
Benchmarking best practice in European manufacturing sites

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In 1992, when setting up a new consulting practice aimed at bringing IBM's expertise as a manufacturer to the marketplace, one of the first requirements was to understand the market. Just what do the leaders of our manufacturing sites need to do to become world best?

The "man in the street" view frequently suggests that Europe has lost some of its former glory and that the manufacturing industry is in decline, especially if the numbers of people employed is any measure. More informed observers point to the obvious existence of some clearly excellent European manufacturers competing successfully on a world stage. International comparisons of productivity suggest strong progress, but not enough to change our position relative to the USA, Japan or even the newly industrialized nations.

If there is a point of agreement it is that we cannot sustain exporting economies without a manufacturing industry, and that the capability of many European companies is not yet strong enough to compete against the best in the world.

It was to understand the real issues facing European manufacturers that the "Made-in-Europe" programme was undertaken. The goal was to test just how far European manufacturing companies had gone in implementing best practice, and to see what results they had achieved as a result. Implicit in this was the assumption that we could define just what that "world-class best practice" comprised.

One source of such confidence was from the simple observation that the much-documented pictures of Japanese manufacturing practices are so widely found on the bookshelves of European companies. The other source of confidence that best practice could be defined and modelled came from the internal benchmarking that has been common practice in the IBM plants throughout the world.

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A model of world class best practice

It was not intended to create the definitive model for world-class manufacturing. Many perfectly sound conceptual models already exist in the publications of manufacturing authors, consultants and government reports. The high-level quality templates such as the Malcolm Baldrige American National Quality Award or the European Foundation for Quality Management similarly provide a conceptual framework for world-class business operation.

The goal of this study was to find a simple framework against which to test best practice but one that would be consistent with the much published picture of Japanese manufacturing, while fitting closely to the customer-driven quality ethos of Baldrige and EFQM. Indeed, it was planned that results from benchmarking – specific manufacturing sites should be usable in the provision of trend data in any quality accreditation submission. Development of the model (Figure 1) was undertaken in close collaboration with the primary academic partner in this project, Professor Chris Voss of London Business School.

The key components of the model are characterized as follows:

- *Organization and culture.* With obvious leadership from the chief executive, a clear vision for the business is jointly developed and shared throughout the site. Employees are inspired to follow the direction set and are encouraged and trained to work in teams to take responsibility for its achievement. The measurement of the business is displayed for all to see.
- *Logistics.* Relationships with suppliers are built on the assumption of lasting partnership. The benefits of joint activity leading to lower total supply-chain costs are shared. Outbound logistics are capable of delivery into highly variable just-in-time retailers, for example.
- *Manufacturing systems.* Information technology systems are integrated so that the design process delivers, for example, a workable bill of

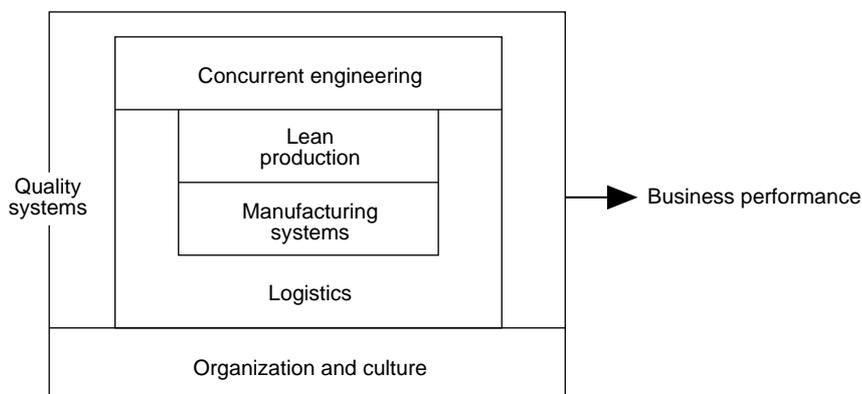


Figure 1.
World class
manufacturing – best
practice model

materials to the planning process. CAD and CAM can realistically be spoken of in the same breath. MRP schedules are trusted and acted on without need for local modification.

