CHAPTER V

I T ENABLED AGRO PROCESS INDUSTRIES

5.1. Introduction

In the last two decades, information technology has emerged in the world affecting our personal, social and public life and has made a significant impact on the quality of life. It handles data and information represented in digital, text, image, graphics or voice media and deals with communication, storage processing and printing or exhibition in the manner and kind as desired by the users. It is an outcome of the advances in telecommunication and computer technology. Information Technology (IT) helps to optimize the use of scarce resource through intelligent information support for decision making and helps further in its implementation by supporting coordination effort without wasteful delays. Decision making has become a very complex process due to competitive environment, scarce resources, time pressures and unavoidable compulsions to achieve goals.

IT replaces old, outdated slow methods by fast ones. It allows to handle large and complex data and its structure with ease which has never possible earlier. It helps to test the solutions without implementing them. The distance and access are no longer technical or operational problems, as information stored anywhere can be used without its personal possession. It has affected the work culture in organizations and life style of each individual, Information therefore is considered the important productive resource along with men, materials, machines and money.\(^1\)

Agro process industries also can take help of information technology for real time decision making. Agro processing industries are facing number of consequences leading to challenges related with quality of product, efficiency of supply chain network, balanced utilization and procurement of inventories, technology acquisition and human resource development etc. IT enabled systems is in fact, need of the hour. In these circumstances, this research work concentrates on significance and relevance of different IT based and other methodologies like Management Information System (MIS) Total quality management (TQM), Material Resource Planning (MRP), Enterprise Resource Planning (ERP), Six Sigma, Supply Chain Management (SCM), Business Process Reengineering (BPR) etc. for sustenance and enhancement of agro process industries.

5.2. Management Information System (MIS)

The concept of Management Information System (MIS) has been evolved over a period of time. It considers many dimensions of the organizational management system. Initially MIS was limited to process the data and generate reports in different formats to recognize the status of organizational activities. Now MIS can be used as reliable system for decision making. MIS is based on principles and practices of management. It uses the concept of management control and reveals the facts through data analysis. A MIS can be evolved for a specific objective after evolved with proper planning and design. It calls for an analysis of business, management views and policies, organisation culture and the management style. The information should be generated in this setting and must be useful in managing the business.
The MIS is a dynamic concept subject to change with the time and again, with a change in a business management process. It continuously interacts with the internal and external environment of the business and provides a corrective mechanism in the system so that the changed needs of information are met with effectively. The MIS is a system to support the decision-making function in the organisation. The difference lies in defining the elements of the MIS. However, in today’s world, MIS is a computerized business processing system generating information for people in the organisation to meet the information needs for decision-making to achieve the corporate objectives of the organisation.

5.2.1. MIS: A Tool for Implementation of Management Process

The MIS helps to all level of management. For lower level management personnel it provides operational data for planning, scheduling and control. It further helps the middle management in short term planning and controlling. It helps to top management for strategic planning and controlling. The MIS plays the role of information generation, communication, problem identification and helps in the process of decision making.

The process of management requires a lot of data and information for execution of the plan. This requirement arises on account of the fact that in each step of management, a variety of decisions are taken to correct the course of development. The decisions or actions are promoted due to the feedback given by the control system incorporated in the management system. The control of overall performance is made possible by way of budget summaries and reports. The summary showing sales, costs, profit and return on investment throws light on the direction, the organization is moving to. The exception reports identify the weaknesses in the management system.

The objective of the MIS is to provide information for a decision support in the process of management. It helps in such a way that business goals are achieved in the most efficient manner. Since decision making is not restricted to a particular level, the MIS is expected to support all the levels of the management in conducting the business operations. Unless the MIS becomes a management aid, it is not useful to the organization.

