**CHAPTER 9 – QUALITY AND INVENTORY MANAGEMENT**

**Learning outcome 1 – Explain the need for the firms to hold various kinds of inventory – Pg. Ref. 153**

1. Continuity in production and marketing – sufficient inventory ensures that production is continuous. Low unit costs and constant availability of final products provide marketing opportunities such as timeous availability and better service to customers which could result in a better competitive position.
2. Cost savings and hedging against price uncertainties – The enterprise may make use of quantity discounts and transport in bulk, which means cost savings.  Hedging against price in important to enterprise prone to currency volatility.
3. Protection against supply uncertainties – It serves as protection against breaks in supply caused by unexpected events, such as strikes and natural disasters.
4. Purchasing costs – Larger less-frequent deliveries must be traded off against the increased cost of inventory holding and decreased costs of transportation. ??

**Learning outcome 2 – Illustrate the importance of inventory on the return on investment (ROI ) of business enterprises Pg Ref. 154**

1. It is generally accepted that inventory represents on average about 20% of total assets and inventory holding costs
2. Represent on average about 20% of the amount invested in inventory. Assuming that an enterprise has assets of R 1 million, the following conclusions may be drawn:

          Total assets:                                     R1 000 000

          Investment in holding:                      R200 000 (20% of total assets)

          Inventory-holding costs:                   R40 000 (20% of

Inventory investment)

          Assumed income of enterprise:       R100 000

          Return on investment:                     10%

         Assume better inventory:                  20% reduction in inventory

            Management

         Total assets will then be:                   R960 000 (R1mil – 20% of

R200 000)

         Inventory holding costs are:             R32 000 (20% of R180 000)

           Then

        Income (profit) of the:                       R108 000 (R 100 000 + R 8 000

(R 40 000 - R 32 000)

          Enterprise

         Return on investment:                      11.25%

**Learning outcome 3 – Explain the importance of the different cost elements of inventory holding in the decision to buy the right quantity Pg. Ref. 155**

1. The cost of financing the inventory - by means of interest paid on borrowed capital or interest lost on equity
2. The cost of storage – costs of having a warehouse, for example maintenance costs or property tax
3. Cost of handling inventory – such as equipment or remuneration of personnel
4. Insurance cost – to reduce the risk of loss due to damage or theft
5. Technical and depreciation of inventory cost – when product are perishable or become obsolete, it will cause inventory losses ( costs)

**Learning outcome 4 – Perform in practice a Pareto analysis (ABC analysis) of a firm’s total inventory pg. ref. 158 – 159**

* aimed at providing management with info on the importance of different inventory items ito monetary value
* can only be done after a thorough investigation of all items in the inventory catalogue looking at variables like usage patterns, price variations and stability, supplier lead times, particular unique characteristics of inventory items
* inventory management may use it to plan inventory selectively and to set up purchasing priorities
* ABC analysis (def): expressing the rand demand and te quantity of inventory items in a category as a % of the total rand demand (per period of time) and total number of items in the inventory respectively
* From this 3 categories of items can be identified:

1. Class A – represent approx. 10% of total number of items, but 70% of rand value [careful control to be exercised over class A items as they account for major part of inventory investment & considerable implications if inventory shortage]
2. Class B – approx. 40% of total number of items, but 20% of rand value
3. Class C – 50% of items, but only 10% of the rand value

The method to classify A,B, C ito annual demand rand value can be divided into 7 steps:

1. List every item in the inventory on the basis of stock item number

2. Determine the annual consumption and rand value of every item

3. Multiply every item's annual consumption by its rand value

4. Calculate, in rand, every item's percentage share of the total inventory in terms of annual consumption

5. Choose the top 10% of all items in terms of the highest rand percentage, and classify them as class A items.

6. Choose the next 20% of all items in the terms of the highest rand percentage, and classify them as class B items.

7. The remaining 70 percentage of all the items, those with the lowest rand percentage are then classified as class C items.

