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**SWP 43/92    BENCHMARKING FOR STRATEGIC  
MANUFACTURING MANAGEMENT**

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# BENCHMARKING FOR STRATEGIC MANUFACTURING MANAGEMENT

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## ABSTRACT

Benchmarking to improve strategic manufacturing management seems to be a logical extension to benchmarking to improve operating system performance. This assumption is however untested. The research objective for this study was to learn how to benchmark the strategic management process. The experiences of a consortium of non-competing firms struggling with the problems of benchmarking implementation constitute the base data for this research.

The study has found that inappropriate choices of key manufacturing performance indicators were made by 50% of the business units studied and this is because of poor strategic vision for manufacturing operations. Also evidence was found to show that 70% of the firms studied needed a better understanding of their own processes before they could benefit from benchmarking other organizations.

## INTRODUCTION

A student of business management, without any previous practical experience, may quite confidently assume that the designation of key performance indicator is attributed to only those performance measures that are critical to creating or maintaining a competitive advantage. In practice, however, the selection of some manufacturing performance measures may not be as clinically determined as logic would lead us to believe. This research has found that some key manufacturing performance indicators can become permanent fixtures within the organization of a business and continue to be used without an adequate questioning of their appropriateness. To adopt such an indifferent approach to managing the measurement of performance can be justified but only when the current manufacturing strategy is the same as that pursued when these measures of performance were originally installed.

The measures of performance that are universally used are those that record the sources and uses of finance. Such financial figures are usually treated as the foundation for performance measurement. Often the effort devoted to the short-term improvement of financial performance substantially exceeds that given to the improvement of measures of performance that are non-financial.

Performance reporting is undeniably needed to guide business decisions towards the achievement of the strategic plan for either the company or for one of its functions. To be the lowest cost producer requires a continuous monitoring of costs and an unending campaign to reduce them.

For this reason, the selection of the performance measures to be used is critical to successful business management. The selection of the key performance indicators to be used also has a profound effect upon organizational behaviour. The reporting process will prompt line management to pay particular attention to improving the performance of those activities that are being closely monitored by senior management.

Performance measures are therefore instruments designed to trigger the management of change. Obviously, the management of change is a capability required by all businesses. But it is the rate at which changes are implemented and the degree to which they improve competitiveness that determines which companies will be the winners in the race to market dominance.

A brake on this rate of change is a reluctance to discard established and proven methods of operation. The dichotomous problem for management is an inclination to adhere to the proven and a realization that world class manufacturing is only accomplished by the development of a corporate culture that values innovation and adopts the philosophy of continuous improvement. How can the senior management of a manufacturing business find the right catalyst for the development of a corporate culture that is motivated to transform its operations to better those that are recognized to be world class?

An in vogue solution to this problem is to adopt benchmarking as the means of demonstrating both the need to improve operating performance and how it can be accomplished. The concept of studying and then implementing best practice, identified by using selected key performance indicators to compare one company's achievements with those of others, is a plausible one but also one that is fraught with difficulties.

The purpose of this paper is to present a recommended methodology for the use of benchmarking to improve manufacturing competitiveness. The methodology proposed derives from the findings of a twelve month study of benchmarking in practice. The research has been carried out in collaboration with the twenty companies that are members of the Cranfield Benchmarking Consortium.

## THE STRATEGIC MANAGEMENT OF MANUFACTURING

The goal of most manufacturing businesses is to establish and maintain a competitive advantage. This enables a firm to generate the profits needed to finance its growth to market dominance. A competitive advantage can be gained by either improving product performance or manufacturing performance. The attractiveness of establishing a competitive advantage through manufacturing performance is that it is more difficult to emulate. It is, however, not easy to establish. Severence and Passino [1] suggest that to accomplish a change to manufacturing competitiveness, the following are required:

1. A clear management vision
2. Organizational flexibility
3. An integrated plan

It is first necessary for the senior management of a manufacturing business, searching for the means to establish a sustainable competitive advantage, to have a clear vision of the

preferred generic competitive strategy for the company. To implement this chosen strategy, the management must also have a clear vision of the type of manufacturing strategy needed to deliver the quality of service expected by the customer and desired by the company. This latter vision is necessary to ensure a consistency of strategic purpose within the firm. The imperative to design functional strategies to be compatible with the chosen competitive strategy is well understood but can be poorly practised.

