

The impact of invention and innovation on production processes

Over the last 20 years production and Information and Communications Technology has made an impact on all organisations. Some businesses have grasped the possibilities of these new methods to the maximum extent, whilst others have accepted its impact somewhat grudgingly. In more recent years the adoption of new production processes by world leading firms and the growth of the Internet, plus the impact on it has had on business and ways of doing business, such as the ability to communicate cheaply to any point on the globe, means that all firms must now accept that ICT has to be an integral part of their operations. If they do not do this then it seems likely that they are in the long run doomed to failure.

With progress in ICT technology it is possible for computers to have an impact on every aspect of business operations. From stock control to monitoring of staff performance, from marketing to managing budgets, from sourcing suppliers to finding buyers, from design to manufacture, from direct selling to dealing with existing customers, ICT has an important and growing role to play.

Computer Based and Controlled Applications

There are a number computer based and controlled applications that have had massive impacts on the way businesses are run, the most important of these are:

Computer Aided Design (CAD)

Computer Aided Design is an interactive computer system, which is capable of

generating, storing and using geometric and computer graphics. It assists design engineers in solving design problems. This system has reduced lead in time on products, that is the length of time between the initial design concept and actual production. The shorter the lead in time, the more competitive the firm remains. CAD also allows an infinite variation on design themes, allowing all possibilities to be tested. Modifications or changes can be easily made, without having to go back to the 'drawing board'. Also CAD can identify design problems at an early stage, preventing the need for expensive reworking.

Computer Aided Manufacture (CAM)

The use of computers in production is widespread. They can be used in a number of ways, but mainly in the control of machinery. For example robotic welders in vehicle production. These machines always produce welds of the same quality, day in day out. The use of CAM can aid in flexibility of production. For example reprogramming is quite simple, but retraining a welder may be a great deal more complex. CAM can also cut costs in even small businesses. Tailors and dressmakers use CAM machines to cut material in the most economic way, ensuring that waste is minimised.

Robotics

It is difficult to define exactly what a robot in manufacturing is—when does a machine become a robot? But the basic rule is a robot is defined not by its appearance, but by how it is controlled. The more automated it is and the more it can determine its own behaviour, the more likely it is to count as a robot. Robots can

carry out a huge range of tasks from mowing lawn to defusing bombs. Toyota and Honda expect domestic robots to become a huge market in the future, with machines working as a family helper. For businesses robots have huge potential. For example robots with machine vision can check to see that bottles and jars are filled to the right level, that the tops and caps fit, that the right labels are stuck on (and neatly, mind). They can recognise and sort pretty much anything extremely accurately and rapidly. Robots put chocolates into boxes, sort apples, make salads and wield knives in chilly abattoirs, butchering carcasses without having to take a rest or visit the toilet. Robots even work in bakeries, slicing cakes—because they are more accurate than people and if you make thousands of cakes a day, all those wasted crumbs add up.

The advantages to firms of using robots include ;

Improved Quality

Thanks to their high precision and outstanding repeatability, robots have the ability to consistently produce top quality products and accurately perform repetitive tasks. They can also be linked to sensors and vision systems to undertake online QA measurement and inspection. Nor will quality suffer if the work is physically demanding, tedious or in a hazardous environment.

Higher Productivity

High quality itself translates into increased output, with less scrap and rejects, and robots can work faster to maximise gross output too. They can operate round-the-clock to raise productivity levels, don't need breaks, weekends off, holidays and sick leave, working tirelessly without any loss of performance.

Extreme Precision

Extreme positioning precision and means that robots can undertake tasks that could not be accomplished by a human. High precision also means improved visual appearance of the product, with cleaner welds and better finishes, which yields higher perceived quality and premium prices.

Increased Revenue

Consistent quality, high productivity rates, fewer rejects and reduced time to market translate into increased revenue opportunities.

Cost Avoidance

In addition to eliminating all or most labour costs on automated processes, robots ensure fewer wasted consumables, like paint, less waste disposal expenses and , thanks to improved quality, the removal rejects. Robots save money on employee-related expenses like injury compensation, sick pay and liability insurance.

Flexible Automation

The trend toward shorter product life cycles has dictated growing flexibility for manufacturing equipment and a robot can be reprogrammed and redeployed any number of times.

Employee Benefits

Safety is often a main driver for installing robots, removing people from the presence of heavy machinery, dangerous environments and the risk of handling heavy weights. Robots also substitute for humans on routine or repetitive work and can assist workers to make their jobs more efficient and manageable.

Internet Marketing.

Internet sales are increasing in a geometric fashion. Companies that have already entered this lucrative market have seen share values rocket, as well as sales (though profits are still to show up in many cases). Tesco have recently launched a full range of products for sale on

the Internet that is even wider than the range available in its largest stores. Amazon.com, Internet book sellers look like taking up to 10% of all best seller sales within the next 2 years, and business to business trade on the Internet, where shopping around for best value is so important, looks like becoming the new method of cost reduction. Recently a marketing analyst has stated that 'all companies must become Internet companies. If not they will die'.

B2B Business to Business.

B2B involves the finding of commercial buyers for businesses output, and the sourcing of components and raw materials for businesses production, via the Internet. It has been estimated by industrial economists that there are potential cost savings of between 5 and 10% if business operated all their purchasing through B2B.

Electronic Point of Sale Systems (EPOS)

The reading of bar codes at checkouts is the tip of the iceberg of EPOS systems. Below this we have a stock database, that controls stock holding and ordering in retailers, and warehouse stock holding in manufacturers, and supply from firms in the supply chain. Used most efficiently retailers can use EPOS to determine promotions, selling space allocations, and staff requirements. Manufacturers can use EPOS systems to reduce stock holding and working capital, and ensure that suppliers supply only as and when required.

Location of Business and ICT

The rapid increase in global quality of

communications technology, and the matching fall in cost of use of this technology has allowed large businesses the option of outsourcing or relocating their 'back office' operations world wide. Call centre operations in India, taking what were UK based jobs, have filled the newspapers recently. The costs of these operations are far lower than in the UK, (and USA and Australia, who have also seen the same effect occurring), in fact the estimated cost to the call centre operator of each 1 minute call is just 7p. This includes the cost of call and employee costs. When we consider wages in India can be just \$200 dollars a month, perhaps just 15% of UK wage costs, and that many posts are filled by graduates, we can see the attractions of this type of relocation.

Notes