

**CAPABILITIES AND COMPETENCIES - TOWARD STRATEGIC
RESONANCE BETWEEN OPERATIONS AND STRATEGY
PROCESSES WITHIN FIRMS**

(Draft version)

**Professor S Brown¹
Dr Brian Squire²**

University of Exeter

Discussion Papers in Management

Paper number 07/16

ISSN 1472-2939

¹Professor Steve Brown, School of Business and Economics, The University of Exeter, Streatham Court, Rennes Drive, Exeter, EX4 4 PU, United Kingdom. Tel: +44(0)1392263200, Fax@ +44(0)1392263242. Email: Steve.Brown@Exeter.ac.uk

²Dr Brian Squire, Manchester Business School, The University of Manchester, Booth Street West, Manchester, M15 6PB, United Kingdom. Tel: +44(0)1612756333. Email: brian.squire@mbs.ac.uk

There has been a plethora of literature which discusses the strategic importance of routines, related to the Production/Operations function, that take place within firms. It has been argued that these routines allow firms to accrue capabilities (Nelson and Winter 1982) which, over a period of time, may be developed into competencies that allow a particular firm to gain competitive advantage due to the inimitable basis upon which competencies are formed. It is axiomatic that many of these routines, capabilities and, indeed, competencies reside within, but of course are not limited to, the Operations function of the firm. We might suppose, therefore, given the strategic importance of such capabilities, that there would be explicit links made within the literature between such strategic competencies on the one hand and the role of the Operations management function within the firm on the other.

However, we contend that much of the literature on routines, capabilities, and competencies within strategy mainstream literature makes no explicit allusion to the strategic importance of Operations management within the firm. Moreover, we suggest that much of the mainstream business strategy literature likewise makes little explicit reference to the Operations function as a *strategic* contributor to the firm. We also argue that part of the ‘blame’ for the failure of the Operations management function to be seen within the mainstream strategic realm lies within the inability of the manufacturing/Operations strategy literature to make a sufficiently strong case for such inclusion. The result to this is that articles continue to be written extolling the virtues of routines, capabilities, and competencies without any understanding as to how such firm-specific capabilities line up with the Operations function, where much of these activities take place.

More pertinent to the role of strategy is that such capabilities do not come about by chance but need, instead, to be part of strategic intent (Hamel and Prahalad 1989). We suggest that the very process of strategy will indicate the level to which such capabilities will be developed and safeguarded over time. We will argue in this paper that managers are sometimes incapable of developing such capabilities for three reasons:

1. The strategy making process remains stuck in a paradigm more closely related to traditional mass production approaches where such dynamic capabilities were not required.

2. Senior-level strategic managers who, we might expect, are chiefly responsible for guarding such competencies, may have little or no understanding of strategic capabilities that reside within Operations.

3. Other strategic-level decisions leading, often, to dramatic levels of outsourcing and downsizing within the firm, means that the firm loses the potential to accrue, develop and retain competencies over time.

The structure of the paper is as follows. In the next section we discuss how the resource-based view of strategy, including notions of capabilities and competencies, is dependant upon Operations management and why the latter must be seen in terms of strategic importance. Following this, we explain why manufacturing/Operations strategy literature has failed to influence the wider mainstream strategy debate. We then discuss why there is a gap between Operations and strategy level decisions, which has developed over time, even with the emergence of new manufacturing paradigms. After this we examine some of the current paradigms including *Lean Production*, *Agile Manufacturing* and *Mass Customization* and show these are often talked about in terms of capabilities but without any reference to strategic issues of how these capabilities can be accrued, developed and protected over time. Finally, we discuss the concept of strategic resonance.

RESOURCE BASED STRATEGY.

Undoubtedly, the strategy process is a complex and dynamic issue for firms (Mintzberg *et al* 2000 Whittington 2001) and managers are faced with a range of contradictory statements about what constitutes 'good' strategic practice. For example, the tension between resource-based versus market-led strategies continues to appear in the literature and the focus of attention given to each, as both approaches are explored in turn by supportive sets of academics, may be likened to a 'swing of a pendulum' (Hoskisson *et al* 1999). The resource-based view of the firm and its relation to planning strategy has become increasingly popular in recent times. This approach can be traced back to Penrose (1959:24) where she described the firm as "more than an administrative unit; it is also a collection of productive resources".

Under the resource-based view, senior level strategists are charged with determining the best use of resources, and to leverage these either alone, on a firm-specific basis, or with partners (Wernerfelt 1984, Barney 1991, Dierickx, and Cool 1989, Lamming, 1993, Hines, 1994, Stump et al 2002, Ireland et al 2002). Strategists, therefore, are charged with assessing firm resources, developing their accumulation and then utilizing these in order to convert distinctive competencies into competitive advantages that meet market requirements. Such capabilities are important as a means of gaining competitive advantage as Hamel and Prahalad (1994:78) suggest:

"To get to the future first, top management must either see opportunities not seen by other top teams or must be able to exploit opportunities, by virtue of preemptive and consistent capability-building, that other companies can't copy"

Resource-based strategy thus depends upon senior-level managers who are concerned with scanning external opportunities, while at the same time, developing and guarding capabilities within the firm's Operations that are superior to other competitors and which other competitors either cannot copy, or will find it extremely difficult, to copy (Teece et al 1997, Eisenhardt and Martin 2000). This leads to our first proposition:

Proposition 1: Those firms that have senior level managers who understand the importance of accruing, developing and sustaining Operations capabilities, are more likely to safeguard these capabilities than those that do not.

The ability to develop and guard such capabilities depends upon deploying and coordinating different resources (Amit & Schoemaker, 1993; Grant, 1996; Prahalad & Hamel, 1990; Teece et al 1997). These capabilities reside in Operations' routines that are essentially intangible (Conner & Prahalad, 1996; Itami & Rohel, 1987; Kogut & Zander, 1992; Leonard-Barton, 1992; Winter, 1987). Accruing capabilities depends upon firm-specific knowledge, emanating from learning that takes place within the firm (Iansiti & Clark, 1994; Leonard-Barton, 1995; Teece et al., 1997; Ulrich & Lake, 1990). The scope of learning may be wide but includes problem-solving tasks whose purpose become evident in

the gaps between potential and existing Operations performance (Dosi & Marengo, 1993). As Cantwell and Fai (1999:331) assert:

“The essential idea here [...] takes the form of firm-specific learning in production, by way of a process of cumulative and incremental problem-solving activity [...] The outcome of this firm-specific learning process in production is the creation of tacit capability or corporate technological competence, that requires the generation of specially tailored knowledge inputs, the composition of which inputs reflects the company's distinctive fields of technological specialisation and the focus of its learning activity.

However, the problem for firms that follow a ‘resource-based’ strategy of accumulating technological and other assets is that simply accumulating a large knowledge base may not be sufficient - as the cases of well-established firms like IBM, GM, Kodak and others demonstrate (Bessant et al 2001). A concern with capabilities is that routines undertaken within Operations may develop into excellence in the “wrong things” and inward-looking myopia is an issue that needs to be addressed by strategists as Verdin and Williamson (1990:10) explain:

"Basing strategy on existing resources, looking inwards, risks building a company that achieves excellence in providing products and services that nobody wants...market-based strategy, with stretching visions and missions, can reinforce and complement competence or capability-based competition. And that successful strategy comes from matching competencies to the market."

To combat this, it has been advocated by Teece and Pisano (1994: 542) that competitive advantage can be gained by:

‘timely responsiveness and rapid product innovation, coupled with the management capability to effectively co-ordinate and redeploy internal and external competencies’.

This approach places considerable emphasis upon the conscious role that can be played in shaping and configuring the organization and its competencies to meet these challenges – termed by Teece and Pisano (ibid) as ‘managerial capability’. This is where the distinction

between capabilities and competencies comes to the fore because the latter is inextricably linked to matching firm-specific capabilities with market needs.