In a recent study of the strategic management of manufacturing operations in the United Kingdom, Sweeney[2] found, in ten of the twelve firms studied, that there was an inconsistency between the marketing and the manufacturing managements' visions of how the corporate objectives of the business could be accomplished. From interviews carried out with senior manufacturing management, to ascertain the current manufacturing capabilities of each firm and the changes to these current capabilities that were planned in the future, it was clear that little thought had been given to the creation of a strategic vision for future manufacturing operations. Senior manufacturing management did claim to have a strategic vision for the function. This was to be a continuation of the low cost manufacturing philosophy that had been their traditional approach. However, in most of the firms studied this manufacturing strategy was not entirely in accord with the agreed marketing strategy. This had been changed to require not only low cost manufacture but also the provision of other forms of improved customer service, for example a reduced customer delivery lead time.

Although the most senior management of these firms had agreed a change of competitive strategy, neither the manufacturing process design nor any of the key performance indicators used to manage the production function had been changed in any way. As a consequence, the most senior management of these firms thought that the manufacturing function was underperforming.

A possible cause of the difficulties that some senior manufacturing management have with creating a vision for the strategic management of their operations is the limitations of current theory on this subject. Most books on the management of manufacturing strategy explain the management of specific types of manufacturing resource, for example, the management of manufacturing capacity or technology. The missing conceptual link is a framework that can be used to help the creation of a vision that links competitive strategy and manufacturing strategy.

Recent research by Roth and Miller [3], Stobaugh and Telesio [4], Hayes and Wheelwright [5] and De Meyer [6], claim that a set of similar manufacturing strategies are used by production businesses of all types and they have also suggested a taxonomy for these generic manufacturing strategies. These research findings have been used by Sweeney [7] to propose a strategic manufacturing management framework that links customer service strategies to these types of generic manufacturing strategy. This framework is shown in figure 1 below.

