Inventory management

13.1 What is inventory?

Inventory = accumulation of the transformed resources (physical items, people/queues or information (databases)) that flow through processes, operations or supply networks

Physical inventory/stock = accumulation of physical materials such as components, parts, finished goods or physical (paper) information records

Queues = accumulations of customers, physical as in a queuing line or waiting for service online.

Databases = accumulations of digital information

Minimizing material inventories in factories can release large quantities of cash, but reducing them too far can lead to customers' orders not being fulfilled

All processes, operations and supply networks have inventories

Because most operations involve flows of materials, customers and/or information, at some points they are likely to have material and information inventories and queues of customers waiting for goods or services

Table 13.1 Examples of inventory held in processes, operations or supply networks

Process, operation or supply network	'Inventories'		
	Physical inventories	Queues of customers	Information in databases
Hotel	Food items, drinks, toilet items	At check-in and check-out	Customer details, loyalty card holders, catering suppliers
Hospital	Dressings, disposable instruments, blood	Patients on a waiting list, patients in bed waiting for surgery, patients in recovery wards	Patient medical records
Credit card application process	Blank cards, statements	Customers waiting on the phone	Customers' credit and personal information
Computer manufacturer	Components for assembly, packaging materials, finished computers ready for sale	Customers waiting for delivery of their computer	Customers' details, supplier information

Inventories are often the result of uneven flows, if there is a difference between the timing or the rate of supply and demand at any point in a process or network, then accumulations will occur

When the rate of supply exceeds the rate of demand, inventory increases. When the rate of demand exceeds the rate of supply, inventory decreases

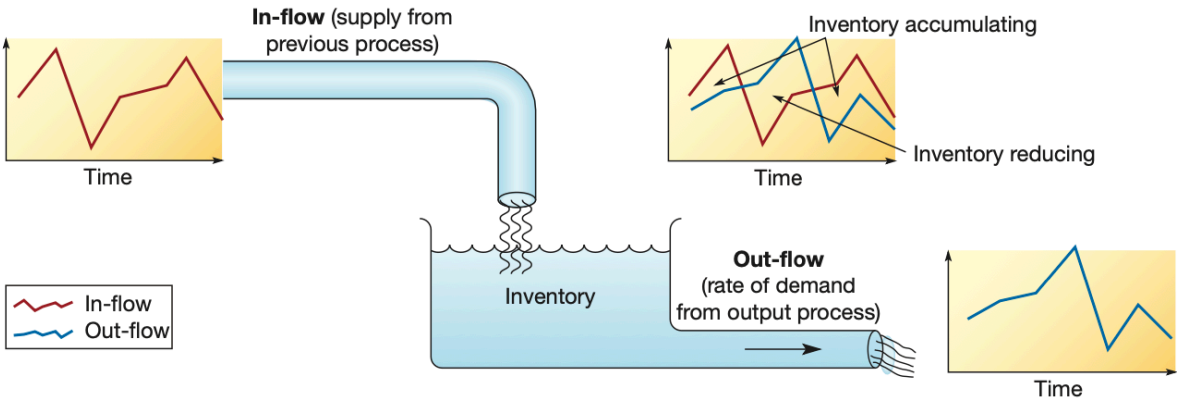

Figure 13.2 Inventory is created to compensate for the differences in timing between supply and demand

Inventoried information can be different

Inventories of information can either be stored because of uneven flow or because the operation needs to use the information to process something in the future.

Customer details could be permanently stored in a database and used for future orders from the same customer as well as for other processes such as targeting promotional activities. The inventory of information has then turned from a transformed resource into a transforming resource

13.2 Why should there be any inventory?

So why have inventory?

The task of operations management is to allow inventory to accumulate only when its benefits outweigh its disadvantages: some benefits are:

- **Physical inventory is an insurance against uncertainty** = inventory can act as a buffer against unexpected fluctuations in supply and demand. **Safety or buffer inventory** can compensate for the uncertainties in the process of the supply of goods into the store
    - **Physical inventory can counteract a lack of flexibility** = even when demand is steady and predictable, there will always be some inventory to compensate for the intermittent supply of each type
        - **Cycle inventory** = where a wide range of customer options is offered unless the operation is perfectly flexible, stock will be needed to ensure supply when it is engaged in other activities
- **Physical inventory allows operations to take advantage of short-term opportunities** = even when there is no immediate demand for it there might arise opportunities that necessitate accumulating inventory. A purchasing department may make advantage opportunistically of the short-term price advantage
- **Physical inventory can be used to anticipate future demands** = medium-term capacity management may use inventory to cope with demand capacity.

