



IT in the Supermarket



Information systems are used widely in shops and in the distribution of goods and one area in which their use is particularly important is supermarkets. Computer systems are used in a variety of ways in the modern, large supermarket, from stock control to maintaining temperatures in fridges and freezers. In this section we will look in more detail at these systems in one particular large supermarket, which is part of a national chain.



The supermarket uses several computers which are located in a room known as the system office and form the supermarkets own Local Area Network. These computers are used to control the stock and are connected to the checkouts. These are the 'branch computers'. The computers are multi-functional, and each can access the data, which gives the management a number of access points.



Admin and stock control staff now have access to hand held computers, SEC (Shelf Edge Computers). These are used for price changes, creating stock pictures (information on stock totals) and for forecasting deliveries.

Like many companies, they have experimented with giving customers hand held scanners to enter their own shopping. The experiment has been discontinued due to huge stock losses, staff called them 'Shop and Rob' rather than 'Shop and Go'. The company is currently looking at developing a better system to get round these problems.



Located at each checkout is an ELECTRONIC POINT OF SALE (EPOS) till. This EPOS till comprises a keyboard, a digital display, a scanner which reads bar codes, a set of scales, a printer, a credit / debit card reader and a till drawer. Each till also has its own base to which all of the above is attached. It is the base unit which is connected by cables to the branch computer in the supermarket's system office.



Each product to be sold must have an identifying code number which is different from that of every other product. Different sizes of the same product even need different code numbers. These code numbers are printed onto the labels or packaging of the product in the form of bar codes.



Bar codes are made up of a set of black lines and white spaces.

Look at the bar code. You can see that it is split into two halves, and each half is contained within two thin black stripes.



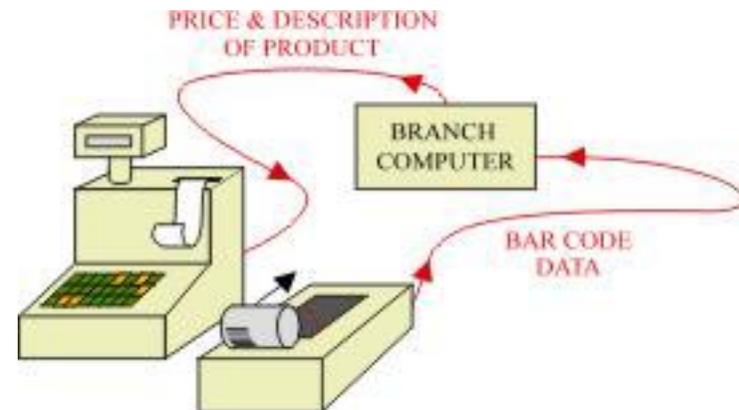
The diagram shows the pattern of lines for each digit on the bar code. Notice that the pattern for a digit on the right hand half of a bar code is the opposite of the one on the left hand half.

Many bar codes today use the European Article Number or EAN. This is a thirteen digit number which can be used to uniquely identify a product. Using the bar code shown as an example :

- The first 2 digits represent the country from which the company producing the product comes. 50 - U.K.
- The next five digits represent the company which produced the product. 00208 - Lyons Tetley Ltd.
- The following five digits represent the product. 02100 - 80 Tea bags.
- The last number is a check digit. This is used to make sure the bar code has been read correctly. So 5000208021000 is the EAN for a box of 80 Tetley tea bags.



The bar codes on products are read by the EPOS tills at the checkouts. This is achieved by using a scanner, which sends out infra-red laser beams via a set of mirrors, enabling the bar code to be read at most angles.



When an item is passed over the scanner, the black and white parts of the code are detected by the laser, as the black parts reflect very little light whilst the white parts reflect most of the

light. This is converted into electrical pulses which are sent along the cables to the branch computer. The branch computer then searches its stock file for the product matching the EAN number. When this record is located the price and description of the product is extracted and sent back to the EPOS till at the checkout which then shows this item and price on the digital display, prints them on a receipt and adds the price to the total. At the same time, the branch computer records that one of this item has been sold. We will look at how this is used for stock control on other pages.



