MANUFACTURING - PAST, PRESENT AND FUTURE

Part 3: The Future

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INTRODUCTION

This is the third part of a three part series based upon David Little's inaugural lecture as professor in manufacturing systems at the University of Huddersfield.

Part 1 in the series examined the important change from craft based manufacture to mass production which, through the emergence of the factory system, changed much of our landscape and many of our lifestyles. Part 2 recognised the important and growing role of technology in manufacture and considered our relative economic performance when compared to other, competitor, developed nations. In particular, it drew attention to our relatively low productivity and our apparent fall in the generation of innovative products and processes. Part 3 looks to the future and the challenges we face.

MANUFACTURING FUTURE

Manufacture and distribution are becoming technology dependent in most industrial sectors and the UK has a poor record for capital investment. To make things worse, we are not using the information systems, people and technology that we do have in an optimum way, and this accounts for the comparatively few UK world class manufacturers identified by Hanson and Voss in a recent survey. However, the pace of change, driven by our competitors, is accelerating, with new technologies, for example the Internet with all the implications of E-commerce, challenging the status quo in many markets and in the ways that we serve them. We need a mindshift to compete in the future.

Firstly, we must invest and apply new technology in order to close the productivity gap with Europe and North America to but use a different approach to technology application than that adopted during the 1980s. To do this we must recognise the key contribution of the workforce and unlock its potential because it is people who make technology work (or the reverse). Without such empowerment technology has a poor track record.

Secondly, we must recognise the growing importance of the supply chain for most manufacturing sectors and extend our manufacturing systems to reach out to our customers to gain direct access to their data whilst, at the same time, improving our relationships with suppliers, who become responsible for component design as well as supply. In doing this we must embrace the concept of the Total Manufacturing System (TMS) and enhance our information systems accordingly.

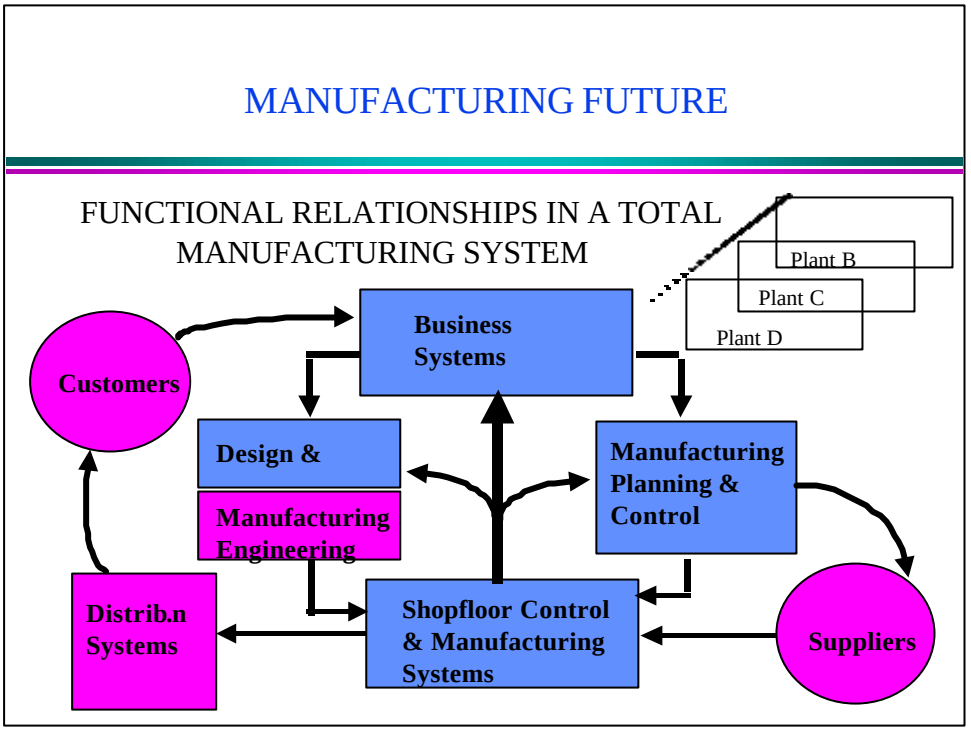

Figure 15: The Total Manufacturing System

This TMS is shown in Figure 15 and can be described as:

> *A total enterprise system that provides fast and flexible response to customer requirements by optimising the activities of people, machines and processes under one integrated enterprise wide control architecture. This control architecture to include all plants, suppliers and customers necessary to meet the requirement and to be transparent to both organisational and state boundaries.*

The trends in the design of manufacturing information and decision-support systems are moving fast in this direction. ERP products from vendors such as SAP and Baan claim to provide high level decision support and facilities for supply chain management (including demand management) along with the core facilities for material planning and shop floor control associated with MRPII. Even so, all but the most over-enthusiastic sales person would not claim that their solution met all the required criteria.

