



**SWP 32/93 THE STRATEGIC MANAGEMENT OF INTERNATIONAL
MANUFACTURING AND SOURCING**

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ABSTRACT

Little previous research has been carried out on the strategic management of international manufacturing and the subject appears to be a "missing theme" in operations management literature. What are the criteria used for the selection of products to be manufactured offshore, what are they for sourcing from third parties or for manufacturing in the home country? This is the subject of this paper. The research findings show the hypothesis that offshore manufacturing is organized to prolong the competitiveness of mature products to be an oversimplification as an explanation for the location of production. Some manufacturing businesses now use time based competitive strategies and their take-up requires a different configuration of manufacturing resources.

INTRODUCTION

Many British and foreign-owned multinational companies, in their search for a competitive advantage, look beyond their national boundaries for a source of components or finished products. Miller and Roth(1988) have reported that many manufacturing businesses consider global sourcing to be a competitive weapon and some firms have already used it to their advantage (Moxon 1975, Fitzpatrick 1983). However, little research has been carried out to examine the cost and service reasons for manufacturing offshore instead of using a third party supplier or whether it would ever be advantageous to return internationalized production to the United Kingdom.

Adam and Swamidass(1989) identified the international context of manufacturing strategy as a "missing theme" in the operations management literature and Anderson, Cleveland and Schroeder(1989) make no mention of it in their review of the current literature on manufacturing strategy. These literature reviews have confirmed that there is a need for more research on the strategic management of international manufacturing and sourcing.

The objective of this research project was to study the practice of international manufacturing management and to develop a framework for the global sourcing of finished products, by either "intra-firm" or by "contractual" supply. This research design has therefore precluded a study of investment decisions made to gain access to targeted offshore markets as these decisions are taken for a different although an obviously related strategic purpose.

RESEARCH METHODOLOGY

The case study research method was used because it provided the opportunity to carry out a longitudinal study of international manufacturing and sourcing management. This strategic management activity was researched by acting as a facilitator and adviser at Board of Directors meetings. Through this regular contact with the senior management team, it was possible to become familiar with all the cost and service benefit reasons for their chosen manufacturing and sourcing strategy.

The two firms that agreed to collaborate with this research manufacture apparel and electronic goods and their businesses comprise a total of eight strategic business units. These two types of business were selected because of their contrasting competitive environments. In the United Kingdom the apparel manufacturing industry is in decline and the electronic goods industry is a growing but mature market.

The selection of the collaborating firms was also based upon an additional set of sought-after contrasts. These were the characteristics of their manufactured products, their life cycles and the

significance of manufactured cost, delivery speed, delivery reliability and product technology upon the selection of an appropriate competitive strategy.

The reason for the careful selection of collaborating firms was an attempt to produce a generic framework for the strategic management of international manufacturing and sourcing even though it is based upon a small sample size. The philosophy adopted was that recommended by Eisenhardt(1989) "...given the limited number of cases which can usually be studied [because of cost and time constraints], it makes sense to choose cases such as extreme situations and polar types in which the process of interest is "transparently observable" (Pettigrew 1988)".

PREVIOUS RESEARCH

An explanation for the diffusion process of products across national boundaries has been given by Vernon (1966, 1974, 1979) and Wells (1968, 1972). Their international product cycle hypothesis describes the relationship between the stage of the product in its life and the location of its production. They reason that the characteristics of a product stabilize as a product matures and then industry competition shifts to price. This is the motive for moving its production offshore because the manufacturers now seek to reduce costs by engaging in low labour-cost production. Hence, foreign direct investment or other forms of international involvement (licensing or subcontracting) will begin to occur.

Grunwald and Flamm (1985) have also studied the reasons for the overseas production of manufactured products for the American markets. They also claim that this strategy allows firms to retain their cost competitiveness after their products have entered the later stages of the product cycle. The firms that developed the product are able to continue producing economically by eventually relocating to or subcontracting assembly production to low-wage developing countries. This arrangement is referred to as "production sharing" in which production activities are coordinated vertically across national boundaries in order to withstand foreign competition (Drucker 1979).

McGrath and Bequillard (1989) carried out a study of fifty-six electronics companies and identified four types of international manufacturing strategies. These were as follows:

Home country manufacturing: A centralized strategy consisting of almost all manufacturing taking place in the company's country of origin with a high degree of global sourcing taking place through third parties.

Regional manufacturing: For the adoption of this strategy, the world is viewed as a number of regions that comprise similar markets, common distribution requirements and government policies. The strategy consists of developing manufacturing operations in these areas at the product and component level.

