UNIT 21 CONTROL OF MATERIAL MANAGEMENT AND PERFORMANCE APPRAISAL

Objectives

After reading this unit, you would be able to:

- describe the importance of control and different types of controls in materials management;
- elucidate the need and approaches for performance appraisal in materials management; and
- explicate the balanced score card approach and SCOR framework for performance appraisal.

Structure

21.1 INTRODUCTION

Materials are one of the major inputs to the production process. It is necessary to properly manage the material for efficiency of the system and controlling the costs. Organizations have to procure it in advance and hold it for some time. For example, a super market stocks thousands of items in the shelf and wait for customers, similarly in auto manufacturing company, thousands of parts are stored as inventory. Materials management is the planning and control of the activities related to the material flow from the suppliers up to the end of the conversion/production process. Ultimately, the customers consume the finished items. In simple terms, materials management is the management of materials, right from the time when a demand originates or is expected to originate leading to a need for production, all through the various stages of the processing and manufacturing etc, until it becomes a finished product and has been dispatched to a satisfied customer. It includes the planning, organization and control of all aspects of inventory management, procurement, warehousing, work-in-progress, shipping, and distribution of finished goods.

Thus, activities in materials management include anticipating materials requirements, sourcing and obtaining materials, introducing materials into the organization and monitoring the status of materials as a current asset. This also involves management of a huge amount of important information – for example, engineering, supplier, project management, cost, and delivery are part of materials management.

Performance appraisal is periodically (usually annually) done, in which the work performance of the system is examined and discussed, with a view to identifying weaknesses and strengths as well as opportunities for improvement and system upgradation. In other words, it is the process of assessing, summarizing and developing the system's performance. Performance appraisal of material management system is necessary to ensure that there is an optimum use of materials and prompt identification of unwanted materials. System's inefficiencies like late delivery, poor customer service, etc, can be identified through performance appraisal system in material management.

21.2   WHY CONTROL IS NEEDED IN MATERIALS MANAGEMENT?

The growth in marketing, market segmentation and increased competition has caused a growth in a variety of products that firms produce and sell. This has complicated the manufacturing and materials management functions of the firms. It assumes great importance when practices like infrequent long production runs cause delays and stock outs, while another situation could be of excessive inventory its management. Situations of this kind are likely to create a conflict in marketing and planning systems.

Effective management of materials is crucial to the performance of an organization as:

a) Materials costs are usually a firm's largest expenditure.

b) Management of inventory in line with the demand and strategy to reduce it are necessary to cost efficiency.

c) Operating with fewer inventories offers a firm a competitive advantage.

d) Timely execution, implementation and administration of contracts are important business needs.

e) Supervising and/or monitoring the flow and storage of materials are important.

f) Development of proper relationships with suppliers and with other departments within the organization is needed for long-term survival.

g) Increase productivity is a continuous affair.

h) Ensuring customer satisfaction i.e. *timely supply* along with *quality supply* is important.

i) Reduction of wastage and obsolescence to a minimum is needed for cost cutting.

21.3   DIFFERENT TYPES OF CONTROL NEEDED IN MATERIALS MANAGEMENT

To achieve the objectives of material management, different controls are needed, depending upon the individual functions. These may broadly be categorised into following aspects:

i) Forecasting,

ii) Purchasing and procurement,

iii) Stores and stock control,

iv) Inventory planning and control,

v) Production planning control.

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Forecasting: Forecasting forms the basis for planning by establishing assessment assumptions about the future needs. Good forecasting practice and timely availability of information are crucial for good organization. Forecasting identifies the future needs in terms of demand of product and services. Based on the forecasting of what changes can be reasonably expected to occur in the business, materials managers can determine what opportunities the organization is in a position to take advantage of.

Purchasing and procurement: This is one of the key controls needed in materials management. The functions of a purchasing manager include:

i)   Reviewing procurement requests,

ii) Soliciting and evaluating requests,

iii) Analyzing current and potential suppliers,

iv) Conducting negotiations with the suppliers,

v)   Executing, implementing, and administering contracts,

vi) Developing forecasts and procurement strategies,

vii) Supervising and/or monitoring the flow and storage of materials, and

viii) Developing working relationships with suppliers and with other departments within the organization.

All these functions require control at different levels of materials management.

Stores and stock control: The store has to take care of controlling and managing the flow of materials. The important functions that need to be performed in this can be categorized into the followings:

● Deciding on binning, raking, shelving using pallets, block staking or floor storage etc, depending upon the type of material,

● Inspection for incoming as well as outgoing materials,

● Stock taking and deciding appropriate policies,

● Managing all warehouse functions.