So, it would appear that we could do better but where will we be in another 10 years?

Looking at the state of UK manufacture, the evidence which we can use to predict the future is mixed:

- Labour productivity now within 10% of Germany and probably ahead of France
- Labour rates are half of Germany and Japan and well ahead of France and Italy
- UK employment costs are 15%, compared to 30% in Germany and over 40% in France and Italy

This seems promising, but since our overall productivity is 25% behind France and Germany and about 50% behind North America, our low wage costs (shown in Figure 16) can only offset this gap rather than provide true competitive advantage.

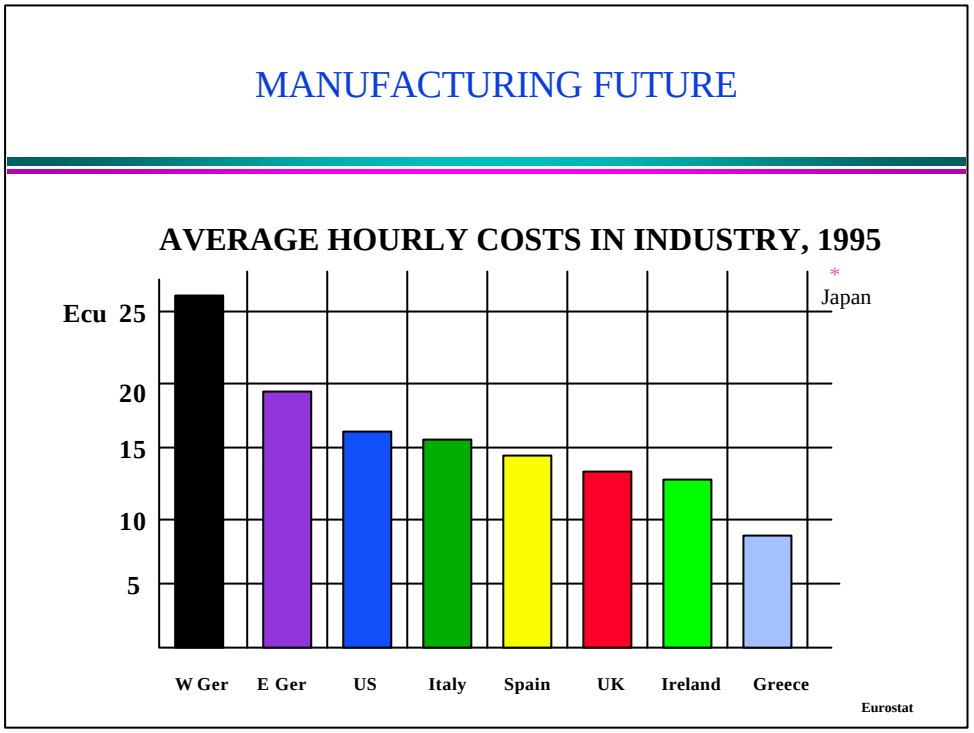

Figure 16: Average hourly costs in industry, 1995

On the other hand, a factor which bodes well for the future is inward investment by the Japanese, the Koreans and the Germans (see Figure 17). This inward investment has often raised the benchmark of best practice within the UK and provided a significant proportion of our jobs. The UK has topped the European league for inward investment for a number of years.

FIXATION UPON COST RATHER THAN VALUE

It has been argued that the main problem with UK manufacturing has been our focus upon reducing cost rather than adding value. As a result, for an industrialised economy, we have become a low wage economy. A German engineer in Ford earns twice as much as his British counterpart, he has 60 days holiday against 30 and much better pension rights (a quote from a Ford senior engineer). Part of the outcome of the pursuit of reduced costs is a reduction in overheads through downsizing, but associated with this is often a loss of intellectual capital and the time for senior management to think and plan.

