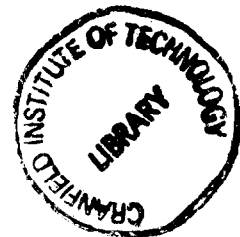




**SWP 36/92 STRATEGIC MANUFACTURING MANAGEMENT:
RESTRUCTURING WASTEFUL PRODUCTION
TO WORLD CLASS**

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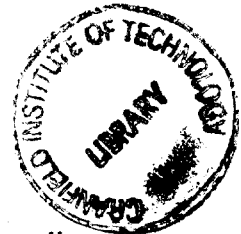


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STRATEGIC MANUFACTURING MANAGEMENT:
RESTRUCTURING WASTEFUL PRODUCTION TO WORLD CLASS

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Abstract

The strategic management of manufacturing requires a more comprehensive paradigm than just the current generally accepted one. This is to seek to ensure that the manufacturing capabilities of the firm are compatible with the order winning criteria of the target market.

The inability of many UK companies to be world class competitors suggests that managing manufacturing strategically continues to be practised ineffectually. How can the complexity of this task be reduced?

The purpose of this article is to describe a methodology which has been found to facilitate strategic manufacturing management. A model has been developed that links the critical manufacturing performance improvements required to sustain each of the generic competitive strategies that may be pursued. The model is designed to help create a vision for the manufacturing operations of a business which is essential for its strategic management. How the use of the model can simplify strategic manufacturing management in practice is illustrated by describing a case study of how a wasteful manufacturing operation was transformed into one that gained a cost and time-based competitive advantage.

The paper is the result of research carried out in twelve UK manufacturing companies during the last three years.

Strategic Manufacturing Management: Restructuring Wasteful Production to World Class

Introduction

How can UK manufacturing companies outperform international competitors when the odds are so heavily stacked against them? The odds often quoted are the inadequacy of the investments made in the past, the adversarial attitudes of both management and labour, the short-term expectations of the investors, and many others.

The question is not a rhetorical one. The success of the many foreign - owned manufacturing businesses based in the United Kingdom demonstrates unequivocally that these barriers to achieving world class competitiveness can be overcome. Increased competition necessitates a comprehensive understanding of the customers' needs, a capability to respond quickly to a change of demand and the expertise to counteract any strategic moves made by competitors. However, it seems that the senior management of competitor manufacturing businesses have a better understanding of how to manage their competitive strategy than their UK counterparts. The gradual decline of many long-established UK manufacturing businesses is, in part, evidence for making such a claim.

The objective of this article is to describe a methodology to facilitate the strategic management of the manufacturing operations. The performance of this function is often claimed to be a major cause of an organization's inability to increase its competitiveness. The methodology described is the product of a study of twelve manufacturing businesses in the UK which had to change to survive. The purpose of this study was to develop a procedure to simplify the process of strategic manufacturing management.

Research Objectives

Twelve companies collaborated with this research and the sample of firms included both those that manufacture using the time-honoured method of large batch production, i.e. with high levels of inventory in process, and those that use lean production methods.

There were two research objectives for the study.

1. To seek common cause and effect reasons for the poor strategic management of manufacturing.

2. To develop a conceptual model for the strategic management of manufacturing. The purpose of the model is to present the alternatives to a manufacturing strategy that primarily furthers the cause of cost-based competition, i.e. one that supports a least cost competitive strategy. The model therefore must illustrate how a firm's manufacturing resources are to be deployed and used to enable the successful achievement of other generic competitive strategies. It must also illustrate how a change of competitive strategy can be successfully accomplished.

Research Methodology

The study of strategic manufacturing management in each firm consisted of an audit of manufacturing performance and an investigation of the performance measures used by general and manufacturing management to control their business. Interviews were carried out to research each manager's understanding of the competitive strategy that each company had chosen to adopt and to obtain the interviewee's description of the manufacturing strategy being implemented to actualize the desired competitive advantage. The interview was also used to examine each manager's perception of his or her role as an implementor of the company's manufacturing strategy.

