

Operational decisions and stocks

Businesses purchase raw materials, semi-finished goods and components. A washing machine manufacturer, for example, may buy electric motors, circuit boards, rubber drive belts, nuts, bolts, sheet metal and a variety of metal and plastic components. These stocks of materials and components are used to produce products which are then sold to consumers and other businesses. Managing these materials is the responsibility of the production or operations manager. Materials management involves:

- the purchasing of stocks and their delivery;
- the storing and control of stocks;
- the issue and handling of stocks;
- the disposal of surpluses;
- the provision of information about stocks.

The nature of stocks

Businesses prefer to minimise stock holding because it is costly. In practice a variety of stocks are held, for different reasons.

Raw materials and components These are purchased from suppliers before production. They are stored by firms to cope with changes in production levels. Delays in production can be avoided if materials and components can be supplied from stores rather than waiting for a new delivery to arrive. Also, if a company is let down by suppliers it can use stocks to carry on production.

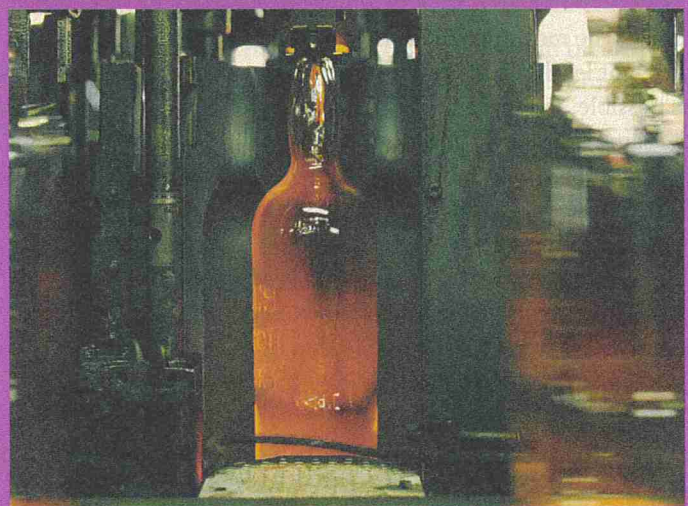
Work-in-progress These are partly finished goods. In a television assembly plant, WORK IN PROGRESS would be televisions on the assembly line, which are only partly built.

Finished goods The main reason for keeping finished goods is to cope with changes in demand and stock. If there is a sudden rise in demand, a firm can meet urgent orders by supplying customers from stock holdings. This avoids the need to step up production rates quickly.

Normally, at least once every year, a business will perform a STOCK TAKE. This involves recording the amount and value of stocks which the firm is holding. A stock take is also required for security reasons – to check that the items actually in stock match the stock records kept by the business. The stock take is also necessary to help determine the value of total purchases during the year for a firm's accounts. A physical stock take can be done manually by identifying every item of stock on the premises. Many firms have details of stock levels recorded on computer.

The cost of holding stocks

In recent years stock management has become more important



Question 1.

- Look at the photographs. Explain which of them shows: (i) stocks of raw materials; (ii) work-in-progress; (iii) stocks of finished goods.
- Explain why businesses hold stocks of finished goods.

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for many firms. Careful control of stock levels can improve business performance. Having too much stock may mean that money is tied up unproductively, but inadequate stock can lead to delays in production and late deliveries. Efficient stock control involves finding the right balance. One of the reasons why control is so important is because the costs of holding stocks can be very high.

- There may be an **opportunity cost** in holding stocks. Capital tied up in stocks earns no rewards. The money used to purchase stocks could have been put to other uses, such as buying new machinery. This might have earned the business money.
- Storage can also prove costly. Stocks of raw materials, components and finished goods occupy space in buildings. A firm may also have to pay heating, lighting and labour costs if, for example, a night watchman is employed to safeguard stores when the business is closed. Some products require very special storage conditions. Food items may need expensive refrigerated storage facilities. A firm may have to insure against fire, theft and other damages.
- Spoilage costs. The quality of some stock, for example perishable goods may deteriorate over time. In addition, if some finished goods are held too long they may become outdated and difficult to sell.
- Administrative and financial costs. These include the cost of placing and processing orders, handling costs and the costs of failing to anticipate price increases.
- Out-of-stock costs. These are the costs of lost revenue, when sales are lost because customers cannot be supplied from stocks. There may also be a loss of goodwill if customers are let down.

