituents:

(i) leadership

(ii) Crossfuctional teams

(iii) 5S

(iv) Productivity Improvemetnt

(v) Process Focus

(vi) Discipline In the Workplace

(vii) Teams

(viii) Improvement

Kaizen Blitz: A Kaizen Blitz is a rapid improvement workshop designed to produce results/approaches to discrete process issues within a few days. It is a way for teams to carry out structured, but creative problem solving and process improvement, in a workshop environment, over a short timescale.

Stages of a Kaizen Blitz: The main Stages of a Kaizen Blitz are:

(i) Preparation: It includes the following activities:

(a) Identifying a senior management sponsor

(b) Defining the improvements required and scope of the problem/ process to be addressed, including Set SMART objectives and Identify any constraints

(c) Gathering available data and process information that will need to be available during the Blitz

(d) Selecting and brief the Blitz team

(e) Briefing any other key stakeholders

(ii) The Blitz Event

(iii) Follow-up: It includes the following activities:

(a) Continuing with implementation actions for items not done during the Blitz

(b) Communicating process changes to stakeholders

(c) Coaching managers/staff and complete "hand-over" to business as usual

(d) Measuring impacts and benefits

(e) Signing off achievements with Sponsor

15.8 BUSINESS PROCESS REENGINEERING (BPR)

Business Process Reengineering involves changes in structures and in processes within the business environment. The entire technological, human, and organizational dimensions may be changed in BPR. Information Technology plays a major role in Business Process Reengineering as it provides office automation, it allows the business to be conducted in different locations, provides flexibility in manufacturing, permits quicker delivery to customers and supports rapid and paperless transactions. In fact, Information Technology can aid BPR in the following ways:

(i) Database Management System that ensures availability of information at many places,

(ii) State of art telecommunication networks allowing flexible and faster operations,

(iii) Decision Support Systems enabling all inclusive and prompt decision-making,

(iv) Advanced wireless data communication enabling flexible and faster operations,

(v) ERP software such as SAP, IFS, Microsoft Dynamics ERP etc. for improving efficiency of various processes.

3 R's of BPR are:

(i) REDESIGN

(a) Simplification

(b) Standardization

(c) Empowerment

(d) Employeeship

(e) Groupware

(f) Measurements

(ii) RETOOL

(a) Networks

(b) intranets

(c) extranets

(d) Work Flow

(iii) REORCHESTRATE (synchronize)

(a) processes

(b) IT

(c) human resources

Business processes are characterized by three elements:

(i) Inputs, (data such customer inquiries or materials),

(ii) Processing of the data or materials (which usually go through several stages and may necessary stops that turns out to be time and money consuming), and

(iii) Outcome (the delivery of the expected result).

The BPR characteristics - outcomes include the following:

(i) Several jobs are combined into one.

(ii) Decision-making becomes part of the job of employees (employee empowerment).

(iii) Steps in the processes are performed in natural order, and several jobs get done simultaneously.

(iv) Processes have multiple versions. This enables the economies of scale that result from mass production, yet allows customization of products and services.

(v) Work is performed where it makes the most sense.

(vi) Controls and checks and other non-value-added work are minimized.

(vii) Reconciliation is minimized by cutting back the number of external contact points and by creating business alliances.

(viii) A single point of contact is provided to customers.

(ix) A hybrid centralized/decentralized operation is used.

15.9 SUPPLY CHAIN MANAGEMENT

Supply chain management (SCM) happens to be an indispensable component of marketing. Supply chain management is a set of approaches used to efficiently integrate suppliers, manufacturers, warehouses, and stores in order that merchandise is produced and distributed at the right locations, in right quantities, and at the right time. In this manner, supply chain management may greatly help in "minimizing systemwide costs while satisfying service level requirements". SCM is an important tool for the effective management of a set of "organizations engaged in the delivery of a product or service to the consumer" or ultimate user. The latter scholars have stated that two technological developments have greatly influenced supply chain management, namely, information and communication technology and flexible manufacturing technology. SCM is the "integration of key business processes from the end user through original suppliers that provides products, services, and information that add value for the customers and stakeholders". Presently, SCM has been greatly aided by the advent of online marketing tools as evident from the use of online purchase websites like Flipkart, Amazon, eBay etc.