    - **Anticipation inventory** = Rather than trying to make a product only when it is needed, it is produced throughout the year ahead of demand and put into inventory until it is needed. Commonly used when demand fluctuations are large but predictable
- **Physical inventory can reduce overall costs** = holding large inventories may bring savings that are greater than the cost of holding the inventory
- **Physical inventory can increase in value** = items held in inventory can increase in value and become an investment. Many financial processes within most organizations will try to maximize the inventory of cash they hold because it is earning them interest
- **Physical inventory fills the processing pipeline** = pipeline inventory exists because transformed resources cannot be moved instantaneously between the point of supply and the point of demand. Can be substantial to use in geographically dispersed supply networks
- **Queues of customers help balance capacity and demand** = useful if the main service resource is expensive. By waiting a short time after their arrival, and creating a queue of customers, the service always has customers to process. Helpful where arrival times are less predictable
- **Queues of customers enable prioritization** = where resources are fixed and customers are entering the system with different levels of priority, the formation of a queue allows the organization to serve urgent customers while keeping other less urgent ones waiting.
- **Queuing gives customers time to choose** = time spent in a queue gives customers time to decide what products/services they require
- **Queues enable efficient use of resources** = by allowing queues to form customers can be batched together to make efficient use of operational resources
- **Databases provide efficient multi-level access** = databases are cheap way of storing information and providing many people with access, may be restrictions or different levels of access
- **Databases of information allow single data capture** = there is no need to capture data at every transaction with a customer or supplier, though checks may be required
- **Databases of information speed the process** = for example can delivery address and credit card information be stored in Amazon

Reducing physical inventory

The effect of inventory on return on assets

Inventory governs the operation's ability to supply its customers. The absence of inventory means that customers are not satisfied with the possibility of reduced revenue

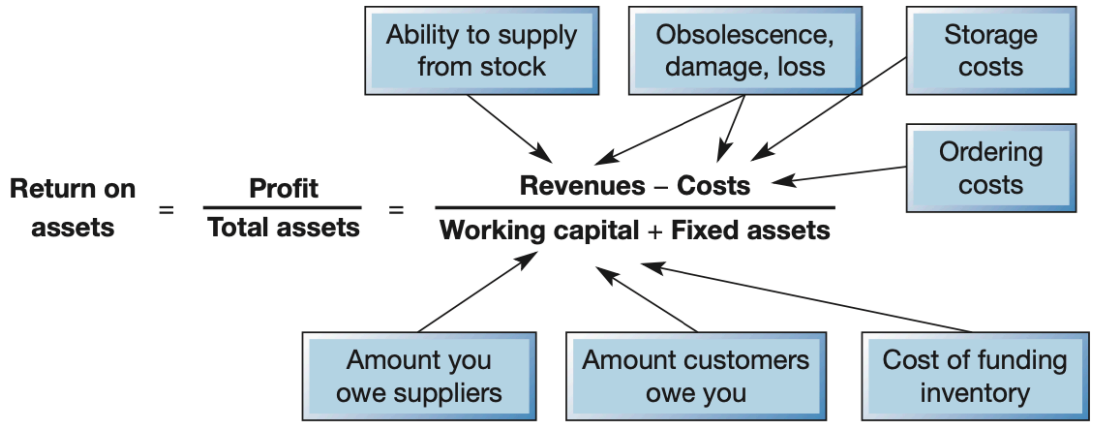

Figure 13.4 Inventory management has a significant effect on return on assets

Inventory may become obsolete as alternatives become available, or could be damaged, deteriorate or simply get lost. Increases costs (because resources have been wasted) and reduces revenues (damaged items cannot be sold)

Inventory incurs **storage costs** which could be high if items are hazardous to store (chemicals, explosives) or requiring special facilities (frozen food)

Inventory involves administrative and insurance costs since every time a delivery is ordered, time and costs are incurred

Inventory **ties up money** in the form of working capital which becomes unavailable for other uses such as reducing borrowings or making investment in productive fixed assets

Inventory contracts with suppliers can dictate the timing of when suppliers need to be paid. If they require paying before the operation receives payment from its customers, the difference between the amount the operation owes suppliers and the amount suppliers owe the operation adds to working capital requirements