When a bar code has been correctly scanned, the scanner emits a bleep. If no such sound is made, the item can be passed over the scanner again until it has been correctly read. The keyboard is used to enter price codes of products that will not scan, for example reduced price items.



The scales at the EPOS till are also linked up to the branch computer. All loose fruit and vegetables are weighed at the checkout. Each product has a code number which, when typed in at the keyboard, gives the customer a description of the product on the receipt along with the weight and price of the purchase. The weight of the product is also deducted from the stock file. As well as printing an itemised receipt, the printer attached to the EPOS till can also print the name of the supermarket, the date and the amount owing on cheques and debit / credit card vouchers. This lessens the chance of mistakes as well as minimising the amount of time a customer has to spend at the checkout.



Not every customer pays by cash or cheque though. Many now opt to pay by a debit card such as Switch or Delta. In these cases the customer's card is swiped through the card reader which reads the information (such as the account number and date of expiry) held on the magnetic strip on the back of the card. The latest in store development has been the arrival of smart card readers at the EPOS. A debit card with a smart chip is placed in the reader and the customer then enters their PIN to authorise the money being taken out of their account. This is much more secure than signing a docket as it cannot be forged.



This information is then added to the details of how much the customer has spent and, after checking that sufficient funds are present, used to transfer this amount from the customer's bank account to that of the supermarket's. This process is called ELECTRONIC FUNDS TRANSFER and works even if the supermarket's bank is different from that of the customer.

PRICING

The price of a product, as we have seen, is sent to the EPOS terminal when the product's bar code is read. In the past, every single item had a price sticker attached and when a price change was required, new labels had to be placed over the old ones. This was a time consuming task, as every single item on the shelves of the product requiring the price change required a new label. Mistakes were sometimes made and customers over or undercharged. Nowadays there are no price labels

attached to products, neither does the packaging of the product show the price. The only reference to the price of a product is contained on a label attached to the shelf where that product is situated.

These shelf labels are produced by the branch computer and are printed out in different sizes according to the size of the shelf display for a particular product.



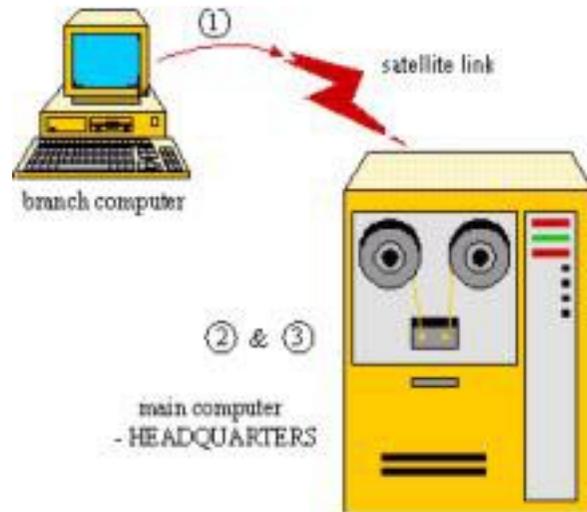
Special offers such as Multibuy - "Buy two and get one free" or LinkSave - "Buy one product and save 50% on another" could not be offered before the introduction of Information

Technology. As bar codes are scanned, the branch computer looks for items which are on special offer and discounts the prices where necessary.