Coordinated global manufacturing: This is the classic strategy for taking advantage of low labour cost areas. This strategy typically leads to the firm having separate manufacturing facilities for lower level components and subassemblies. Outputs are then transferred to other facilities for final assembly.

Combined regional and coordinated global manufacturing: This involves a mix of the second and third strategies with component and subassembly manufacturing in low cost regions and final assembly in regions close to markets.

DuBois and Oliff (1992) used the McGrath and Bequillard classification of international manufacturing strategies and researched the objectives for the adoption of each type of manufacturing configuration. Their conclusion was that the configuration of international manufacturing operations is the result of giving a differential emphasis to each of the four key manufacturing performance priorities (Wheelwright 1978, 1984). Their findings were that "cost-based competition encouraged the use of coordinated global manufacturing; the flexibility imperative encouraged a combination strategy of regional and global manufacturing; dependability

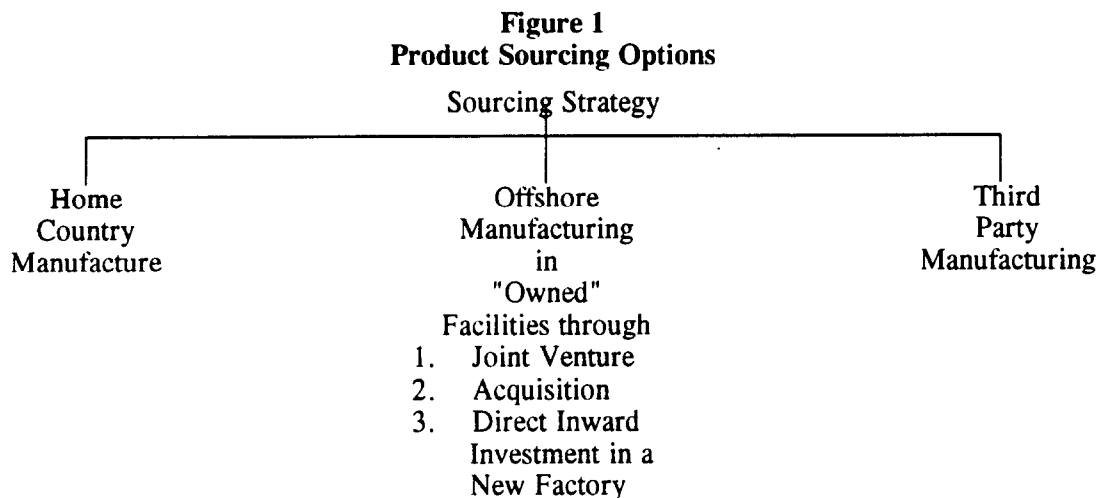
required regional and home country strategies; while quality as a manufacturing imperative required either home country or regional manufacturing". This research has found evidence to show that offshore manufacturing plants in low labour cost countries also produce high quality products. It is unlikely that any manufacturing organization would enter into a joint venture or invest in an offshore manufacturing facility unless it had confidence in the ability of local or expatriate management to oversee the production of high quality products. DuBois and Oliff also concluded that the level of industry technology and the type of market served, that is whether it is a consumer or an industrial market, is relevant to the international configuration decision.

Finally, Moxon (1974, 1975) found a positive relationship between the value-to-weight ratio of products and the likelihood that the product would be produced offshore. A high value and light weight product is less likely to incur transportation cost penalties to offset the lower cost advantages gained from manufacturing offshore (Haug 1986).

MANAGING THE MANUFACTURING CONFIGURATION

Competitive manufacturing is only accomplished by ensuring that the sourcing strategy of a firm, for raw material, components and product supply, fully supports the longer-term vision for competitive strategy (Skinner 1969, 1978, 1985; Hill 1985; Sweeney 1993). Any change made to competitive strategy will therefore require a review of the current combination of make and buy operations to determine their compatibility with the revised competitive strategy. As Chandler (1977) put it "Structure follows strategy".

Figure 1 shows that there are three types of sources of manufactured product. These options are home country manufacturing, direct inward investment and third party supply.