5.2.2. Effective Management Process Using MIS

A practical model is shown in figure 5.1, which analyses management processes that results into effectiveness of organization in achieving the goals and objectives. The model puts a lot of emphasis on the management philosophy and the environment factors on which the effectiveness depends. Environment factors provide an opportunity to survive and grow along with certain constraints, while the management philosophy sets the guidelines for deciding management practices to run the organization.
Figure 5.1: Management Effectiveness Analysis Model

It is difficult to control environmental factors. So, management can change the policy towards different stakeholders, namely, employees, consumers, suppliers, shareholders, consumers and the government to ensure profitability.²

5.2.3. MIS in Agro Process Industries

The agro process industries require to maintain the voluminous database for anticipating customer demands and make real time decisions. Management information system can be used effectively for this purpose. In addition MIS is very useful tool to identify options for generating competitive advantage and incorporate value addition particularly for production and marketing of processed agro products.

5.3. Total Quality Management (TQM)

Total Quality Management is an approach of developing whole organisation in such a way that it not only meets the expectations of the customers but exceeds it. The whole system in the organisation is so geared that the quality, of the product or service from the very raw material to the point of delivery is maintained and every effort is made - to improve the quality successively and continuously.

5.3.1. Quality Challenges Faced by Industries

Managers of manufacturing and services organizations always confront with three important issues, profitability, productivity and quality. Amongst these three factors, quality can be the most significant factor in determining the long run success of the organizations. High quality of products and services offer competitive advantages to the organization. A good quality reduces costs due to less return, scrap and rework and increase productivity and profits.

In the current techno-economic scenario, quality leadership is the key to business success. Effective operation of business now depends upon the consistent
performance of products and services without any allowances for failures. Quality has become the fundamental strategy for survival and competitiveness of business organizations. Today, every country is concerned with a high standard of living and better quality of work life (QWL) for its people. Every organization intends to have a high level of profits and increased market share. As a consumer, we are concerned with quality or fitness for use of goods and services offered. Therefore, productivity and quality management constitute a major driving force for survival and sustainable growth. Quality is the term that has a valuable meaning to both producer and consumer. Producer views fitness for use in terms of ability to process and produce less rework, less scrap, minimal downtime and high productivity. The consumer views fitness for use from the product benefit derived, value for money etc.

Organizations irrespective of size, whether small, medium or large face the problem of limited supply of resources where as competitive environments demand a better quality product at the existing price or at a lower price, survival through acceptable quality and profit levels and maintaining and improving the market share. In order to attain the end goal of profit, problems typically arise in allocating the scarce resource to a variety of alternative purposes competing for their use. Matching objectives with resources to attain end results is not an easy task. Only those organizations that manage productivity and quality as an ongoing activity will be able to deal with these problems.

Quality of product depends upon, material, machine, men, motivation, money, modern information methods, mounting product requirements and markets. Quality is the characteristic feature of the product or service that meets customer needs. Quality is composed of many separate elements depending upon the product or the service. These elements are specification, conformance, and reliability, cost (value) and delivery. To produce a genuine quality product or service, quality must be built in at the very start and must be maintained at every stage. The design of the product must be such that there would be no scope to make mistake. This approach of managing quality is called TOTAL because it encompasses everything the company does, all its processes and all its employees at every level in the organization all the time. The word total is added to send the message that all processes, systems at all level of management and employees must be concerned with quality. Quality is everybody's business. Total quality management also can be defined as 'a positive attempt by the organisation concerned to improve structural, infrastructural, attitudinal, behavioural and methodological ways of delivering to the end customer, with emphasis on consistence, improvements in quality, competitive enhancement, all with the aim of satisfying or delighting the end customer. Total quality management is not a separate initiative supporting business as usual, but it is the business itself. Total quality management also can be defined as 'a positive attempt by the organisation concerned to improve structural, infrastructural, attitudinal, behavioural and methodological ways of delivering to the end customer, with emphasis on consistence, improvements in quality, competitive enhancement, all with the aim of satisfying or delighting the end customer. Total quality management is not a separate initiative supporting business as usual, but it is the business itself.