Refer to illustrations fig. 9.2 and fig 9.1

**Learning outcome 5 –Discuss inventory timing and quantity as it relates to independent demand management Pg. Ref. 160 - 162**

1. Inventory timing – The inventory level of a particular items is reviewed regularly, i.e. once a week or month, and based on the inventory level observed at that time, a decision is made regarding replenishment. The decision taken is merely to reorder amount. This technique is also called periodic reorder system. This is based on the current inventory level, the expected demand during the replenishment lead time and some predetermined maximum inventory level. (Understand the graph illustration of periodic reorder system  Fig.9.3)??
2. Inventory quantity - Two aspects to be considered when determining the replenishment quantity. 1st concerns reorder point and the second the quantity to be ordered. If reorder point system is used, replenishment takes place only once an order “trigger “has been reached (this trigger is known as “reorder point”. Demand during lead time and a safety stock quantity are taken into consideration in order to determine reorder point.  Reorder point is calculated using the following formula;

ROP = D(LT)+SS

Where

D=demand per period

LT=lead time

SS=safety stock

The following info is assumed;

* Average inventory consumption rate per day is 5 units
* Lead time is 8 working days
* Safety stock is 20 units

              Reorder point may be calculated as follows;

              ROP=D(LT)+SS

                      =5(8)+20

                      =60 units

               Please also understand the graph illustrated in Fig. 9.4 ???

**Learning outcome 6 - Calculate the most economic ordering quantity ( EOQ ) Pg Ref. 162**

* EOQ (def): the optimum quantity to be ordered where the carrying costs are equal to the ordering costs
* Given the assumptions behind EOQ (known demand, stable prices and consumption, reliability of supplies) it’s not generally applicable in current business conditions

**Learning outcome 7 – Calculate the reorder (ROP) of an inventory item Pg. Ref. 161**

ROP = D(LT)+SSF

Where

D=demand per period

LT=lead time

SS=safety stock

The following info is assumed;

·         Average inventory consumption rate per day is 5 units

·         Lead time is 8 working days

·         Safety stock is 20 units

              Reorder point may be calculated as follows;

              ROP=D(LT)+SS

                      =5(8)+20

                      =60 units

               Please also understand the graph illustrated in Fig. 9.4 ???

**Learning outcome 8 – Explain response-based techniques that can be used for the management of independent demand items Pg Ref. 163 - 164**

1. Quick response - aimed at minimizing response time to unexpected changes in market and reducing inventory levels, often Lead times from receipt to delivery of the order, increase customer satisfaction and improve cash flow the manufacturing. Response time of all supply chain is reduced QR dependent on the retailer providing accurate information to upstream suppliers reacting in time to provide downstream retailers with products when required.
2. Continuous replenishment CR - also known as vendor-managed inventory. Inventory is replenished by supplier as it is sold, therefore there is no order point or order quantity batches. Timing and quantities are determined on a real-time basis gathered from point-of-sale data capturing. Supermarket and retail stores are ideal for implementing CR; the supplier replenishes the buyer's inventory continuously. The buyer generates no orders and the supplier commits to maintaining the stock levels of the retailer at the required level.
3. Efficient consumer response ECR - consumer-driven system in which links of logistics work together in order to satisfying consumer needs at lowest possible cost. ECR aims to; place consumer satisfaction and requirements centrally, ensure maximum efficiency in all integrated logistics activities. Maximize the effectiveness of demand by managing product introductions and store assortment. Optimize efficiency of replenishment if inventory between supply chain partners. ECR is a form of QR used by grocery industry. It discourages stockpiling and aims to improve the overall efficiency of supply chain.

**Learning outcome 9 – Discuss the essence and functioning of the materials requirement planning (MRP) system Pg. Ref. 164**

1. The essence of the MRP system – It entails a computer-support system used to synchronise the supply of materials, components and subassemblies with production planning and scheduling so that inventory may be as limited to absolute minimum.
2. The functioning of MRP system - It uses planned production to determine what and how much should be ordered, when to order and on what date delivery should take place. Inventory replenishments are scheduled in such a way that they coincide closely with the time of need. The demand for materials and requirements depends on the forecast demand for the finished product. The dependent demand for requirements is determined by the independent demand for the end product. MRP is a management technique that provides information for total integrated planning and control, particularly in enterprises manufacturing a wide range of products with similar materials requirements.

