Manufacturing your future

Paul T Kidd takes a look at the way manufacturing may develop over the next 10 to 20 years, and the role of international research in such developments

Your washing machine is broken. It's very old so you decide to buy a new one. Off you go to the local store, where on arrival you see lined up the usual array of products, but you immediately discover that none of them are for sale.

Before you get upset and head off for another shop, you may want to know that you can have any one of the products on show, or choose from several that are not in store, and have it delivered to, and installed in your home within four hours. And it will cost you nothing, well not immediately anyway. You won't pay anything until you start using it, and then you'll only pay for the amount of use.

When you visit this futuristic store, you won't even need to speak to a sales person if you don't want to. You'll be able to use in-store computer screens to help you chose the washing machine that best suits your circumstances. You'll find yourself being asked about the number of people in your family, and how many times each week you use a washing machine. Based on the answers you provide to such questions, you'll be offered a choice of products that best suits your requirements. Here you'll see the familiar brand names, Hoover, Hotpoint, Indesit, and many more, plus several brands that don't exist today – new market entrants from emerging industrial economies such as China, Malaysia and several others.

But you won't see any information on price because you won't want to pay the high price tag that is attached to modern consumer products. The price is high because it covers the cost of recycling the product once its useful life is over. The price is also high because it covers the product upgrades that will be provided over the period of use, to extend the useful life. Also included in the high price

are the advanced energy efficient technologies and electronics that will help to reduce energy usage, as well as the maintenance and repair costs that will keep the machine operating at optimum efficiency.

Next you'll be asked about your broadband Internet connection, and if you have a wired or a wireless network in your home. The Internet you see is the key to this new way of using a washing machine. When it is installed in your home, in addition to the usual power, water and drainage services, it will also be connected to the Internet.

The operation of the machine will be continuously monitored using the Internet so that any problems are quickly detected and a repair technician despatched to your home before you even experience a breakdown. And for those non-urgent washes, the Internet will provide the means for the energy supply company to control the timing of the wash so that it makes use of cheaper off-peak electricity. This aspect is part of a Europe-wide energy management scheme designed to ensure a more constant energy demand, which has resulted in a reduced need for power stations devoted solely to handling demand peaks, thus saving on unwanted and harmful emissions of greenhouse gases.

The Internet is also key to how you will pay for the service, for it is no longer a product that you are buying, but a service.

On the in-store computer screen you'll be asked to identify your utility suppliers – gas, electric, water, telephone, and Internet. Then you'll see what the service will cost from each of your utility companies, for each of the products that have been identified as being suitable for your needs; the manufacturers of washing machines have teamed up with utility companies to deliver the service. Each utility will offer you a deal based on your specific circumstances, and your payments will be collected through the monthly or quarterly bill from the utility company that you eventually select.

And of course you didn't need to visit an electrical appliance store to do all this. You could also have done the same from home using Internet shopping, or at your local supermarket, or any one of several outlets offering computerised shopping facilities.

This scenario is yet to become reality, but the technologies to enable this to happen are either already available or on the way. And what will make this scenario feasible and likely are transformations that are taking place in the manufacturing industry, resulting from the merging of once separate industries, technologies, and products and services, and the need for a more environmentally sustainable form of consumerism.

The scenario highlights what manufacturing may be like in the future, 10 to 20 years from now. But manufacturing has an image problem, inherited from its past that is hindering the development of this industry. It is perceived as dirty, largely based on manual work, polluting, and as being no longer relevant to modern economies. Manufacturing is in decline and is something that is done in newly industrialised countries like China. The future for European economies lies in services.

And the figures seem to support the view that manufacturing in Europe is in decline with manufacturing jobs being exported to poorer nations on the other side of the world. In the wealthy countries such as the United States, the United Kingdom and many others, growth in service sectors has outpaced growth in industrial sectors. This has been accompanied by a significant growth in manufacturing in Asian counties.

World Bank figures produced in 2003 show that manufacturing as a share of Gross Domestic Product (GDP) fell by about 2 percent to a typical level of 20 percent during the 1990s in the wealthiest nations. However, in the Asian countries around the Pacific Rim, manufacturing as a share of GDP rose in the same period by 4 percent to a typical level of 32 percent. Industry employment in the European Union fell over the same time from 33 to 28 percent.

Many might say good riddance. If manufacturing is no longer relevant to modern economies, why bother with it at all? But the fact remains that manufacturing in the European Union accounts for 22 percent of EU GDP – not insignificant. The whole basis of modern life rests on manufacturing. Without manufactured goods our quality of life would be much the poorer, as we can see from the state of affairs that exists in poor countries such as those found in Africa. Manufacturing is not only a significant contributor to wealth creation in Europe; it is also the basis for a high quality of life.