TQM is the integration of all functions and processes within an organization to achieve continuous improvement in the quality of the product or the service. Basic components of TQM are culture of quality, information systems, process controls and human resource. Success of TQM depends on the method of its implementation. Organization starts with setting a goal that it intends to attain. These goals should be benchmarked, realistic and stated clearly. There is a need to set an appropriate time limit for achieving these goals.
5.3.2. Factors Influencing Quality

A reputation for quality being good or bad is not by mere chance or coincidence, but it is result of the policy of the company in respect of designing, establishing and maintaining the quality programs. To make such quality programmes operationally effective, the company has to exercise a good control over them in order to achieve the quality goals. The fundamental factors controlling the quality of products and services are represented in figure 5.2.

![Figure 5.2: Factors Influencing Quality of Products and Services](image)

1. Market

Organisations have to make the customer believe that there is a product or service to meet every need of the customer. Customers are becoming more demanding and hence the organisations are under tremendous pressure to meet these ever demanding needs. Markets are growing in terms of both size and variety and also there is a shift from local to global. As a result, the business should be flexible and responsive to meet expectations of customers with new, innovative, cost effective, quality and reliable products and services.

2. Money

Always there is a pressure on profit margin due to increase in competition and changing business environment throughout the globe. The demand for mechanization and automation calls for heavy capital investment and the investments must be justified and supported through increase in productivity. The focus should be on quality, cost area and reduction of costs associated with quality and increasing the profit.
3. Management

Responsibility for quality mainly lies with the management. It is the responsibility of the human resource to motivate to perform their functions efficiently and effectively to develop quality mindedness. Management should have a strong belief and faith in employee empowerment.

4. Motivation

Increased complexity of a quality product to the market has increased the importance of contribution of each employee towards quality. Employee should be motivated to accept the challenges of quality and constructively channelise their potential to achieve excellence in quality.

5. Information

The revolution in computer and communication technology has made possible the collection, storage, retrieval and manipulation of information on a scale which cannot be imagined. The power of information technology has made it possible to control machines and processes during manufacture of products and services.

6. Product

Intricacy and complexity of equipment design demand closer control over manufacturing processes, increased complexity and higher performance requirements. The importance of safety and reliability has become important. So, a reliable design is must to ensure the quality of the product.

7. Machines

The demand of the companies to get cost reduction and production volumes to satisfy the customers’ demands in competitive markets has forced the use of more sophisticated and complex machines and equipments of better quality. Good quality is becoming critical in maintaining the machine up time for the full utilization of the equipment. Some organizations prefer to use mechanization/automation as a means to reduce cost and increase productivity.

8. Materials

The effective specification and utilization of material is a big challenge for engineers. The area of material research has a greater potential, as it constitutes a major component of cost of the product.

9. Human Resource

People form the dynamic resource of the organisation. People should be flexible, adaptive and responsive to the changing technology and production processes.
5.3.3. Relevance of TQM for Agro Process Industries

Different factors influencing the quality of products and services as mentioned earlier are equally applicable for agro process industries. Quality consciousness is the key to attain competitive advantage in today’s business scenario. The TQM approach should become philosophy of agro process industry so that, there would be continuous development of both the organization and the entire society as well.

5.4. Material Requirement Planning (MRP)

Material Requirement Planning (MRP) refers to the basic calculations used to determine components’ requirements from end product requirements. It also refers to broader information system that uses the dependence relationship to plan and control manufacturing operations.

MRP is a technique of working backward from the scheduled quantity and needs dates, for end products specified in a master production schedule to determine the requirements for components needed. The MRP logic serves as the key component in an information system for planning and controlling production operations and purchasing. The information provided by MRP is highly useful in scheduling because it indicates the relative priorities of shop orders and purchase orders.

"Materials Requirement Planning (MRP) is a technique for determining the quantity and timing for the acquisition of dependent demand items needed to satisfy master production schedule requirements”. MRP is one of the powerful tools that, when applied properly, helps the management in achieving effective manufacturing control.

5.4.1. Objectives of MRP

1. Inventory Reduction

MRP determines how many components are required, when they are required in order to meet the master schedule. It helps to procure the materials/components as and when needed and thus avoid excessive build up of inventory.

