8. PRODUCTION MANAGEMENT

Functional Areas

In any business organization, the commonly identified functional areas are production, marketing and finance. In recent years, the personnel and materials that go into the production process, packing process and marketing process have gained importance and given due importance by treating it separately as personnel and materials management.

Organization functional areas are

1. Production Management
2. Marketing Management
3. Financial Management
4. Personnel Management
5. Materials Management

The above functional areas are not watertight compartments. The decisions/action taken in one functional area affects the other functional area. The decisions in production and marketing are influenced by the actions on such matters as volume, terms and conditions of loan. The quantity, quality and timely availability of materials also has a bearing on production and marketing decisions. The labour motivation towards work, supervising ability/skill of supervising personnel also affects production and marketing.

Production/Operations Management

In general, operations management refers to management of all operations of a production unit. So it may be interchanged with production management. Production is a system for converting inputs into finished products. The production often refers to manufacturing industries. Yet, in reality, production can be defined as the creation of value or wealth by producing goods and services. Production management refers to planning, organization, direction, co-ordination and control of the production functions carried out in such a way that the desired goods or services could be produced at the right time, in right quantity and at the optimum cost.

The production management involves the following activities:

a) Developing the product/service
b) Establishment of proper organization structure
c) Selection of personnel
d) Establishment and maintenance of factory building, plant and equipment
e) Management of purchases, storage, and transportation of raw materials
f) Ensuring effective control

In production management decisions to be taken consist of

a) What to produce
b) When to produce
c) How much to produce and
d) How to produce

Production includes a) manufacturing of commodity (physical output) and b) creation of services

Deciding whether to buy or make

The process of changing raw materials into finished products that is delivered to customer is a long process, usually involving many companies performing different productive functions. One company may refine the raw materials, several may perform manufacturing processes, and another may assemble the parts into the finished product and so on. A given company may perform a large or small part of this process. Fixing the place and size of the segment is an important decision.

Deciding to specialize or generalize

A food (fruit) processor may

1. Grow or buy his fruit requirements
2. Sell his output to a wholesaler, retailer or directly to consumer

The advantages of specializing and concentrating in a small segment are:

1. Less capital investment is needed
2. Management can concentrate better on small segment
3. Planning, directing and controlling are less complex

The advantages of a larger segment are

1. More control of the process
2. Less idling (time) of men and machinery
3. Greater potential of growth

The economics of decision to set up a production unit.

The decision on what segment of the total transformation process to be depends on the economics of situation. Having decided on the segment of the transformation process, one can begin to plan, obtain and install the producing unit.

Physical Facilities

The physical facilities of the firm would include building, machineries and equipments, furniture and fixtures and others. They must be designed to aid employees in producing the desired product or service at a low cost. The design function includes lay out, selection of machines and equipments and determination of features desired in the planning.

Steps in planning the physical facilities

i) Good selection and arrangement of physical facilities can pay dividends. Planning the physical facilities require the following steps.

ii) Determine the goods and services to be produced and performed.

Break the product or services into parts, operations and activities. Parts are the divisions of the product that, when assembled form output. Some outputs have only one part while others may have many. Operations are the steps or segments of work performed to accomplish the conversion of inputs into outputs. Activities such as moving raw materials are necessary for the performance of operations. Non-activities including delays are caused by imbalance of times of the operation. Activities and non-activities may not be identified fully until the final lay out planning is done. The number and extent of non-activities should be minimized.

iii) Determine the time to perform operations

Each operation required to produce a good or perform service consumes the time of work of machines and personnel. The total time includes the time to perform the operation plus time for unavoidable delays and personnel needs. The time of work determines the number of machines and the number of people needed to perform the work and speed of conveyors.

iv) Estimate the number of machines and workers needed

Knowing the time that a machine takes to perform an operation on a product, and knowing the planned production, the number of machines needed can be determined.

v) Decide the best arrangement for the sequence of operations

The operations management has to ensure the least movement of product and people. However, people and machines should not be idle and space available should not be wasted. The plant can be planned according to either or a combination of both of the following two types of layout.

a. Product or Service layout.
b. Processor or Function lay out

a) **The product layout** places machines or serving units in such a way that the product moves along a line as it passes through the sequence of operations. Materials and people move forward from operation to operation with little back tracking.

Advantages

1. Specialization of workers and machines
2. Less inventory
3. Fewer instructions and control
4. Faster movement
5. Less space for storage

b) **The process layout** is based on keeping machines and workers busy thus idle time is reduced to a minimum. Machines performing the same type of work and workers with similar skill are grouped together.

Advantages

1. It has flexibility to take care of change
2. It uses general-purpose machines and equipment
3. Efficient use of machines and personnel
4. Few layouts are combination of both to take advantage of the situation. Decreasing inventory compensates idle time created by differing production.
5. Determine the general layout
6. Plan the detailed layout for efficiency and effectiveness

Some specific matters that the manager should include in the final layout planning are:

a) Space for movement
b) Utilities
c) Supply of equipments
d) Safety
e) Working conditions
f) Cleanliness and maintenance
g) Product quality

Implementing the plan

The first step in implementing the plan is to test it see whether it is sound (working well). There are many ways to do this. One method is to have employees or other persons who can give some experienced opinions – review of the plans and suggestions. Another method is to stimulate the process by moving templates or models of the goods or people through the process so that their movements can be analyzed. Some mishaps can be deliberately included to see what happens. The actual implementation of the plan will depend on whether it is a brand new venture, a layout for an existing building or rearrangement of the present layout.