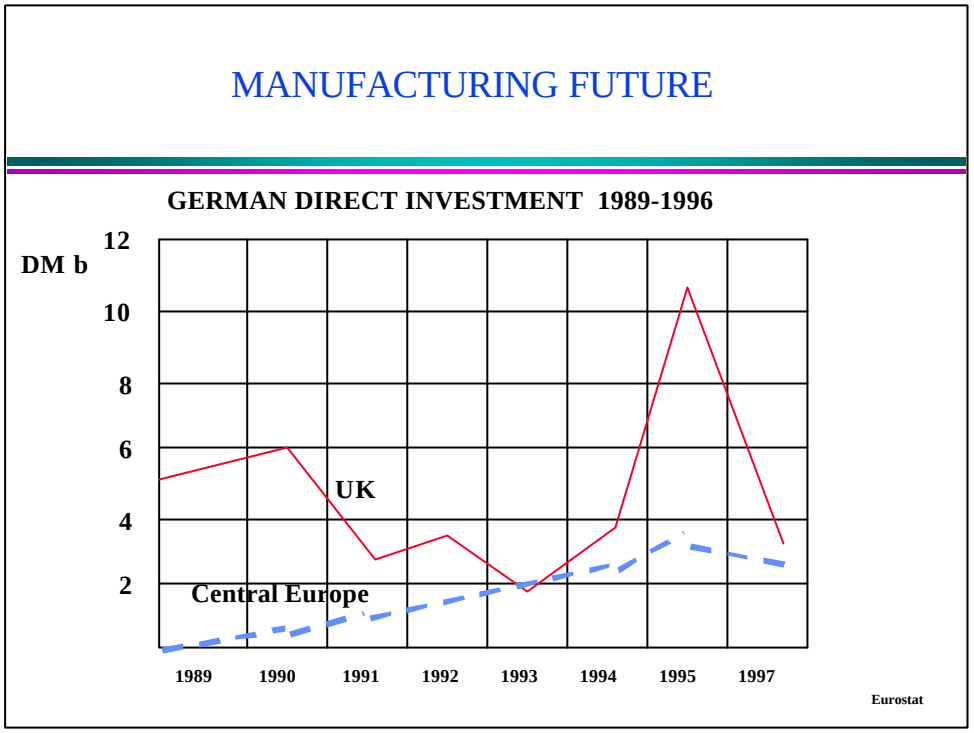

Figure 17: German inward investment in the UK

The problem is that we cannot downsize indefinitely to achieve reductions in cost – or our firms will ultimately disappear. Productivity gains become increasingly difficult to achieve without product and process innovation. Not only are our wages artificially low but, as we downsize, we lose the ability to innovate. We are in danger of becoming low paid 'busy fools'.

The low cost route brings success in manufacture within a European context now but, in future, will bring us up against developing economies in central Europe and around the world. We have tended to focus on European or Japanese comparisons, the former understandable in the light of the arguments about the single currency which have plagued us recently, but this is dangerous. We must think in more global terms for inflexible European manufacture may well be left behind by China and other Asian mass producers.

For example, central Europe is receiving major funding from international companies as diverse as Tetrapak and Coca-Cola. Philips have decided that China will be the global location for the manufacture of small domestic appliances and Indonesia is being recognised as a new industrial force. And so on. Not forgetting what may be the most competitive economy - that of the US, with the recently launched Chrysler Neon as an example of what it can do.

The Europeans are not daft. Well, not all of them. The Germans appear to be shifting their manufacture offshore as quickly as they can and have been pouring money into the UK – presumably as a low wage economy. But now we see from Figure 17 that German investment is moving towards central Europe.

But there are other ways to compete than the low cost model of the sweat shop and we need to study these. Take the industrial value progression model, for which I thank Gunther Kruse, published recently in Management Today and shown in Figure 18:

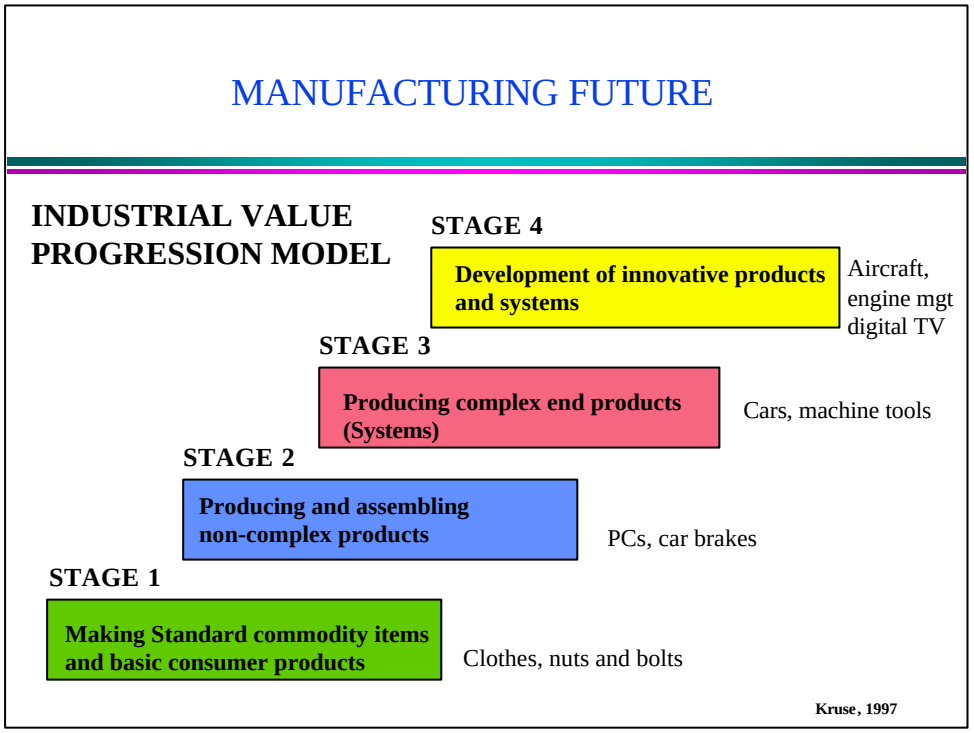

Figure 18: Industrial value progression model

This illustrates four main stages in the industrialisation of a nation.

Stage 1 represents the start of basic manufacturing activity where simple end products, for example clothes and furniture, are manufactured and is typical of the first efforts of a newly industrialised country.

Stage 2 is the next stage of industrialisation where simple non-complex items are manufactured and assembled. Examples of these may be PCs or domestic appliances with relatively low added value.

In Stage 3 an economy has reached the mature phase of industrialisation and produces complex systems rather than products such as cars, aircraft and power generation equipment. The implication here is that integration is required between operating or management software and the hardware of the product. An example of this is the relationship between a modern car engine and the engine management software.

But it is only at Stage 4 that highly innovative products that lead the market are developed. Such products command the very high added value necessary to support the extensive R&D necessary to sustain the market lead. In the UK, pharmaceuticals and aerospace fit comfortably here, but not many other sectors. A world class example would be probe manufacturer, Renishaw.

Whilst the UK does operate in all four sectors, we tend to focus on stage 2 and 3 with only a small percentage of our effort in stage 4. Many of our competitors in the developed world are moving away from low added value manufacture by exporting this to the newly industrialised nations allowing them to concentrate upon the development of innovative products and systems, see Figure 19. To move more industries into that vital fourth sector and become a high value-adding nation we must remember that it is people who have ideas and create cultures to foster and support creativity.

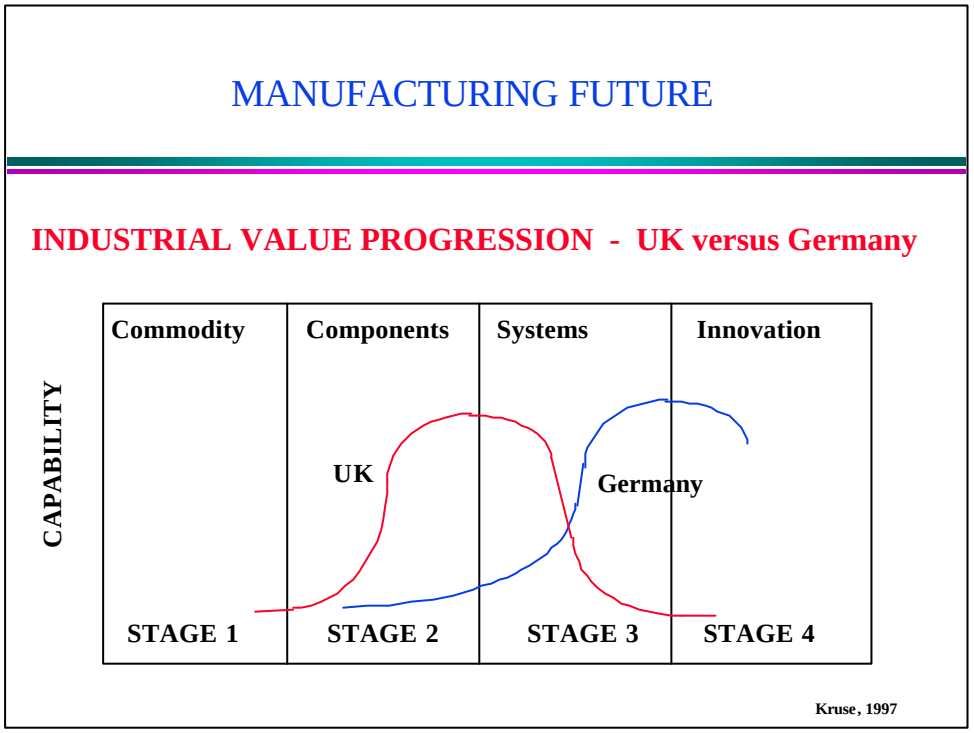

Figure 19: UK versus Germany

If we look at our leading companies we can see that manufacturing is undergoing a sea change. Manufacturing is changing its shape through de-layering and re-structuring in a less formal manner around focused business units. This is an essential pre-requisite to create the culture which unlocks the potential of their staff.