- *Lean production.* Every aspect of the manufacturing processes that adds cost but not value has been systematically eliminated (e.g. unnecessary movement, counting, inspection, paperwork, etc.).
- *Concurrent engineering.* The design and development process involves suppliers and customers as well as manufacturing and sales teams. The product will not only meet customer requirements but will enable optimum manufacture and distribution.
- *Total quality.* With all business processes sharply focused on meeting and exceeding customer expectations, a spirit of continuous improvement pervades the entire business.

A European project

The first phase of this project was undertaken in the UK and involved 202 manufacturing sites. The results of this phase were published in June 1993[1]. Subsequent phases in Germany and The Netherlands were similarly published during 1994. A smaller project in Finland has not been independently published but the results are summarized in the consolidated report published in November 1994[2]. At the time of publishing this study, over 700 site visits had been made across four countries (see Figure 2). Participants had, in many cases, volunteered after local newspaper and radio announcements of the study. Others had been approached so as to balance sample groups in sector, geography or size.

Benchmarking process

From the outset it had been clear that the design of scripts would demand that the process of completing them would require expert facilitation. The benefits of this are that the subtlety of the questions can be described and explored and that the experience of taking part can be one in which there is inherent added value.

Implementation of best practice is something that happens at the specific site and for this reason the target respondent is the senior executive at the manufacturing site (or product manager in process sites). The design envelope was that the session should take no more than an hour-and-a-half of the executive's time, with a factory tour as part of the validation process. While there is some risk that the executive view is one of "rose-tinted glasses", it has the merit that always seeking a top view enables consistent comparison for all sites. A number of participants have since tested the view at different levels in their organization and indeed some use the scripts for training and vision setting. Second-time-round participants typically convene multi-disciplinary teams to complete the self-assessment.

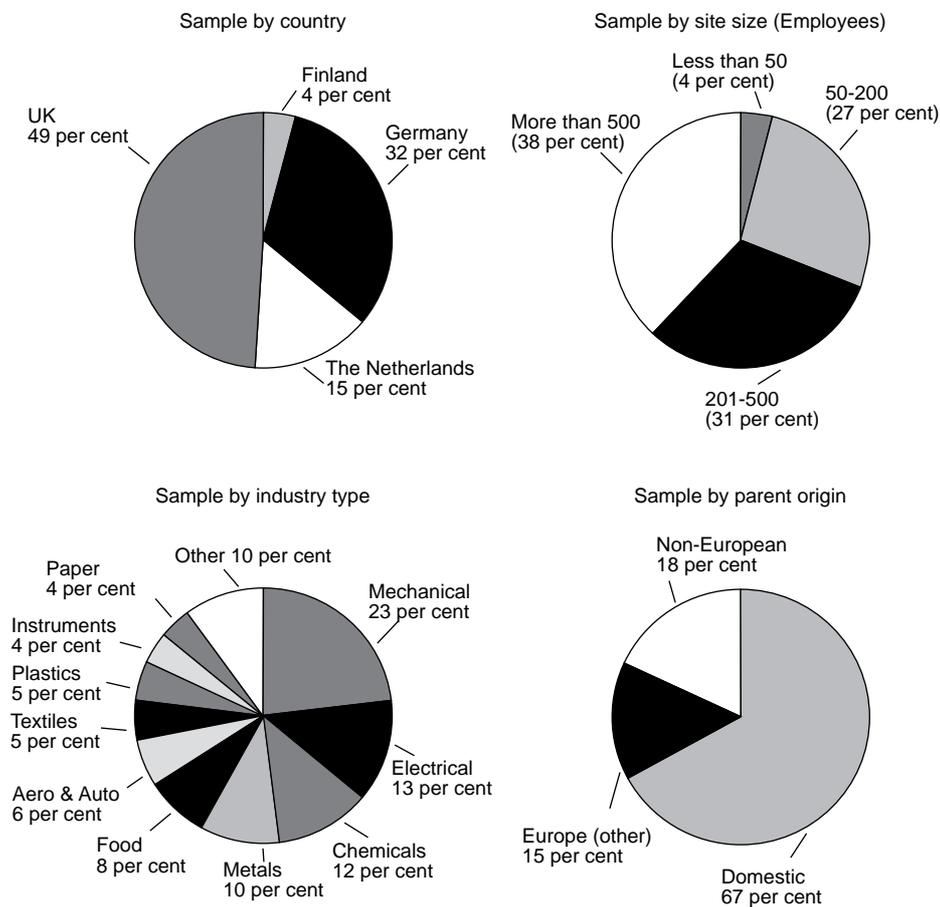


Figure 2.
European sample
by nation, size and
industry sector

Benchmarking scripts

The scripts enable a self-assessment against each of the elements of the world-class model. Within each element of the model a series of questions tests either the degree of implementation of best practice or the level of benefit achieved. The questions require a numeric assessment from one to five. The progress from one to five is characterized in three scenario descriptions representing the business journey involved. Typically, a score of five will require some measurement evidence.