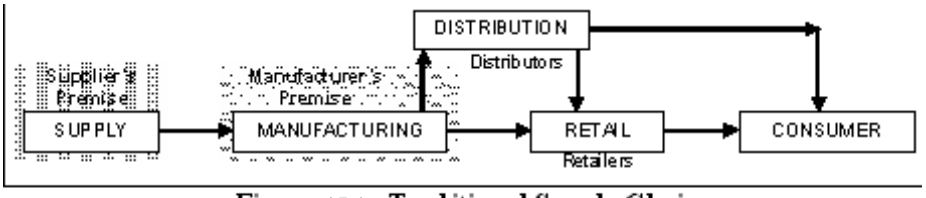


Figure 15.1 : Traditional Supply Chain
(Source: Adapted from Beamon (1999))

15.10 ENTERPRISE RESOURCE PLANNING (ERP)

Enterprise Resource Planning (ERP) is a software package developed for optimum use of resources of an enterprise in a planned manner. ERP integrates the entire enterprise starting from the supplier to the customer covering logistics, financial and human resources. Thereby

ERP enables the enterprise to increase productivity by reducing costs. As discussed earlier, ERP software such as SAP, IFS, Microsoft Dynamics ERP etc. can aid in improving efficiency of various processes. In fact, SAP is one of the common ERP software used by many organizations. The various modules of SAP are:

(i) SAP Financial Accounting (FI): SAP FI module helps in management of financial transactions in organizations. Here, data involved in any financial transactions are handled through a unified system.

(ii) SAP Controlling (CO): SAP CO module helps in management of process works of planning and controlling various operations in organizations.

(iii) SAP Sales and Distribution (SD): SAP SD modules helps in management of all sales and distribution related operations ranging from enquiries, proposals, quotations, pricing, inventory control etc. in an organization.

(iv) SAP Production Planning (PP): SAP PP module helps in management of production planning and management. It comprises of master data, system configuration and transactions for implementing plan procedure for production.

(v) SAP Materials Management (MM): SAP MM module helps in management of materials required (including procurement), materials under processing, and materials produced in organizations.

(vi) SAP Quality Management (QM): SAP QM module helps in quality management of production operations in an organization. It aids such organizations to improve overall quality by involving planned and efficient way of managing quality in different operations.

(vii) SAP Human Capital Management (HCM): SAP HCM module helps in management of human resource related work process and data of organizations. It involves management of human resource

management related activities like hiring, evaluation, promotions, remuneration handling etc.

Salient features of ERP:

(i) Accommodating variety

(ii) Integrated Management Information

(iii) Seamless Integration

(iv) Supply Chain Management

(v) Resource Management

(vi) Integrated Data Model

Scope of ERP:

(i) Financials

(ii) Logistics

(iii) Human Resources

(iv) Work Flow

Benefits of ERP:

Tangible benefits:

(i) Reduction of lead time by 60%

(ii) 99% on-time shipments

(iii) Doubled business

(iv) Increase of inventory turnover by over 30%

(v) Reduction of Cycle time to 80%

(vi) Reduction of work0in-process inventory to 70%

Intangible benefits:

(i) Better customer satisfaction

(ii) Improved vendor performance

(iii) Reduced quality costs

(iv) Improved resource utilization

(v) Improved information accuracy

(vi) Improved decision making capability

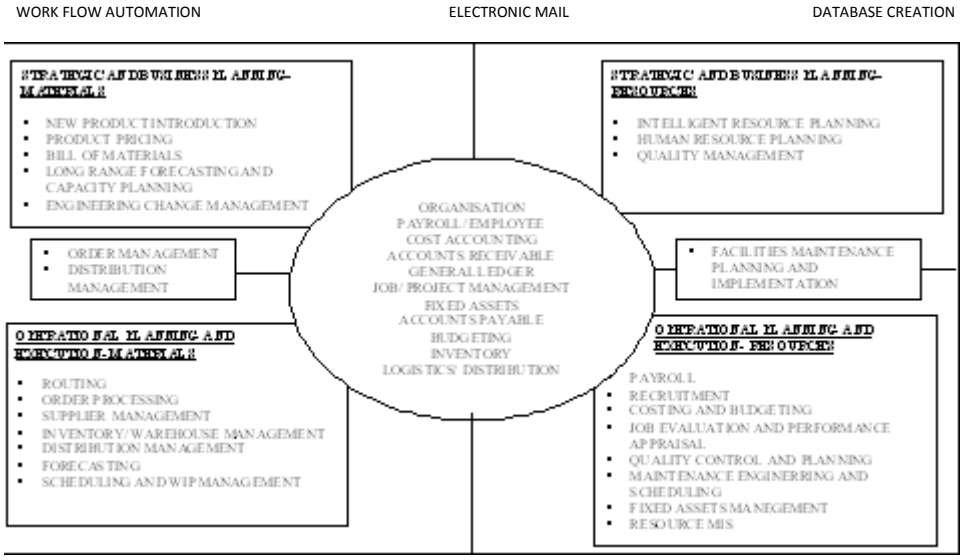


Fig 15.2: Generalized Model of ERP



CHECK YOUR PROGRESS

Q 4: Poka Yoke is a simple technique developed by

(a) Shigeo Shingo (b) Joseph Juran

(c) F.W. Taylor (d) None of these

Q 5: Kaizen stands for.

(a) Inventory control (b) Continuous improvement

(c) Continuous study (d) None of these

Q 6: Which of the following involves changes in structures and in processes within the business environment?

(a) Business Process Reengineering

(b) Business Process Restructuring

(c) Business Process Innovation

(d) None of these



15.11 LET US SUM UP

In this unit, the following modern production management tools have been discussed:

- JIT is basically a concept applied throughout the organisation and aims at producing output with minimum lead time, at minimum cost and attempts to eliminate all kinds of waste and non-value activities and variances continuously.
- Total Quality Management (TQM) guides the coordinated actions of the people, machines and information to identify and fulfill customer quality requirements.
- ISO stands for International Organisation for Standardization. It is an international body which consists of representatives from more than 90 countries to provide common standards on international trade of goods and services.
- Poka Yoke stands for Mistake proofing. It is a simple technique developed by Shigeo Shingo in Toyota Production system.
- Kaizen stands for continuous improvement involving everyone in an organization from top management to managers, then to supervisors, and finally to workers.
- Business Process Reengineering involves changes in structures and in processes within the business environment.
- Supply chain management is a set of approaches used to efficiently integrate suppliers, manufacturers, warehouses, and stores in order that merchandise is produced and distributed at the right locations, in right quantities, and at the right time.
- Enterprise Resource Planning (ERP) is a software package developed for optimum use of resources of an enterprise in a planned manner.



15.12 FURTHER READINGS

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15.13 ANSWERS TO CHECK YOUR PROGRESS

Ans. to Q. No.1: (b) Just-in-Time (JIT) Production

Ans. to Q. No.2: (d) None of these

Ans. to Q. No.3: (a) International Organisation for Standardization

Ans. to Q. No.4: (a) Shigeo Shingo

Ans. to Q. No.5: (b) Continuous improvement

Ans. to Q. No.6: (a) Business Process Reengineering



15.14 MODEL QUESTIONS

Q. 1) What is Just-in-Time (JIT) Production?

Q. 2) Explain the objectives of different ISO 9000 series.

Q. 3) Discuss the benefits of Total Quality Management (TQM).

Q. 4) Explain the role of Kaizen as a tool for continuous improvement in a production based organisation.

Q. 5) What is Business Process Reengineering?

Q. 6) What is Supply chain management?

Q. 7) What is Enterprise Resource Planning (ERP)? Explain its benefits.

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