The notion of capability has been extended into that of *dynamic capabilities* (Eisenhardt and Martin, 2000; Teece et al., 1997). An example is human and intellectual capital (Barney, 1991; Castanias and Helfat, 2001; Reich, 1991; Ulrich and Lake, 1990; Wright et al., 1994, 2001). This is enhanced by the development of people's information, knowledge, and ideas (Pfeffer, 1994), and these in turn help to create dynamic flexibility (Hitt et al., 1998) and strategic competence (Barney, 1986; Bates et al., 1995; Jayaram et al., 1999).

The view of competencies as resources and their implications for company performance and long-term economic growth increased in popularity during the 1990s (Prahalad and Hamel, 1990; Carlsson and Eliasson, 1994; Duysters and Hagedoom, 1996) but the competence-based theory of the firm has emerged from the more general resource based approach (Richardson, 1972; Winter, 1987).

Prahalad and Hamel, (1990: 80) argue that there are a number of important issues involved in core competencies. First, a core competence should be difficult for competitors to imitate: "And it *will* be difficult if it is a complex harmonization of individual technologies and production skills."

Second, managing and utilizing competencies are the ultimate responsibility of the most senior-level management team, including the CEO - and CEOs will: "be judged on their ability to identify, cultivate, and exploit core competencies [...]" (ibid p91).

Third, as we indicated earlier, learning gained from accumulating skills over time is a central feature because "Core competencies are the collective learning in the organization, especially how to coordinate diverse production skills and integrate multiple streams of technologies." (ibid.)

Fourth, core competencies provide opportunities, rather than limitations for the firm: Prahalad and Hamel cited how NEC's competencies applied to the chosen 'core product' - semiconductors - allowed NEC to compete in both telecommunications and computing industries. These four 'tests' are relevant to our discussion because they include the need for senior managers to understand competencies, many of which are related to Operations, as well as the need to develop these over time. Understanding such competencies provides

strategic opportunities, rather than being a limiting factor to the firm's strategic scope of options. This leads to two, interlinking propositions:

Proposition 2: The mere presence of senior-level staff whose job it is to protect in-house capabilities is irrelevant if such capabilities do not meet market requirements.

and

Proposition 2a: The role of senior-level Operations (or related) staff must include scanning and being aware of *external* opportunities and not be one of guarding perceived *internal* capabilities if such routines and production skills provide no strategic advantage for the firm..

However, there are difficulties in pursuing a competence based strategy and a key issue is that identifying a set of core competencies and capabilities may not be as easy as some of the literature implies, because senior-level strategists within the firm may not agree on what is really strategically important (Marino, 1996; Schroeder and Pesch, 1994).

Another issue for the resource based view is that sustainability depends upon three criteria: imperfect imitability, imperfect substitutability and imperfect mobility (Barney, 1991). Resources are only imperfectly imitable if firms that do not have them cannot purchase them. There is a threat that strategies based on substitutable resources might be either matched by competitors using equivalent resources or, alternatively, made obsolete by the introduction of strategies based on superior resources. Resources should not be mobile between actors. Assets such as a reputation for quality, loyalty or innovation cannot be traded freely on open markets but must be accumulated over a sustained period of time within firms.

The extended RBV is basically a recognition that assets may also be acquired externally on factor markets (Mathews, 2003), and has led scholars to search for resources outside of the boundaries of the firm. In particular, studies have focussed on the role of inter-firm relationships as a means to acquire external resources (Koh and Venkatraman, 1991; Harrison et al , 2001; Ireland et al, 2002). The relationship acts as a vehicle on which to acquire those resources required to fill a particular 'resource gap' (Grant, 1991). However, not all inter-firm relationships are equal in this context; the type of resources acquired is

contingent on the form of relationship between the two parties (Araujo *et al.*, 1999; Moller *et al.*, 2003).

However, within the overall resource-based view of strategy it is notable that the terms ‘Operations and ‘Operations strategy’ are notable for their absence. Indeed, it might be argued that the terminology used in much of the resource-based literature falls shy of citing Operations as a strategic factor at all and, at best, the Operations function is seen within the narrow confines of ‘making products within factories’. Thus, within the literature, although much light has been shed on wider issues of routines, capabilities and competencies, we suggest much of the context of this is devoid of the key context within which such activities take place – within Operations. This robs academics and practitioners alike of the full understanding of the Operations role. However, as we shall now see, part of the problem lies with the failure of manufacturing/Operations strategy literature to make a sufficiently strong case to influence the strategy mainstream that might lead to a shared and common dialogue for understanding capabilities, competencies and resourced based strategy.

THE FAILURE OF MANUFACTURING/OPERATIONS STRATEGY

Dangayach & Deshmukh (2001) have estimated that over 250 conceptual and empirical papers on manufacturing strategy have been published in over 30 major journals since the seminal contributions of Skinner (1969; 1974; 1985), Hayes and Wheelwright (1984), and Hill (1985). Academics have asserted for a long time that business and manufacturing strategies should be “linked” (Corbett and Van Wassenhove, 1993; Garvin, 1993; Hill, 1980; Schendel and Hofer, 1979; Skinner, 1969; Wheelwright, 1984). Much of the content concerned with proposed links is couched in terms of the need to align Operations with a market-led strategy. In contrast, it has also been argued that Operations must contribute to a broader “resource protection” strategy (Amit and Schoemaker, 1993; Barney, 1986, 1991; Grant, 1996; Lei *et al.*, 1996). Given the strategic importance of capabilities that reside within Operations, both within the firm and across networks, we might assume that firms would:

- a) Ensure that they had senior-level Operations personnel in place; and

- b) Allow these senior level strategic managers to influence wider business strategy decisions; and
- c) Empower such senior level managers to protect and guard capabilities from being divested or outsourced over time. The problem, though, is that a case for divesting may come from another senior-level strategist within the firm who might not fully understand the strategic importance of Operations (Hayes and Wheelwright 1984, Brown and Blackmon 2005).

It might be assumed that a resource-based view would necessarily involve Operations managers who could be best positioned to fully understand what the content of resource-based strategy should be. Given such strategic responsibility, the Operations manager knows best how far to set stretch-goals and “strategic intents” (Hamel and Prahalad 1989) because he/she is closest to where competencies and capabilities reside within the business enterprise. Operations capabilities have been likened to ‘stocks’ of strategic assets that are accumulated over time. These strategic assets are not able to be copied or acquired and good substitutes cannot be found (Dierickx & Cool, 1989). Thus, a range of capabilities such as low cost, quality, flexibility, and delivery performance, residing within the firm, are stocks of strategic assets that have been accumulated over time. These competitive capabilities, which are needed within modern manufacturing paradigms, may be enhanced by appropriate investment in process technology (Bessant *et al.* 2001). In particular, process technology is a strategic enabler within manufacturing firms (Meredith & Vineyard 1993; Schroeder *et al.* 1995; Wathen 1995; Beach *et al.* 2000), allowing the firm’s manufacturing-specific capabilities (Bahrami & Evans 1987; Twiss & Goodridge 1989, Adler & Ferdows 1990; Bessant 1993) created by process technology to be more competitive in the market.