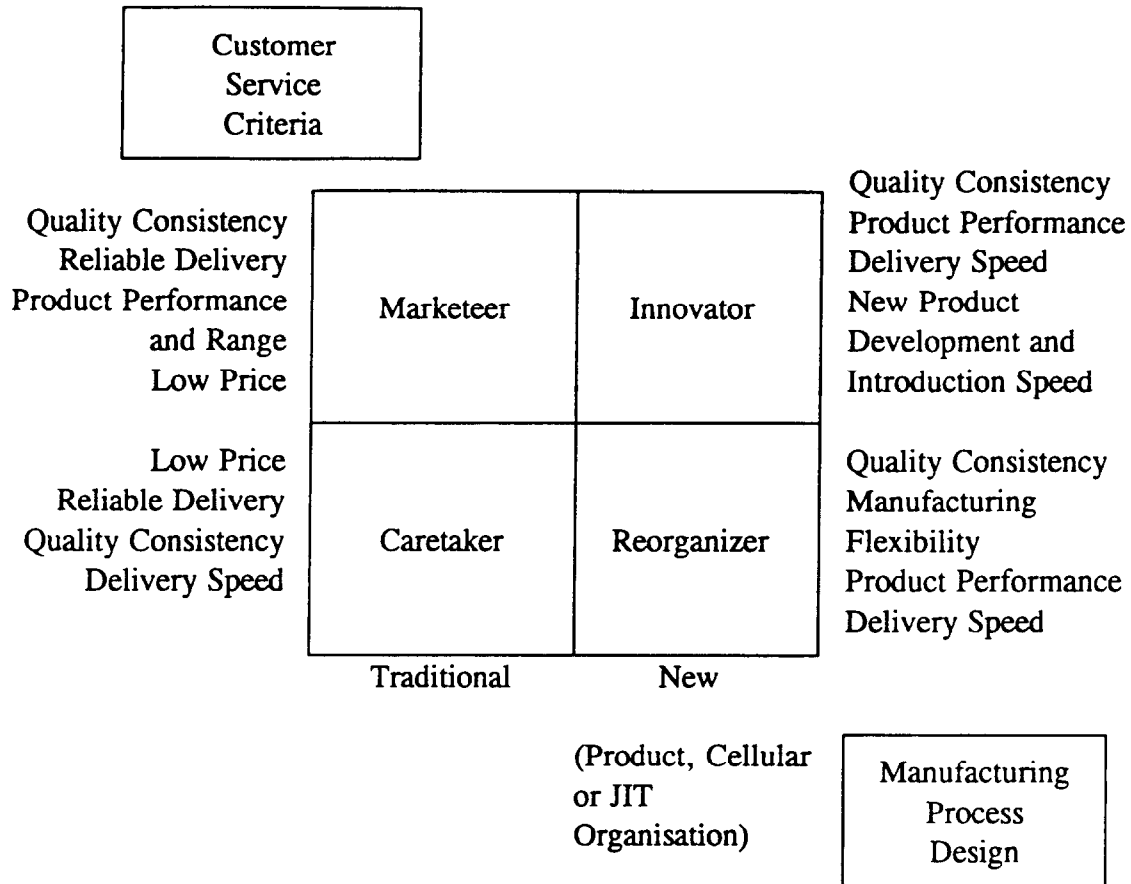


Figure 1 The Relationship between Generic Manufacturing Strategy Types and Competitive Strategy

To show how this framework can help create a clear management vision on what actions are necessary to improve manufacturing competitiveness, each of the generic manufacturing strategies is briefly explained. For a more detailed explanation, refer to Sweeney [8].

The caretaker manufacturing strategy is implemented by a manufacturing management team when it considers its role is to only oversee the production of a quality product and achieve increased efficiency and lower costs. This strategy is the type usually adopted by high volume continuous flow production businesses. The key performance indicators for the management of this type of manufacturing strategy usually include the volume of quality product produced, yield, direct and indirect labour costs and ex stock delivery performance.

The marketeer manufacturing strategy is one that is similar to the caretaker strategy and in most instances its implementation has evolved from it. Its name explains how it has evolved. The needs of customers draw the manufacturer into expanding its range of products on offer, usually without any modification to how the production flows through the factory. This is obviously acceptable when a company uses continuous processing production facilities but, perhaps, less sensible for discrete product manufacture. The adoption of this type of generic manufacturing strategy brings with it the problem of managing increased complexity, more product types to schedule and control using an unchanged organization of production resources. The usual solution found to deal with this

problem is to change the manufacturing system infrastructure. For example, the introduction of a materials requirements planning system or a total quality management system. The key performance indicators for the management of this type of generic manufacturing strategy usually include delivered quality and the yields of processes (often measured by statistical process control (SPC)), delivery performance, production output (measured in terms of planned production units), inventory investment, direct and indirect labour costs.

The reorganizer manufacturing strategy is often perceived to be a higher risk strategy to implement than the caretaker or the marketeer strategies. This is because its implementation may necessitate changes to methods traditionally used to manage individual elements of the total supply chain and therefore, the abandonment of some long established customs and practices. The strategy is designed to reduce the major constraints to manufacturing flexibility. It is most suitable for a company that is seeking to increase the competitiveness of the speed of delivery to the customer of its make to order products.

This strategy has recently been adopted by some discrete product manufacturers to overcome the problem of managing the increased complexity created by both broadening their product ranges and, at the same time, reducing the customer delivery lead time without recourse to holding larger stocks. It has also been implemented by some least cost manufacturers that produce a standard product in high volume and then customize or package the product as a last value adding operation. The reorganizer strategy is often adopted to simplify the management of this final operation. The key performance indicators used for the management of this strategy are the cost of quality (pence per standard hour), percentage achievement of the production schedule, unit cost of production, set up time reduction achievements, manufacturing lead time reduction, order backlog size and inventory investment.