Preliminary Observations

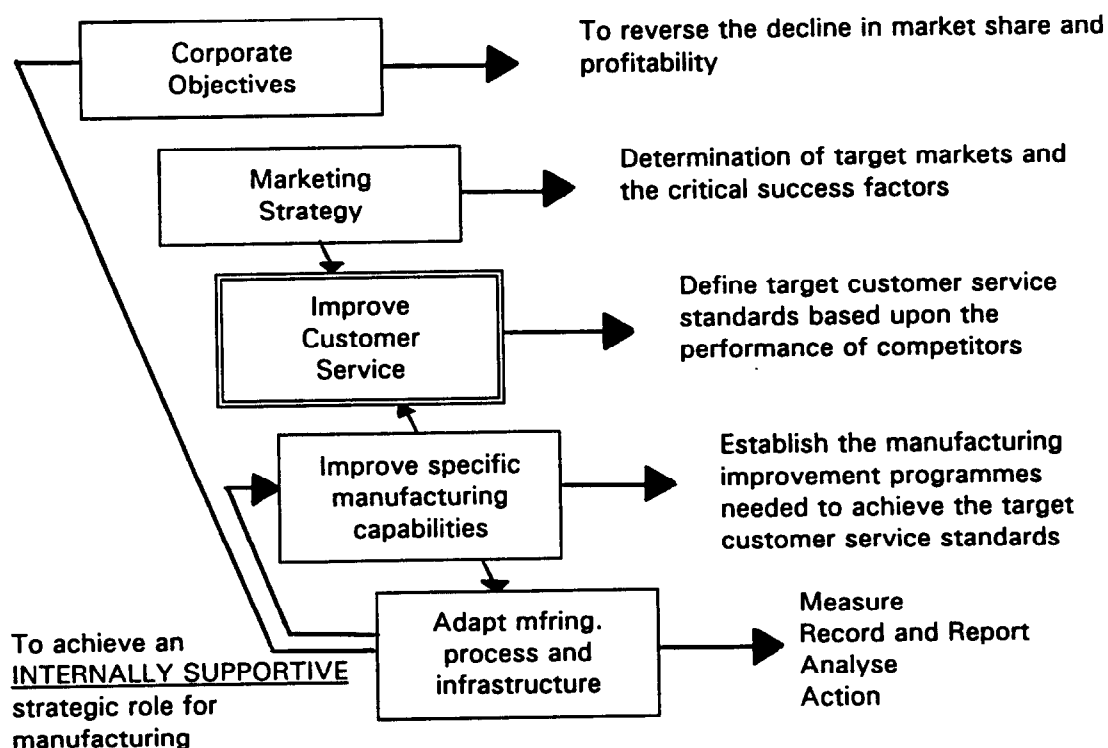
The study has shown that, in 10 of the 12 businesses studied, very little improvement to customer service had previously been accomplished. Delivery performance, on customer delivery lead times that were stated to be too long, was still below that desired by senior management. The full costs of inadequate quality management were unknown but the businesses knew that they were paying a high price for deficient process management. All companies have suffered, for some considerable time, the consequences of manufacturing inflexibility and yet continue to ignore this problem. One explanation for these findings was that the firms' Senior Management had paid insufficient attention to the strategic management of manufacturing. The evidence for this conclusion was the continuous implementation of a manufacturing strategy designed principally to minimise unit cost even though the competitive strategy of these firms had significantly changed. This lack of strategic vision by the firms' senior manufacturing management reinforced the perception of their middle management that their corporate role was to be the champions of cost minimisation policies. As a consequence, attention to key performance indicators that reduced unit cost took precedence over other strategic measures of performance. The need to introduce key performance indicators compatible with the changes to competitive strategy was not fully understood. Production managers were therefore not aware of the need to evaluate the impact of their decisions in any other way than by cost.

The most common problem resulting from this flawed method of strategic manufacturing management was the inability to be both flexible to customers' needs and quick in response to their demand. This was a common strategic objective of all the firms studied. How these manufacturing capabilities can be established is the subject of this article.

A theoretical approach to strategic manufacturing management.

A management theory that is referred to in most published books and articles on the strategic management of manufacturing is the need for the manufacturing strategy of a business to be compatible with the firm's competitive strategy. The competitive strategy is a statement of intent. It defines how a firm intends to outperform its competitors. The target customers' needs determine the manufacturing capabilities that the firm must possess in order to offer a competitive customer service. How these capabilities are established is usually through a series of action programmes designed to improve the performance of specific processes within the firm's manufacturing system. Alternatively, a change to the infrastructure may be required to satisfy a specified standard of customer service [1],[2],[3],[4],[5],[6]. The firm's choice of its key manufacturing capabilities determines its strategy for gaining a competitive edge [7]. This process is shown in Figure 1.

Figure 1. Determining a manufacturing strategy:



This approach to designing a manufacturing strategy has been well understood for some time but what is difficult to explain is the inability of many organisations to put this approach into practice.

One explanation may be a lack of a more detailed conceptual framework for the strategic management of manufacturing operations. The purpose of such a framework would be to provide a connection between each type of generic competitive strategy and the appropriate combination of manufacturing capabilities that would be needed to pursue it. The model must also indicate how a change of competitive strategy can be accomplished by an appropriate change to the manufacturing resources of the firm. With a conceptual model of this type, the complexity of determining a strategic plan for manufacturing could be simplified. The purpose of such a model is to help reduce the complexity of choice. The scope of its use is therefore limited by its simplicity. Consequently the model is intended only as a basic framework.

It is however essential that the selected combinations of manufacturing capabilities, used in the paradigm, are representative of generic manufacturing strategies. This is to ensure that the model is appropriate for general use and not just pertinent to the strategic management of manufacturing in a specific company or industry.

The choice of names given to the generic manufacturing strategies could also simplify the process of understanding their strategic objectives. For example, a caretaker strategy could be used to describe a manufacturing management philosophy that attempts to ensure that all production resources are carefully managed on behalf of their owners. The objective of this style of management is to maximise capital or labour utilisation and prevent an escalation of costs. The name reflects a particular type of management philosophy and it also communicates, albeit to a limited degree, a vision of how the resources of the manufacturing unit will be utilised. Such a vision is essential for the strategic management of any function of a business.