2. Reduction in the Manufacturing and Delivery Lead Times

MRP identifies materials and components quantities timings when they are needed, availabilities and procurements and actions required to meet delivery deadlines. MRP helps to avoid delays in production and priorities for production activities by putting due dates on customer job orders.

3. Realistic Delivery Commitments

By using MRP, production can give timely information to marketing department. This information may be about likely delivery times to prospective customers.
4. Increased Efficiency

MRP provides a close co-ordination among various work centres and hence helps to achieve uninterrupted flow of materials through the production line. This increases the efficiency of production system.

5.4.2. Functions and Terminology of MRP

A) Functions of MRP

1. Order Planning and Control

   The first function of MRP is related with identification of information about required time and quantity of raw material needed.

2. Priority Planning and Control

   It compares and confirms the expected date of availability and actual date of requirement of each component.

3. Capacity Planning and Control

   It provides a basis for planning the capacity requirements and developing a broad business plan that can be used as direction to have optimum utilization of production capacity.

B) Terminology of MRP

1. Dependent Demand: The demand for an item depends on another item. The demand dependency is the degree to which the demand for one item is associated with demand for another item.

2. MRP: Technique for determining quality and timing of dependent demand items.

3. Lot Size: The quantity of items required for an order.

4. Time Phasing: Scheduling to produce or receive an appropriate amount (lot) of material so that it will be available in the time periods when required.

5. Time Bucket: The time period used for planning purposes in MRP.

6. Gross Requirements: The overall quantity of an item needed at the end of the period to meet the planned output levels.

7. Net Requirements: The net quantity of an item that must be acquired to meet the schedules output for the period. It is calculated as, Gross requirements minus schedules receipts for period minus amounts available from the previous period.

8. Requirements Explosion: The breaking down of (exploding) of parent items into component parts that can be individually planned and scheduled.
9. **Scheduled Receipts**: The quantity of an item that will be received from suppliers as a result of orders that have been placed.

10. **Planned Order Receipts**: The quantity of an item that is planned to be ordered so that it will be received at the beginning of the period to meet net requirements for the entire production plan.

11. **Planned Order Release**: The quantity of an item that is planned to be ordered or it is a plan (quantity and date) to initiate the purchase or manufacture of materials so that they will be received on schedule after the lead time offset.

12. **Lead Time Offset** - The supply time or number of time buckets between releasing an order and receiving the materials.\(^5\)

### 5.4.3. MRP System

The inputs of MRP system are,

- a. A master production schedule (MPS)
- b. An inventory status file
- c. Bill of material (BOM)

Using these three information sources, MRP processing logic provides three kinds of information for each component, namely, order release requirements, order rescheduling and planned orders. Interlink between these components is shown in figure 5.3

![MRP System Diagram]

**Figure 5.3.: MRP System**

a) **Master Production Schedule (MPS)**

MPS is series of time phased quantities for each item that an organization produces, indicating how many are to be produced and when to be produced. MPS is initially developed from firm customer orders or from forecast of demand before MRP system begins to operate. The MRP system accepts whatever the master
schedule demands and translates MPS end items into specific component requirements.

b) Inventory Status File (ISF)

Every inventory item being planned must have an inventory status file, which gives complete and up to date information on the on hand quantities, gross requirements, schedules, receipts and planned orders releases for the items. It also includes planning information like lot sizes, lead time, safety stock level and scrap allowances.

c) Bill of Materials (BOM)

To schedule the production of an end product, an MRP system must plan for all the material, part and sub assemblies that go into the end product. The BOM file in the computer provides this information.

5.4.4. MRP in Agro Process Industries

Agro process industries face number of difficulties related with the material resource. Some of them are non availability of good quality materials, absence of storage facilities, requirement of preservation of material because of its perishable characteristics etc. MRP suggests a schedule of material procurement considering lead time, inventory carrying and other related costs, benefit of economies of scale etc. Thus, wastage of valuable material can be prevented which ultimately results into optimum utilization of working capital available with agro processing enterprise.