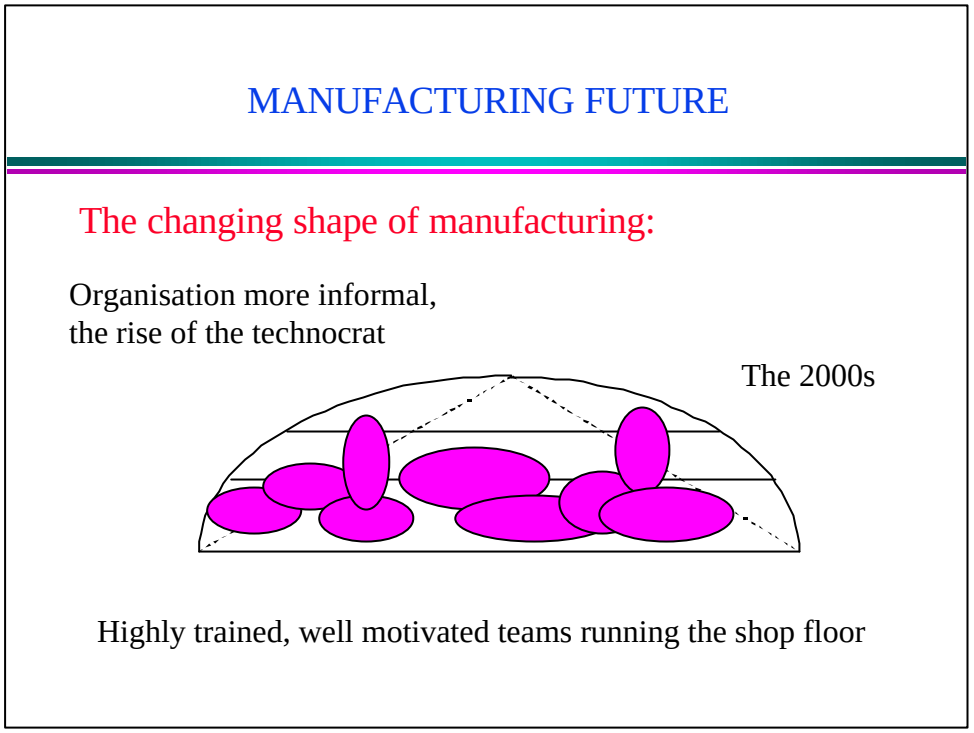

Figure: 20 The Changing shape of manufacturing

CONCLUSION

The key issue for the UK appears to be to invest heavily in innovative product and process design (Japan invests twice as much as we do). This will not only allow us to compete in the technology driven markets of the future but also to deliver the productivity necessary to stay ahead of the newly industrialised nations (and, more importantly, those yet to come). In addition we must consider the following:

- Provide more encouragement for innovation
- Improve the quality of much of our manufacturing management
- Increase our intellectual capital in manufacturing
- Improve the educational level of the shop floor
- Improve the supply of highly skilled workers.

It will not surprise you that the key to much of the above relies upon an effective interface between universities such as this and the local industries who are their prime customers. This is something that urgently must be addressed for the relationship is generally too weak for the national good. The fault lies on both sides, but I will accept that universities, particularly some of the more traditional where I have worked, have tended to avoid the world of mammon wherever possible.

Fortunately that is not the case here, as I hope I demonstrated in a small way in my opening remarks - although we could and should do more. My parting message is: 'Let's start the dialogue now'.

About the author

Professor David Little FIOM, worked in industry after graduating from Loughborough University with GEC, A Reyrolle and Molins, ending up as a senior manager in their Spares Division. He then moved into higher education at Huddersfield Polytechnic Business School, leaving to undertake research at Liverpool University where he became a senior lecturer and Sub-Dean. He recently returned to the University of Huddersfield as Professor of Manufacturing Systems. Currently Director of Research and Postgraduate Studies in the School of Engineering. He is a past president of The Institute of Operations Management.