Strategic manufacturing management in practice

In the twelve firms that collaborated with this research, it was clear from the interviews carried out that the vision of each firm's competitive strategy was well understood by the senior management. Two of the firms had commissioned outside organisations to prepare business plans for them. However, the senior management of only two of these firms were able to articulate a vision of the manufacturing strategy needed to support the pursued competitive strategy. In only one firm was the manufacturing strategy understood by all in

the production department. Severence and Passino [8] suggest that there are three elements that are essential to accomplishing a change of manufacturing competitiveness. These are:

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

It is unlikely that planned change can be accomplished successfully without an initial vision of the desired outcome. All firms recognised the need to change. However, it is clear from this research that a clear vision of the strategic development of the firm's manufacturing capabilities was lacking in ten of the twelve firms studied. Consequently, there had been little attention given to the strategic management of manufacturing. The evidence for this conclusion was the inconsistency between the competitive manufacturing capabilities stated to be desired and the measures of performance used to manage the manufacturing operations. This is illustrated in more detail in Table 3.

The search for generic manufacturing strategies

Some important research has been carried out to determine a taxonomy of generic manufacturing strategies [9], [10], [11]. The research has shown that it is possible to distinguish a number of generic manufacturing strategy types.

Two of the aforementioned research teams, i.e. Roth and Miller and Stobaugh and Telesio, have used both the dominant competitive priorities of a manufacturing unit and the emphasis placed on future action plans as the means for classifying a type of manufacturing strategy (as recommended by Cool and Schendel [12]). The objective of their research was to search for groups of manufacturers that possess homogeneous characteristics, i.e. those firms that are developing similar types of competitive capabilities. Both Roth and Miller and Stobaugh and Telesio discovered three types of manufacturing strategy which the former named caretaker, marketeer and innovator. The relationships between the three types of manufacturing strategy identified and the manufacturing capabilities associated with each strategy are shown in Table 1.

Table 1
Manufacturing Capabilities Groupings
by Generic Manufacturing Strategy Type

	Generic Manufacturing Strategy Types			
Competitive Capabilities Priorities	Caretaker	Marketeer	Reorganizer (Product/Process Performance Group*) (1988 data)	Innovator
First	Low Price	Consistent Quality	Consistent Quality	Consistent Quality
Second	Reliable Delivery	Reliable Delivery	Reliable Delivery	High Performance Products
Third	Consistent Quality	High Performance Products	High Performance Products	Reliable Delivery
Fourth	Speed of Delivery (Availability)	Low Price	Speed of Delivery	Design Flexibility

* Note: The ability to change production plans quickly was a capability that was included in the De Meyer analysis. However, this capability has not been reported in this table because Roth and Miller did not include it in their study. All other listed competitive capabilities were included in both studies.

Sources: Roth and Miller [9] and De Meyer [11]

The third column in table 1 details some of the results of De Meyer's research. He adopted the Roth and Miller research methodology and also discovered three groups of homogeneous competitive capabilities. These he named the manufacturing innovators, the marketing-oriented group and the high-performance products group. The last of these groups he considered to be distinctly different from any of the manufacturing strategy groupings identified by Roth and Miller. For this reason, the priorities for the competitive capabilities of this group are shown separately.

Roth and Miller and De Meyer presented their findings on future action plans in different ways. Roth and Miller chose to rank the statistical significance of the importance attributed to a range of possible future action plans. De Meyer's report details the comparative emphasis attributed to action plans by the three groupings of manufacturers. It is therefore

extremely difficult to integrate these two sets of result. For this reason table 2 only shows the Roth and Miller results for the caretaker, marketer and innovator strategies and the author's research results for the reorganizer strategy. (The sample size is obviously inadequate to claim that the author's results are as statistically significant as the other research results).

Table 2
Future Improvement Programmes

Caretaker	Marketeer	Reorganizer	Innovator
1 Use of statistical Process Control (SPC) for Process improvement	1 SPC for Process improvement	1 Manufacturing lead time reduction	1 Manufacturing lead time reduction
2 Job enlargement	2 SPC for product improvement	2 Vendor lead time	2 Improving the number of products introduced on time
3 Manufacturing lead time reduction	3 Zero defects	3 Zero defects	3 Zero defects
4 Vendor lead time reduction	4 Manufacturing lead time reduction	4 Job enlargement	4 The application of of computer aided design

Tables 1 and 2 show the caretaker management philosophy to be one that strives for efficiency and low cost. Caretakers are often found in high volume continuous flow production environments. Future improvement programmes are concerned with reducing the costs of poor quality and the costs of production.

The marketer management philosophy is one that emphasizes quality and product performance. The degree of this emphasis is demonstrated by the range of quality improvement programmes these companies are planning to implement and the scale of a firm's product offerings.

Innovators are focused on programmes that will reduce manufacturing lead times and improve the management of the introduction of new products. Many of the firms that adopt the innovator manufacturing strategy are in technology-based industries and therefore, technological innovations to both product, process and infrastructure are critical to their success.

The innovators display many of the characteristics of the time-based competitors that Stalk [13] has identified in the Japanese world class manufacturers. These include the achievement of competitive advantage through time-based innovation, time-based product introduction, manufacture and distribution.

This author's research has, in the main, been carried out in firms that are currently pursuing the caretaker or the marketeer manufacturing strategy but need the competitive capabilities of a reorganizer (see table 1). All were planning to implement the improvement programmes classified under the reorganizer manufacturing strategy (see table 2). This strategy has been named, by the author, as the "reorganizer" strategy because it usually requires a reorganization of methods of production and changes to the measures of performance used.

This research has found evidence of the existence of four generic manufacturing strategies. The caretaker and marketeer have been long established and are consistent with the least cost and differentiation generic competitive strategies. The reorganizer and innovator manufacturing strategies seem to be strategic roles for manufacturing along an evolutionary path that leads to the establishment of world class design and manufacturing capabilities.