5.5. Enterprise Resource Planning (ERP)

Information technology is revolutionizing the way the business is being done. For any organization to succeed all business units or departments should work in harmony towards a common goal. Enterprise Resource Planning (ERP) is an extremely powerful tool, which provides seamless information system to support the various functional business modules of an enterprise. Most organizations are turning to available ERP package for solution to their information management problems' ERP package if chosen correctly, implemented judiciously and used efficiently will raise the productivity and profit of companies dramatically.

To reap the full benefits of technology such as information technology (IT) one has to devise a system with a holistic view of the enterprise which has to work around core activities of an organization and should facilitate uninterrupted flow of information across departmental barriers such systems can optimally plan and manage all the resources of the organization and hence called as ERP systems.

ERP cover the techniques and concepts employed for the integrated management of business as a whole, from the point of view of the effective use of resources to improve the efficiency of an enterprise. ERP system includes a commercial software package that provides for the seamless integration of all the information flowing through a company- financial, accounting, human resources, supply chain and customer information. The successful deployment of ERP results in an enterprise that has streamlined the data flow between different parts of the
business. The main reason for popularity of ERP is the efficiency that an ERP system forces the organization to implement, the analysis and the reporting that can be used for long term planning and the efficient use of applications and system resources. ERP system employs client / server technology, which means that a client (user) system runs an application (finance human resources, production etc.) that access information from a common ERP database management system which is on the server.

5.5.1. Need of ERP

ERP covers the techniques and concepts employed for the integrated management of business as a whole with an objective of effective use of management resources to improve the efficiency of the organization ERP packages are integrated software packages that support the ERP concepts. ERP software is designed to model and automate many of the basic process of the company from finance to the shop floor with a goal of integrating information across the company and eliminating complex expensive links between computer systems. ERP systems produce the dramatic improvements when used to connect parts of an organization and integrate its various processes. The ultimate benefit goes to the customer who will get better products and better services at affordable prices.

5.5.2. Benefits of ERP

The ERP system extends both direct and indirect benefits to the organization. They include,

1. Reduction in lead time for procurement of material.
2. On time delivery of goods and services.
3. Reduction in cycle time from receipt of order to delivery of goods.
4. Improved resource utilization.
6. Increased flexibility.
7. Reduces quality costs.
8. Improvement and accuracy of decision-making capability.

5.5.3. Development of ERP

Enterprise Resource Planning provides integrated business software modules to support the functional unit of an enterprise. It has a process oriented approach in the sense, that, it focuses on core processes like order fulfillment, material procurement, balance sheet preparation etc. and attempts to integrate various functions of an enterprise involved in the execution of these processes.

The strength of ERP lies in its ability to go beyond the fulfillment of needs of specific departments or functions and address the needs of an enterprise as a whole. The process oriented perspective of ERP breaks departmental barriers in the generation, transmission and processing of data which may be accessed by any department as and when needed. The development of ERP is shown in figure 5.4.
ERP has been developed from two earlier planning systems: Material Requirement Planning (MRP) and Manufacturing Resource Planning (MRP-II). In 1970s MRP was introduced to reduce inventory levels in industries to plan order releases in a phased manner. It enabled industries to bring down inventory levels significantly and facilitate materials planning.

MRP II was introduced in the 1980s to deal with the entire manufacturing function. As a result, its scope was much broader than that of MRP which was concerned with only one aspect of manufacturing process, namely, materials planning. MRP-II enabled industries to examine the viability of a specific production schedule in terms of several resources including materials availability.

A drastic change in the business scenario was noticed in the 1990s as a result of global competition and reduced product life cycles. Customers are now provided with a wide range of choices from competing brands and their requirements are changing at a fast pace. In order to retain or enhance market share, enterprises must have the agility to respond to customer needs in the shortest possible time, not only to ensure customer satisfaction but also to avoid the obsolescence of their products and services in a globally competitive market. An integration of all the functions extending from design to sales is now needed to address today's market requirements. ERP provides an answer to this issue.