Stock levels

One of the most important tasks in stock control is to maintain the right level of stocks. This involves keeping stock levels as low as possible, so that the costs of holding stocks are minimised. At the same time stocks must not be allowed to run out, so that production is halted and customers are let down. A number of factors influence stock levels.

- Demand. Sufficient stocks need to be kept to satisfy normal demand. Firms must also carry enough stock to cover growth in sales and unexpected demand. The term **BUFFER STOCK** is used to describe stock held for unforeseen rises in demand or breaks in supply.
- Some firms stockpile goods. For example, toy manufacturers build up stocks in the few months leading up to December ready for the Christmas period. Electricity generating stations build up stocks of coal in the summer. During the summer, demand for electricity is low so less coal is needed. At the same time, prices of coal during the summer months are lower, so savings can be made.
- The costs of stock holding. The costs of holding stock were described earlier. If stock is expensive to hold then only a

small quantity will be held. Furniture retailers may keep low stock levels because the cost of stock is high and sales levels are uncertain.

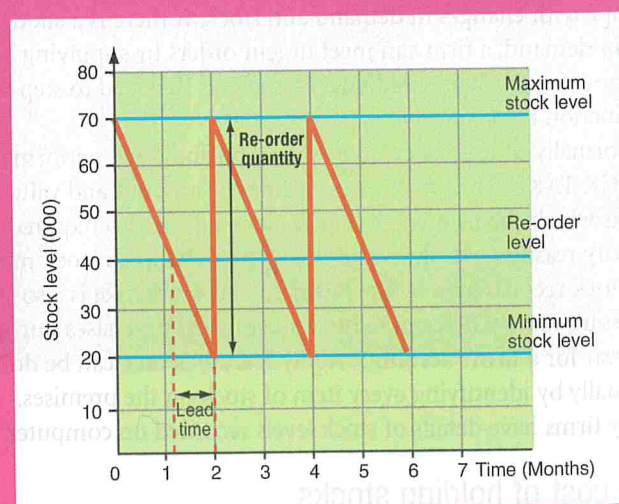
- The amount of working capital available. A business that is short of working capital will not be able to purchase more stock, even if it is needed.
- The type of stock. Businesses can only hold small stocks of perishable products. The stock levels of cakes or bread will be very small. Almost the entire stock of finished goods will be sold in one day. The 'life' of stock, however, does not solely depend on its 'perishability'. Stocks can become out of date when they are replaced by new models, for example.
- **LEAD TIME**. This is the amount of time it takes for a stock purchase to be placed, received, inspected and made ready for use. The longer the lead time, the higher the minimum level of stock needed.
- External factors. Fear of future shortages may prompt firms to hold higher levels of raw materials in stock as a precaution.

Stock control

It is necessary to control the flow of stocks in the business. This ensures that firms hold the right amount. Several methods of stock control exist. They focus on the **RE-ORDER QUANTITY** (how much stock is ordered when a new order is placed) and the **RE-ORDER LEVEL** (the level of stock when an order is placed).

- **Economic order quantity (EOQ)**. It is possible to calculate the level of stocks which minimises costs. This is called the economic order quantity. It takes into account the costs of holding stock, which rise with the amount of stock held, and the average costs of ordering stock, which fall as the size of the order is increased. A business must calculate the EOQ to balance these costs.
- **Fixed re-order interval**. Orders of various sizes are placed at fixed time intervals. This method ignores the economic

Figure 1: Stock control



order quantity, but ensures that stocks are 'topped up' on a regular basis. This method may result in fluctuating stock levels.

- **Fixed re-order level.** This method involves setting a fixed order level, perhaps using the EOQ. The order is then repeated at varying time intervals.
- **Two bin system.** This simple method involves dividing stock into two bins. When one bin is empty a new order is placed. When the order arrives it is placed into the first bin and stocks are used from the second bin. When the second bin is empty stocks are re-ordered again.

A stock control system is shown in Figure 1. It is assumed that:

- 50,000 units are used every two months (25,000 each month);
- the **maximum stock level**, above which stocks never rise, is 70,000 units;

- the **minimum stock level**, below which stocks should never fall, is 20,000 units, so there is a buffer against delays in delivery;
- stock is re-ordered when it reaches a level of 40,000 units (the **re-order level**);
- the **re-order quantity** is 50,000 units - the same quantity is used up every two months;
- the **lead time** is just under one month. This is the time between the order being placed and the date it arrives in stock.