The reorganizer strategy was considered, by the senior management of the two firms that were implementing it, to be an intermediate but distinct objective for the development of their manufacturing operations. It is an objective to be achieved within a longer term plan leading to the goal of "world class manufacturing". However, both strategies make different demands on a firm's manufacturing resources (see tables 1 and 2).

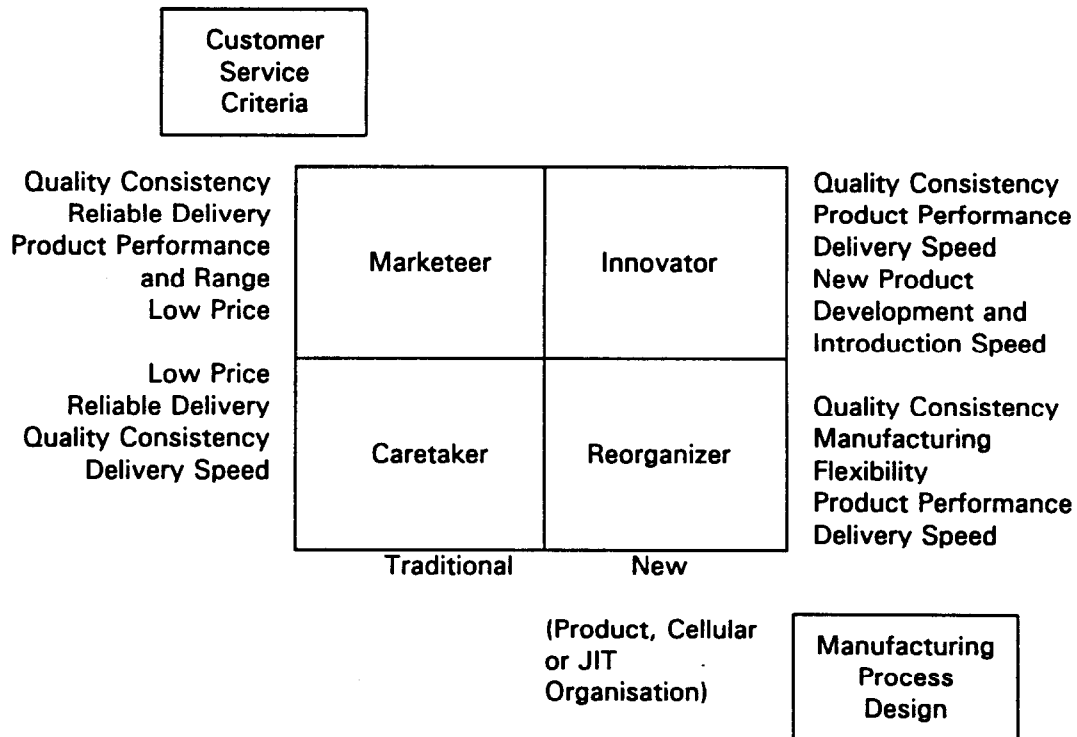
The ultimate goal of the world class manufacturer is to be the least cost producer of a highly differentiated product range. Consequently the reorganizer and innovator strategies could be considered to be manufacturing strategies consistent with those needed by a world class competitor. (See figure 2)

Figure 2 Competitive and Manufacturing Strategy Options

Relative Degree of Differentiation	High	World Class Competitor (Innovator Reorganizer)	Market Differentiator (Marketeer)
	Low	Least Cost Producer (Caretaker)	Stuck in the Middle (Wasteful)
		Low	High
		Relative Manufacturing Cost	

The key competitive capabilities of the four generic manufacturing strategies are shown in Figure 3. A more detailed explanation of each type of generic manufacturing strategy is given in Sweeney [14] and [15].

Figure 3 The Relationship between Generic Manufacturing Strategy Types and Competitive Strategy



The model, shown in Figure 3, may be judged to be an oversimplification of the strategic options that are available to many manufacturing businesses. It's use might also result in a superficial examination of the required competitive strategy needed by a business.

Hambrick and Lei [16] have warned against such behaviour. However, its use may be advantageous as a way of simplify the complexity of strategic choice. Many conceptual frameworks have been created to aid strategic decision-making and suffer from being reductionist but are useful as tools for strategic management. As Severence and Passino [8] suggest an integrated plan cannot be developed without a clear and commonly held vision of what needs to be done. The paradigm for the strategic planning of manufacturing has been found to be helpful for both strategic planning and for the communication of management's vision of a competitive manufacturing capability.

The decline to wasteful production

Table 3 shows the competitive capabilities that were stated to be required by the twelve firms that collaborated with this research and the manufacturing strategies that they were pursuing.