Designing and controlling work

The planning and control process is a communication system designed to convey to employees what, how, where, who, when and why the work is to be done.

1.Work design

After the layout of the plant, plan for the movement of materials. Steps involved in work design and improvement are:

a) State the problem
b) State the functions
c) Collect the information
d) List alternatives
e) Formulate, review and test the selected changes
f) Install and follow up changes

2. Work measurement

Physical work can be measured more precisely than mental work but it sill requires judgment. The time to perform can be divided into i) time to perform the work and ii) time for personal needs and irregular activities.

The methods used to determine time to perform the work are:

i) Estimates by people experienced in the work

ii) Time study, using a watch or timing device

Adding time for personal needs

Personal and irregular time allowances are added to normal time to obtain the total time in which operation should be performed under normal conditions. Time for use of rest rooms, poor working conditions and fatigue are some allowances of personal needs.

3. Planning

The optimum plan from a production standpoint is to maintain a constant level of production to its capacity for both machine and person of one product, with inputs needed arriving and outputs taken by customers as and when they are finished.

4. Scheduling the time for work to be done

Orders are scheduled into production

a) On a preplanned schedule
b) When inventory is reduced to a certain low level
c) When orders are received and inventory is not available.

Schedules set the times to produce specified goods. The scheduling can be done by one of the following methods.

1) Sending orders into the shop in sequence. The shop processes the job through operation on a first come first served basis.
2) Setting priorities and processing orders accordingly. Rush orders which have top priority.
3) Using either (i) or (ii) for each operation.
4) Setting a specific time for each operation and for each job.

Controlling production: Quantity and quality

If no control is expressed over operations the process will fail. The principle of exception should be followed. Controlling by exceptions involves comparing the plans with the plant's performance. In simple systems, this comparison can be made informally by personally observing performance. Orders may be filed by due date, work o be completed in each department may be recorded each day or bar charts may be used. The record is obtained through feedback or by having forms returned with information on work performed. Changes may not be done when performance equals or exceeds the plans. An exception arises when performance does not reach the level desired. Then the operations manager has to decide what to do to improve future performance.

The methods used in quality control have been developed further than those for other control systems and are used in many other systems, including cost control. The system begins with setting the level of quality desired. The quality level is based on:

1) The value of quality to the customer
2) The cost of the quality.

Then controls should be established to obtain that quality. The cost will increase, if an attempt is made to exceed that level of quality. At the same time, if quality is allowed to go below the level, then the firm will lose its customers.

Steps needed in any system of control are:

1. Set standards for your quality range.
2. Measure your actual performance.
3. Compare performance with standards.
4. Make corrections when needed.

Standards of quality may be set for dimension, colour, odour/flavour, strength, content weight, service and other characteristics.

ISO Standards

The World Trade Organization's agreement on technical barriers to trade emphasizes the vital role laid by International Standards in providing the technical foundation for global markets.

When this is done, conflicts are minimized and agreements are more. On this occasion it may be worthwhile to review the development of the new version of ISO 9000 Standards for Quality Management Systems, which have now become so essential for acceptance of products and services at the International level.

The ISO 9000 Standards originally evolved for Quality Management Systems for manufacturing units. The same formulation was then extended to service and software fields. There has been a need felt over the years for a generic system which is all comprehensive and at the same time easily applicable to the business of the user, whether it be in manufacturing or service or software fields. Also in the meantime the environment management standards have come in. Taking into account all this and the fact that the ISO 9000 Standards were last revised in 1994, ISO's Technical Committee TC 176 had taken up the task of bringing out "Year 2000" revision. This is expected to be announced at the end of year 2000, though by now the finalized draft has been circulated which contains all the essential features.

The changes

The current ISO 9000 family of Standards contains over 20 Standards and documents. The year 2000 ISO 9000 Quality Management Standards (QMS) on the other hand will have only three primary standards, which are

1. ISO 9000 Quality Management Systems - **Fundamentals and vocabulary**
2. ISO 9001 - Quality Management Systems- **Requirements**
3. ISO 9004 - Quality Management Systems - **Guidance for Performance Improvement**

The current ISO 9001, ISO 9002 and ISO 9003 Standards will be consolidated into a single ISO 9001 Standards. A reduction of scope of the ISO 9001 requirements will be permitted to omit clauses that do not apply to a particular organization. In addition to the three core standards, ISO 10011, the auditing standard will be consolidated with the ISO 14010, ISO 14011 and ISO 14012 environmental auditing standards.