STOCK CONTROL

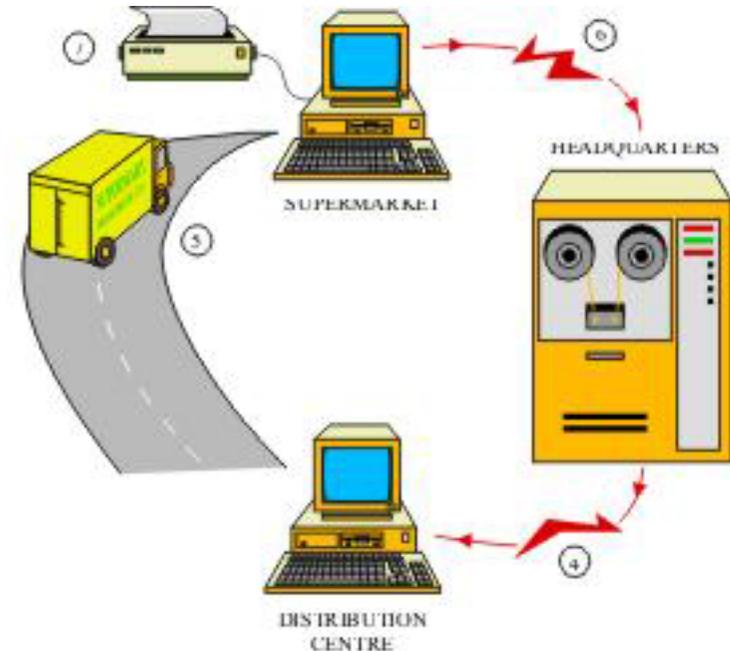


There are, in fact, six branch computers linked to the EPOS terminals at the checkouts. They all record information about items sold and provide backup for each other. If only one computer was used and it broke down, the supermarket could not function. These branch computers are linked via the satellite links to a large main computer housed at the supermarket's head office elsewhere in the country. All branches of this supermarket are also linked in this way to the main computer and this is an example of an extranet.

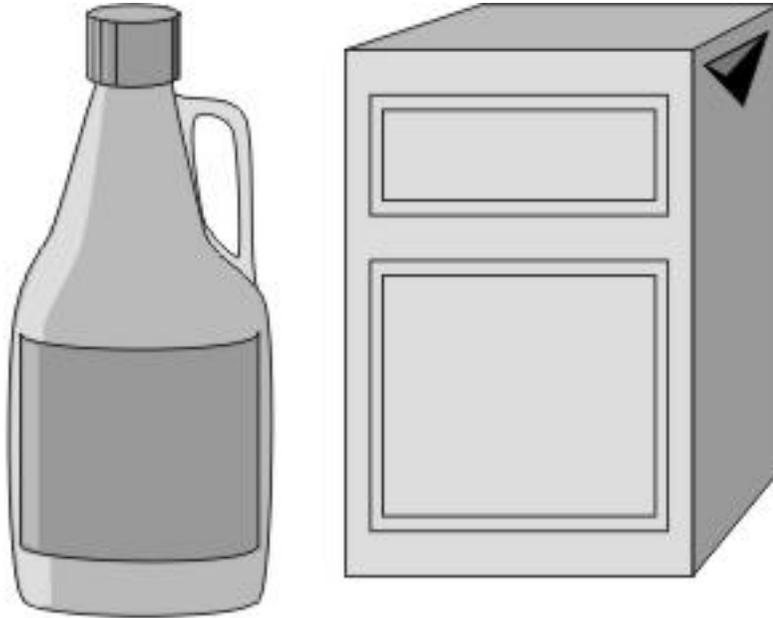


After the supermarket has closed at the end of the day, the following happens :

- 1) The branch computer sends the details of every individual sale to the main computer at the Head Office.
- 2) Using this information, the main computer system updates its record of the number in stock of every item in the store. The SEC allows managers to get a real time stock picture and allows a manager to escalate stock deliveries from nothing to 72 hours to 48 hours. It also gives a better picture of stock losses and improves the service the shop can give its customers
- 3) Using a forecast of sales along with other factors (such as the weather and the time of the year etc.) the system automatically orders the correct amount of stock required by the store for the next available delivery 48 or 72 hours ahead.



- 4) The main computer also transmits these orders to computers in the distribution centres (large warehouses storing products ready for delivery to stores) across the satellite link.
- 5) These distribution centres then deliver the required stock to the stores immediately.
- 6) Price changes and prices of new products, special offers etc. are sent back to branch computer in the supermarket.
- 7) New shelf labels are printed and the night staff of the supermarket place these on the shelves ready for the following day.



In addition to being used for stock control, the information from scanning is collected on the main computer at the Head Office to build up a 'profile' or description of the way in which its customers shop. For example, the ratio of customers who use a washing powder to those who use a liquid detergent can be calculated from the sales of washing detergents in any particular store. From this sort of information, the amount of shelf space to be given to a product can be calculated.