Please refer to illustration Fig. 9.6 Broad review of MRP

**Learning outcome 10 – Illustrate and discuss the main components of an MRP system Pg Ref 167**

In addition to the marketing plan, these inputs are needed to implement an MRP system:

1. Master production schedule (most important input to MRP)

- based on actual orders and demand forecast generated by MRP system

- schedule is developed by taking marketing plans and production

capacity into account

- should be left unchanged for relatively long period of time/ frozen to

ensure continuous production

- provides ito lead times, the target dates for purchasing and supply

management & enables it to keep orders and deliveries in line with

production scheduling

1. Bill of materials

- list of contents of final product with specs of all components

(‘explosion’)

- provides sequences in which they’re incorporated into the product &

quantity of each item => this is the basic info needed for MRP

- master production schedule can then be used to determine when, ito

sequence, parts or materials are required

1. Inventory status file:

- file to provide correct info on the availability/ requirements for every

item according to the master production schedule

- file contains info such as ID numbers, quantity on hand, safety inventory,

quantity issued and lead times of each item

- computer can then calculate material requirements for a time period

taking into account the production schedule, inventory on hand and on

order and the lead times for each item.

1. MRP computer program:

- Info contained in master production schedule and bill of materials is

basic input for MRP computer program

- Program breaks down the required number of end products into gross

requirements for individual parts and materials THEN deduct materials

that is already in inventory/ have been ordered (contained in inventory

status file)

- Program then determines exact quantities of materials that needs to be

on hand at a specific time & taking into account lead times generates the

actual orders

**Learning outcome 11 – Discuss the influence of an MRP system on purchasing and supply management Pg. Ref. 168**

Positive implications of MRP systems for the purchasing function:

• Forge closer links with suppliers & user depts.

• Considerable decrease in inventory of purchased parts

• Fewer outstanding orders

• Elimination of expediting orders

• Improve accuracy of (1) records and control information (2) purchasing

planning and scheduling

• Time available for value analysis, research on purchasing and supplier

development

Possible problems:

• Purchasing quantities largely inflexible

• Lead times need to be short and reliable which can put suppliers under

Pressure and damage relations

• Low inventory levels put pressure on purchasing function

• Reliable info on availability and lead times of stock items has a big

influence on the success of MRP and might not always be available in SA

• MRP systems requires a greater degree of expertise regarding production processes and

Alternative products from buyers

**Learning outcome 12 – Explain the philosophy, characteristics and advantages of just-in-time (JIT ) purchasing Pg Ref. 170 - 173**

1. Philosophy

Inventory is evil. It increases risks such as quality and supplier inefficiencies. Inventory holding is very costly and it ties up working capital. JIT depends on short and reliable delivery times, high quality standards and reliable workers and suppliers

2. Characteristics

JIT affects the purchasing function in 3 main areas.

1. Supply chain management = JIT buyers treat their suppliers an extension of the transformation process and this motivates suppliers to join the want for quality assurance, quality certification and zero defects.

2. Quality assurance = high priority as below par products have negative influence on the functioning of the system

3. Inventory management = stockless purchasing is used when inventory is eliminated and buyers need to operate under pressure.

3. Advantages

Lower inventory levels – lower working capital needed and higher cash flow

Smaller buffer stocks – JIT demand for short and reliable lead time

Short lead times – JIT uses kanban information system (meaning=card, visible sign) it refers to the card information system that the kanban functions. It has three NB characteristics,

1. M – kanban = movement and p – kanban = production these are the storage containers that carry the product.

2. Every area has a storage area where full or empty containers are stores.

**Learning outcome 13 – Diagnose and describe the symptoms of poor inventory management Pg Ref 173**

1. Increase in number of outstanding orders. This is one indication of poor management

2. Increase in rand investment in inventory with no definite reason

3. Differences in inventory turnover rates or times at different plants or at different comparable depots

4. Increase in number of out-of-stock in a fixed time period. Indicates a drop in control by inventory management.

5. No storage space from time to time. Indicates too much inventory.

6. Increase in inventory holding costs compared to previous figures

7. Increase obsolete inventory.