Strategic resonance between technological and organisational capabilities in the innovation process within firms

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Abstract

The literature on innovation has been both rich and varied in approach and has provided much insight into the process of, and difficulties contained within, innovation. A number of important concepts including those of path dependency, technological trajectories, together with the plethora of articles concerned with organizational learning, involving the contribution and limitations of tacit knowledge, have helped us to understand the nature of innovation. As important as these strands of literature are, we suggest that a key weakness in much of the literature on innovation is that it does not deal sufficiently with the contextual issues concerning the changing paradigms of manufacturing and the profound impact that these developments have had upon the innovation process. We offer the concept of strategic resonance as a missing ingredient within some firms who are now faced with conditions of hyper competition where ongoing innovation is a key requirement. The concept of strategic resonance is not offered as a prescriptive panacea but it is suggested that firms need to understand and remove the blockages to strategic resonance as part of their innovation development processes.

Keywords: Strategic resonance; Technological and organisational capability; Innovation process

1. Introduction

In this paper, we put forward the concept of strategic resonance as a necessary (but not necessarily sufficient) dynamic attribute within manufacturing/assembly firms competing in today’s environment of hyper-competition (D’Aveni, 1994). Although strategy is clearly a complex issue (Whittington, 2002; Mintzberg et al., 2000), for the purpose of this paper the context in which we use the term is based upon the following factors. For us, strategy is:

- Concerned with meeting existing market needs as well as exploiting opportunities for potential market segments (Kim and Mauborgne, 2002; Nunes and Cespedes, 2003)
- About making the best use of resources, and to leverage these resources either alone or with partners (Wernerfelt, 1984; Barney, 1991; Dierickx and Cool, 1989; Lamming, 1993; Hines, 1994; Stump et al., 2002; Ireland et al., 2002).
- The ultimate responsibility of senior-level managers within the firm—of course we recognise the vital of importance of a range of stakeholders in the process both within the firm and with eternal linkages to the enterprise (Frambach et al., 2003; Hax and Majluf, 1991; Dougherty and Corse, 1995). This factor of seniority is important to innovation because these managers will have responsibility for allocating resources for innovation processes.
- About devising and implementing processes that will enable the enterprise to compete and, ideally, to create competitive advantage (Whittington, 2002; Hamilton et al., 1998).
- Concerned with developing 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).

We offer this list as an indication of the role and scope of strategy, which is important because the term, strategy, is used throughout the paper. Moreover, we will discuss how,
although innovation is a strategic issue for firms, senior-
level personnel, charged with strategic decision-making of
the firm may not be aware of, or be able to capitalise upon,
the operations capabilities that reside within the firm. We
shall argue that the problems of not understanding, or being
unable to utilise, the resources that reside within the firm’s
operations are issues that continue to plague the innovation
process within firms.

The key issue for us is that although a number of
important contributions to the literature see innovation as a
key strategic issue (e.g. Hamel, 2001; Christensen, 1997;
Acs and Audretsch 1991; Ali, 1994; Anderson and Tushman
1990; Ettlie et al., 1984; Henderson and Clark, 1990; Nelson
and Winter 1982; Tushman and Anderson, 1986; Utterback,
1994), we suggest that the specific role of operations is
underplayed in much of the literature.

It is axiomatic that operations personnel will be involved
in innovation simply due to the fact that they will be charged
with producing or assembling the new product. But the
assertion that manufacturing personnel should be involved in
NPD is not enough because the specific role and contribution
from operations personnel in innovation is still far from clear
in spite of the plethora of articles related to the subject.

We suggest that capabilities in innovation do not come
about by chance but, instead, owe a great deal to the role of
strategy in accruing and guarding a range of capabilities that
might lead to successful innovations (Dierickx and Cool,
1989). We will argue that firms struggle with devising
strategies, particularly related to innovation, not because
these firms are inept or stupid but because they remain stuck
in old manufacturing paradigms, even though these firms
may realise that the current manufacturing era bears little
resemblance to these past modes of production. We suggest
that the reason why this hurdle is, often, not overcome is
that, as we shall see in the discussion of examples, firms
have not dealt organisationally with the change of
manufacturing paradigms over time.