Table 3
Strategic Manufacturing Management Audit
of Collaborating Firms

Products Manufactured	Competitive Capabilities Required	Manufacturing Strategy Pursued	Manufacturing Capabilities to be Required	Manufacturing Strategy Needed
Clothing	Low Price, Product Design, Delivery Reliability	Caretaker	Quality Consistency Product Design Mfring Flexibility	Innovator
Mechanical Engineering	Product Performance, Quality Consistency and Reliable Delivery	Reorganizer	New Product Introductions, Quality Consistency	Innovator
Computers	Quality Consistency, Product Performance Reliable Delivery	Reorganizer	New Product Introductions, Quality Consistency	Innovator
Machine Tools	Product Performance Quality Consistency and Reliable Delivery	Marketeer	Quality Consistency Delivery Speed	Reorganizer
Electronic Components	Low Price, Quality Consistency and Reliable Delivery	Caretaker	Quality Consistency Manufacturing Flexibility	Reorganizer

Commercial Aircraft	Product Performance Quality Consistency and Reliable Delivery	Marketeer	Product Performance Manufacturing Flexibility	Reorganizer
Environmental Control Equipment	Low Price, Quality Consistency and Reliable Delivery	Caretaker	Quality Consistency Manufacturing Flexibility	Reorganizer
Trucks	Product Performance Quality Consistency Low Price	Marketeer	Product Performance Manufacturing Flexibility	Reorganizer
Confectionery Goods	Quality Consistency Product Range Delivery Speed	Marketeer	Quality Consistency Manufacturing Flexibility	Reorganizer
Electrical Consumer Goods	Low Price, Product Range and Delivery Speed	Caretaker	Low Price Manufacturing Flexibility	Reorganizer
Metal Extrusions	Low Price Quality Consistency Product Range Reliable Delivery	Caretaker	Quality Consistency Manufacturing Flexibility	Reorganizer
Fire Control Equipment	Quality Consistency Product Range Reliable Delivery	Marketeer	Quality Consistency Manufacturing Flexibility	Reorganizer

The manufacturing performance of ten of these firms was poor when compared with the best in their industries. The exceptions are those firms implementing a reorganizer manufacturing strategy. How their manufacturing performances had declined is typical of the way that many manufacturing companies in the UK have lost their distinctive competences. All of these firms originally pursued a caretaker manufacturing strategy, i.e. a least cost philosophy to managing their manufacturing operations. All have continued to use production methods that were devised at the start of this century. All have inevitably lost ground to those firms that have improved the way that products flow through their production system. An example would be a menswear manufacturer that uses large batches for the manufacture of product components, to ensure low component unit cost, and assembly lines for the production of large batch quantities of finished products. The total manufacturing costs for this method of production are 10 per cent to 30 per cent greater than those incurred using the modular or cellular method of production [17]. Typical results achieved from the use of the modular method of production for the manufacture of menswear are [17]:

1. Manufacturing cycle time reduced by 80 - 90 per cent
2. Quality improvements of 20 - 90 per cent
3. Total cost improvements of 10 - 30 per cent
4. Space reduction of 20 - 50 per cent
5. Greater flexibility
6. Better attitudes to work
7. Less absenteeism and labour turnover

Thus to continue to pursue a caretaker manufacturing strategy, which uses a batch sizing logic similar to the one previously described, to supply a market that was price, delivery and quality sensitive but now also expects improved performance (new designs) and speed of delivery is evidence that strategic myopia prevails. The financial performance of the firm will decline until it reaches standards like those shown in Table 4. These data derive from a benchmarking study of the clothing company included in this research project and the best of its competitors.

Table 4
Comparative Performance with Best in Class

	Current Performance	Best Competitor
<u>Market share</u>	Half the size of the major share-holder and declining	Major shareholder target of 30 per cent
ROCE	17 per cent	30 per cent
Return on Sales	1 per cent	7 per cent
Stockturns	3.5	10
Sales per employee	£34,000	£60,000
Sales per sq. metre	£180	£450
Delivery lead times		
Cat A	12 weeks	8 weeks
Cat B	16 weeks	12 weeks
Cat C	20 weeks	16 weeks
Delivery Performance	60 per cent on time	90 per cent

To decline to such a poor competitive position is a consequence of both a lack of a strategic vision and an adherence to the use of the traditional manufacturing performance measures. Many people (for example Kaplan [18], Drucker [19]) have criticised the use of financial measures of performance that only report on the utilisation of direct labour because this cost element is now a small percentage of total unit cost. Manufacturing management reports that only provide information on direct labour utilisation and scrap/rework costs are using

measurement systems which do not supply all the data needed for the development of the manufacturing capabilities required in the 1990s. It is, for example, essential that delivery performance, stockturns and the cost of "non value adding" activities, such as machine changeover and setup times, are also reported. What is measured signifies what is important to the senior management of the firm. If only costs are measured and these are only used to assess manufacturing management performance, then the achievement of financial targets will prevail over all others. Such action can result in establishing and maintaining a cost minimisation culture within the production function. Attention to costs only can also lead to a massive difference in the quality of customer service provided by the best and the average domestic manufacturer, as the example given in this article actually shows. This was the method of manufacturing management observed in the six firms that were pursuing the caretaker manufacturing strategy.

An inconsistency between a firm's manufacturing strategy and its business strategy, similar to that previously detailed, can also result from another evolutionary process. Some least cost competitors in the past, through necessity, have elected to change to a product differentiation competitive strategy and therefore have had to compete by offering the customer, for example, an increased range of products. Such a product offering may require a more flexible manufacturing capability and thus a change from the cost efficient caretaker manufacturing strategy to a marketeer manufacturing strategy. The confectionary goods manufacturer in the sample of firms studied is one example of the four companies that have followed this type of competitive strategy development.

The expansion of the product range increases the complexity of production management and the means adopted to cope with the increased quality and complexity problems has traditionally been to develop the manufacturing infrastructure. The tactics used have been quality improvement programmes and investment in manufacturing management information systems, such as material requirements planning systems, to help schedule the production of the increased range of products.