The body of manufacturing strategy literature has often been couched in terms of providing a case for the existence of manufacturing strategy (Hill, 1995; Platts & Gregory, 1990). The volume of literature on manufacturing strategy has increased substantially since the mid-1980s when, among others, Hayes and Wheelwright (1984) made a profoundly important contribution by mapping how manufacturing’s role is linked with that of business strategy. Their model showed that the degree of involvement varies from a position of being passive and reactive (stage 1) to a full, pivotal involvement in the planning stages of business strategy (stage 4). As important as this has been to the debate on manufacturing/Operations

strategy literature, its impact is suspect for at least three reasons. First, evidence is lacking as to the extent to which firms utilize the model within their strategic planning process or how firms change within this four-stage process either over time (Hum & Leow, 1996). Second, there is little evidence to show how the model has been applied within particular industrial sectors. Third, this, and other models within the Operations strategy literature, has not been embraced within the mainstream strategy literature and it is still unclear as to how precisely manufacturing strategy links with the corporate strategy process (Spina 1998). The reason seems to lie in the fact that in the attempt to be seen as an important area of strategy literature, manufacturing strategy has failed to create sufficient links with mainstream strategy literature. Ward et al. (1996: 597) observe that:

“research in strategic manufacturing practices has been largely independent of research in competitive strategy despite a considerable literature proclaiming the need to regard manufacturing as a competitive weapon.”

Part of the “blame” for the lack of common dialogue between the business and manufacturing strategy literatures lies with major gaps in the manufacturing strategy literature. Leong et al. (1990) suggest that the manufacturing strategy literature has not produced a well-organized paradigm due to three reasons:

- (a) An absence of cohesive theory-building efforts on the part of manufacturing strategy researchers;
- (b) A shortage of survey-based empirical work; and
- (c) A lack of effort to integrate manufacturing strategy ideas with established concepts and theories developed in related disciplines.

Surprisingly, research in strategic manufacturing practices has been largely independent of research in competitive strategy despite a considerable literature proclaiming the need to regard manufacturing as a competitive weapon (Buffa, 1984; Cohen & Zysman, 1987; Hayes & Wheelwright, 1984).

Thus, the extent to which manufacturing strategy has impacted upon wider realms of business strategists is far from clear. There has even been the suggestion that, for some academics and practitioners alike, manufacturing strategy might be seen as passé (Clark, 1996). What is clear, though, is that manufacturing strategy has not been alluded to and cited

in the body of mainstream strategy literature; nor has it become an explicit feature of the body of literature, largely under the heading of ‘innovation’, that discusses routines, capabilities and competencies. We now seek to offer insights into why such an omission has taken place over time.

THE TRANSITION FROM CRAFT TO MODERN PRODUCTION METHODS AND ITS IMPACT UPON STRATEGY

The transition from craft manufacturing through mass production to the current era provides profound insights into how Operations strategy became divorced from the strategy mainstream.

The transition from craft to mass production caused four major factors to emerge. First, whereas under craft production, there was a close link between the strategic pursuit of the firm and the Operations it performed, this changed under mass production. In short, Operations became identified as a separate function and Operations managers were often absent from the most senior levels of the firm as enterprises became larger and more functionally organized (Chandler, 1962; Chandler, 1992; Lazonick, 1991). Coinciding with the transformation from craft to mass processes was the emergence of the M-form, which over time dominated the structure of firms within the USA and also became the dominant form among large diversified companies in Britain, France and Germany (Whittington and Mayer, 2000).

The M-form enabled the subsequent development of the conglomerate company and the multinational enterprise (Williamson, 1981; Teece, 1977, 1983, 1986). Although the organizational shape of the M-form has come under some criticism (Gooderham and Ulset 2002, Bartlett and Ghoshal 1993) the reasons for this are not linked to the development and protection of capabilities and competencies, nor of their deployment by senior-level Operations managers. One of the areas under-developed within the literature is, we suggest, how the M-Form led, consciously or otherwise, to the demise of the strategic importance of Operations. Thus, although there has been increasing importance placed on Operations personnel in terms of their contribution to the firm’s capabilities (Womack et al., 1990;

Kenney & Florida, 1993), - and hence part of the dynamic capabilities of the firm (Teece et al 1997) to which we referred earlier - this has not included discussion about their involvement in terms of their position of level of seniority within the hierarchy nor of the associated strategic influence they might have within the firm.

The second factor is that, within mass production and the emergence of the M-Form, the role of Operations managers often became reduced to that of a technical specialist rather than an involvement in the wider strategic business of the firm. Thus, coupled with our first point, Operations' contribution to the strategy process was often ignored by other, often more senior-level, strategists within the firm whose understanding of the potentially strategic contribution from Operations were, typically, very limited (Hayes & Wheelwright, 1984).

Third, the role of Operations strategies declined over time (Skinner 1969, 1985, Hill 1995, Brown 2000). This is an important issue too because, as we have noted before, accruing and developing capabilities and competencies does not come about 'by chance' but depends upon a strategy to accumulate such. However, over time, Operations strategies, if they existed at all, were merely the means by which an already existing *business* strategy became translated into plant-level, tactical Operations. This may have been appropriate for the mass production era but current market requirements are entirely different and demand a dynamic set of capabilities and competencies to be in place (Teece et al 1997).

The fourth factor was a mismatch in the timing of, and synchronization between, business strategy and, where it existed at all, Operations strategy, with the former being seen as 'long-term' and the latter, 'short-term' and tactical in nature (Lazonick 1991). Synchronization in aspects of strategic planning has relevance for Operations because as Itami and Namarari (1992) suggest, cohesion of timing in linking strategy with technology is a vital managerial task. This leads to our third proposition:

Proposition 3: The change of paradigms from craft to mass production needs to be seen not only in terms of the shift from low to high volume; rather, such change provides the major insights to how the Operations function lost strategic importance, in spite of its continued pivotal role in a range of mainstream strategy areas, including core competencies and key success factors.

We suggest that these four changes in the transition from craft to mass production need to be understood by those who discuss capabilities and competencies as strategic factors for the

firm. Thus, mass production was not merely about the change from low volume, craft products, to high volume (mass produced) products. Rather, the four factors provide insights into the key changes between craft and mass production in the context of strategic planning. Without senior-level Operations personnel being in place, with the associated power of involvement within the overall strategy process of the firm, any accumulation of capabilities and competencies residing within Operations could be under threat. Thus, although as we indicated earlier, we might expect Operations personnel to be charged with safeguarding such capabilities they might be unable to do so if a strategic decision has been made at ‘higher’ levels within the firm’s hierarchy so that Operations personnel are powerless to resist.

These four changes were perhaps inevitable, particularly in the growth of large, multi-divisional enterprises within the United States. With this increase in size came the creation of increased levels of hierarchy within the firm. The exclusion of Operations personnel from the strategic direction of the firm had enormous impact because now, in contrast to craft enterprises, there could be conflict and tension between conflicting goals within the firm. In other words, strategic resonance would be difficult to achieve because of conflicting demands between top levels (strategic) and perceived lower levels (Operations) of management

Although the strategy process in some firms involves multiple functional areas and hierarchical areas of the firm (Hax & Majluf 1991), the corporate “parent” typically has the final say in devising strategy for the subsidiary divisions and plants within the firm (Goold & Campbell 1988). Such strategy may lead to the demise of accumulated capabilities and competencies in the pursuit of lowering costs. This is clearly notable in the recent increase in the level of outsourcing activities where cost, frequently, becomes the key cost driver (Abdel-Malek *et al* 2005, Feeny *et al* 2005)

The key issue for us is that firms have remained stuck within past paradigms of strategy rooted within mass production. This is notable for the over-dependence upon an elite strategy-making group at the top of the organization’s hierarchy. As a result of this *strategic dissonance* (Brown 2000) occurs not only between the firm and its chosen markets, but also within the firm itself, in the mismatch between strategic intent (Hamel & Prahalad, 1989) and Operations capabilities. The reason for this lies in the changes of manufacturing/Operations

processes over time and how these became divorced from the firm's strategy process (Lazonick, 1991; Lazonick & West, 1995).