We recognize that innovation is a profoundly difficult
task for firms (Pavitt, 1990) and that a panacea for all firms
in all types of industries is a non-sensical proposition.
However, we propose that, in the current era, firms need to
develop capabilities in strategic resonance in order both to
align functions within the firm, as well as between the firm
and its market segments.

As a conceptual paper, we offer some evidence to support
our proposition, although we recognise that to support our
proposition more fully in the future, empirical research must
be carried out in future studies.

This paper takes the following structure. First, we will
provide a detailed definition of the concept of strategic
resonance and indicate its significance. Second, we discuss
how the transition from craft through mass production to
the current era of manufacturing led to strategic dissonance
in the strategy process and how this impacted upon
innovation. Third, we provide evidence of strategic
resonance and strategic dissonance within two industries
(automobiles and computing). We then discuss how
organisational responses to mass production may not be
enough and why these need to be changed in order to deal
with the current era of hypercompetition. Finally, we
conclude with a review of strategic resonance.

2. Strategic resonance

Brown (2000: p6) has previously defined strategic
resonance as:

“an ongoing, dynamic, strategic process whereby cus-
tomer 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, oper-
ations capabilities.”

The concept of strategic resonance is illustrated in Fig. 1:
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.

Strategic resonance is also about ensuring that the firm
will develop and protect those capabilities that can be used
to exploit market opportunities. As we have indicated, such
capabilities do not come about by chance. For example, as
Kay (1993) has noted, there are two accounts of Honda’s
success—one by the Boston Consulting Group, which
suggests that Honda’s success was the result of an intense
and deliberately planned pursuit of the market; the other
account by Pascale (1984) suggests that it was more to do
with good fortune. However, Kay (1993) provides a telling
insight of Pascale’s ‘good fortune’ view of Honda’s success
when he suggests that this view might be more convincing had Honda not been so successful in its other endeavours—it is stretching credibility to put this all down to ‘good fortune’. Similarly, Whittington (2002) narrates how:

‘...when Honda was overtaken by Yamaha as Japan’s number one motorbike manufacturer, ...There followed a stream of no less than eighty-one new products in eighteen months. The massive effort nearly bankrupted the company, but in the end left Honda as top dog once more’ (p69–70)

The ability to launch such a plethora of innovations in a short time came about by mobilising a set of capabilities that had been developed over time by Honda. These operations capabilities were then able to be utilised in the market in order to ward off competitive advances.

Strategic resonance is more than ‘fit’ between the firm and its chosen markets. Similarly, it is more than merely compatible ways of thinking between functions within the firm and its external stakeholders, in that the latter may be a consequence of coincidence and serendipity. Resonance is the dynamic activity that should allow the relationship to develop. The appreciation of the concept, and the recognition of it as a real issue that should concern firms, is important because the current competitive environment is increasingly characterised by rapid technological changes in new and existing products, brought about, in part at least, by enhanced levels of competition.

Thus, strategic resonance could be seen perhaps as an element within the broader concept defined by Teece et al. (1997) of dynamic capability. However, the contribution of strategic resonance lies in understanding the current problems within the domain of strategic-level processes that need to be rectified so that capabilities can be developed over time and employed as needed in order to create, or respond to, market opportunities.

Although strategic resonance was used, initially, to describe the need for change in the process of strategic formulation and implementation in order to cope with the current era of hypercompetition, we suggest that it is particularly applicable to the innovation process within and between organisations.

What, though, does strategic resonance have to do with innovation? Strategic management has profound importance for innovation because as Dosi et al. (1988:7) suggest, ‘Strategic management may and does orient market position and learning trajectories in the long term’ and Scott (1999:77) in his research into innovation difficulties, found that ‘strategic planning for technology products’ was the most difficult hurdle for firms to overcome.

Of the numerous reasons why innovations fail (see Douthwaite et al., 2001), Pavitt (1998: p433) identifies the following as a reason at the firm level:

‘Firms rarely fail because of an inability to master a new field of technology, but because they do not succeed in matching the firm’s systems of coordination and control to the nature of the available technological opportunities’.

Such an observation goes to the very essence of internal strategic resonance. A necessary requirement here is for various functions, notably R&D, operations and marketing, to resonate in a process of continual feedback, consultation

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1 We would like to thank one of the anonymous referees for raising this concept with us.