However, very often no changes are made to the organization of the manufacturing facilities that are to be used to produce the increased range of products. Therefore the design of the manufacturing system remains as that used for the original caretaker manufacturing philosophy.

The outcome of this neglect to focus the manufacturing capabilities on the competitive needs of the business is a lengthening of the manufacturing cycle time. Companies fail continually to meet their delivery promises and very rarely measure the manufacturing throughput time or actual delivery performance. All the four companies shown in Table 3 that were

pursuing a marketeer manufacturing strategy were experiencing these problems. The cause of this inability to change the methods of production to those more conducive to manufacturing flexibility is the ingrained least cost production mentality of the production management team.

The result of this strategic manufacturing management approach is an inflexible production system, i.e. a low throughput efficiency, high levels of work in process, quality problems and poor customer service, both in delivery lead time and delivery performance. The financial performance of such companies will be the same as that previously shown and they will also fare badly when compared with the best in their industry.

The one redeeming feature of the outcome of these strategic approaches to manufacturing management is the size of the financial resources that are hidden within the business. The release of these resources can provide the working capital needed to restructure the firm's manufacturing operations.

To Change from Wasteful Production to World Class

To formulate a competitive strategy involves positioning a business to maximise the value of the capabilities that distinguish it from its competitors. Therefore, to devise a strategy that will re-establish a competitive edge requires an assessment of the current competitive capabilities of the firm and a measurement of the customer service performance gap already established by the best of the competitors. The results of such an audit are shown in table 4. The audit illustrates how uncompetitive a firm can become without a strategic vision for manufacturing. How to restore competitiveness is the subject of the case study to be described.

In addition to this benchmarking process, a company must carryout an examination of its progress towards establishing a distinctive competence. Figure 2 shows the four possible outcomes of competitive strategy management.

The worst possible assessment of the firm's competitive position is to be what Michael Porter[20] describes as "stuck in the middle". To extricate the firm from this unenviable position requires a sustained initial commitment to the pursuit of one of the two alternative generic competitive strategies. (In this case study the company had already elected to focus on selected market segments).

It is a confused corporate culture that causes a firm to drift into the stuck in the middle uncompetitive position. This is because the management of the firm either do not have a

common resolve to be the least cost producer or they do not have the determination to establish differentiation attributes that obviate the need for a low-cost position. The consequence of this uncertainty about the strategic direction for the business is a reducing market share and declining profitability. This is the diagnosis of a wasteful manufacturing operation.

The use of the strategic manufacturing management model can facilitate the development of a plan to extricate the firm from this uncompetitive position. The results of the competitor analysis should help determine the more appropriate set of competitive capabilities that need to be established in the short-term. Initial agreement about the firm's short-term competitive capabilities is necessary to eradicate the confused corporate culture and establish an immediate common strategic vision for the business.

The firm to which table 4 refers was endeavouring to supply an increasing range of high quality clothing goods within a delivery lead time that was less than the manufacturing cycle time of the products. Its solution to the poor production throughput rate problem was to hold a large stock of finished goods. The manufacturing management culture was that of the caretaker but the competitive capabilities that it was striving to establish were those of a marketeer (see figure 3).

Figure 4 was developed to help create the longer-term strategic plan for manufacturing operations. It was necessary for the case study firm to establish a set of competitive capabilities similar to those of a reorganizer, i.e. to retain the firm's established reputation for quality products with the manufacturing flexibility to continue to supply a broad range of products quickly and at a lower cost.

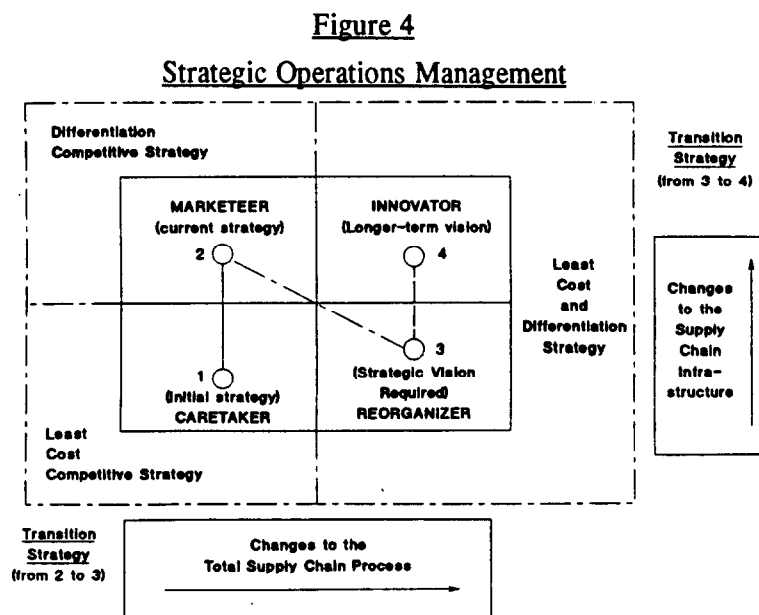


Figure 4 also shows that to concentrate only on changes to manufacturing operations within the company will not be sufficient. An holistic view of the impact of these changes along the total supply chain must be taken before the full benefit of a change to manufacturing strategy can be realized.