5.5.4. ERP for Agro Process Industries

ERP being an integrated software solution can be successfully used for solving various problems in front of agro process industries. In today’s competitive environment the organization should be alert to respond quickly for customer demand. In spite of factors beyond control, organizations have to satisfy the end user for sustenance. This can be done with help of integrated network associated with all functions of the organization. ERP can provide working solution in this direction.

5.6. Six Sigma

Six Sigma is a business management strategy originally developed by Motorola, as of 2009. It enjoys widespread application in many sectors of industry. Six Sigma seeks to improve the quality of process outputs by identifying and removing the causes of defects (errors) and minimizing variability in manufacturing and business processes. It uses a set of quality management methods, including statistical methods, and creates a special infrastructure of people within the organization; who are experts in these methods. Each six sigma project carried out within an organization follows a defined sequence of steps and has quantified targets.
These targets can be financial (reduced cost or increased profit) or whatever is critical to the customer of that process (cycle time, safety, delivery etc.).

5.6.1. Methods of Six Sigma

Six sigma follows two methodologies inspired by Deming’s Plan-Do-Check-Act cycle. These methodologies comprising five phases each bear the acronyms DMAIC and DMADV. DMAIC is used for projects aimed at improving an existing business process. DMADV is used for projects aimed at creating new product or process designs.

a) DMAIC

The DMAIC project methodology has five phases:

- **Define**: Identify the problem, the voice of the customer, and the organizational goals. Specifically:
  - Define the problem, the voice of the customer, and the organizational goals, specifically.

- **Measure**: Identify key aspects of the current process and collect relevant data.

- **Analyze**: Analyze the data to investigate and verify cause-and-effect relationships. Determine what the relationships are and attempt to ensure that all factors have been considered. Seek out root cause of the defect under investigation.

- **Improve**: Improve or optimize the current process based upon data analysis using techniques such as design of experiments, mistake proofing, and standard work to create a new, future state process. Set up pilot runs to establish process capability.

- **Control**: Control the improved process to ensure it remains in control and maintain the gains made.

![Figure 5.5: DMAIC Methodology](image)

- Define
- Measure
- Analyze
- Improve
- Control

Figure 5.5: DMAIC Methodology
• Control the future state process to ensure that any deviations from target are corrected before they result in defects. A control system like statistical process control is implemented for this purpose.

![Figure 5.6: DMADV Methodology](image)

b) DMADV

The DMADV project methodology also known as DFSS ("Design For Six Sigma"), features five phases:

• **Define** design goals that are consistent with customer demands and the enterprise strategy.

• **Measure** and identify CTQs (Critical to Quality characteristics), product capabilities, production process capability and risks.

• **Analyze** to develop and design alternatives, create a high-level design and evaluate design capability to select the best design.

• **Design** details, optimize the design, and plan for design verification. This phase may require simulations.

• **Verify** the design, set up pilot runs and implement the production process.

5.6.2. Importance of Six Sigma

Six Sigma focuses on the customer and improves processes enabling the delivery of higher quality services and a competitive edge in the market place. In addition to process improvements and customer service, Six Sigma approach can make the work
environment safer and more conducive to productivity. Sooner or later, everyone in
the organization should have some degree of exposure to Six Sigma which leads to
personal and professional development. This way, Six Sigma becomes not just a
quality program, but also a way of doing business. In some organizations, Six Sigma
training is required for management positions.

The foundation of the process is facilitating reduced variability and increased
efficiency while eliminating non-value-added activities. All this leads to the ultimate
goal of retaining and building relationships with clients for a mutually beneficial
future.

In today's highly competitive business environment, organizations cannot afford to
deliver defective, sub-standard products to customers and get away. The information
explosion brought about by the Internet has made it possible for customers to get
information at their fingertips and make informed decisions. All this means that
organizations have to deliver products, which are free from any defects. The bottom
line is, ‘Organizations must delight customers and relentlessly look for new ways to
exceed their customers' expectations’. To achieve this, it is imperative that Six Sigma
Quality becomes a part of business culture. Six sigma is a system that is uniquely
driven by close understanding of customer needs, disciplined use of facts, data, and
statistical analysis, and diligent attention for managing, improving, and reinventing
business processes.