2 This is not to neglect the fact that differences between two parties might occur. However, resonance should lead to a situation satisfactory to both on the basis of mutual understanding, an appreciation of each others' limitations, responsibilities, resources, capabilities, etc. We also recognise that should the desired aims of the two parties become so divergent that dissonance occurs, they might be better off realigning themselves with different third parties.
and adjustments. Similarly, just as functions within a firm need to resonate with each other at each stage of product development, so too must the firm resonate with its current and potential customer-base (see Fig. 2 for further elaboration). This can be assisted with strong strategic formulation, but the firm must also recognise that new information stemming from the various functions of the firm and its various interfaces with up—and downstream elements (suppliers and the market)—need to be considered, and incorporated into the evolution and continual refining of the strategy itself.

The issue here is that internal alignment is not enough. Resonance is also about reducing distance between the firm (and its infrastructure) and its customers. This is important because as Thomke and Von Hippel (2002, p5) observe:

> In a nutshell, product development is often difficult because the “need” information (what the customer wants) resides with the customer, and the “solution” information (how to satisfy those needs) lies with the manufacturer.

As we shall see, strategic resonance is concerned with rectifying both the process and content of internal strategic planning and formulation, which became a cause of internal strategic dissonance within firms within the mass production era.

### 3. The changing manufacturing paradigms and the emergence of strategic dissonance

The transition from craft through to mass production has been described in terms of the changes of ownership and control (Berle and Means, 1932; Berle, 1954) or in developments to manufacturing processes over time (Womack et al., 1990; Kenney and Florida, 1993) from low volume/high variety (craft) to high volume/low variety (mass production). Undoubtedly, these insights are helpful but the nature and importance of the transition from craft to mass production and, consequently, to the current manufacturing era is far more profound than mere changes to volume outputs and is wholly linked to the process and content of strategy, its impact upon the innovation process as a whole, and its embodiment in the organizational form. A brief overview in the change to manufacturing paradigms may provide insights into the importance of strategy and its impact upon the innovation process.

#### 3.1. From craft to mass production

The era of ‘craft’ manufacturing was characterised by two key features. First, many operations activities—in which much of the innovation processes and capabilities reside—were involved in, and significantly influenced, the business decisions of the firm (Womack et al., 1990; Landes, 1979, 1994). Second, there was integration between what the firm did within its operations and the strategic direction that a firm would pursue (Landes, 1998). Of course, we appreciate that craft firms may not necessarily be ‘locked in’ to craft process and may well change to become mass producers over time. Nokia, now the number one player in the global business of mobile telephones had its origins in craft shoe production and the Stora company in Sweden which was founded in the twelfth century as a timber cutting and processing operation, remains in
existence today—but in the very different areas of food processing and electronics (de Gies, 1996).

However, our discussion is more to do with links between the changes to the modes of production and the strategy process. In essence, craft manufacturing fused together business strategy and operations capabilities. In addition, the dual processes of design and manufacture became an integral part of the craft firm’s business and was an iterative progression. To borrow Arrow’s arguments (1969) on small firm flexibility, craft firms had low organisational distance between their internal units and the informational asymmetry between innovators and managers allocating resources, was small. However, we are not trying to romanticise this era—although craft production still exists as an important, but not dominant, transformation process in manufacturing, it had severe limitations and was replaced by mass production, the emergence of which had direct relevance for innovation.3

The mass production system grew in North America—in contrast to the European origin of craft production—and in Schumpetarian terms (Schumpeter, 1939, 1976), creative destruction took place because mass production was an innovation that largely destroyed the competitive position of craft production. The key factor here, related to strategic resonance, is that the transition from craft to mass production had a major influence on diminishing the strategic role of operations management within the firm. In mass production, operations became identified as a separate function, as part of a number of functions, within the hierarchy of firms. More pointedly, in contrast to craft processes, operations managers were often absent from the most senior, strategic levels of the firm as enterprises became larger and more functionally organized (Chandler, 1962, 1992; Lazonick, 1991). In addition, the role of operations managers often became one of a technical specialist as opposed to an involvement in the strategic business of the firm.