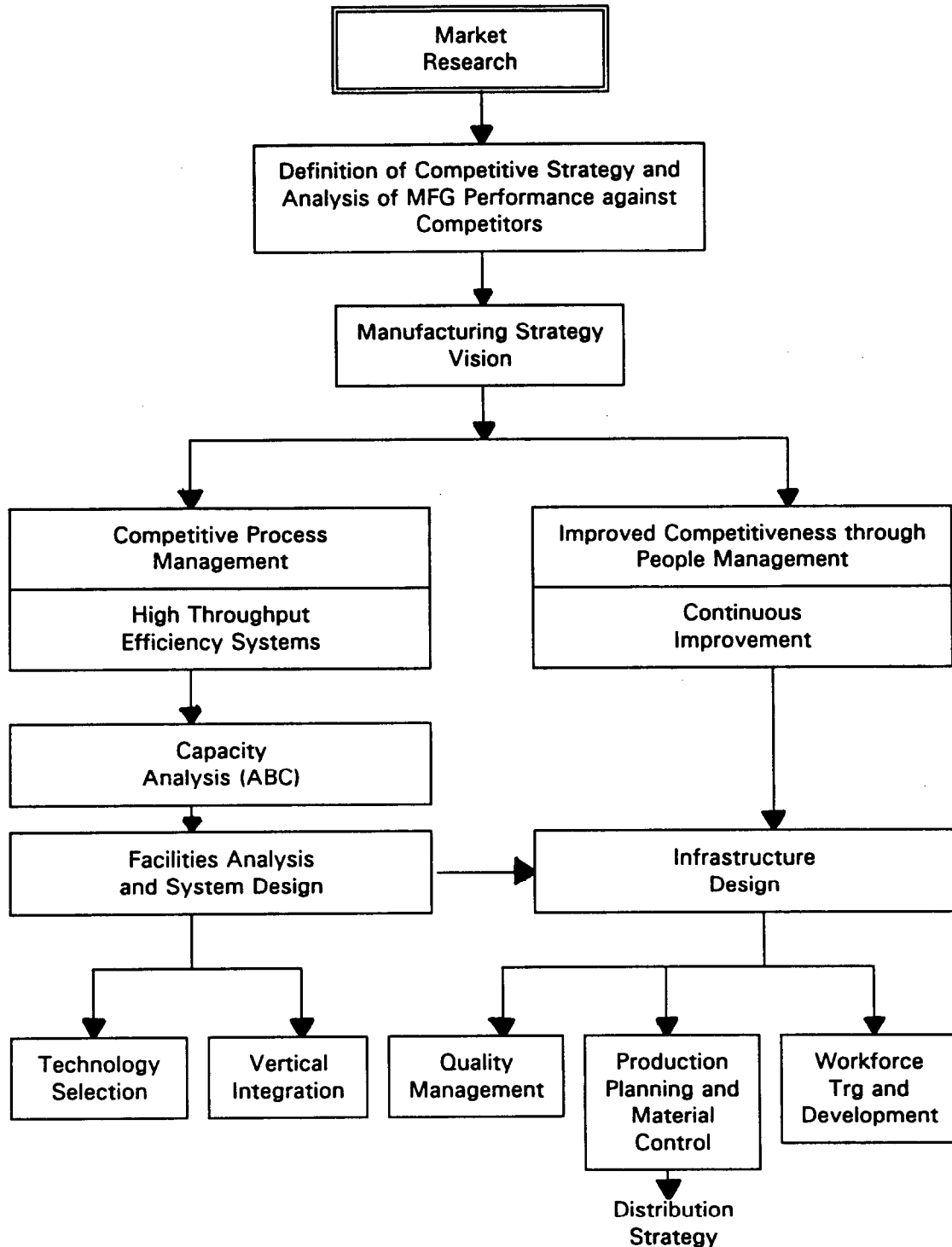
The strategic plan for the clothing goods manufacturer was therefore to reorganize the production process in order to simplify the throughput of the product. This would reduce both manufacturing cycle time and the working capital tied up in stocks. The solution was to establish a cellular production system (i.e. to move from 2 to 3 on figure 4). Longer-term the firm will establish closer links between product design and manufacturing and compete through product innovation, i.e. to move from 3 to 4 on figure 4).

As Figure 4 shows, the route to world class manufacturing for many companies is to first develop quick response and flexible manufacturing systems. Such a plan is also appropriate for the high volume producer of a single product or for a high volume manufacturer of a small range of similar products. Such firms usually use continuous processing systems and consequently, they possess the ultimate manufacturing system design. However, for some firms the flexibility of down-stream operations such as packaging and distribution is the challenge of the 1990s.

Figure 5 shows a recommended procedure to follow when preparing a strategic plan for manufacturing operations. A change of strategy, such as to develop a flexible manufacturing capability, will require analyses of the types shown in figure 5. The relative vertical position of each element of manufacturing strategy signifies the recommended sequence for carrying out strategy design and action planning.