Table I is an extract from the "Organization and culture" section of the script, and offers examples of the scenarios.

What did we hope to understand?

The biggest single question to be answered related to developing a true picture of just what proportion of European Manufacturing sites really can claim to be employing world-class best practice.

	1	3	5
1 Vision	Maximize product output: managers dictate direction; cost-reduction key goal	Customer service, emphasis; employee involvement; quality and cycle times are key drivers	Leadership in quality and service; production balanced with customer needs; production cycle time less than order lead time
2 Shared vision, mission and goals	Insufficient direction; no shared plan or vision statement; employees do not understand goals	Management commitment to shared vision; written mission statement; some employee involvement	Total employee involvement; published improvement plan; individuals and departments have vision matching company's
3 Manufacturing strategy	Framed in output and cost targets, less than one-year horizon	Functional strategy for manufacturing, 1-3 year horizon	Business-led manufacturing strategy with strong links to corporate plan, 3-5 year horizon
10 Problem solving	Crisis mindset, confusion, finger pointing	System for recognizing and responding to problems, emphasis on process not people, teamwork	Problems viewed as opportunities for further improvement, employees empowered to correct
11 Design process	Design department sole responsibility	Team-based involving manufacturing	Customer-driven, including manufacturing, marketing and suppliers

Table I.
Benchmarking scripts

The sample was designed to enable comparisons by sector, geography and size of site. Over and above these, specific tests were devised to test the effect of purchasing power, ownership, ISO 9000, export activity and breadth of best practice.

The basic test of validity of the model was to correlate those questions relating to use of best practice against the questions relating to performance (Figure 3). Some 52 per cent of performance can be explained by the practice adopted. The highest correlation is achieved when sites with less than 50 employees and those manufacturing food products are removed from the sample. The food industry effect is not great but it is the only sector which makes any significant difference.

Just how “world class” is European manufacturing?

After examination of other international studies and a careful assessment of the question scripts Professor Voss proposed that we set a threshold that sites

"The adoption of best practices will result in strong operational performance"

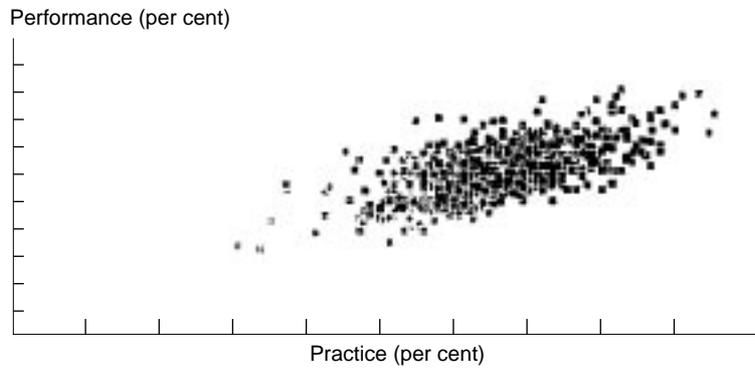


Figure 3.
Practice versus
performance

exhibiting better than 80 per cent practice and 80 per cent performance should be designated world class. As the study is extended into other countries, so we are increasingly able to assess just what it actually takes to be internationally ahead of the rest.

Other categories were defined by their practice and performance scores also (see Figure 4). To characterize the rough and tumble of industrial life, a boxing analogy was used:

- *World class*: Those with both practice and performance better than 80 per cent turned out to be just 2 per cent of the original sample.
- *Contenders*: A healthy 46 per cent of the companies studied had practice and performance better than 60 per cent. This group being well-