In addition, the strategy process became the prerogative of senior-level managers within the firm and operations personnel were, typically, excluded from this process, because of their position within the hierarchy of the firm. This exclusion from the strategic levels of the firm had major repercussions for the innovation process because operations managers were expected to ‘receive’ instructions from the elite strategic planning group, which had been formulated without due consideration of the specific opportunities or constraints contained within the firm’s manufacturing or operations’ capabilities (Skinner, 1969, 1985; Hayes and Wheelwright, 1984). This exclusion, or at least under valuation of operations managers’ potential contribution to wider strategic issues, continues in many large firms today (Lazonick and West, 1995; Schroeder et al., 2002) despite the recognition that operations personnel make an important contribution to firm capabilities (Womack et al., 1990; Kenney and Florida, 1993). As Brown (2000) has noted in research into strategic level personnel in large US firms, many organisations do not have a Vice-President of Operations and even if they do, this does not guarantee that these senior-level staff understand operations. The changes to the strategy process, brought about by mass production, served to divorce the strategic levels of the firm, which provided—and still continues to provide—resources for innovation (Hamel, 2001; Christensen, 1997), from the actual manufacture of the innovation at the operations level.

The separation of operations capabilities from strategic levels of the firm is highlighted by Lazonick (1991:33) when he states:

“By separating strategic from operational decision making, top management could (potentially but not necessarily) focus all its attention on planning long-run investment strategies. But in focusing on strategic decision making, top managers had to ensure that operating divisions would respond to the overall goals of the enterprise.”

These ‘overall goals’ of the business often became focused around purely short-term, financial criteria by which senior-level managers would be judged. This in turn created the potential for strategic dissonance between long-term strategic decisions (with which senior level managers are charged) with short-term criteria (by which these same senior-level managers are assessed). Specifically, the problem with this is that in focusing on financial criteria senior-level managers could take decisions that might threaten operations capabilities, including those related to innovation. The question of outsourcing will be discussed later in the paper but a note is pertinent here. It is not unreasonable to assume that strategic outsourcing decisions within the firm are made easier with the exclusion of operations personnel from the most senior levels of the firm. This is because, first, it is unlikely that they would want to ‘outsource themselves out of a job’—although the more enlightened would be able to determine to what degree an in-house capability really acted as a core competence; second, having been part of the process that might have developed capabilities within the firm these operations personnel would be loath to give up such capabilities easily in the name of ‘focus’ or—other possible reasons—under the remit of strategy.

Chandler’s (1979, 1992) contribution has been immense and the notion of the ‘three pronged’ investment in manufacturing, marketing and management is of direct relevance to our discussion but again, we suggest that the role and seniority of operations personnel and the degree to which manufacturing/operations strategies play in such investment, is to our minds, underdeveloped.

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3 The question, ‘if craft was so ‘good’ why, then, did it fail?’ was raised by one referee and the reasons have direct relevance for our paper.
Similarly, when Nelson (1991, pp. 67–68) posited how “three different if strongly related features of a firm that must be recognized [...] its strategy, its structure, and its core capabilities” the relevance to our discussion is clear. However, he endorsed the notion of hierarchy in which the contribution of operations personnel was functional in scope and reactive in nature with little or no strategic relevance. For Nelson (1991) 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. (Italics added for emphasis)

Thus, the mass production paradigm had major consequences on the process of forming and implementing strategy and the repercussions that this had on the innovation process. With it came a ‘top-down model’ of strategy, from the CEO down, which, in spite of the evolution from purely mass production to mass customisation, lean or agile paradigms of production, remains the dominant organisational approach to strategy. However, there are potential major flaws with this based around (lack of) communication processes with the question of “who talks to whom about what?” remaining an issue.5 Mass production confused the issue because, first, it enforced the idea of different realms of strategy—each with its own agenda—within the levels of the firm. Second, it assumed that corporate decisions would, somehow, line up with business and functional strategies without any assurance of such internal strategic alignment between them. This lack of alignment would then, often, lead to strategic dissonance. Third, it also assumed that corporate managers actually knew about operations capabilities and would be able to leverage these capabilities so that strategic resonance would occur between these capabilities and the firm’s market requirements.