Inventory planning and Control: Inventory management is the most crucial issue in material management because of the apparent heavy capital directly involved with it. Efficient materials management must ensure a high service level with an inventory level at optimal cost. Planning and control are the key aspects in this. You must have studied these in earlier units.

Production planning and control: MRP (Material Requirement Planning) is commonly used in industries. It consists of tracing and priority control, expediting and de-expediting, all the works of purchasing section and in addition making an estimate of lead times, standard units, discounts, substitutes, vendors' problems and price hikes. Using product design information (like bill of material), inventory status, and master production schedule (MPS), MRP generates purchase orders on a regular basis. DRP (Distribution Requirement Planning), like MRP starts with demand for a product as captured from the customer, it then works backwards using goods on hand, planned receipts and planned order dates to establish a schedule for efficiently ensuring the supply.

21.4 APPROACHES TO MATERIALS MANAGEMENT

The Japanese View: Decision-making tends to come from bottom in Japanese firms and rely highly upon consensus decisions. Procurement is made from small vendors 3

that are in proximity. Work-in-progress and production activities are often pulled through the system according to sales and delivery requirements. The *pull approach* is applied through a system of *Kanban* cards that travel with lots of goods. The subsequent production activities are linked with the respective location of the cards.

The US and European View: The US view focuses on JIT (Just in Time) approach. Similar to Japanese vendor supply methods, the system coordinates production plans with vendor production and transportation delivery so that goods can be removed from the carrying vehicles and placed immediately on production line.

In the European view, the emphasis has been tended more towards the optimal utilization of plants capital, goods, labor and invested capital. There have been a few practices that emerged in different regions, owning to different economic and social scenarios. The current approaches are more likely to apply a mix of all the above practices in addition to various other approaches that would be suited locally and otherwise.

ABC Analysis: Monitoring and tracking all types of inventories incur a heavy cost to firms and is a very challenging task. For example in automobile manufacturing where thousands of parts are used, it is very difficult to monitor all the inventories. Certain items may have a relatively low value and these items can often be monitored very loosely. On the other hand, items with high value must be tracked carefully and monitored.

To determine which inventory items should receive the highest level of control and monitoring, a method has been proposed and called as ABC analysis. It is based upon the Pareto principle that proposes that twenty percent of items account for eighty percent of the value, while the remaining eighty percent of items accounts for only twenty percent value. The ranking of items is done as follows:

Class A

The first twenty percent of items are assigned to class A. These items carry around 80% of total material cost. These items need closest control and monitoring. Accurate inventory records are important, and there is a high potential for cutting cost through careful buying and close scrutiny of safety stocks.

Class B

The next thirty percent of the items are classified as B items. These deserve less attention than 'A ' class items.

Class C

The last fifty percent of items are C items. These have the lowest value and can be monitored loosely, with larger safety stocks maintained to avoid stockouts.

Example: Group the following stocks into an ABC classification scheme.

Table 21.1: Problem data set for ABC Classification

Material code#	Volume	Cost (Rs.)
109	200	600
222	26000	36
346	2000	55
432	20000	4
211	7000	10

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Solution:

STEP 1: The total cost value of each item is calculated as follows:

Table 21.2: Calculation of Rs. Volume

Material code#	Volume	Cost (Rs.)	Rs. Volume
109	200	600	120,000
222	26000	36	936,000
346	2000	55	110,000
432	20000	4	80.000
211	7000	10	70,000

STEP 2: Arrange the total cost (product of volume and unit cost) of each stock in a descending order.

STEP 3: Pick up top stocks whose aggregated total cost (product of volume and unit cost) is around 80%. These are A-class item. Next, pick up the least aggregated total cost (product of volume and unit cost) from the bottom of the table so that these account for around 5-7% of the cost or around 70-80% of volume. These are C-class items. Remaining items may be placed under B-class items.

The ABC classification scheme of the problem is as follows.