Implementing the innovator manufacturing strategy entails more than just a re-examination of manufacturing policies. As its name implies, this strategy is designed to support a competitive strategy that uses product innovation to establish a competitive advantage. The success of this strategy is dependent upon the frequency and the quality of product innovations. To introduce new products to the market is an expensive process because of the costs of the resources needed. For this strategy to be implemented profitably requires the collaboration of design, development and production personnel. Only through such a teamworking approach can the elapsed time to design, to development and to learn how to make a quality product be minimised. To increase the productivity of these expensive engineering resources also requires technological investments such as computer aided design and manufacturing systems. It is these forms of infrastructural change that a manufacturing organization will make when it has elected to adopt the innovator manufacturing strategy.

The innovator manufacturing strategy is usually adopted by companies that are competing in mature markets against competitors that have been using quality, price and speed of service as their competitive weapons for some time. (That is they are implementing a reorganizer manufacturing strategy). Time-based competition is seen by these firms to be a new means of gaining a competitive advantage. To succeed with the adoption of this strategy requires flexible working practices in all the engineering functions, an objective that is not easy to attain. Time-based competitiveness for both the development of new products and to respond to customer demand obviously requires a

different set of key performance indicators to manage its realization. The key performance indicators used for the management of this strategy are elapsed time to bring a new product to market, total costs of engineering design changes and total labour and material costs of new product development (needed to subsequently calculate the return on that investment). The use of these key performance indicators will be in addition to those needed to manage the implementation of the reorganizer manufacturing strategy, which have been defined previously.

Figure 2 shows the range of generic competitive strategies for a business (excluding focus). It also shows the generic manufacturing strategy type that will establish the production capabilities needed to fulfil each generic competitive strategy. To demonstrate how this model can help the creation of a vision for a manufacturing company, there is superimposed on figure 2 a plan for the progressive development of a strategic role for the manufacturing operations of an engineering business. It has been assumed that the firm is currently uncompetitive because it is unsuccessfully implementing a marketeer strategy, it has expanded its product range without trying to simplify the organization of its production resources.