Such an approach to the strategy process may have been suitable for the mass production era but is now a cause of internal strategic dissonance within the firm as well as in external dissonance in the relation between the firm and its customers. By the latter decades of the 20th Century, the relatively static market conditions began to give way to more dynamic market requirements, and it was during this transition that Skinner (1969) first made his seminal contribution by urging American firms to involve the manufacturing function in the strategic debate. This was because, as he noted, such omission was in direct contrast to Japanese firms who integrated business strategies, including the role of innovation, with manufacturing capabilities in their strategic processes. Such an observation was also made by those with inside knowledge of Japanese strategic planning processes (Ouchi et al., 1978; Ouchi, 1993) as well as those within Germany (Prais, 1981a,b; Harding, 2001).

However, it was in the USA’s focus on short-term financial rewards rather than in developing and guarding operations capabilities that led to the demise of manufacturing capabilities in a number of industries. Hayes et al. (1988) lamented how the lessons that manufacturing managers were learning from Japan were lessons that:

“American managers developed, taught the rest of the world, and then, their attention directed elsewhere, forgot.” (p31)

Hayes and Wheelwright (1984) added to this criticism when they stated:

“There seems to have been a tacit agreement between firms in… manufacturing industries over the past 15–20 years to compete on dimensions other than manufacturing ability.” (p20)

The core differences in operations’ performance came to light in the publication of The Machine That Changed the World (Womack et al., 1990). This was important to our discussion on innovation because one of the key parameters here was in the 2:1 ratio between lean (largely Japanese) plants and non-lean competitors (including many US plants) in the speed of innovations. Lean plants would take half—or less—development time in new product launches.

We are not aiming to be critical either of the formulation and implementation of strategy or of the innovation process within firms under mass production. Its very existence was a major process innovation that had profound consequences. There can be little doubt that for several decades at the beginning of the 20th Century the adoption of this paradigm enabled the USA to become an economic powerhouse. However, although the strategic process associated with mass production may have been tolerable for the relatively static nature of the market that existed then it is wholly inappropriate now that many market requirements are substantially different with respect to the pace of rapid technological change.

The era of mass production within large, multi-divisional firms threw R&D, and manufacturing operations into

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4 The importance of this question was mentioned by one of the referees and we see this as a pivotal issue within the innovation process in the development and evolution of the manufacturing paradigms.

5 We should be careful not to dismiss Japanese capabilities in strategic resonance simply because of the downturn in the Japanese economy at the end of the 1990s. This downturn had more to do with a range of financial factors rather than diminishing capabilities in operations. For example, it is still Honda and, particularly, Toyota whose operations capabilities, including innovation, remain the criteria by which the rest of the car industry is judged.
distinct functional categories, breaking down the iterative communication. Organisational capabilities enabled large-scale production, but afforded little flexibility and responsiveness, between the firm, the market and the science base or between the design processes and those of manufacture.

Chandler (1990) observed how corporate control became divided into entrepreneurial control and administrative control. This distinction is important because the former was linked to R&D and/or marketing and the latter to manufacturing operations. Thus the main problem of the multi-divisional structure, in relation to innovation, was due to the functionally specific arrangement and focus within the divisions themselves. However, separation and specialisation led to (and still allows if not rectified) organisational distance between operations managers and the most senior managerial levels of the firm (Chandler, 1962, 1992; Lazonick, 1991; Wheelwright and Clark, 1992).

Separation and increased specialisation was an important ingredient to the innovation process during the mass production era, but this is in direct contrast to the need to integrate these various inputs in modern times now that the extent of technological complexity is greater than any single firm or organisation can cope with alone (Pavitt, 1998).

Whilst the ‘benefits of functional specialization’ (Pavitt, 1998) were, and continue to be, a key means to enhancing the innovation process, during the mass production period this specialization also created a gap between the various functional activities. This gap appeared most tangibly in the physical location of laboratories, plants and offices but also intangibly in cognitive structures and beliefs about the limitations of responsibility and influence.

We might suppose that because the dominant manufacturing paradigm has shifted away from the old mass production system that companies would, in turn, be able to modify internal blockages resulting from functional conflicts. However, this appears not to be the case (Tushman and O’Reilly, 1997; Stringer, 2000; Bellmann and Shaffer, 2001; Edmondson, 2003).

It is in the further transition from mass production to the more complex manufacturing era, which embraces mass customisation, agile, and lean production that strategic resonance is needed.