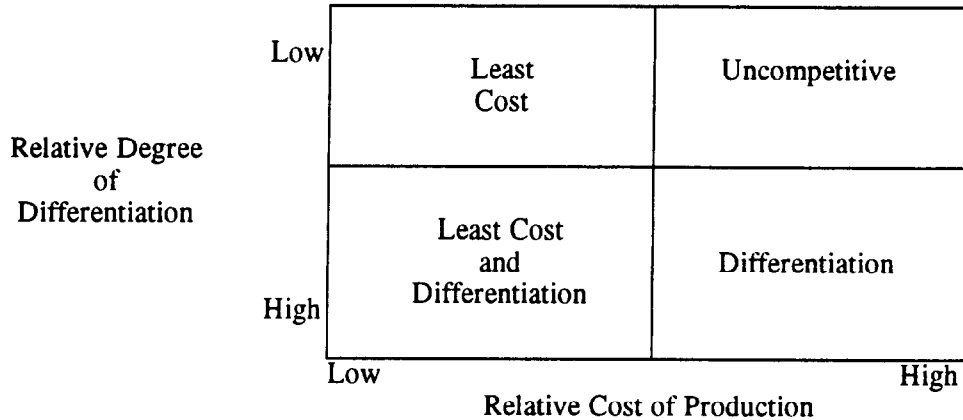


The choice of sourcing strategy to use is dependent upon the competitive advantage that each offers. Home country manufacturing ensures proximity to the market and absolute control over manufacturing performance and supply. Offshore "owned" production provides the opportunity to minimize labour and material costs, when both are locally supplied, and the retention of responsibility for manufacturing control. Third party manufacture is a competitive source of product supply when capacity limits have been reached or when the complexity of production control has significantly reduced the cost competitiveness of the firm. The contracting out of lower volume or lower margin product manufacture to smaller specialist producers can allow the contractor to focus on its core manufacturing business. Consequently, the determination of a product sourcing strategy requires the same degree of care and attention as choosing the competitive strategy that it must support.

Figure 2 shows the types of competitive strategy adopted by manufacturing companies, some by design and one by default. The concept of a focused strategy, as detailed by Porter (1980), has not

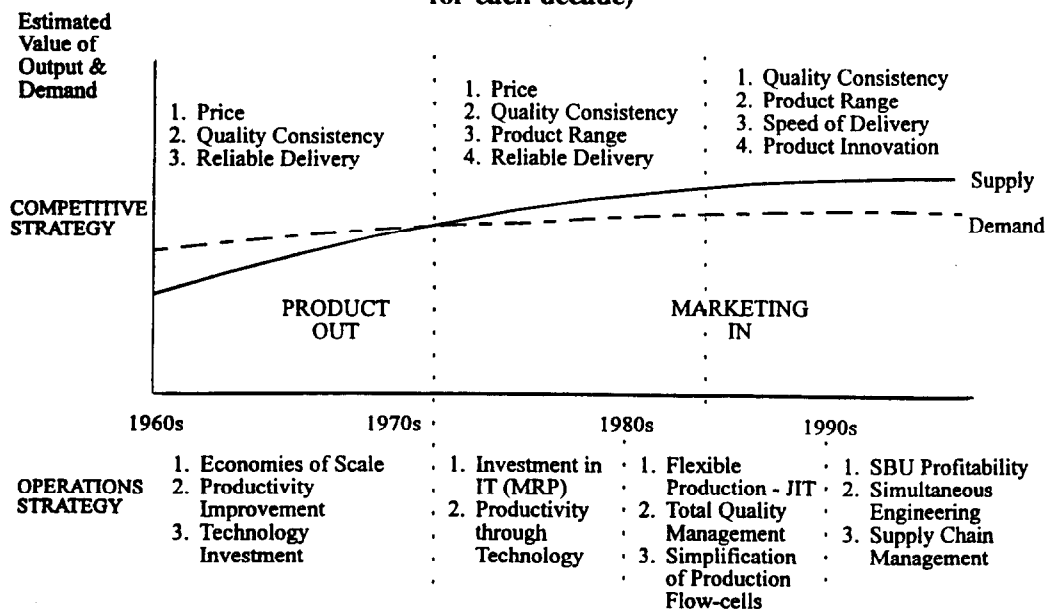
been included on the matrix but can be used, as Porter has stated, in combination with each of the three generic competitive strategies shown.

Figure 2
Competitive Strategy Options



A firm can achieve a competitive advantage through differentiating its products, its quality of customer service or by both of these competitive strategies. The recent changes to international trading agreements, for example the single European market, has induced a greater emphasis on improving both of these competitive edge criteria. Figure 3 shows the evolution of competition for manufactured goods in the United Kingdom and some examples of the additional customer service offerings made to gain a competitive edge. This progressive enlargement of the customer service concept is also representative of the actions taken by competitor manufacturers in other developed economies. Figure 3 also shows the manufacturing strategy and structure designs needed to deliver each type of service package. As Stalk (1988) has predicted, manufacturing companies are now using the speed of delivery as a weapon for gaining a competitive edge by offering both a least cost and a service speed differentiation strategy.