Interestingly, much of the literature on routines, capabilities and competencies discuss changes to the organizational form and a great deal of attention has been placed on the 'M-form' of organization as a coping mechanism to deal with change (Chandler 1992, Ouchi 1984, Milgrom and Roberts 1990). However, although discussions of organizational change and the emergence of the 'M-form' shed light on the historical developments, they fail to deal with the demise of Operations from the strategic realms of the firm.

THE GAP BETWEEN CAPABILITIES AND THE STRATEGY PROCESS.

We have seen how strategy processes changed under the transition from craft to mass production. Recently, it has become evident that the current competitive landscape in many industries is one of ongoing, heightened levels of competition, which demand that a range of capabilities - including flexibility, delivery speed, and innovation - are in place. Dynamic environments (Swamidass & Newell 1987; Gerwin 1993) and new production modes such as *mass customization* (Pine *et al.* 1993, Kotha 1995), *agile manufacturing* (Kidd 1994), *flexible specialization* (Piore & Sabel 1984), *lean production* (Womack *et al.* 1990), and *strategic manufacturing* (Hill 1995; Brown 2000) demand increased manufacturing flexibility and a more dynamic approach than was the case with the more traditional and inflexible approach of mass production. These approaches have emerged as a result of increased competition and greater levels of customer choice.

Mass customization describes the ability to both produce and distribute what are perceived to be customized goods and services within a Mass market (Davis, 1987). Some of the literature (for example Gilmore and Pine, 1997; Feitzinger and Lee 1997) indicated that *mass customization* somehow follows a natural trajectory through the different eras of manufacturing: from craft (high variety, low volume Production) to Mass Production (high volume, low variety Production) through to *mass customization* (the ability to achieve simultaneous requirements of both volume and variety).

Mass customization and *Agile Manufacturing* are sometimes linked but Bessant *et al* (2001:30) offer a useful definition of Agility in its own right:

“Agility in manufacturing involves being able to respond quickly and effectively to the current configuration of market demand, and also to be proactive in developing and retaining markets in the face of extensive competitive forces”

Developing capabilities within both *Mass Customization* and *Agile manufacturing* demands that a strategy is in place to achieve these requirements. However, some interesting current examples of this “strategy-Operations” mismatch have been found because in many industries, firms have fallen behind due to their failure to apply flexible technologies “flexibly” (Dean and Snell, 1996). That is, they failed to build-up the proper organizational processes required to take advantage of flexibility as markets demanded. These organizations have often encountered what McCutcheon and Raturi (1994) see as the “responsiveness-customization squeeze”. In hoping to attack markets from a traditional “market-based” viewpoint, these firms have failed to respond on time to demand because they have tried to set customization objectives according to strategic marketing prerogatives, but have drawn their Operations function into impossible targets to deliver the requirements. Under such circumstances, Operations capabilities were not allowed to achieve their full potential to survive in the face of hyper-competition. However, Operations strategy may become a means of ensuring that the firm’s strategic resources are constantly regenerated (Tranfield and Smith, 1998). Organizational agility would depend directly on Operations’ proficiency in analyzing, developing, and leveraging resources, capabilities, and competencies.

Perhaps the most popular term to describe the current era is that of *Lean Manufacturing*. This developed from the book, *The Machine that Changed the World*. (Womack et al 1990). In Womack et al’s (1990) book there was, typically, a 2:1 ratio between *Lean* and ‘non-*Lean*’ producers in a range of capabilities. For example, *Lean* producers would use half the time for innovation compared to ‘non-*Lean*’ plants; they would have at least 50% fewer defects; they would need only half the space required to manufacture products compared with their non-*Lean* counterparts; and the same 2:1 ratio applied to productivity levels. These parameters have relevance for our earlier discussion about ‘stocks’ of strategic assets or capabilities that a firm’s Operations function has accumulated over time and that others (in this case, non-*Lean* competitors) would find hard to copy. Clearly, *Lean* practices have been adopted across a range of industries but we suggest that, in common with

mass customization and *agile* paradigms there are weaknesses regarding the strategic importance of Operations in *Lean* manufacturing. The main problems of modern manufacturing paradigms include the following:

1. The strategic role of the Operations function: The potential strategic contribution made by the Operations function, upon whom the firm depends for its capabilities in *mass customization*, *agility* and *Lean*, is largely ignored in terms of its contribution (at any stage) to strategic planning.

2. Operations strategy: There is little or no mention of the presence and development of Operations strategy that might feed into corporate planning and strategy. Indeed the term, "Operations strategy", is noticeable by its absence within the literature on *Lean*, *Customization* and *Agile Manufacturing*.

3. The role of senior-level Operations staff: *Lean* and other manufacturing paradigms literature focus on the *operational* capabilities and competencies that are required without addressing the link between these and Operations' presence and involvement at senior levels within the firm.

These are glaring omissions because Operations capabilities, particularly within Toyota (often cited as the exemplar of *Lean*), were dependent upon, and owed their success to, a strategic process (including who was involved in the strategic planning process) that was entirely different to that which took place within many firms in the West (Gleave & Oliver, 1990). Toyota was able to fuse together corporate strategy and Operations capabilities into a unified whole. This was perhaps the most important feature of the Toyota Production system, yet, for some reason, the link between plant level capabilities and strategy formulation was a glaring omission in various publications that narrated these superior Operations capabilities without describing the full strategic context (Brown, 2000). This leads to our fourth proposition:

Proposition 4: Modern manufacturing paradigms including *Lean Production*, *Mass Customization* and *Agile Manufacturing* are often discussed in terms of sets of capabilities that reside within Operations but their links to the strategic processes of the firm are typically ignored altogether or, at best, underdeveloped.

and

Proposition 4a Unless such capabilities are understood and become an explicit part of the strategic decision making levels of the firm their strategic potential may not be fully exploited and, indeed, may become lost via a range of strategic decisions including outsourcing, downsizing and divesting, thereby sacrificing such capabilities.

We mentioned earlier how we might expect senior-level Operations people to be able to safeguard capabilities and competencies that have developed over time but they are often incapable of doing so because of their subservient role within the hierarchy of the firm. This was clearly exemplified at Rover within the UK. Through its alliance with Honda it had accumulated capabilities and competencies in *Lean* practices and was heralded as one of the most ‘*Lean*’ of all automobile firms within Europe (Johnson and Scholes 1999). These capabilities came about only because of Rover’s strategic alliance with Honda – in essence the *operational* capabilities were accrued and developed only as a result of Rover's *strategic* horizontal alliance. However, all of the accumulation of skills, capabilities and competencies, which had been developed and guarded over time, counted for nothing when its parent, British Aerospace, then sold Rover to BMW. In essence, a corporate/business decision had served to threaten accrued capabilities and to annihilate the strategic alliance with Honda. Over a short period of time, Rover’s fortunes declined until finally, in 2004, Rover ceased to exist.

The strategy-Operations capabilities issue was clearly evident at Chrysler. The turnaround between 1991 (when it was almost bankrupt) and 1996 owed a great deal to accruing capabilities in innovation. Rapid innovation demonstrated the intense learning that Chrysler had undertaken concerning Japanese approaches (Brown, 2001). However, the merger that took place between Daimler and Chrysler in 1999 dramatically threatened these capabilities. The merger of Daimler–Chrysler created the world’s fifth-largest car company by volume but there were major differences both in the organizational structures and the innovation processes that resided within the two firms. At the time of the merger, Chrysler purchased 70% of its added value from its US suppliers with whom it enjoyed the best relationships of the former, ‘Big 3’ US car producers (Brown, 1998). In contrast, Daimler was, and remains, a very vertically integrated manufacturer of luxury cars. The problem is evident in the differing supply networks and the merger has threatened one of the major foundations upon

which Chrysler's success in innovation was built, which, like Rover, was its strategic relationships with suppliers. The Daimler–Chrysler exemplifies part of the strategic puzzle for firms: on the one hand, given the over-capacity evident within the automobile industry, there are valid, strategic reasons why the merger took place; on the other, the development of capabilities and competencies in innovation is strategically important but the merger may threaten the strategic innovation capabilities of both firms within the merger.