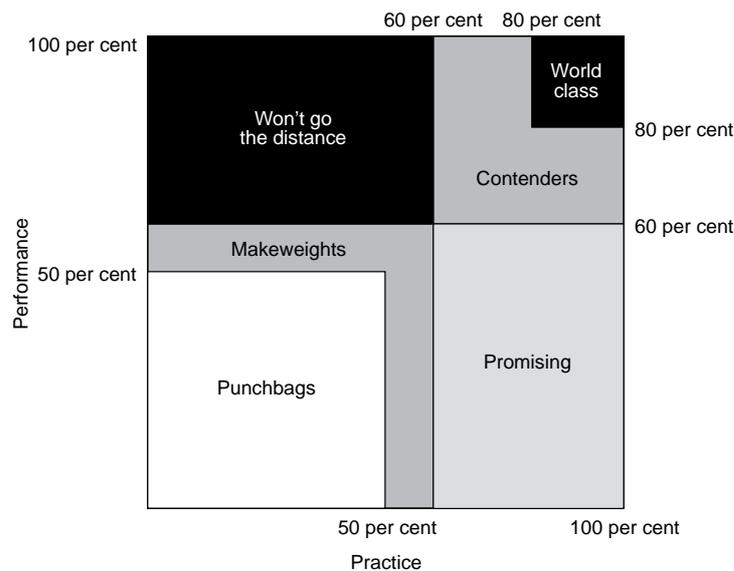


Figure 4.
Segmenting the sites
by practice and
performance

positioned to achieve “world class” is clearly a source of optimism about European manufacturing.

- *Promising*: Some 19 per cent of sites had put in place 60 per cent or more of the practice but had yet to enjoy the performance benefits to the same level. This is, of course, entirely plausible in that the benefits of total quality management, for example, take possibly years to show in strong business benefits. Nonetheless, these sites have the essential foundations for long-term competitiveness.
- *Won't go the distance*: These 9 per cent of sites have apparently better than 60 per cent performance scores but without having the enduring best practice to the same level. We all know that it is, for example, easy to deliver quality output by inspecting every item that leaves the line. This is not, however, the basis of long-term competitiveness in many industries. (Some argue that it is possible to operate manufacturing companies in this way indefinitely!)
- *Makeweights*: About 20 per cent of sites show both practice and performance in the 50-60 per cent range. These facilities will surely struggle with real international competition and are typically in market niches that are in some way protected.
- *Punchbags*: There were 4 per cent of sites showing practice and performance below 50 per cent for whom the business strategy must be one of survival.

The picture that emerges shows approximately 2 per cent of European sites meet the world-class criteria and almost 50 per cent are well positioned to get there (see Figure 5). This is a basis for optimism, though it should be remembered that the last part of the journey is surely the hardest and is a rapidly-moving target. Of particular concern in the UK is the long tail of low practice and performance sites. Much progress has been made thanks to the positive effects of inward investment pulling best practice through the supply chain in the UK (Figure 6). The sites at the low end of the spectrum, however, rarely see US or Japanese customers and, as such, never benefit from best practice above them.

A sense of realism?

Outside the benchmarking questions we also asked participants for their personal views as to how close to being internationally competitive they thought they were and how long it would take them to become “world class” (Figure 7). When asked a specific question on current international competitiveness the results were strongly optimistic.

There is evidently a higher level of self-opinion than the best practice levels suggest as being reasonable. To test the picture further, we plotted the group who considered themselves to be already globally competitive against the total practice performance picture. The result showed that they were spread through