This is a hypothetical model which would be the ideal for a business. In practice deliveries are sometimes late, so there is a delay in stocks arriving. Firms may also need to use their buffer stocks in this case. It is likely that re-order quantities will need to be reviewed from time to time. Suppliers might offer discounts for ordering larger quantities. The quantities of stocks used in each time period are unlikely to be constant. This might be because production levels fluctuate according to demand.

Too much or too little stock

Why might having too much or too little stock be bad business practice?

Too much stock

- Storage, insurance, lighting and handling costs will all be high if too much stock is held.
- Large stock levels will occupy space in the premises. There may be more productive ways of using this space, such as improving the layout of the factory.
- The opportunity cost will be high. Money tied up in stocks could be used to buy fixed assets, for example.
- Large stock levels might result in unsold stock. If there is an unexpected change in demand, the firm may be left with stocks that it cannot sell.
- Very large stocks might result in an increase in theft by employees. They may feel the business would not miss a small amount of stock relative to the total stock.

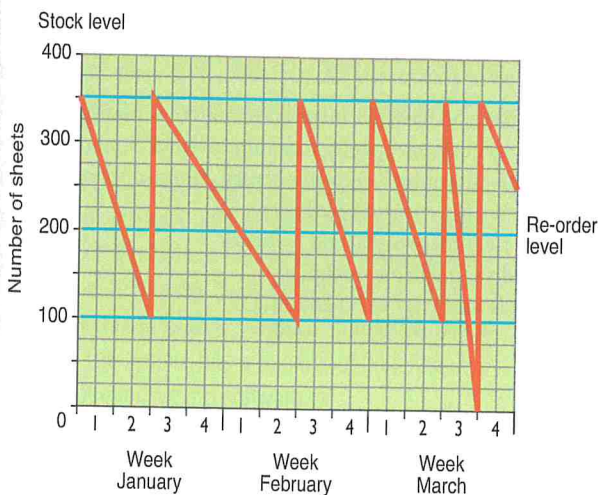
Too little stock

- The business may not be able to cope with unexpected increases in demand if its stocks are too low. This might result in lost customers if they are let down too often.
- If deliveries are delayed the firm may run out of stock and have to halt production. This might lead to idle labour and machinery while the firm waits for delivery.
- The firm is less able to cope with unexpected shortages of materials. Again, this could result in lost production.
- A firm which holds very low stocks may have to place more orders. This will raise total ordering costs. Also, it may be unable to take advantage of discounts for bulk buying.

Question 2.

Hahmid & Odusanya is a machine fabrications specialist. It makes large parts for machine tools and special parts machines such as those be found on production lines. It holds stocks of steel. The pattern of its stockholding is shown in Figure 2.

Figure 2:



- Measured in numbers of sheets of steel, what is (i) the maximum stock level; (ii) the buffer stock level; (iii) the re-order level?
- Explaining your reasoning, suggest in which weeks there was (i) an unexpected large rush order; (ii) very disappointing sales.
- Explain what might happen to maximum stock levels if the business began to experience cash flow problems.

Computerised stock control

Stock control has been improved by the use of computers. Many businesses hold details of their entire stock on computer databases. All additions to and issues from stocks are recorded and up to date stock levels can be found instantly. Actual levels of stock should be the same as shown on the computer printout. A prudent firm will carry out regular stock checks to identify differences.

Some systems are programmed to automatically order stock when the re-order level is reached. In some supermarkets, computerised checkout systems record every item of stock purchased by customers and automatically subtract items from total stock levels. The packaging on each item contains a bar code. When this is passed over a laser at the checkout, the sale is recorded by the system. This allows a store manager to check stock levels, total stock values and the store's takings at any time of the day. Again, the system can indicate when the re-order level is reached for any particular item of stock.

Access to stock levels is useful when manufacturers are dealing with large orders. The firm might need to find out whether there are enough materials in stock to complete the order. If this information is available, then the firm can give a more accurate delivery date.

KEYTERMS

Buffer stocks – stocks held as a precaution to cope with unforeseen demand.

Lead time – the time between the placing of the order and the delivery of goods.

Re-order level – the level of stock when new orders are placed.