The key problems related to modern manufacturing paradigms are shown in Table 1.

Please insert Table 1 about here

DISCUSSION: THE NEED FOR STRATEGIC RESONANCE BETWEEN OPERATIONS AND STRATEGY PROCESSES WITHIN FIRMS

Mass production's very existence was a major process innovation with very defined and narrow sets of routines, which had enormously positive consequences for the US economy. Indeed, for several decades in the 20th Century, the adoption of this paradigm enabled the USA to become an economic powerhouse. It is within the context of this manufacturing paradigm that much of the literature on routines was positioned. However, with current greater demands being placed on flexibility and speed (among other competitive requirements) the view that sees the role of Operations being reduced to menial, repetitive, tasks and routines is inappropriate for the current era. More fundamental to our discussion is that, although the strategic planning processes associated with mass production may have been entirely appropriate for the relatively static nature of markets that existed before, it is wholly inappropriate now that many market requirements are substantially different with respect to the pace of rapid market changes.

The problem remains that for some writers the notion of capabilities continues to be rooted within the mass production strategy paradigm with the separation of Operations from strategy levels of the firm. For example, Nelson (1991: 67–68) stated “three different if strongly related features of a firm that must be recognized [...] its strategy, its structure, and

its core capabilities” but he also endorsed the rather fixed notion of hierarchy in which the contribution of Operations personnel was functional in scope and reactive in nature with little or no strategic relevance. Thus, for Nelson (ibid) core organizational capabilities are based on:

“a hierarchy of practiced organizational routines, which define lower order organizational skills [skills required at the lower levels of the hierarchy], and how these are coordinated, and higher order decision procedures for choosing what is to be done at lower levels”.

Such separation and specialization led to (and still allows if not rectified) organizational distance between Operations managers and the most senior managerial levels of the firm (Chandler, 1962, 1992; Lazonick, 1991; Wheelwright and Clark, 1992).

Whilst the ‘benefits of functional specialization’ (Pavitt, 1998) were, and continue to be, seen as a key means to enhancing the firm’s processes, during the mass production period this specialization also created a gap between the various functional activities.

We are not trying to prescribe a formula for success here. Rather, we are attempting to show the inherent strategic blockages that took place within mass production – which were permissible given the nature of static markets of the time – but are inappropriate today. We now allude to the notion of strategic resonance as a means of unifying notions of capabilities, competencies linked to the specific – and strategic – role of Operations within and across firms. Brown (2000:6) has already defined strategic resonance as:

“an ongoing, dynamic, strategic process whereby customer requirements and organizational capabilities are in harmony and resonate. Strategic resonance is more than strategic fit—a term which has often been used (rightly in the past) to describe the ‘fit’ between the firms’ capabilities and the market that it serves. Strategic resonance goes beyond that. Strategic fit may be likened to a jigsaw where all parts fit together. This is a useful view but it can have [...] a very static feel to it. In strategic fit it is as if once the ‘bits’ are in place, the strategic planning is done. By contrast, strategic resonance is a dynamic, organic process, which is about ensuring continuous

linkages and harmonization between:

- The market and the firm's Operations capabilities
- The firm's strategy and its Operations capabilities
- All functions and all levels within the firm.

Firms need to find and exploit their strategic resonance— between markets and the firm; within the firm itself; and between senior level strategists and plant-level, Operations capabilities.”

We develop the term strategic resonance here to focus specifically on capabilities, competencies and resource driven strategies. Brown and Blackmon (2005) argue that three core areas contribute to strategic resonance between Operations and business strategy:

- (1) Identifying and developing Operations capabilities, especially core capabilities related to people, processes, products, and networks.
- (2) Increasing senior executive awareness of Operations capabilities in the strategy process.
- (3) Increasing the involvement and influence of manufacturing executives in the strategy process

In essence, strategic resonance is concerned with managing two sets of capabilities that need to be in place simultaneously. These are:

1. Within the firm's functions so that there is cohesion and strategic alignment within them.
2. Between the firm's capabilities and the market segments in which the firm wishes to compete.

The issues of implementing strategic resonance include one of communication (who speaks to whom about what?) and how the process is then operationalized. Again, with the caveat that we are not describing a panacea, we suggest that ensuring links take place between capabilities, competencies and Operations strategy (allied to business strategy) the following must come into play.

First, Operations/Manufacturing personnel need to be in place at senior management/director levels of the firm in order to rectify the omission that took place under the changes from craft to mass production. As we have noted, such senior-level presence is not common in many firms nor is it an explicit feature within the strategy mainstream literature (Hayes and Wheelwright, 1984; Hill, 1995).

Second, there needs to be much greater cohesion and less organizational ‘distance’ between the role of the Chief Executive Officer and the Chief Operating Officer within firms. Recently, the advent of this closer liaison of the two roles accounts to some degree for expertise within Operations capabilities in various firms, most notably Dell (Dell and Fredman, 1999; Hodgetts, 1999) and Toyota (Brown 2000). The issue of organizational distance (and its negative impact upon innovation) has been addressed to some extent within the literature (e.g. Clark and Wheelwright 1992, Simonin 1999) but the linkages between the CEO (business) and COO (Operations) strategies has not been fully explored.

Third, these senior-level manufacturing/Operations personnel need to be involved in the business strategy planning process rather than being limited to a role of technical specialist.

Fourth, there will need to be explicit, plant-specific, Operations strategies that feed into, and form part of, the business strategy. A key element of this is that there needs to be cohesion in timing between manufacturing/Operations and business strategies.

CONCLUSIONS

We have provided insights into how the strategic role and importance of Operations has diminished within firms over time. The two main reasons are:

1. The changes of manufacturing paradigms from craft through mass production to the current era of *Mass Customization* and *Lean*, among others.
2. The change of the organizational form over time, particularly in the emergence of the M-form.

Both of these developments led to the Operations function becoming relegated in strategic importance due to a lack of senior level presence within the firm; the change of role in Operations from any business input to a technical function; and the absence of manufacturing/Operations strategies that may lead into, and form part of, wider business strategy. This separation of Operations from the strategy process has become evident in how academics and practitioners alike view the strategy process. The strategic importance of Operations has become notable by its absence in mainstream literature in spite of Operations’ central and pivotal role in the whole debate on capabilities, competencies and the wider resource-based view of strategy formulation. In addition, from the manufacturing/Operations side, little impact has been made in infiltrating and

influencing the mainstream literature in spite of over 250 articles having been written on manufacturing strategy since Skinner's (1969) seminal work. However, what is clear is that capabilities and competencies in Mass Customization, Lean Production and Agile Manufacturing do not come about by chance but, instead have to be developed and guarded over time. The fusion of the two elements of strategy mainstream and manufacturing strategy into a more unified coherent body would seem to be a necessary development within future strands of the literature in order to aid our understanding of modern manufacturing paradigms.