Benchmarking best practice

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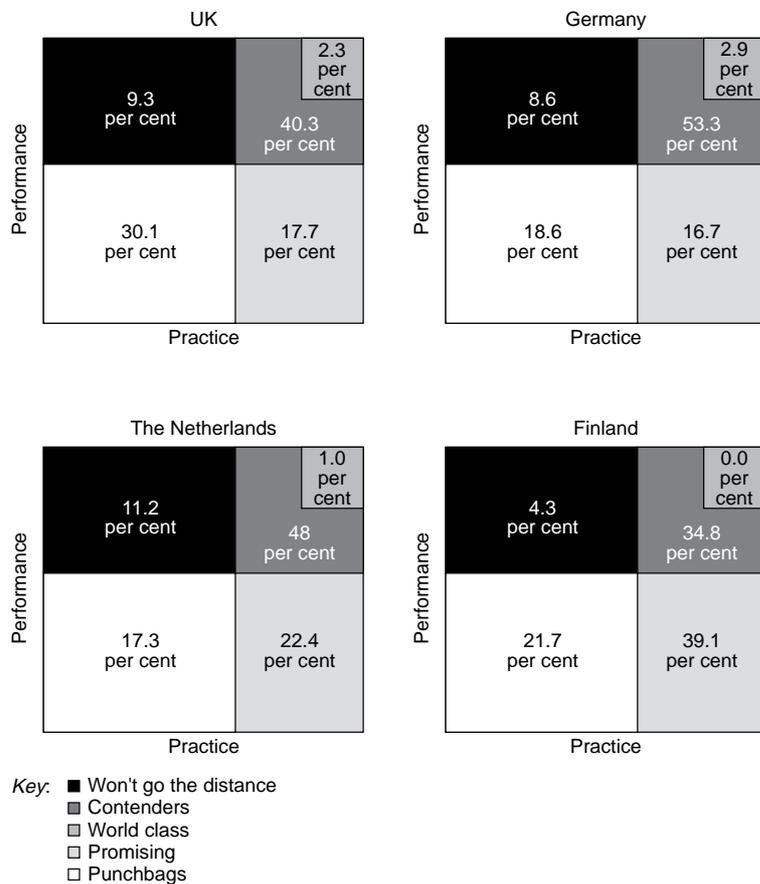


Figure 5.
European sites – who is fighting fit?

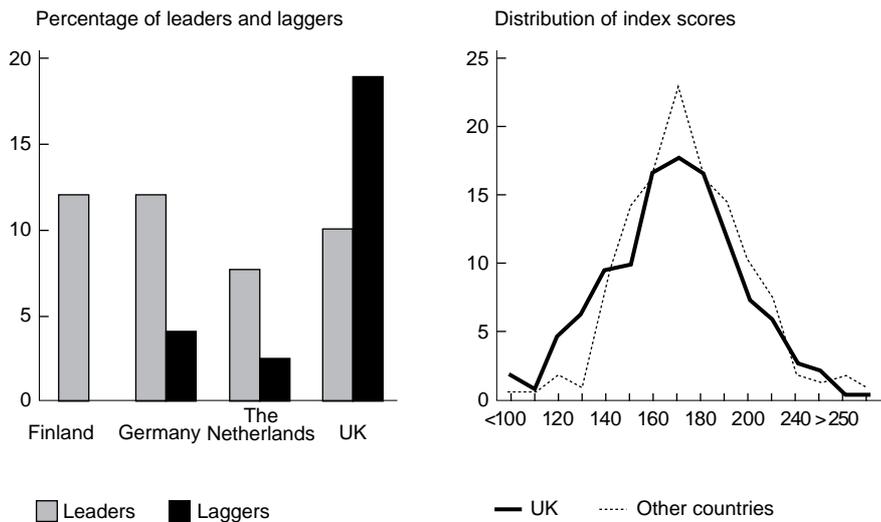
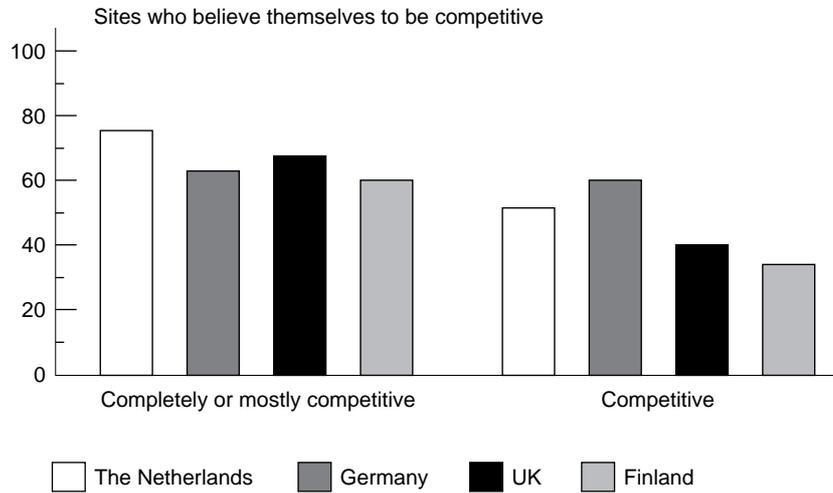


Figure 6.
UK tail of low performers

Figure 7.
To what extent do you consider yourself able to compete successfully with the best of your international competitors anywhere in the world?



the entire range of capabilities from punchbag to world class. This clearly points to the need for wide-scale use of benchmarking as a basis for objective comparison. The other observation that can be drawn is that those who have already achieved high levels of practice are the most realistic about their position, while at lower levels the perception gap is more marked (see Figure 8).