Figure 5

**An Implementation Programme for
Strategic Manufacturing Management**



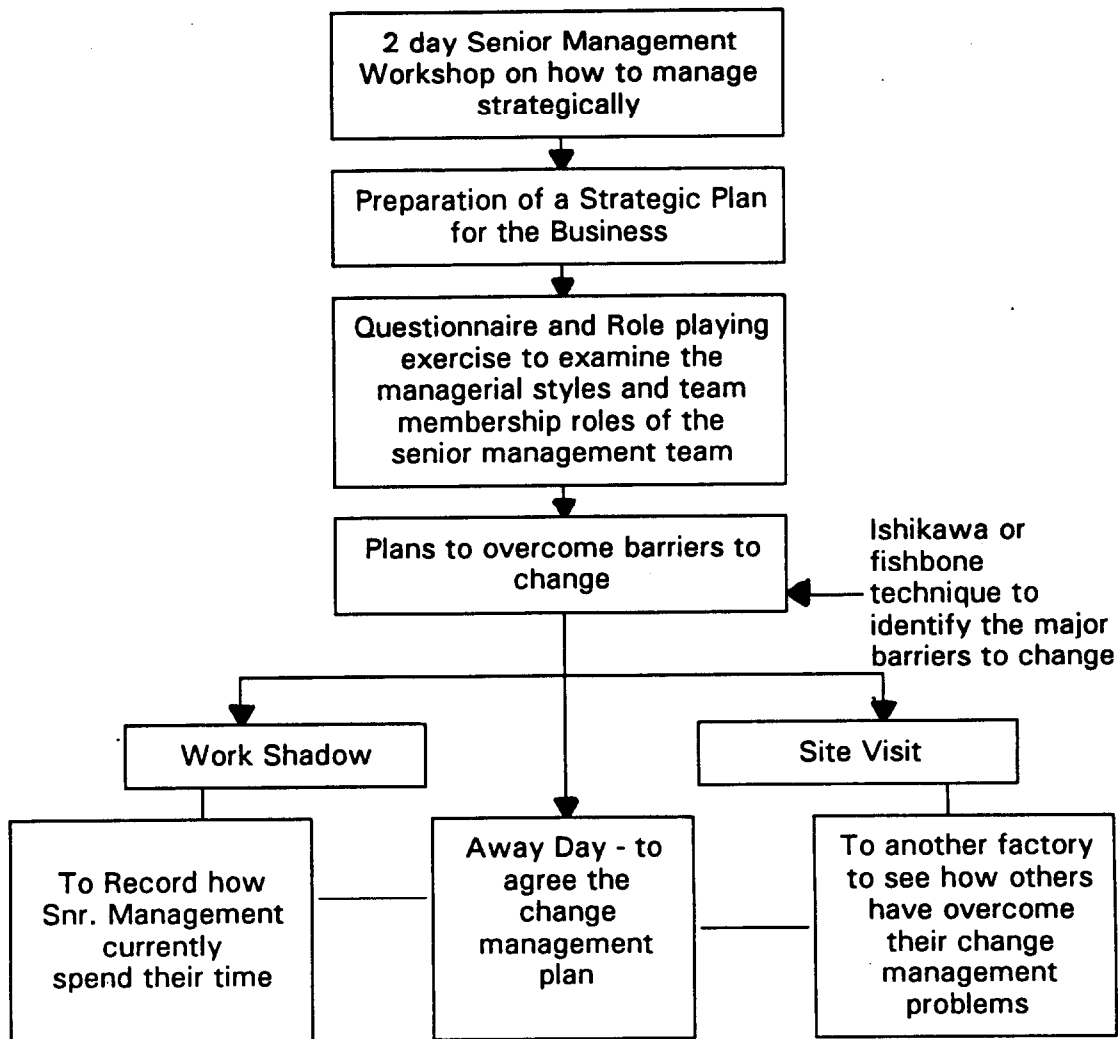
To effect a smooth and efficient change to manufacturing strategy of the type previously described, will require a training programme for the development of the human resources of

the firm. The reasons for the need to change and how such changes will effect management and labour must first be explained because it is the human resistance to change which has proved to be the main barrier to change. It is very rarely a financial problem to restructure the manufacturing function because the firms have huge amounts of working capital tied up in inventories. The release of this capital is the source of funds needed to finance the strategic change to manufacturing operations.

The most difficult problem to overcome is the development of the strategic management skills of the senior manufacturing management. Most of these managers perform as tacticians rather than developers of competitive strategy. They rely on their expertise at resolving priority problems instead of developing plans to establish manufacturing-led competitive advantage.

To achieve such a transformation in management culture may require a management development programme similar to that shown in Figure 6. It is crucial that the vision of manufacturing's future strategic role is understood by all the manufacturing management team and that it is also communicated to the whole department. It is also imperative that senior management delegate operations management decision-making to their subordinates and that they concentrate on the strategic management of the manufacturing unit. The purpose of the development programme shown in Figure 6 is to create a common vision of the manufacturing strategy needed by the business. This is the minimum management development programme required to create an awareness of the need for a strategic manufacturing management capability.

Figure 6
A Tactical to Strategic Management Development Programme



Conclusions

The collaborative work carried out with the twelve UK manufacturing companies has provided the opportunity for case research on the strategic management of manufacturing. Previous research on the existence of generic manufacturing strategies have provided evidence of their existence. This research has used the researchers' taxonomy of generic manufacturing strategies and a model for the strategic planning of manufacturing has been developed and tested.

The purpose of the paper is to propose a transition management plan for a specific type of change to the strategic management of manufacturing, i.e. to a reorganizer or internally supportive strategic role for manufacturing. The objective of the paper has been to provide an aid to simplify the strategic management of manufacturing and a guide to implementing a strategic change.

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