5.6.3. Six Sigma for Agro Process Industries

In fact, Six Sigma is an approach that considers customer requirements,
upgraded quality standards and appropriate use of different resources for enhancement
of product and service quality. Now a days customer are more aware about the
quality especially of the agro products like, processed food, bakery items, milk, fruits
and vegetables products etc. The agro products are perishable in nature; hence they
may face the quality related problems. The Six Sigma approach can be used for these
industries to prevent quality and cost related issues.

5.7. Supply Chain Management (SCM)

Supply chain is defined as the sequence of business processes and information
that provides a product or service from suppliers through manufacturing and
distribution to the ultimate customer. It is a term that is being increasingly used to
emphasize the interactions among marketing, logistics, and production.

In a typical supply chain, which is also referred to as the logistics network,
raw materials are procured, items are produced at one or more factories, shipped to
warehouses for intermediate storage, and then shipped to retailers or customers, thus
the supply chain-is a 'process umbrella’ under which products are created and
delivered to customers. The cycle of buy-make-move-store-sell is the supply chain.

The facilities in a supply chain typically include suppliers, manufacturing
centers, warehouses, distribution centers, and retail outlets. These facilities are
connected by transportation and communication links, along which raw materials,
work-in-process inventory finished products, and information flow. Ideally, the supply chain consists of multiple organizations that function as efficiently and as effectively as a single organization, with full information visibility and accountability.

There are several supply chains in an organization. The supply chain for a particular product family is identified by tracing the flow of materials and information from the final customer backward through the distribution system, the manufacturer, suppliers, and the sources of raw material. The total time for materials to travel through the entire supply chain can be six months to a year or more. Since materials spend so much time waiting in inventory, there is a great opportunity to reduce the total supply chain cycle time, leading to a corresponding reduction in inventory, increased flexibility, reduced costs, and better deliveries.

5.7.1. Characteristics of Supply Chains

1. Decisions in each part of the supply chain affect the other parts.

2. Demand changes by the end-user create an accelerator effect in the supply chain, which magnifies the size of demand changes on upstream supply chain elements (wholesalers, warehouses, and factories). Each upstream element in the supply chain not only aggregates the inflated demand changes of all the elements fed by it but also overreacts to these demand changes and adds its own safety margins to take care of perceived fluctuations in future demand from downstream elements. Inaccurate forecasts, information time lags, and replenishment time lags account for the dynamics observed. Upstream elements must be careful to not overreact to inflated orders from downstream elements; rather they should consider only the real demand changes at the end-user level.

3. The best way to improve the supply chain is to reduce the total replenishment time. Reducing replenishment time allows the supply chain to react rapidly to real demand changes and reduces the inventory needs.

4. Accurate forecasting of demand changes and making this information available to all levels can dampen the effects of the demand change. Effective demand management can smooth the fluctuation in the demand.

5.7.2. Objectives of a Supply Chain Management System

1. To decrease inventory costs by more accurately predicting demand and scheduling production to match it. SCM forecasting applications utilize extremely complex planning algorithms to predict demand based upon information stored in the database. These applications also facilitate incorporation of any changes in supply chain data into the forecast much faster than previous modes of calculation.

2. To reduce overall production costs by streamlining the flow of goods through the production process and by improving information flow between an enterprise, its suppliers, and its distributors. SCM applications such as manufacturing scheduling, transportation management and warehouse
management all contribute to reduced production cost. By ensuring real-time connectivity between the various parties in a supply chain. These applications decrease idle time, reduced the need to store inventory and prevent bottlenecks in the production process. SCM helps suppliers, producers and transporters in an integrated manner.

3. Improve customer satisfaction by offering better quality, higher product variety and fast response. SCM application allows enterprise to reduce lead time, increase quality and offer greater customization, enhancing the customer relationship and improving retention. 

5.7.3. Stages of Supply Chain

There are five stages in supply chain. It starts from supplier’s end and finishes with customer satisfaction. These stages are shown in figure 5.7.