National traits?

By simply separating out those aspects of practice and performance that are more than 5 per cent different to the average it is possible to indicate areas of national strengths or weaknesses (Table II). In the UK, for example, the management of supplier relationships may well have benefited from the Japanese and US inward investment; the highest national promotion of ISO

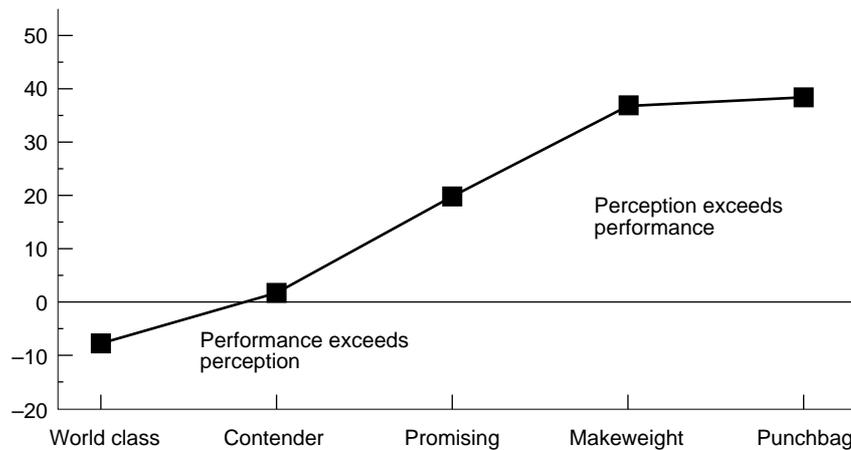


Figure 8.
Self-assessment versus reality

Country	More than 5 per cent above the average	More than 5 per cent below the average	Benchmarking best practice
Finland	Competitive cost Equipment layout Stockholding Information systems Preventive maintenance Market share Manufacturing strategy	Customer deliveries met Inventory turns Warranty claims Business score-card use Production cycle time Business process management Benchmarks	69
Germany	Benchmarks Automation Concurrent engineering Equipment layout Employee involvement	Product reliability in use Supplier relationships Business process management	
The Netherlands	Production cycle time Training Warranty claims Cash flow	Stockholding Order processing Manufacturing strategy Customer orientation Order release to make	
UK	Supplier relationships Business process management Product reliability	Benchmarks Equipment layout Automation	

Table II.
National strengths and weaknesses

9000 may be the reason that a more widespread understanding of the management of business processes, while a high commitment to excellence in service may be related to the apparent strength in product reliability in service.

Interestingly, the German strengths and weaknesses show an almost exact pattern of opposites to those in the UK. The German reputation for high-quality delivered products is not reflected in the views of manufacturing executives in this sample.

When asked about their business priorities the picture that emerges is one in which UK and Finnish sites are clearly customer-service focused, while German and Dutch sites are strongly product focused. In every country the availability of skilled manpower is seen as an inhibitor. Commitment to investing in people as a business strategy is, on the other hand, often a medium or low priority.

Supply chain effect

In the UK sample, one of the areas explored was the hypothesis that there would be differences between sites which are suppliers to different major purchasers (Figure 9).

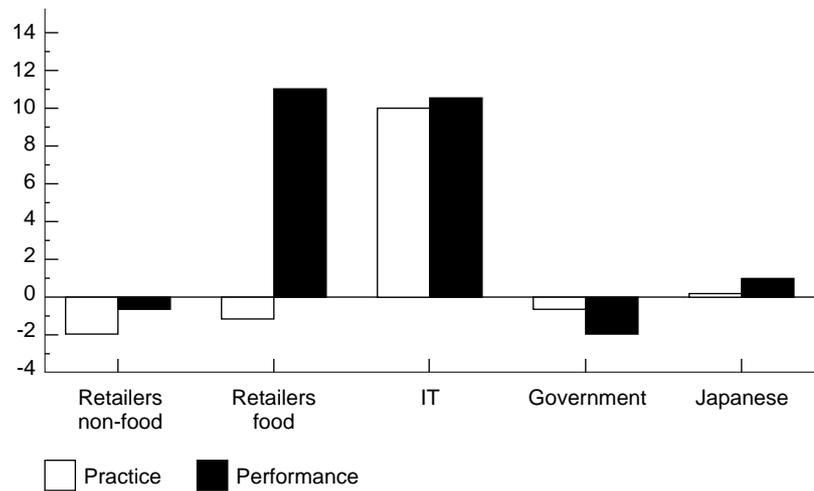


Figure 9.
Practice and performance indices for UK suppliers to large organizations