Table 21.3: ABC Classification Scheme

Material code#	Volume	Cost (Rs.)	Rs. Volume	Percent	Classification of Material
222	26000	36	936,000	71.1	A
109	200	600	120,000	9.1	A
346	2000	55	110,000	8.4	B
432	20000	4	80.000	6.1	B
211	7000	10	70,000	5.3	C
TOTAL			**1316,000**	**100**	

You have already studied *Continuous Review (Q) systems (or Reorder Point (ROP) systems) and Continuous Periodic Review (P) Systems in earlier units.* For class A and B items, *Continuous Review (Q) systems (or Reorder Point (ROP) systems)* should be used for independent material control systems. This requires constant monitoring of material levels. *P Systems* are more convenient to administer than *Q Systems.*

For class C items, *Continuous Periodic Review (P) Systems should be used for independent material Control Systems. This requires m*onitoring of material at fixed intervals. *Q Systems* are more expensive to administer than *P Systems.*

21.5 NEED FOR PERFORMANCE APPRAISAL IN MATERIALS MANAGEMENT

Basic to any program is the need to systematically review and evaluate the status and performance of the program. In planning and controlling the materials management function, it should be recognized that the success of different activities depends on the proper establishment and pursuance of a performance evaluation system. In material

management, traditionally static measures like average inventory, service levels, etc are common. However, with emergence of supply chain concepts, more comprehensive approach would be needed, which can also integrate the flow of material across the supply chain partners. Different approaches such as "Balance score card," "SCOR Framework," etc are fast emerging.

21.6 APPROACHES FOR PERFORMANCE APPRAISAL IN MATERIALS MANAGEMENT

Appraisals of materials management activities should concentrate on the effectiveness of programs and procedures for managing materials. Specific activities should include, but not be limited to, the following evaluations:

i)   Material quantities with respect to minimum inventory levels required to meet program objectives.

ii) Programs, procedures, and practices for managing materials.

iii) Forecasts related such as accuracy, thoroughness, completeness, usefulness, and compatibility with program plans and budgets.

iv) Use of materials in the quantities and for the system.

v)   Procedures for identifying, reporting, and managing inactive materials and scrap.

vi) Adequacy of information provided by contractors responsible for developing materials management plans.

vii) Adequacy of materials management procedures in contracts and subcontracts issued by the contractor.

21.7 MATRICES OF PERFORMANCE APPRAISAL SYSTEM

Different matrices are common in the effective management of materials. Some of these are listed below.

21.7.1 Inventory Turnover Ratio

The inventory turnover ratio indicates how many times the inventory is 'turned over' in one year. In other words, it shows how quickly inventory can be sold. Inventory turn over ratio shows how many times in a year the inventory is sold. This shows the company with high turnover ratio is able to sell inventory more frequently. With this ratio we can easily compare the companies on inventory utilization. Major disadvantage of this ratio is that we cannot compare two firms from different industries. There is huge variation in the inventory holdings of different industries and organizations. For example in one industry inventory is held for longer time for operation while in other it is requiring only short duration.

21.7.2 Safety Stock

Stock that is held in excess of expected demand due to variable demand rate and/or lead time is known as safety stock. Safety stock reduces risk of stockout during the lead time (Figure 21.1). As shown, the order is placed when stock depletes to reorder point (ROP). During the lead-time (LT) if there are demand fluctuations, these are covered by safety stock.
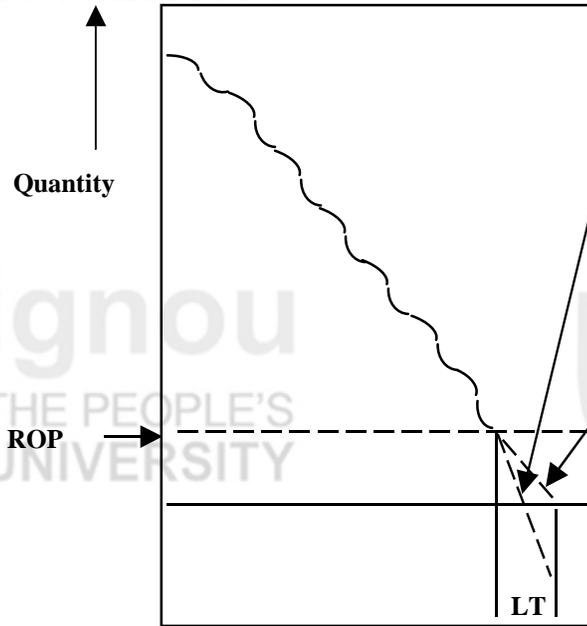
Figure 21.1: Safety stock covers the risk of stockout during leadtime (LT)