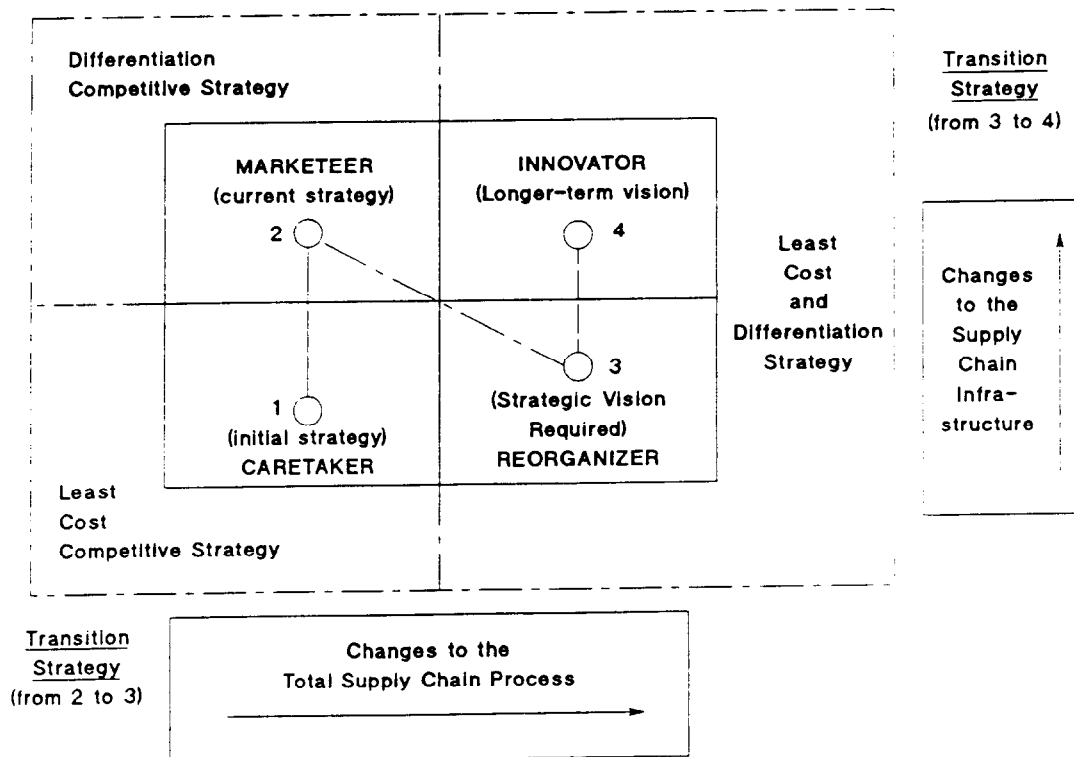


Figure 2  
Strategic Operations Management

The purpose of this overview of the four generic manufacturing strategies and the set of key performance indicators used with each strategy type is to stress the importance of choosing measures of performance that will steer the organization of the production resources towards the desired combination of manufacturing capabilities.

## BENCHMARKING FOR SUPERIOR PERFORMANCE

The Japanese word "dantotsu" means striving to be the best of the best. It captures the essence of benchmarking, which is a proactive process of changing operations in a structured way to achieve superior performance. Camp [9] has recommended a benchmarking methodology and explained how the benchmarking of the warehouse operations of L. L. Bean helped Xerox to substantially improve the performance of its logistics operations.

In principle it is a simple concept to accept and it would appear to be an easy one to implement. However, there is very little published research on the learning required to use benchmarking successfully. It may be assumed that there are very few problems to overcome because many businesses have used internal financial benchmarking for strategic management purposes for some considerable time. But the benchmarking of processes is a different task to comparing equivalent standard financial ratios. A number of papers have been published that describe the value of benchmarking for improved strategic planning [10], to increase shareholder value [11] and for better cost management [12]. These papers illustrate the diversity of the activities that have been benchmarked. It is therefore not surprising that benchmarking has captured the attention of the management of many UK manufacturing businesses struggling to cope with both national and international competition.

The current considerable interest in benchmarking has catalysed the creation of a benchmarking consortium of non-competing organizations. The objective of the Consortium is to facilitate functional benchmarking. (For an explanation of the four types of benchmarking refer to Camp [13]). The first activity selected for benchmarking was manufacturing performance.

Although Camp has recommended a ten step benchmarking process, the membership of the Cranfield Benchmarking Consortium agreed to adopt a similar procedure but one developed by the Corning Company. This benchmarking procedure is shown in Figure 3.