The typically US parent companies in the information technology industry which have been manufacturing in the UK for 20 years or more and have adopted very open partnership-sourcing strategies have spawned a set of suppliers which exhibit both practice and performance that is almost identical to their customers.

That this is not yet obvious in the sites supplying the UK Japanese inward investment sites is surely just a matter of time. It is salutary, however, to understand just how long these influences take to show.

The suppliers to the major and dominant retailers show high performance but not the same apparent adoption of enduring best practice. If the capability of the supplier is taken as the yardstick, it does appear that manufacturers can make better buyers than retailers. No wonder the retail sector shows such strong interest in partnership sourcing procurement strategies.

Suppliers to government departments sadly show little benefit from the experience. In an environment where purchasing must be administered on the basis of continued equal opportunity even across international boundaries, it is clearly impossible to achieve the benefits of long-term supply chain partnerships.

An optimum size of site?

The practice and performance of different sizes of European sites (Figure 10) shows an interesting pattern. Size is measured by the number of people employed on the site.

In the smallest sites, the need to establish company-wide processes to deliver best practice is typically unnecessary. It is increasing size that demands increasing process and procedures. As the sites increase above 50 employees the sample suggests they are increasingly likely to be adopting best practice. It

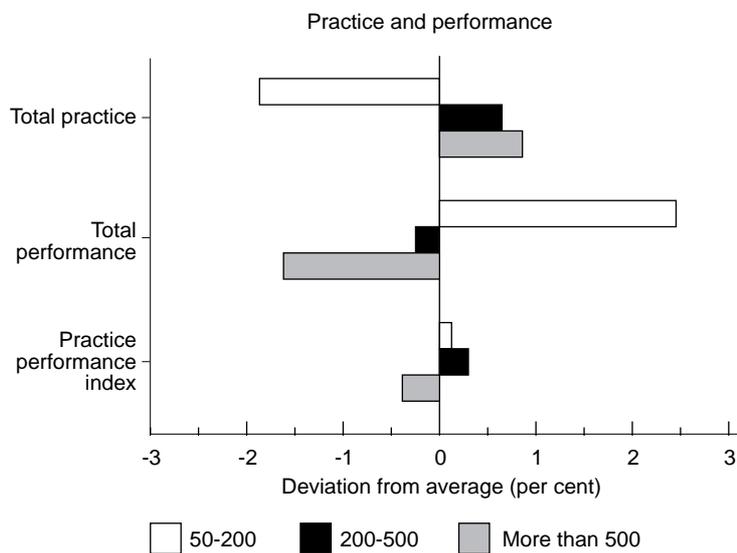


Figure 10.
Practice and performance indices for sites of different sizes

also, however, suggests that the relative benefits they are deriving decrease as the site gets bigger.

As manufacturing sites get bigger, so the numbers of management levels increases and so too does the independence of organizational functions and departments. All this represents an inertia to change and an internal friction that any attempt to implement best practice must first overcome.

In the sites where world-class best practice is something that executives have found for themselves with all the faith and passion that goes with such leadership, the effect is inevitably far stronger than in similar sites where progress is driven by corporate energy from above. This too appears to favour the smaller, often independent sites.

BS 5750 (ISO 9000) as a guide to quality practice

The promotion of ISO 9000 in the UK has been extensive and numbers of companies achieving accreditation run well ahead of the rest of Europe. Key to the hypotheses tested in the UK phase of “Made-in-Europe” was to understand what business benefit has been gained in manufacturing sites by this clear time advantage.

When sites were listed in sequence of their overall practice and performance index, the top 20 were grouped and described as “leaders” while the bottom 20 were similarly grouped and labelled as “laggers”. Using the quality performance index as the vertical axis and a knowledge of which sites had achieved ISO 9000 accreditation as the horizontal axis, it was possible to plot the leaders and laggards into the four quadrants shown in Figure 11.