OTHER USES

The stores are also big users of email. Each store is connected to each other, to every depot and to the Head Office. The email is used for area initiatives, promotional planning, quality control issues, head office bulletins, warning about shoplifters and banning letters.

The company also uses computers for staff recruitment. New applicants can fill in an application form over the Internet and have it vetted by the Head Office. This saves time at branch level and serves to get rid of some applicants. If an applicant fills in a form at the branch, this can be scanned in and then uploaded to the Head office.

JUST IN TIME v STANDARD METHOD OF STOCK CONTROL

In the standard method, a shop selling cookers etc, keeps its stock in a shop and in an attached warehouse. When stock in the shop runs low it is replenished from the warehouse. A check is kept on how much stock is in the warehouse. When the warehouse needs new stock, an order is placed with the appropriate suppliers – or with the organisation's main warehouse – and the goods are delivered.

The 'just-in-time' system takes advantage of a stock information system. As products pass through the electronic points of sale (EPOS), the relevant data is sent to a database containing information about stock levels. When stock falls below a set level more is ordered. Thus only a bare minimum of necessary stock is ordered and there is no need to maintain a large, fully stocked warehouse. In some cases the system is fully automated, working out how what stock is needed and electronically processing and communicating the order.

Advantages

- Money is saved because less warehouse space needs to be purchased and maintained.
- Economies can be made in regard to labour costs, i.e. fewer staff are needed.
- The business is more aware of and more responsive to changes in supply and demand

Disadvantages

- If there is disruption to the transport system, shops and businesses will quickly run out of stock.
- Shops can still be caught out by sudden changes in buying patterns. In such cases they often find themselves without the stock the customers are asking for.
- An ICT system can be costly to set up and maintain, and expertise - which may also be costly – will be needed to run it.

INTERNET SHOPPING

Some supermarket companies now have websites which allow you to shop over the Internet, this has allowed them access to different markets i.e. people who do not have transport to get to the store.

Businesses have recognised that the Internet allowed people to interact with each other in a different way, and it gave the potential for creating new markets and in reinvigorating old ones. Businesses began to use the Internet in different ways:

- As a means of communicating information about the products and services they offer;
- As a 'virtual shop', allowing customers to purchase goods and services online;
- As a free service which makes money by advertisers to use the site;
- As a subscription service, e.g. allowing subscribers access to valuable information such as might be contained in research papers;
- As an interactive site that encourages customers to give them feedback on their products.

Steps in interactive shopping

1. The customer views the company's products via a website and selects the object(s) for purchase.
2. The customer enters his order, together with credit card details, via an on-screen form.
3. An encryption system or secure link is used to protect the transaction and to ensure credit card details are not accessible.
4. The order is received and sent to a database.
5. The information in the database is communicated to a distribution centre where orders are made up.
6. The order is delivered to the customer.

Advantages to the customer

- Customers do not have to travel long distances to the shops and struggle through crowds to make their purchases.
- It can be beneficial to those customers who are disabled or who, for some other reason find it difficult to travel to shops.
- New, smaller, more specialised businesses present themselves on the web, thus widening the range of goods and services available.

Advantages to the business

- Overheads can be cut. A web-based business does not necessarily need a high street shop and staff to run it. Small specialised concerns have therefore been able to establish themselves on the web with very little capital outlay.
- Many new businesses have been created via the Internet; some have been successful some not. The overall effect, however, has been to invigorate the

business environment by introducing healthy competition.

Some difficulties

- Despite assurances by business that their sites are secure, many people are anxious about giving out their credit card details online. There have been sufficient examples of Internet-based credit cards fraud to justify this fear.
- Anybody can set up an online business and some websites are not run in an honest and reliable manner. Customers have ordered and paid for goods that have never arrived.
- Shopping is not just a functional act. It is also a social activity. People go shopping to be with their friends and enjoy the atmosphere of towns and cities.