Principles of revision

The principles driving the revision process are:

1. Applicability to all product and service sectors and to all sizes of organizations,
2. Simplicity to use, clear in language, readily translatable and easily understandable,
3. Ability to connect Quality Management Systems to organizational processes,
4. Provision of a natural stepping-stone towards performance improvement,
5. Greater orientation toward continual improvement and customer satisfaction,
6. Compatibility with other management systems, such as ISO 14000, for Environmental Management,
7. Need to provide a consistent basis and address the primary needs and interests of organizations in specific sectors such as aerospace, automotive, medical devices, telecommunications and others.

Process Model: The revision of the ISO 9000 QMS makes a radical change and repositions the 20 elements of the current ISO 9001 into four parts.

1. Management responsibility
2. Resource Management
3. Product and/or Service realization
4. Measurement, analysis and improvement

The process model is similar to the well-known Deming's PDCA (Plan, Do, Check and Act) cycle of quality improvement. This kind of a structuring permits the applicability of this model to any business or service. The concept of continuous improvement is intended to stimulate the efficiency of the organization, to increase its competitive advantage in the market and better respond to customers' needs and expectations.

Another new item that has been addressed is the measurements to evaluate customer satisfaction, providing key information for continuous improvement.

In terms of resources, attention has been given for the need to provide and make available all necessary resources, which will now include elements such as information, communication, infrastructures and work environment protection.

Changes have also occurred in terminology. Now the more natural term "organization" is used instead of "supplier" in the old standard. The expression "product and service" is used instead of only "product" as was in the old standard. These changes are friendlier with the normal use and meaning of the words. Also compatibility with ISO 14001 environmental standards is sought to be achieved through informative annexes correlating the clauses.

Transition

There is an ISO document on Transition Planning Guidance to help the change over. Further authentic information regarding revision can be obtained from the Bureau of Indian Standards (BIS), which has played a leading role in the deliberations of the ISO's Technical Committee. Since the new standards are integration and simplification of the older one, transition should be easy and also there is sufficient time given for the process.

The process model is well suited to really focus on the needs of customers and if genuinely implemented should help the growth of business. In fact this is the real essence of the change over. While the past standard no doubt implied this, there was no explicit requirement to measure customer satisfaction and initiate continuous improvements. On the other hand, in the new standard these are explicit and essential part of the elements. Also they include other interested parties (suppliers, owners, employees and society) under management responsibility.

Over 5,000 firms in India are estimated to have obtained ISO 9000 Certification so far. It is no more a luxury but has been considered commonplace for achieving standards of product or service. There has also been the unfortunate side, namely the creeping in of the "certificate culture". Once the certification is obtained, organizations tend to be complacent and do not effect continuous improvement. What the customer needs is not a certificate to be shown to him but provision of an improved product and service, which is by itself the best certificate that any organization can get. This has been the secret of the Japanese and Korean success. The new standards will help simplify the procedural part and invigorate the commitments of organizations to continuously provide better products and services to their customers.

Hazard Analysis Critical Control Point (HACCP)

Since its introduction in the early 1970's, HACCP system is a cost effective management tool for food safety assurance that can be applied to all sections of the food chain from primary production to processing, manufacturing, distribution and retails to the point of consumption. The WTO and Sanitary and Phytosanitary Measures (SPS) agreements emphasize that food safety standards be based on scientific principles as they relate to risk assessment. Currently, the emphasis by organizations like Bureau of Indian Standards is to issue certification on HACCP, which will enhance the marketability of Indian food products, like meat, poultry, vegetables, sea foods and processed foods in the global market. Training programmes need to be conducted to increase the awareness of HACCP among the food managers, which could also help in achieving certification.

Food safety is a social responsibility and its achievement can only be possible with the active participation of all segments, *viz*, the producer, the processor, the consumer and the government.

Farm operations

The greatest amount of attention that needs to be paid is to the observance of hygienic and sanitary practices in various farm operations. Inadequate consideration given to potential hazards at the farm level is often responsible for making subsequent correction of the problems unnecessarily expensive or in some cases rendering them insoluble. Some of the typical problems and the foods in which they are encountered are pesticide residues in fruits, vegetables, egg and milk; pathogens in fruits, vegetables, spices, poultry and sea food; insects in fruits, vegetables, spices; high microbial load in most fresh produce, milk, meat and poultry; mycotoxins in cereals, oilseeds and milk. Almost all these problems can be effectively overcome by adherence to farm practices.

Total Quality Management (TQM)

ISO 9000 deals with the process. Total Quality management is about people. TQM link quality to customer satisfaction by acting on four aspects – customer requirements, management commitment, total company wide participation and systematic analysis of quality problems. TQM provides the overall concept that fosters continuous improvement. TQM philosophy stresses a systematic, integrated, consistent, organization wide perspective, involving every one and every thing in an organization. ISO is a milestone in TQM journey.

Core concepts for TQM are

1) Customer satisfaction - Be customer focused.
2) Internal customers are real.
3) All work is process. Make it a good place to work, create a work culture, which will lead to satisfied customers.
4) Measurement – measure the work.
5) Teamwork – Top management must be involved.
6) People make quality – Do it right first time, quality is an attitude, empowering.
7) Continuous improvement cycle.
8) Prevention.