21.8 BALANCED SCORE CARD APPROACH FOR PERFORMANCE APPRAISAL

The balanced scorecard is a performance measurement system that allows managers to look at the business from four divergent important perspectives: customer, internal business, innovation and learning, and finance (Kaplan & Norton, 1992, 1996). It thus links the financial and non-financial, tangible and intangible, internal and external factors, thus providing a holistic framework for performance appraisal systems (Figure 21.2).
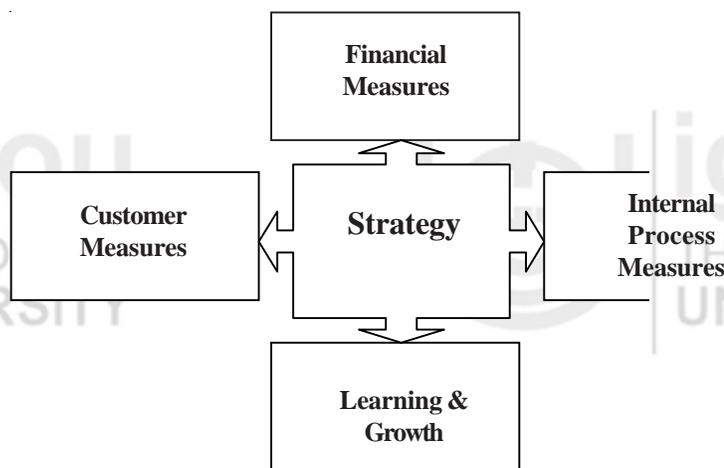

Figure 21.2: Four Perspectives of Balance Scorecard

A performance measurement system using Balanced Scorecard allows a firm to align its strategic activities to the strategic plan. Under the balanced scorecard system, financial measures are the outcome, but do not give a good indication of what is or will be going on in the organization. Measures of customer satisfaction, growth and retention are the current indicator of company performance, and internal operations (efficiency, speed, reducing non-value added work, minimizing quality problems) and human resource systems and development are leading indicators of company performance.

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Thus "Balance" includes

- Short and long term objectives
- Financial and non-financial measures
- External and internal measures, and
- Four different perspectives.

Purposes of the balanced scorecard include

- Clarify and translate vision and strategy
- Communicate and link strategic objectives and measures
- Plan, set targets and align strategic initiatives.

21.9 SCOR FRAMEWORK FOR PERFORMANCE APPRAISAL

The SCOR Model (Supply Chain Operations Reference Model) was originally developed by PRTM Consulting. It is now managed and maintained by the Supply Chain Council (supply-chain.org). It provides an excellent representation of the Fulfill Order process. Other models such as the ABCD Check list (Oliver Wight Corp.) and OEE (Overall Equipment Effectiveness) may also be used to represent the Fulfill Order process. The performance indicators are well applicable in Material Management also.

Table 21.4: Matrices of Performance

Type of Performance	Performance Attribute	Performance Attribute Definition	Level 1 Metric
E X T E R N A L	Supply Chain Delivery Reliability	The performance of the supply chain in delivering: the correct product, to the correct place, at the correct time, in the correct condition and packaging, in the correct quantity, with the correct documentation, to the correct customer.	Delivery Performance Fill Rates Perfect Order Fulfillment
	Supply Chain Responsiveness	The velocity at which a supply chain provides products to the customer.	Order Fulfillment Lead Times
	Supply Chain Flexibility	The agility of a supply chain in responding to marketplace changes to gain or maintain competitive advantage.	Supply Chain Response Time Production Flexibility
I N T E R N A L	Supply Chain Costs	The costs associated with operating the supply chain.	Cost of Goods Sold Total Supply Chain Management Costs Value-Added Productivity Warranty / Returns Processing Costs
	Supply Chain Asset Management Efficiency	The effectiveness of an organization in managing assets to support demand satisfaction. This includes the management of all assets: fixed and working capital.	Cash-to-Cash Cycle Time Inventory Days of Supply Asset Turns

The SCOR model provides a set of performance metrics (Table 21.4) and supply chain practices where the supply chain performance is contingent on the maturity of supply chain practices. This model allows the firm to relate the weaknesses in their material management function of the supply chain practices.

21.10 SUMMARY

This unit deals with the control issues and the performance appraisal in materials management. Different types of control needed in materials management are also discussed. Matrices of performance appraisal system in the context of materials management are also presented.

21.11 SELF ASSESSMENT QUESTIONS

1) What is materials management and explain its importance?

2) Explain how a performance appraisal system can be used in the context of materials management.

3) What are the matrices of performance appraisal in materials management?

4) Explain balanced scorecard approach for performance appraisal.

5) Explain SCOR framework for performance appraisal and how is it useful in material management?.

21.12 REFERENCES AND SUGGESTED FURTHER READINGS

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