Re-order quantity – the amount of stock ordered when an order is placed.

Stock rotation – the flow of stock into and out of stores.

Stock take – the process of counting the amount of stock held at a point in time in order to calculate the total stock level held.

Work-in-progress – partly finished goods.

JIT and stock rotation

In recent years many businesses have changed their approach to stock management. To reduce costs, firms have held low levels of stocks. In some cases holdings of both finished goods and raw materials have been reduced to zero. This approach to stock control is the key feature of just-in-time manufacturing (JIT). It is explained fully in the unit on lean production.

Businesses often use systems to control the flow of stocks in and out of their store areas. This flow of stock is sometimes called STOCK ROTATION. One system used to rotate stock is called First In First Out (FIFO). This means that those stocks which are delivered first are the first ones to be issued. This method is useful if stocks are perishable or if they are likely to become obsolete in the near future. A second method of stock rotation is called Last-In-First-Out (LIFO). This system involves issuing stock from the latest rather than the earliest deliveries. This method might be used if the stocks are difficult to handle and it is physically easier to issue the more recent deliveries. However, when using this method it is important that stocks are not perishable. 'Old' stock could remain in store for long periods before it is finally used.

KNOWLEDGE

1. What are the activities involved in materials management?
2. Why do businesses prefer to minimise stock holdings?
3. What is meant by: (a) components; (b) finished goods?
4. What are the costs of holding stocks?
5. Why are buffer stocks held by firms?
6. Why do some firms stockpile?
7. What is meant by LIFO and FIFO?

Case Study: Regal Jewels

Regal Jewels is a small chain of jewellers. It has nine outlets in the south east. Each shop has a manager and employs one or two other full-time staff with some part-time staff who help out at times, such as Christmas. The shops stock a wide range of rings, pendants, bracelets, necklaces, gemstones and watches. They also offer specialist, tailor made pieces for wealthy customers. The business has flourished by focusing on the old fashioned virtues of excellent service and value for money. All managers are members of the Gemmological Institute of Gemology, Antwerp (Europe's diamond capital). This is a highly regarded professional qualification and gives the business a great deal of credibility. The shop operates at the top end of the market with most of their pieces sell for over £100 – with many pieces going for £1,000s.

Stock is the most valuable asset for the business. After the last stock take, the total value of stocks held by Regal Jewels was £60,000. The stock is purchased centrally by the owner of the business. Regal Jewels uses a number of different suppliers, some of which are based overseas. However, there have been one or two problems relating to stock management at the business.

One problem is maintaining the supply the supplier of customised carrier bags. All customers leave the shops with their purchases packaged in a specially designed Regal Jewels bag, adorned with gold lettering and the business logo. Regular purchases of these carrier bags are made every month. The diagram in Figure 2 shows stocks of the carrier bags for a nine month period.

Another problem faced by the business owner is keeping right up to date with the stocks held in each shop. At the moment a manual, computer-based stock system is used. This is proving to be increasingly cumbersome and inefficient as the business grows. She is thinking of introducing an online stock control system. A new online system has recently been developed which allows small businesses, such as Regal Jewels, to login and manage their stock levels. It is possible to monitor stock movements and react to information delivered to a computer from anywhere in the world. The system has a number of benefits.

- Cost effective (no software to purchase/upgrade).
- No new hardware needed.
- Available from multiple locations.
- Easy to use system/set-up system.
- Free support available (unlike all other systems).
- Time saving (no need to produce your own reports or fill in endless paperwork).
- Up/downsizeable for when your business grows or shrinks.

- Easy to train other members of staff.
- 30 day free trials available.

- (a) Regal Jewels have monthly stock takes.
 (i) What is meant by a stock take? (3 marks)
 (ii) Why do you think a stock take is so important for Regal Jewels? (6 marks)
- (b) Discuss two stock holding costs that Regal Jewels will incur. (6 marks)
- (c) Look at Figure 3. Identify the (i) lead time; (ii) the re-order quantity; (iii) re-order level; (iv) minimum stock level for the carrier bags. (8 marks)
- (d) In September 2007, Regal Jewels found a new supplier of carrier bags. Why do you think it took this action? (6 marks)
- (e) Do you think Regal Jewels should introduce the online stock system? (10 marks)

Figure 3: Stocks of Regal Jewels carrier bags