The top 20 sites all show high quality performance and all but two have sought and achieved ISO 9000 accreditation. Among the 20 laggards, all but four

have low-quality performance. Of these 16 low-quality laggards, 11 have, nonetheless, achieved ISO 9000. It might then be concluded that ISO 9000 is perhaps necessary, but not sufficient, for quality performance.

Experience of those seeking to conform to ISO 9000 appears to include those for whom it has been a great voyage of discovery of the horizontal business processes that flow through the departments of the company and which deliver customer service. For others it appears to have been a less inspiring experience of documenting procedures for the first time. What is clear is that sites which have high-quality performance and strong customer locus have done far more than simply meet ISO 9000 standards.

Sector differences

It might be expected that world-class sites would be electronics factories in green-field sites with Japanese ownership and significant recent investment. In fact, world-class sites are found in every sector and with every nationality of ownership (Table III).

The idea that best practice can be learned from one sector by another has been often argued. There are many intrepid benchmarking teams that make a positive virtue out of unlikely and unexpected sources of process comparison. In this project we sought to explore options by listing the areas where sectors appear to have relative strengths and weaknesses (Table IV). As well as

Figure 11.
Quality performance
and BS 5750 (ISO 9000)
for UK leaders and
laggers

Quality performance	High	2	18	Leaders
		3	1	
Low	High	5	11	Laggers
		Without	With	B5 5750

Table III.
World-class
manufacturers are found
in every sector

Chemicals	2
Electronics	1
Instruments	1
Machinery	4
Metal products	1
Plastics	2
Textiles	2
Food	1

Sector	Relative strengths	Relative weaknesses	Benchmark sector?	Benchmarking best practice
Chemical	Training Product reliability Deliveries met	Cycle time Stockholding Design process	Textiles	73
Electrical	Preventative maintenance Information systems Equipment changeover	Deliveries met New product yield Cycle times	Food and drink	
Food and drink	Cycle times Inventory turns Deliveries met	Batch sizes Business process management Preventive maintenance	Electrical	
Instrumentation	Equipment layout Stock holding Business process management	Order processing Warranty claims New product yield	Rubber and plastics	
Mechanical	Stock holding Batch size Information systems	Warranty claims Product reliability Order processing	Paper and wood	
Metals	New product yield Product reliability Order processing	Priority orders Cycle time Training	Chemical	
Paper and wood	Order processing Supplier lead times Customer deliveries	Scrap/rework Defects Batch sizes	Mechanical	
Rubber and plastics	Warranty claims Order processing Priority orders	Cycle times Stock holding Scrap and rework	Aero/auto	
Textiles	Customer orientation Order processing New product yield	Defects Equipment layout Business process management	Instrumentation	
Aero/auto	Stock holding <i>Kanban</i> Supplier relationships	Cycle times Housekeeping Equipment changeover	Textiles	

Table IV.
Relative strengths and weaknesses by sector

confirming the potential benefits for electronics sites to benchmark against food companies for example (not uncommon in practice), the table suggests some rather less obvious places for benchmarking exploration.

A long-term programme

What has been achieved so far is to show that the technique of best practice benchmarking can offer a significant insight into the workings of an individual

site as well as the competitiveness of national manufacturing capabilities. The use of this particular benchmarking tool as a diagnostic basis for process re-engineering is well underway in a number of client sites.

The goal of achieving and maintaining world class manufacturing capability is, of course, a continuously moving target. We must be prepared to examine every element of our model of best practice to ensure it reflects the true state of the art. The winners will be those who can stay ahead of our model. Already there are aspects of total preventive management and the manufacture of varieties (mass customization) that must be reflected into future versions of the best practice model.

For those who have already participated in this particular programme there is a stake in the ground against which to test their rate of improvement and, indeed, it is hoped they will have been able to identify the business processes they should systematically examine and benchmark against the best they can find.

Finally, no amount of benchmarking alone will improve any business. It is the vision, energy and teamwork of the entire organization that will deliver the improvement. Good luck!

References

1. Hanson, P. and Voss, C., *Made in Britain – The True State of British Manufacturing Industry*, IBM/London Business School, 1993.
2. Hanson, P., Blackman, K. and Voss, C., *Made in Europe – A Four Nations Best Practice Study*, IBM/London Business School, 1994.