REFERENCES

- Abdel-Malek, L., Kullpattaranirun, T. & Nanthavanij, S. 2005. A framework for comparing outsourcing strategies in multi-layered supply chains. *International Journal of Production Economics*, 97 (3):318-328.
- Adler, P.& Ferdows, K. 1990. The chief technology officer. *California Management Review*, 32 (3): p55-63.
- Amit, R. & Schoemaker, P. 1993 . Strategic assets and organizational rent. *Strategic Management Journal*, 14 (1): 33-46.
- Araujo, L., Dubois A., & Gadde L.E. 1999. Managing interfaces with suppliers. *Industrial Marketing Management*, 28 (5): 497-506.
- Bahrami H., & Evans, S. 1987. Stratocracy in high technology firms. *California Management Review*, 30 (1):51-67.
- Barney, J.B., 1986 . Organizational culture: Can it be a source of sustained competitive advantage? *Academy of Management Review*, 11 (3): 656-665.
- Barney, J.B. 1991. Firm resources and sustained competitive advantage. *Journal of Management* 17 (1): 99-120.
- Bartlett,C.A. & Ghoshal, S. 1993. Beyond the reform: toward a managerial theory of the firm. *Strategic Management Journal*, 14 (8): 23-46.
- Bates, K.A., Amundson, S.D., Schroeder, R.G., & Morris, W.T. 1995. The crucial interrelationship between manufacturing strategy and organizational culture *Management Science*, 41 (10): 1565-1580.
- Beach, R., Muhlemann A.P., Price, D.H.R., Paterson A., & Sharp J.A. 2000 Manufacturing operations and strategic flexibility: Survey and cases *International Journal of Operations & Production Management*,20(1): 13-27.
- Bessant, J. 1993 . The lessons of failure: Learning to manage new manufacturing technology. *International Journal of Technology Management* Special Issue on Manufacturing Technology 8 (2/3/4) : 197-215.
- Bessant, J., Brown S., Francis, D., Meredith, S. & Kaplinsky, R. 2001. Developing manufacturing agility in SMEs. *International Journal of Technology Management*. 22 (1-3): 28-54.
- Brown, S. 1996. *Strategic manufacturing for competitive advantage* Hemel Hempstead UK: Prentice Hall.

- Brown, S. 1998 . Manufacturing strategy, manufacturing seniority and plant performance in quality *International Journal of Operations & Production Management*, 18 (6): 24–39.
- Brown, S. 2000 . *Manufacturing the future – Strategic resonance for enlightened manufacturing*. London: Financial Times/Pearson Books.
- Brown, S. 2001 . Managing process technology – Further empirical evidence from manufacturing plants. *Technovation*, 21 (8): 467-478.
- Brown, S. & Blackmon K. 2005. Linking manufacturing strategy to the strategy mainstream: the case for strategic resonance. *Journal of Management Studies* 42 (4): 793-815.
- Buffa, E.S. 1984. Making American manufacturing competitive *California Management Review*, 26 (3): 9-47.
- Carlsson, B. & Eliasson, G., 1994. The nature and importance of economic competence. *Industrial & Corporate Change* 3 (3): 687-711.
- Castanias, R. P. & Helfat, C. E. 2001. The managerial rents model: Theory and empirical analysis *Journal of Management*, (27) 6: 661-679.
- Cantwell, J.& Fai, F., 1999. Firms as the source of innovation and growth: the evolution of technological competence. *Journal of Evolutionary Economics*, 9 (3): 331-67.
- Chandler, A. 1962 . *Strategy and structure: chapters in the history of the American industrial enterprise* Boston: MIT Press.
- Chandler, A. 1992 . Corporate strategy structure and control methods in the United States during the 20th century. *Industrial & Corporate Change*, 1 (2) : 263-284.
- Clark, K. 1996 . Competing through manufacturing and the new manufacturing paradigm: Is manufacturing strategy passé? *Production and Operations Management* 5 (1): 42-58.
- Clark, K. B. & Wheelwright S. C. 1992 Organizing and leading heavyweight development teams. *California Management Review*, 34 (3) 9-20.
- Cohen, S & Zysmann, J. 1987. *Manufacturing matters* New York: Basic Books.
- Conner, K.R. & Prahalad, C.K. 1996. A Resource-based theory of the firm: Knowledge versus opportunism. *Organization Science: A Journal of the Institute of Management Sciences*, 7 (5): 477-501.

- Corbett, C. & Van Wassenhove, L. 1993. Trade-offs? What trade-offs? Competence and competitiveness in manufacturing strategy *California Management Review*, 35 (4): 107-120.
- Dangayach, G.S. & Deshmukh, S.G. 2001. Manufacturing strategy: Literature review and some issues *International Journal of Operations & Production Management* 21 (7) : 884-932.
- Davis, S. 1987. *Future Perfect* Reading MA: Addison-Wesley.
- Dean, J.W. & Snell, S.A. 1996. The strategic use of integrated manufacturing: an empirical examination *Strategic Management Journal*, 17 (6):459-480.
- Dell, M & Fredman C. 1999. *Direct from Dell: Strategies that revolutionized an industry* New York: Harper Business.
- Dertouzos, M., Lester, R & Solow, R. 1989. *Made in America*. Cambridge MA: MIT Press.
- Dierickx, I. & Cool, K. 1989. Asset stock accumulation and sustainability of competitive advantage. *Management Science* 35 (12) 1504-1514.
- Dosi, G. & Marengo, L. 1993 . Some elements of an evolutionary theory of organizational competencies. In R. W. England Ed. *Evolutionary concepts in contemporary economics*. Ann Arbor: University of Michigan Press.
- Duysters, G & Hagedoom, J. 1996. The effect of core competence building on company performance in MERIT Working paper 2/96: 2-14.
- Eisenhardt, K. M. & Martin, J. A. 2000. Dynamic capabilities: what are they? *Strategic Management Journal*, 21 (10/11): 1105-1122.
- Feeny, D., Lacity, M., & Willcocks, L. P. 2005. Taking the measure of outsourcing providers. *Sloan Management Review*, 46 (3):41-48.
- Feitzinger, E. & Lee, H. L. 1997. Mass customization at Hewlett-Packard: The power of postponement. *Harvard Business Review*, (75) 1:116-22.
- Garvin, D.A. 1993 . Manufacturing strategic planning. *California Management Review*, 35 (4): 85-107.
- Gerwin, D. 1993 . Manufacturing flexibility: A strategic perspective *Management Science* 39 (4) : 395-410.
- Gilmore, J. H.; & Pine B. J. 1997. The four faces of mass customization. *Harvard Business Review* 75 (1): 91-101.

- Gleave, S. & Oliver, N. 1990. Human resources management in Japanese manufacturing companies in the UK: 5 Case Studies. *Journal of General Management* 16 (1): 54-68.
- Goold, M. & Campbell, A. 1988 . Adding value from corporate headquarters. *London Business School Journal*, Summer: 17–31.
- Gooderham P. & Ulset, S. 2002. Beyond the M-form: Towards a critical test of the new form. *International Journal of the Economics of Business*, 9 (1): 117-138
- Gottlieb, D.W. 1994. Government pushes agile manufacturing *Purchasing*, 117 (4):33-4.
- Grant, R.M. 1991. The resource-based theory of competitive advantage: Implications for strategy formulation. *California Management Review*. 33 (3) 114-135.
- Grant, R.M. 1996 . Toward a knowledge-based theory of the firm. *Strategic Management Journal*. Winter Special Issue, Vol. 17: 109-122.
- Hax, A & Majluf, N. 1991 *The Strategy Concept & Process* Eaglewood Cliffs New Jersey: Prentice Hall.
- Hamel, G. & Prahalad, C.K. 1989. Strategic intent. *Harvard Business Review*(67) 3: 63-76.
- Hamel, G. & Prahalad, C.K. 1994. *Competing for the Future*. Boston MA: Harvard Business School Press.
- Harrison J.S., Hitt M.A., Hoskisson, R.E. & Ireland R.D. 2001 . Resource complementarity in business combinations: Extending the logic to organizational alliances. *Journal of Management*, 27 (6): 679-690.
- Hayes, R. & Wheelwright, S. 1984 *Restoring our competitive edge*. New York: Wiley & Sons.
- Hines, P. 1994 . *Creating world class suppliers: unlocking mutual competitive advantage*. London: Pitman
- Hill, T. 1980 . Manufacturing implications in determining corporate policy . *International Journal of Operations & Production Management* 1 (1) 3–11.
- Hill, T. 1985 . *Manufacturing Strategy*. Basingstoke: Macmillan.
- Hill, T. 1995 . *Manufacturing Strategy*_ 2nd Ed. Basingstoke: Macmillan.