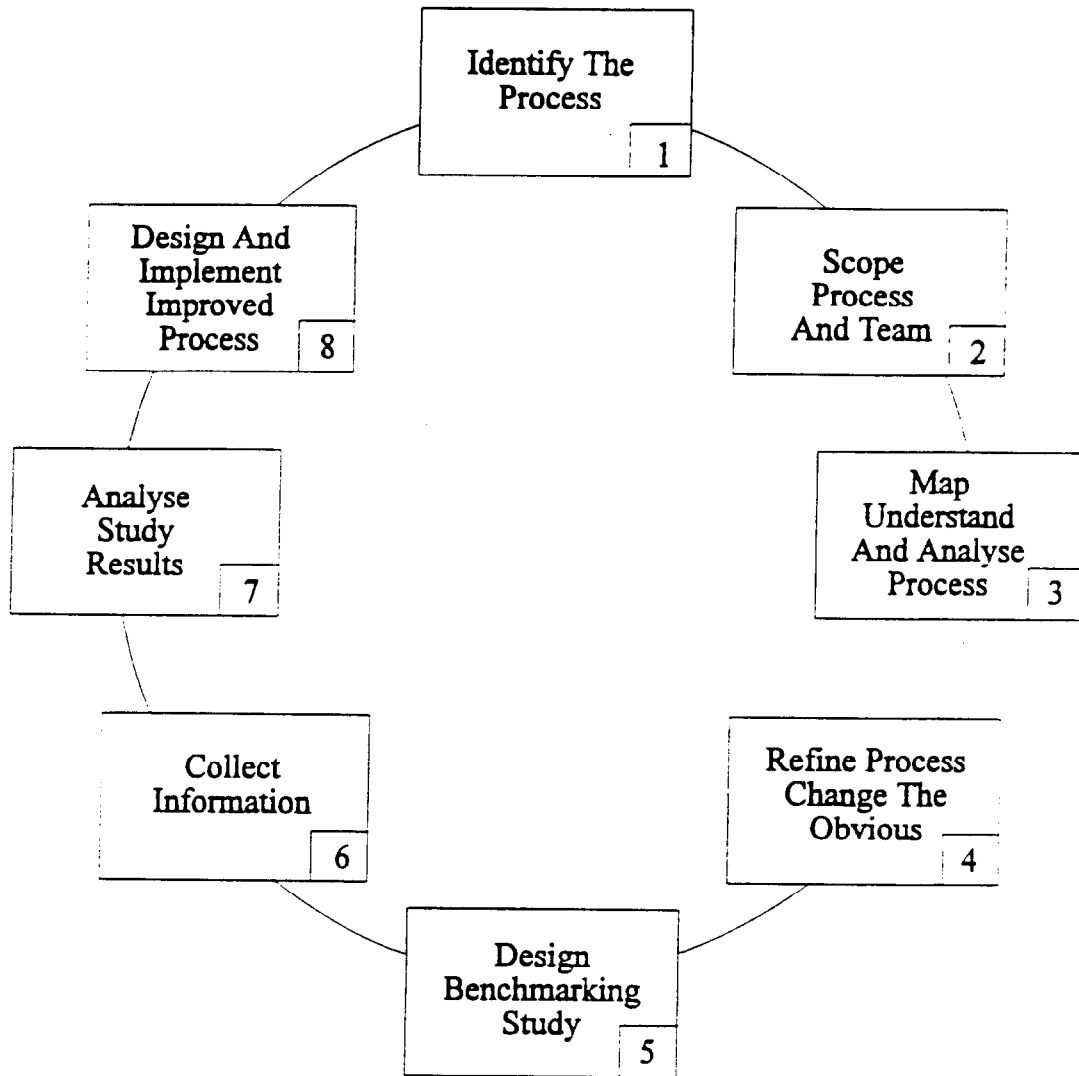


Figure 3  
The Corning Wheel

The knowledge and expertise required to apply benchmarking for strategic manufacturing management is shown in Figure 4. The primary purpose of this model is to illustrate the relationship between the benchmarking activity and the competitive and functional strategies of the business. The selection of the process to benchmark should be based upon a thorough understanding of the competitive strategy of the firm and, Walleck et al. [14] believe, an understanding of both the current and prospective role of the company in the supply chain.