![Figure 5.7: Stages of Supply Chain](image)

5.7.4. Supply Chain Management and Agro Process Industries

Supply Chain Management is a process of planning, execution and monitoring the activities related with pre and post processing of products. Agro process industries can utilize their capacities in optimum way by balancing supply of perishable raw material as an input and supply of processed agro products as an output to the customer through the distributor-retailer chain. As agro products have limited durability and unique parameters of quality, the role of supply chain management is more significant in agro process industries.

5.8. Business Process Reengineering (BPR)

BPR is defined as fundamental rethinking and radical redesign of business processes to bring about dramatic improvements in performance. Performance is measured in terms of cost, quality, accuracy, service, speed etc.

The word ‘fundamental’ attempts to examine why a particular task or job is being done in the first place and why it is being done in a particular way. The objective of these enquiries is to (i) ascertain the relevance of the job and (ii) explore
The possibility of doing it in a different and better way, if it is found relevant. Close scrutiny may reveal its redundancy or modification. It should be obliterated if found redundant and should be modified if it is essential or unavoidable.

The word ‘radical’ is derived from the Latin word ‘radix’ which means ‘root’. BPR attempts to get into the root of business process. It is not concerned with marginal improvements as like ‘Kaizen’, but it is not operate at surface level where improvements are of minor nature.

The word ‘design’ has a strong engineering connotation. Generally it is talked more about product design, but BPR is concerned with the work design. No matter how well a product is designed, if the activities involved in its processing are properly designed, its quality is unlikely to be satisfactory.

The quality of a job depends on two factors; the way it is done and the people who are doing it. There is a linkage between the word ‘fundamental’ and ‘redesign’ in the definition of BPR. As the word ‘fundamental’ attempts an in-depth look into the way, a work is being done, it is possible that the redesign of some of the jobs may emerge as a result of such enquiry.

The word ‘process’ means, a group or collection of related tasks which are performed in logical sequence to create an output that is of value to the customer. The emphasis is on ‘value to the customer’ which is closely linked to customer satisfaction. If the customers are dissatisfied with a product, the process associated with it, right from product design to post sales service needs close scrutiny.

5.8.1. Principles of BPR

BPR focuses on strategic business processes such as order processing, logistics, manufacturing systems, procurement and supplies, cash flow management etc. Five key principles of BPR as shown in the figure 5.8 are as under.

1. Strategic re-design of process
2. Involvement of right teams of people
3. Wise use of information technology
4. Changed management style
5. Continuous improvement of processes
A process is a group of activities that takes an input, adds value to it and provides an output to an internal or external customer. Processes enable the organization to focus on the customer. Viewing the material transformation process in terms of those activities tied to transform material into something of value to the customer is a process view. Such a view examines inventories too in terms of customer value.

### 5.8.2. Business Process Reengineering and Agro Process Industries

In the new business environment, Indian agro processing industries need to bring about dramatic improvements in their key business processes to survive and grow in a globally competitive market. With liberalization and globalization, the scenario has suddenly changed for Indian agro process industries. Domestic industries have to face the severe competition from abroad. This global competition enforced these industries to adopt radical changes in their processing activities.

### 5.8.3. Emphasis on BPR

BPR is a powerful concept to bring about dramatic improvements in key business processes. Although the application of BPR is still new to Indian agro process industry, it is the fact that, to keep pace with global competitors, BPR must become an integrated part of these industries. The BPR is an advancement derived from amalgamation of various modern management practices addressed to specific business functions. These techniques include, IT enabled reengineering, Total Quality Management, Material Resource Planning, Enterprise Resource Planning, Six Sigma, Supply Chain Management etc.
5.9. Conclusion

The emphasis has been given for integrated application and association of different techniques discussed in this chapter for reality based implementation of BPR methodology. Agro process industry which is the backbone of rural social fabric is on the threshold of critical stage and need to make an urgent decision for their survival. Now it is the right time to focus on various components of BPR which will ensure softened development of agro process industries.

References


2. Ibid, pp 11-18.


5. Ibid, pp 175-178.