- Hitt, M.A. Keats, B.W. & DeMarie, S.M. 1998 . Navigating in the new competitive landscape: Building strategic flexibility and competitive advantage in the twenty-first century . *Academy of Management Executive*. 12 (4) 22-43.
- Hodgetts, R. M. 1999 . Direct from Dell: Strategies That Revolutionized an Industry. *Organizational Dynamics*, 28 (2):89-90.
- Hoskisson, R. Hitt, M. Wan W., & Yiu D. 1999. Theory and research in strategic management: Swings of a pendulum. *Journal of Management* 25 (3):417-456.
- Hum S.. & L. Leow. 1996. Strategic manufacturing effectiveness. An empirical study based on the Hayes- Wheelwright framework . *International Journal of Operations & Production Management* 16 (4): 4-18
- Ireland, R.. Hitt, M.A. Vaidyanath, D 2002. Alliance management as a source of competitive advantage. *Journal of Management*, 28 (3): 413-446.
- Iansiti , M. & Clark, K. 1994. Integration and dynamic capability: Evidence from product development in automobiles and mainframe computers. *Industrial & Corporate Change* 3 (3): 557-605.
- Itami, H & Numagami, T. 1992 Dynamic interaction between strategy and technology *Strategic Management Journal*, 13 (8):119-135.
- Itami, H. & Rohel, D. 1987. *Mobilizing invisible assets*. Cambridge MA: Harvard University Press.
- Jayaram, J., Droge, C., & Vickery S. 1999. The impact of human resource management practices on manufacturing performance. *Journal of Operations Management* 18 (1): 1-20.
- Johnson, G. & Scholes, K. 1999 . *Exploring corporate strategy*. 5th ed. Hemel Hempstead UK: Prentice Hall.
- Kenney, M. & Florida R. 1993 . *Beyond mass production*_ New York: Oxford University Press.
- Kidd, P. 1994 . *Agile manufacturing - forging new frontiers*. Reading MA: Addison Wesley.
- Koh, J. & Venkatraman N. 1991. Joint venture formations and stock market reactions: An assessment in the information technology sector. *Academy of Management Journal* 34 (4): 869-892
- Kogut, B. & Zander, U. 1992. Knowledge of the firm combinative capabilities and the replication of technology. *Organization Science*. 3 (3) 383-397.

- Kotha, S. 1995. Mass customization: implementing the emerging paradigm for competitive advantage. *Strategic Management Journal*, 16 (5):21-42.
- Lamming, R. 1993. *Beyond Partnership* Hemel Hempstead UK: Prentice Hall.
- Lazonick, W. 1991. *Business organization and the myth of the market economy*. Cambridge MA: Harvard University Press.
- Lazonick, W. & West, J. 1995 . Organizational integration and competitive advantage: Explaining strategy and performance in American industry *Industrial & Corporate Change*, 4 (1) : 229-269.
- Lei, D. Hitt, M.A. & Bettis, R.A. 1996. Dynamic core competencies through meta-learning and strategic context. *Journal of Management*, 22 (4): 549-569.
- Leonard-Barton, D. 1992 . Core capabilities and core rigidities: A paradox in managing new product development . *Strategic Management Journal*. 13 (5):111-125.
- Leonard-Barton, D. 1995 . *Wellsprings of knowledge: building and sustaining the sources of innovation*. Boston: Harvard Business School Press.
- Leong, G. K. Snyder, D. L.& Ward,P. T.1990 .Research in the process and content of manufacturing strategy. *Omega*, 18 (2): 109–22.
- Marino, K.E. 1996 Developing consensus on firm competencies and capabilities *Academy of Management Executive*, 10 (3): 40-51.
- Mathews, J. A. 2003. Strategizing by firms in the presence of markets for resources. *Industrial & Corporate Change*. 12 (6): 1157-1193.
- McCutcheon, D. M.; Raturi, A. S. 1994. The customization-responsiveness squeeze *Sloan Management Review*, 35 (2): 89-99.
- Meredith , J. & Vineyard M. 1993 A longitudinal study of the role of manufacturing technology in business strategy *International Journal of Operations & Production Management*, 13 (12): 4-25.
- Milgrom, P. & Roberts, R. 1990. The Economics of Modern Manufacturing: Products Technology and Organization. *American Economic Review* 80 (3) 511-28.
- Mintzberg, H. Ahlstrand, B.& Lamprel J.2000. *Strategy Safari: A Guided Tour Through the Wilds of Strategic Management* London:Financial Times Books.

- Moller, M.M., Johansen J., & Boer. H., 2003. Managing buyer-supplier relationships and inter-organisational competence development. *Integrated Manufacturing Systems*, 14 (4): 369-379.
- Nagel, R.N. & Bhargava, P. 1994. Agility: the ultimate requirement for world-class manufacturing performance. *National Productivity Review*, 13 (3):331-40.
- Nelson, R. R. 1991. Why Firms Differ and How Does it Matter? *Strategic Management Journal*, 12 (8): 61-74.
- Nelson, R.R. & Winter, S.G. 1982. *An evolutionary theory of economic change*. Boston, MA: Harvard University Press .
- Ouchi, W. G. 1984. *The M-Form Society*. Reading Mass: Addison-Wesley.
- Pavitt, K. 1998. Technologies products and organization in the innovating firm: what Adam Smith tells us and Joseph Schumpeter doesn't . *Industrial & Corporate Change*, 7 (3): 433-452.
- Penrose E.T. 1959. *The theory of the growth of the firm*. Oxford: Oxford University Press
- Pfeffer, J. 1994 *Competitive advantage through people* Boston MA: Harvard Business School Press.
- Pine, J. Victor, B. & Boynton, A. 1993 .Making mass customization work *Harvard Business Review*, 71 (5): 108-119.
- Piore, M. & Sabel, C. 1984. *The second industrial divide: Possibilities for prosperity* New York: Basic Books.
- Platts, K & Gregory, M 1990 . Manufacturing audit in the process of strategy formulation. *International Journal of Operations & Production Management* 10 (9): 5-26
- Prahalad, C. & Hamel, G. 1990. The core competence of the corporation. *Harvard Business Review*, 68 (3) 379-91.
- Qing Cao; & Shad D. 2005. The impact of alignment between virtual enterprise and information technology on business performance in an agile manufacturing environment *Journal of Operations Management* 23 (5):531-550.
- Reich, R.B. 1991 . *The work of nations: Preparing ourselves for 21st-century capitalism*. New York: Knopf.