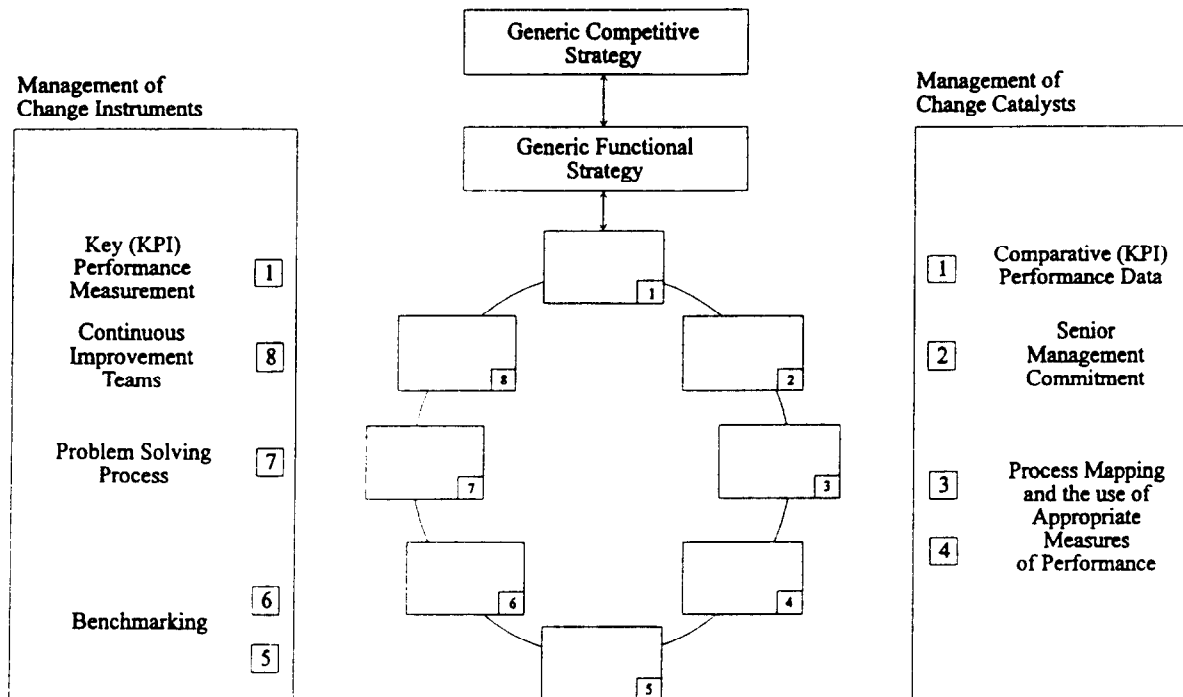


Figure 4  
Benchmarking for Strategic Functional Management

The choice of key performance indicators to be used for benchmarking purposes must be based upon how well they measure customer satisfaction or how well the information generated by their use will facilitate the achievement of customer satisfaction. This study of benchmarking for strategic manufacturing management has found evidence to show that although the senior management of some firms believe that their businesses use sufficient measures of performance to manage their manufacturing operations effectively, many still lack the appropriate measures of performance to develop superior performance.

## BENCHMARKING RESEARCH METHODOLOGY AND FINDINGS

The first problem that the newly constituted benchmarking consortium had to resolve was the selection of the functional processes to benchmark. The procedure used to determine priorities for the exchange of benchmarking data was to first list the processes that the member firms judged to need immediate attention. A total of fourteen activities were proposed and then each firm ranked these in order of priority. The aggregated priorities were then used to determine the five activities with the highest consensus of need.

It was now necessary to identify which member firms had developed the "best" practice for the management of the five priority activities. How to assess what was "best" practice was also not clear except by the use of performance data. To isolate the firm with the "best" practice in the Consortium, another survey was carried out to determine the degree of uniformity of the performance measures used for the management of the five

priority activities. This was considered to be necessary to enable comparisons of performance to be made.

One of the highest priority activities selected for benchmarking was the strategic management of manufacturing operations. The survey carried out to investigate the manufacturing performance measures used by the Consortium membership produced two interesting findings. First, the high number of standard financial measures used and the general recognition that these were for cost control only and, therefore, of limited value for strategic manufacturing management. Secondly, the limited number of non-financial measures used by the member firms to manage their manufacturing operations.

The number and the kind of financial measures of performance used by the surveyed firms made it very difficult to determine the type of generic manufacturing strategy that each firm was striving to implement. At the meeting that followed the survey of manufacturing performance measures, the representatives of the member firms were asked to specify the competitive strategy for each of their company's strategic business units. With this information, the measures of performance used could be compared with those needed to develop the capability of production to support the competitive strategy of each business unit. The findings of this enquiry are shown in Figure 5.

<div>Marketeer</div> <div>Company A - Seals SBU Company B - Food Products</div>	<div>Innovator</div> <div>Company E - Customisation SBU Company C - Video Systems SBU Company A - Gas Seals SBU Company F - Commercial Vehicles</div>
<div>Caretaker</div> <div>Company A - Automotive SBU Company C - Telephony SBU Company D - Aluminium Company E - Commodities SBU</div>	<div>Reorganizer</div> <div>Company G - Tools Company H - Reg. Aircraft Company J - Aircraft Components Company K - Military Company L - Engines Company M - Trucks Company E - Complex SBU Company C - Telecoms SBU</div>

Figure 5  
Manufacturing Strategies Used

This analysis provided the classification required to group organizations with both the same process technology and the same manufacturing objectives. These two operating characteristics are considered to be the qualifiers for an exchange of comparable

manufacturing performance data. The key performance indicators stated to be used by the strategic business units that claimed to be implementing the caretaker and marketeer strategies were comparable with those previously recommended. However, only three of the twelve strategic business units claiming to be implementing the reorganizer and innovator manufacturing strategies were using the measures of performance recommended for the implementation of these strategies. All of these business units used the relevant financial key performance indicators but only three used some of the recommended non-financial ones. The use of these non-financial measures is essential to draw the attention of senior management to the current state of the firm's quality of customer service, the hallmark of the successful implementation of these strategies. It was therefore impractical to benchmark the implementation of these manufacturing strategies until changes to their methods of performance measurement had been made.