The truth about manufacturing, as the scenario highlights, is that it is becoming a service-oriented industry. In doing so it is reflecting a change that is occurring in the advanced economies where services are becoming increasingly important. But this is quite different from the perception of manufacturing that was common in the 1980s. At that time many politicians undervalued the economic importance of manufacturing, not understanding that, what was happening at that time, was not that it was becoming less relevant, but that it was undergoing a process that also happened during an earlier period in agriculture.

In the 19th century, agriculture began a transition from a labour intensive industry to a capital intensive one, a process that accelerated in the mid-20th century. Something similar happened to manufacturing in the 1980s. But just as agriculture did not become economically unimportant as a result of this change, neither did manufacturing. Agriculture also became a global industry in the latter part of the 20th century, and so did manufacturing. Europe still has an important agricultural industry, along with all the product and service industries that it needs to function. Likewise with manufacturing: it remains economically important, along with the product and service industries that support it.

Whilst it is true that a lot of manufacturing has been moved out of Europe to low cost countries such as China, much of what has been shifted to East Asia is low value production of commodity items. Typically, manufacture of products such as DVD players, televisions, and so forth, where competition is based mostly on price, have been exported out of Europe because in such cases production costs are an important factor.

Another area where production has been shifted to East Asia is that of commodity parts for more advanced and sophisticated products. These components are shipped to Europe and incorporated into higher value more technologically advanced products. Production in Europe therefore has tended to focus in recent years on high value, high technology products. These products require high levels of skill and know-how to manufacture, and their production provides good quality jobs. It is the low-value commodity products – those that often involve the boring and repetitive jobs that became synonymous with the production lines of the 20th century – that have mostly been exported.

Increasingly in manufacturing there is more emphasis placed on knowledge as a source of competitive advantage. This knowledge appears in many forms, such as new technologies, or how to manufacture complex products like aeroplane engines, or understandings of changing customer needs derived from customer data. These kinds of knowledge are seen as a means of remaining competitive in a world where an increasing number of nations are acquiring manufacturing capabilities and producing their own home grown commodity offerings.

Another truth about manufacturing is that it does contribute significantly towards environmental problems, not just during manufacture, but also during use and final disposal of products. But this happens regardless of where products are manufactured, and if we are to tackle these problems we have to take an interest in manufacturing and maintain the capability to influence its development towards a more sustainable form.

These factors – globalisation, service orientation, knowledge intensity, and responding to environmental concerns – highlight the importance of undertaking research in the area of manufacturing, not just in Europe, but also on a global level. Manufacturing is a global industry. The way that it is

structured, with both supplier and customers located across several time zones, demands a more global approach to research. National and regional research is still important, but there are many issues, such as finding more environmentally sustainable forms of manufacturing, or formulating international standards, or developing globally accepted operating procedures for suppliers, that require a global manufacturing research programme.

Such a role is fulfilled by the Intelligent Manufacturing Systems (IMS) Programme, which has sought to address global research issues in the area of manufacturing. The Programme includes most of the world's leading manufacturing nations: Japan, the USA, the European Union, Norway, Switzerland, Canada, Australia and South Korea.

IMS started in 1995,with an agreed life span of 10 years, and is industry led. It provides a unique opportunity for manufacturing firms to collaborate on addressing common issues and finding solutions to shared problems.

A recently published report on the impact of IMS over its first 10 years highlights the contribution that has been made towards addressing research in global manufacturing issues. Programme participants have reported numerous benefits from their involvement, including increased understanding of global business practices, an important competitive issue in a world where global operations are becoming the norm. Also identified as an important benefit of participation are significant economic gains such as cost reductions and increased sales. Environmental benefits are also identified as important. These benefits include reduced use of hazardous materials, lower energy consumption, and also the creation of worker-friendly workplaces.

So successful has been this collaboration that continuation of IMS for a further 10 years has been agreed among the participating nations. Over this period, globalisation of manufacturing is set to accelerate, along with its service orientation and knowledge intensity. Apart from the never ending challenges of maintaining manufacturing competitiveness in an increasingly competitive business environment, manufacturing firms face over the next 10 years, the challenge of becoming environmentally sustainable.

In this respect IMS can serve an important role. With its unique position as the only global manufacturing research programme, it can first and foremost provide a forum for manufacturing business from around the world to discuss and better understand the problems faced, the possible solutions, and the opportunities available. IMS also provides the framework for undertaking the ground breaking research that will be necessary, in areas such as manufacturing technologies and product design and delivery, to develop new sustainable manufacturing business models.

Washing machines have evolved since they first appeared in the 20th century. No doubt they will continue to do so. And no doubt the manufacturing industry will provide many more useful and labour saving devices to improve the quality of our lives. But the manufacturing industry also needs to evolve if it is to continue to meet human needs. Research is essential to both evolutions, and to achieve an environmentally sustainable manufacturing industry, both evolutions need to be integrated. And IMS, over the next 10 years, may turn out to be the only global framework where these developments can be addressed in a truly international way.

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The IMS Impact Report is available at www.ims.org.