- Richards, C.W. 1996. Agile manufacturing: Beyond lean? *Production & Inventory Management Journal* 37 (2): 60-4.
- Richardson, G.B. 1972. The organisation of industry. *Economic Journal*, 82 (327) p883-896
- Schendel, D. & Hofer, C. 1979. *Strategic management: a new view of business policy and planning*. Boston MA: Little Brown.
- Schroeder, R.G. & Pesch, M.J. 1994. Focusing the factory: eight lessons. *Business Horizons*, 37 (5): 76-81.
- Schroeder, D.M., Congden, S.W., & Gopinath C. 1995. Linking competitive strategy and manufacturing process technology. *Journal of Management Studies*, 32 (2): 163-190.
- Simonin, B. L. 1999. Transfer of marketing know-how in international strategic alliances: an empirical investigation of the role and antecedents of knowledge ambiguity *Journal of International Business Studies*, 30 (3): 463-490.
- Skinner, W. 1969. Manufacturing - the missing link in corporate strategy. *Harvard Business Review*, 47 (3): 136-146.
- Skinner, W. 1974. The focused factory. *Harvard Business Review*, 52 (3): 113-122.
- Skinner, W. 1985. *Manufacturing, the formidable competitive weapon*. New York: Wiley & Sons.
- Spina, G. 1998 : Manufacturing paradigms versus strategic approaches: a misleading contrast. *International Journal of Operations & Production Management* 18 (8): 684-709.
- Swamidass, P.M. & Newell, W.T. 1987. Manufacturing strategy environment uncertainty and performance: A path analytical model. *Management Science*, 33 (4) : 509-524.
- Stump, R. Athaide, G. & Ashwin, W. J. 2002 Managing seller-buyer new product development relationships for customized products: a contingency model based on transaction cost analysis and empirical test. *Journal of Product Innovation Management*, 19 (6): 439-454.
- Teece, D.J. 1977. Technology transfer by multinational firms: the resource costs of transferring technological know-how. *Economic Journal*, 87 (346): 242- 61.
- Teece, D.J. 1983. Technological and organizational factors in the theory of the multinational enterprise. In Casson M., ed. *Growth of International Business* London: Allen and Unwin: 51-62.

- Teece, D.J. 1986. Transactions cost economics and the multinational enterprise: an assessment. *Journal of Economic Behavior and Organization* 7 (2): 21-45.
- Teece, D. & G. Pisano 1994 The dynamic capabilities of firms: an introduction. *Industrial & Corporate Change* 3 (3): 537-556.
- Teece, D.J., Pisano, G. & Shuen, A. 1997. Dynamic capabilities and strategic management. *Strategic Management Journal* 18 (7): 509-533.
- Tranfield, D. & Smith, S. 1998. The strategic regeneration of manufacturing by changing routines. *International Journal of Operations & Production Management* 18 (2): 114-29.
- Twiss, B. & Goodridge, M. 1989. *Managing technology for competitive advantage*. London: Pitman.
- Ulrich, D. & Lake D. 1990. Organizational capability: Creating competitive advantage . *Academy of Management Executive*, 5 (1) : 77-92.
- Upton, D.M. 1995: What really makes factories flexible? *Harvard Business Review*, 73 (4): 74-84.
- Verdin, P. & Williamson, P. 1994 . Successful strategy: Stargazing or self-examination? *European Management Journal*, 12 (1) : 10-19.
- Ward, P.T., Bickford, D.J., & Leong, G.K. 1996. Configurations of manufacturing strategy business strategy environment and structure *Journal of Management*, 22 (4): 597-626.
- Wathen, S. 1995. Manufacturing strategy in business units. *International Journal of Operations & Production Management*, 15(8): 4-13.
- Wernerfelt, B. 1984: A resource-based view of the firm. *Strategic Management Journal*, 5 (4): 171-180.
- Wheelwright, S. 1984: Manufacturing strategy: Defining the missing link. *Strategic Management Journal*, 5 (1): 77-91.
- Whittington, R. 2001. *What is strategy - and does it matter?* 2nd ed. London: Routledge.
- Wheelwright, S and Clark, K 1992. *Revolutionizing product development* New York: Free Press
- Whittington, R. & Mayer, M. 2000. *The European corporation: Strategy, structure, and social science*. London: Oxford University Press.

Williamson, O.E. 1981. The modern corporation: Origins, evolution, attributes. *Journal of Economic Literature*, 19 (4): 1537- 68.

Winter, S. 1987. Knowledge and competence as strategic assets. In D. J. Teece Ed. *The competitive challenge*: 159-184. Cambridge MA: Ballinger.

Womack, J., Jones, D., & Roos, D. 1990. *The machine that changed the world*. New York: Rawson Associates.

Wright, P.M., McMahan G.C., & McWilliams A. 1994. Human resources and sustained competitive advantage: A resource-based perspective. *International Journal of Human Resources Management*, 5 (6): 301-326.

Wright, P. M., Dunford, B. B. & Snell S. A. 2001. Human resources and the resource based view of the firm. *Journal of Management*, 27 (6): 701-722.

Table 1: The Strategy Operations Gaps in Manufacturing Paradigms

Paradigm	Authors	Description	Problem	Company Illustrations	Key Issues
Lean Production & Lean Supply	Womack <i>et al</i> (1990); Lamming (1993)	This concept was developed from the massively successful Toyota Production System (TPS), which focused on the removal of all forms of waste from the production transformation system.	The strategic importance of Operations is underplayed here – no mention is made of the need for senior-level Operations personnel whose role includes helping to shape business strategy and not simply restricted to a ‘technical’ function.	Chrysler was seen as the prime example but Chrysler is a case in point where <i>Lean</i> capabilities were in place but were then diminished as a result of the business merger with Daimler. The same is true of Rover with the sale to BMW and then its subsequent demise	Having <i>Lean</i> capabilities may be a necessary condition to compete in very volatile markets but without staff in place to protect and develop such capabilities these competencies may be lost by an over-riding corporate decision.
Mass Customization	Pine <i>et al</i> (1993)	Reflecting the need for high volume combined with recognition of ‘customers’ (or ‘consumers’) specific wishes	Again, the strategic role of Operations is underplayed here – no mention is made of the need for senior-level Operations personnel whose role includes business strategy and not simply ‘technical’ capability	Dell has been seen as the greatest exponent of this. However, Hewlett Packard is a case where such capabilities were in place within US and Asian plants but such capabilities have been swept aside by the corporate decision to outsource all production of PCs.	<i>Mass Customization</i> is an increasingly required competence but such capabilities cannot be developed by chance. The need for firm-specific strategies is paramount and key, senior-level Operations personnel need to be able to develop and safeguard such capabilities
Flexible Specialization	Piore and Sable (1984) (Dertouzos <i>et al.</i> 1989)	This concept relates to the manufacturing strategy of firms (especially small firms) to focus on parts of the value-adding process as well as collaboration within networks to produce whole products.	The authors provide insights into capabilities but do not link this to key aspects of seniority of Operations staff, lack of plant-specific Operations strategies and cohesion between business and Operations strategies	Japanese companies were cited as exponents of ‘flex-spec’ abilities. However, the authors do not link these capabilities to the strategic role of Operations within the firm.	To an extent this paradigm has been replaced by <i>Mass Customization</i> where as we have noted above, the need for firm-specific strategies is paramount and key, senior-level Operations personnel need to be able to develop and safeguard such capabilities
Agile Manufacturing	Kidd (1994) Gottlie (1994) Richards (1996)	This concept emphasizes the need for an organization to be able to switch frequently from one market-driven objective to	The key task here is the ability to rapidly alter any aspect of the manufacturing enterprise in response to changing market demands. However, no mention	Qing Cao and Dowlatshahi (2005) offer numerous examples across a range of industries.	Like other manufacturing paradigms there is little in the literature that addresses the business/Operations mismatch to which we have referred

	Upton (1995) Nagel and Bhargava (1994)	another.	is made of Operations strategies to enable such capabilities to be in place		earlier in the paper.
Strategic Manufacturing	Hill (1995); Brown (1996; 2000)	Here the authors emphasize the need for Operations capabilities to be framed in a strategic context and brought to the fore. The authors offer templates to positioning Operations capability and strategy.	Since the seminal work of Skinner upon whose work many authors expand, little impression has been made in the strategy mainstream literature and, more alarmingly, there are only very few firms that practice strategic manufacturing	The authors cite G.E., Dell, and especially Toyota where the fusion between strategy and Operations capabilities is very clear	Much greater appeal to the strategy mainstream in both academic and practitioner circles needs to be in place. Without this much of the literature will simply 'preach to the converted'.