An alternative method of identifying "best" practice was tried. This was to organize overview benchmarking seminars. At these seminars functional managers made presentations to their counterparts on how a specific activity was managed in their firms. The objective of each presentation was to identify whether a benchmarking visit to the presenting firm would be worthwhile. The value of attending the three seminars organized for the Consortium membership was also researched by questionnaire. This research has also shown that many of the organizations in the Consortium are not fully organized to benchmark or be benchmarked for performance improvement. Figure 6 shows the reasons for drawing this conclusion.

Seminar Topic	Process Mapping Exists		Process Mapping Necessary		Follow Up Benchmarking Visit	
	Yes	No	Yes	No	Yes	No
Employee Satisfaction Management	3	9	12	0	5	7
Customer Satisfaction Management	3	5	8	0	6	2
Training And Management Development Evaluation	3	6	8	1	1	8

Figure 6  
Benchmarking Seminar Questionnaire Results

Figure 6 shows how very few of the firms attending the seminars have prepared process maps of the activities that were the seminar topic. This finding may not be representative of other simpler or more easily quantified processes and further research will be required before a general conclusion can be drawn on this issue. However, all seminar attendees but one agreed that a process map is essential to understand both another organization's process and their own.

One measure used to assess the value of each seminar to the attendees was the number of follow up benchmarking visits planned to be made. The questionnaire findings show only one seminar was considered to have been of sufficient value to warrant follow up visits by a large percentage of the seminar attendees. The significant difference between the presentations made at this seminar to those made at the others was the extent that one presenting organization had developed its process to what some considered to be a much "better" practice although it was not considered to be "best" practice.

## CONCLUSIONS AND RECOMMENDATIONS

The original purpose of this research was to examine how benchmarking could contribute to facilitating the strategic management of manufacturing operations. As Figures 3 and 4 show, before benchmarking can be performed it is essential for those planning to undertake a benchmarking study to have first, a very clear understanding of how the functional strategy supports the competitive strategy of the business and secondly, a process map that specifies the performance measures used with data on actual performance.

The findings of this study have shown that, before benchmarking can be used for the strategic management of manufacturing operations, some organizations in the United Kingdom will need to re-examine the fit between the manufacturing capabilities needed to support their competitive strategies and the performance measures used to accomplish the desired changes. There is a visionary gap between what can be accomplished using the traditional financial measures of performance and the performance measures needed implement the reorganizer and innovator manufacturing strategies.

The study has also shown that many firms have not produced process maps for their activities. These are absolutely essential before benchmarking can begin because comparisons of process design and management methods cannot be rigorously made without them. For this reason the Cranfield Benchmarking Consortium has decided that the benchmark for qualifying to begin the exchange of performance information is to have reached step 5 on the Corning Wheel (see Figure 3). This preparation process is the unexciting aspect of benchmarking but, as with decorating, it is the quality of the preparation that produces the ultimate quality of the results. Many organizations have found that preparing a process map improves process understanding and some operating problems become immediately apparent. This is shown as step 4 on the Corning Wheel (see Figure 3).

The survey data on the value of the benchmarking seminar on customer satisfaction management (see Figure 6) shows that the exchange of information about "better" practice, even if it is not claimed to be the "best", can be a positive stimulus for change. The payback for the investment of time and effort spent on benchmarking still needs to be researched. Research on this issue is planned to be carried out with the collaboration of the membership of the Cranfield Benchmarking Consortium during the next two years.

Further research on learning how to benchmark to improve manufacturing competitiveness is also planned.

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