Figure 3
The relationship between supply and demand for manufactured goods in the UK (aggregated for each decade)



From studying the practice of international manufacturing management, three frameworks have been developed that detail the product manufacturing and sourcing strategies that are compatible with each of the three generic competitive strategies shown on Figure 2. They are also intended as models to facilitate the strategic management of international manufacturing and sourcing.

PRODUCT SOURCING STRATEGIES FOR LEAST COST

The choice between manufacturing or sourcing to minimize the unit cost of production is the classic dilemma for manufacturing management. It is sometimes possible to purchase lower cost materials from suppliers within low labour cost regions and these opportunities must be found. However, international manufacturing operations have usually been established or used, as Vernon (1966) and Wells (1968) have explained, to gain a competitive advantage by minimizing labour costs. For this reason, the framework developed to present the options for a product sourcing strategy to support the least cost competitive strategy incorporates a variable labour cost dimension.

Figure 4
Competitive Strategy Options

	<u>Low Volume</u> Many Products	<u>High Volume</u> Few Products
High Labour Content	<u>Development</u> Home Country <u>Then</u> Third Party or "Owned"	"Owned" or Third Party Mfr
Low Labour Content	<u>Development</u> Home Country <u>Then</u> Local Third Party Supplier	Home Country Mfr

Figure 4 shows that offshore manufacturing or sourcing is recommended when the production process is more labour than capital intensive. The criterion used for the switch to offshore supply is when the incremental costs of establishing an international sourcing operation can be offset by the potential labour cost savings of overseas supply. An organizational design change is required to allocate responsibility for resolving the "management grief" issues of controlling quality and delivery reliability. Therefore, offshore supply is a strategy more suitable for the sourcing of the higher volume products. It can also be a viable strategy for sourcing lower volume products that are mature and not subject to frequent design changes.

Home country manufacture is competitive when investments in product and process engineering can be made to establish a lower labour cost per unit of production (direct and indirect) than the competitors. It is also usual for firms to carry out all product development work in the home country manufacturing plants until "owned" manufacturing facilities are well established overseas.

PRODUCT SOURCING STRATEGIES FOR DIFFERENTIATION

A manufacturing business can gain a competitive edge by offering the customer either product differentiation or a better quality of service. The combination of these two forms of differentiation is obviously the most potent.

To supply a differentiated product requires an expertise in the core technology that makes the product unique. Many manufacturing companies try to restrict the transfer of this technological expertise to other organizations because it can constitute an entry barrier to their market. They therefore prefer to manufacture in-house and only subcontract the manufacture of their low volume and lower margin products to preferred suppliers. Figure 5 shows these manufacturing and sourcing strategies. It is also a composite model of the product supply strategies for both the least cost and the differentiation competitive strategies. What is interesting to note is that the product supply model for a differentiation competitive strategy is an inverted copy of the least cost model.

Figure 5
Least Cost and Differentiation
Competitive Strategies

High	"Owned" or Third Party Mfr		High Vol	Low Vol
			Home Country Mfr	<u>Local</u> Third Party Mfr
Low	Low Vol	High Vol	Home Country Mfr	
	<u>Local</u> Third Party Supplier	Home Country Mfr		
		Low	High	

Product Manufacturing Expertise

PRODUCT SOURCING FOR DIFFERENTIATION AND FAST RESPONSE

Figures 4 and 5 detail the most logical positioning of manufacturing and sourcing resources to support the competitive strategies specified. However, the considerable distance between most manufacturers in low labour cost areas and the markets that they serve has created a speed of delivery problem that is increasingly damaging to their customers. This is a recent development and is a consequence of the need for a fast response to ultimate customer demand and the product innovations implemented by competitors. This change of competitive strategy makes use of response time as a competitive weapon, as Stalk (1988) predicted.

This research has shown that a viable strategy for an increase to the speed of response to customer demand, in terms of either quantity or product mix, is to reinstate the needed manufacturing capacity close to the market that it serves. Such a move would constitute a change of international manufacturing configuration from one that is similar to a coordinated global production to a return to regional manufacturing (McGrath and Bequillard (1989)). This inward investment will only provide an acceptable return when it is made to produce a product with a high price premium which can absorb the increased labour costs. The potential benefit is the increased competitiveness of the customer delivery lead time. The data to support this proposition is presented in the following section of this paper.

The use of time as a competitive weapon has forced a review of the most appropriate manufacturing and sourcing strategies for this type of service differentiation strategy. This is shown in Figure 6.