CONTROL SYSTEMS



Computers are also used to control the freezers and chillers throughout the store. In the warehouse, the large freezers have to be kept within a certain temperature range. This is achieved by having temperature sensors inside each freezer which monitor the conditions and switch the cooling motor on or off.

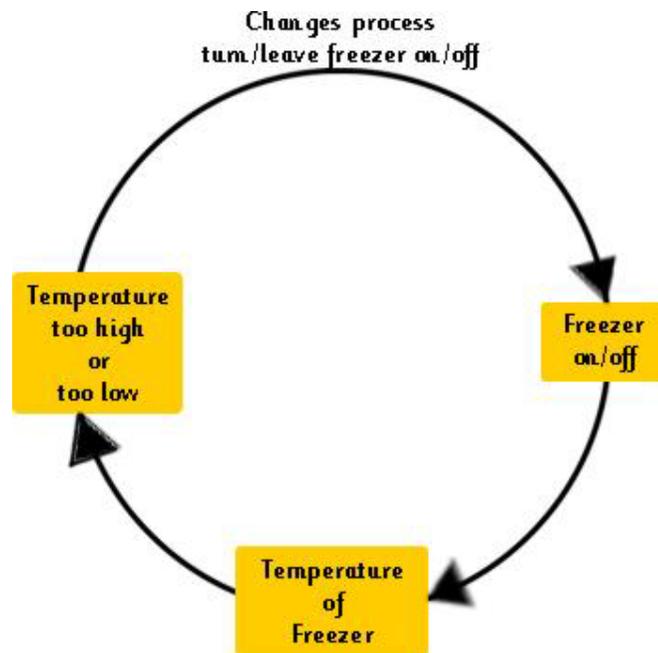
On the floor of the supermarket are many freezers and chillers which are used to store and display a wide variety of products such as fresh meat, dairy produce and frozen goods.



Different products have different requirements in terms of temperature. Fresh meat, for instance, may have to be kept at 4 °C whilst ice cream has to be stored at -15 °C.

The freezers and chillers therefore are kept at many different temperatures and, in the past, an employee of the supermarket had to check the temperature of the chiller every hour. Now every freezer and chiller is linked to a computer in the branch office. A temperature sensor in each freezer or

chiller constantly MONITORS the temperature, sending data back to this computer which sends signals back, when needed, switching the individual freezer / chiller motors on or off, thus maintaining the correct temperatures. A display on each freezer / chiller shows the temperature to customers.



This is called a 'closed loop control system'. As can be seen from the diagram, the freezer can be either on or off (the PROCESS) which leads to the freezer being a certain temperature (the RESULT). The temperature of the freezer is then either too high, too low or alright and this FEEDBACK is used to change the process if necessary (turns the freezer from off to on, or on to off.) Every three or four hours, each freezer has to be defrosted and the computer controls this process as well, turning the freezer off long enough to stop

the build up of ice but without defrosting the food. Any breakdowns are detected immediately, minimising the risk of food thawing and therefore being wasted.

ADVANTAGES

The advantages of using Information Technology in supermarkets can be broken down into two sections, the benefits to the customer and the benefits to the supermarket and its management.

It must be remembered that changes and improvements come about over a period of time, for instance, while the introduction of Information Technology may save the supermarket chain money eventually, it requires a good deal of investment, both in terms of resources and training, initially and throughout its development.

To the customer

- * faster and more efficient checkout services.
- * itemised till receipts.
- * products more tailored to their needs.
- * fresher goods due to low stock levels held by supermarkets.
- * special offers.
- * benefits to the supermarket passed on in the way of lower prices or increased customer services.
- * various methods of payment.
- * chilled or frozen food kept at the correct temperature.

To the supermarket and its management

- * efficient stock control, less chance of goods being out of stock.
- * more efficient checkouts, less chance of errors by staff.

- * ability to use sales forecasts and 'profiles', leading to more efficient use of shelf space.
- * little warehouse space required in each supermarket due to distribution system.
- * ability to monitor the performance of checkout staff.
- * shelf pricing more cost effective than labels on products.
- * ability to use electronic funds transfer improves cash flow.
- * effective management of chilled and frozen goods.