Figure 6
Differentiation and Fast Response

High	Low Vol	High Vol	High Vol	Low Vol
	"Owned" or Third Party MFR	Home Country Manufacture		
Low	Low Vol	High Vol	Home Country Mfr	
		Low	High	

Product Manufacturing Expertise

As Figure 6 shows the type of manufacturing performed by a firm choosing to assemble their products in higher labour cost areas. The firm choosing this strategy does so to enable a quick response to market demand.

The final assembly of products do not usually require a unique manufacturing expertise, in fact for most products it is the manufacture of some high value-added subassembly that is the critical production expertise needed, for example the reading-head assembly for a video cassette recorder. This is a strategy similar to that defined by McGrath and Bequillard (1989) as coordinated global manufacturing but the opposite in concept, that is components are manufactured in the home country plants of the global manufacturer and assembly is performed in low labour cost areas. Time based competitive pressures are increasingly inducing companies to reconsider the appropriateness of offshore assembly when the manufacture of critical components is carried out in home country manufacturing facilities.

THE CASE STUDY FINDINGS

Both the apparel and the electronic goods manufacturers have established overseas production facilities that supply finished products. Both firms are experiencing intense competition and both are finding it increasingly difficult to provide a quick response to customer demand and to cope with product range proliferation. The strategic problem for both was to increase their time based competitiveness.

Figure 7 shows a break down of the electronic goods customer delivery lead time. Excluding the production order release queue and the dice stock delay, the lead time is 88 days +/- 19 days. Of this total time, the logistics of delivering parts to the assembly plant and dispatching the finished product to the customer takes 25 days or 28 per cent of the time.

Figure 7

<u>Customer Delivery Lead Time</u>	
<u>Elapsed Time</u>	<u>Operation</u>
Up to 5 Days	Order Entry Production Scheduling
0 to 10 Weeks	Production Queue
21 days +/- 2 days	Wafer Fabrication Photolithography Etching Diffusion Metallisation
15 days +/- 5 days	Ship to Assy Plant
2 days	Wafer Probe & Sort
0 to 8 weeks	Dice Stock
35 days +/- 7 days	Assembly & Test
10 days +/- 5 days	Ship to Customer

There were also many manufacturing control difficulties that were also a consequence of distance between wafer supply and product assembly, for example the up to six week delay between wafer manufacture and the discovery of yield problems with them in the assembly plant. For these and other reasons associated with costs (the 14 per cent European import duty) and flexibility, the firm has decided to relocate the final assembly of the product in the United Kingdom.

Flexibility for the least cost apparel manufacturer is also a difficult problem to resolve. The room to manoeuvre is very much less than a higher value-added product manufacturer, as Figure 8 shows.

Figure 8
Comparative Costs of Production

UK Manufacture		Overseas Manufacture	
Transport	6%	Margin	16%
	1%		
	Overheads 33%		11%
	Labour 25%		Overheads 23%
	Materials 35%		Labour 15%
		Transport	Materials 35%

However, all the manufacturing operations are carried out in the factory after the fabric has been delivered. Greater flexibility can be achieved by reducing the transport times needed to deliver fabric to the plant (4-5 weeks by sea from Europe) and the same time for the return journey. As Moxon (1974,1975) and Haug (1986) discovered, for a low weight and a relatively high margin item, produced in high volumes, using air transport can provide added flexibility for customer satisfaction and still provide a higher return than home country manufacture.

CONCLUSIONS

Three strategic management frameworks have been developed to provide a guide for determining the use of international manufacturing and sourcing to gain a competitive edge. The research findings are based upon a study of eight strategic business units and therefore the number of case studies carried out is small. However, the collaborating firms were selected because of the contrasting characteristics of both their markets and their products. The reason for this research design was to make transparently observable any consistency or difference between the strategic objectives for the use of international manufacturing and sourcing.

The most significant finding is that the international product cycle hypothesis does still accurately describe the actions taken by manufacturing organizations that are striving to gain a least cost competitive advantage. In addition, for those firms that produce a low weight and a higher value-added item, flexibility of response to market demand can be accomplished by offshore manufacturing in low labour cost areas but at the expense of higher logistics costs.

For a manufacturing business that competes by product differentiation, that has in the past adopted a low cost strategy for final assembly, the international product cycle hypothesis cannot be relied upon to explain the strategic management of international manufacturing operations. This is because the rationale for transferring production offshore has been to lower costs. However, for some mature markets, the customer is prepared to pay a premium for speed of response to demand and satisfying this specific customer need has taken precedence over low price. It can therefore be strategically prudent to locate or relocate the final assembly of such products close to their targeted markets even though this is a higher labour cost area.

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