4. Evidence of strategic resonance and strategic dissonance within the car and computing industries

We mentioned earlier how further empirical work would be needed at plant level to support the case for strategic resonance. We are also aware that picking ‘successes and failures’ after the event may invite criticism. Nonetheless, to propose an idea without any evidence to support the case is problematic and so the following examples are offered as insights to where strategic resonance and strategic dissonance have occurred in two industries—computing and automobiles. These two industries are cited for two reasons. First, both industries operate within high volume manufacturing environments and both have undergone radical changes to manufacturing processes and face challenges to how they manage the innovation process in the transition from mass production to the current era of Lean Production (Womack et al., 1990), Mass Customisation (Pine et al., 1993) and Agile Manufacturing (Kidd, 1994). Second, both industries are notable for the presence of large, multi-divisional enterprises that have had to undergo major changes to organisational structures in order to deal with modern competitive requirements. We shall deal with each industry in turn

4.1. The PC industry

The dramatic increases in volume and revenues for the PC segment of the computing industry over a 15-year-period are illustrated in Table 1.

Manufacturing a PC demands that firms have to manage, successfully, a range of strategic operations that can act as basis for external strategic resonance between the firm and its market but only if internal strategic resonance is in place. First, there is an extremely high volume of components and all of these must meet stringent quality requirements of customers who are now used to user friendly and easily installable products. Second, careful production planning and strong strategic relationships with suppliers are vitally important capabilities. Third, the problem of outdated inventory is a critical one not only for the overhead costs with which the firm will be saddled but also in the impact

<table>
<thead>
<tr>
<th>Year</th>
<th>Shipments (thousands)</th>
<th>Revenues (millions)</th>
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</thead>
<tbody>
<tr>
<td>1983</td>
<td>11,123</td>
<td>11,019</td>
</tr>
<tr>
<td>1984</td>
<td>15,044</td>
<td>18,496</td>
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<td>22,765</td>
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<td>1987</td>
<td>16,676</td>
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<td>18,061</td>
<td>33,367</td>
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<td>1990</td>
<td>23,738</td>
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<tr>
<td>1998</td>
<td>97,321</td>
<td>181,544</td>
</tr>
</tbody>
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6 We do not agree with those who might argue that there is an inherent blockage or tension between, on the one hand, R&D benefiting from high autonomy and, on the other hand, manufacturing being subject to high control. Indeed we argue that the integration of these two activities is an important ingredient of strategic resonance and a requirement for successful innovation.
this will have on new product launches. Thus an important factor here is that current operations practices and capabilities in managing existing products will have a profound impact on future product launches.

The ability to manage strategic resonance, both internally within the various functions of the firm as well as externally, across a number of organisations within the firm’s supply network, is, therefore, a fundamental requirement in producing a computer. However, achieving strategic resonance both in the launch of entirely new products and in managing the flexibility of volumes and ranges of existing products has been problematic for many firms. This has been evident from the very early developments within the industry. For example, in the late 1970s Xerox’ Palo Alto Research Centre developed a computer which included a mouse, laser printer, and a graphical user interface, and packaged them into the Alto. This qualified as the first true, but never commercially manufactured, personal computer. However, the problem of strategic resonance was not between Xerox and a potential market but it was in the internal inability of operations to transfer from a ‘one off’ design to volume manufacture. Although the Alto may be labelled as an “innovation”, the inability to develop this via operations capabilities led to the withdrawal of the product. The Xerox case was one of many such failures where internal strategic dissonance occurred between design and volume manufacture. Strategic resonance was in place in terms of the firm and the market opportunity but was overshadowed by the strategic dissonance that existed within the firm’s operations.

Strategic dissonance between innovation and operations capabilities was also evident in the Osborne 1, which was one of the first portable computers and was a marketing success when introduced in 1981. However, by 1983, Osborne was forced to file for Chapter 11—bankruptcy protection. Some of this failure can be attributed to the technical specification but the failure had as much to do with Osborne’s poor operations as its purely technical shortcomings. Outdated inventory became a huge problem and scheduling was another, exacerbated by the late development of Osborne II. This illustrates how the importance of operations is not limited to the process of new product developments, as important as this is, but is also concerned with managing key operations areas beyond the innovation launch so that the firm is not saddled with a set of operations problems manifest in outdated inventory, poor quality, and inadequate capacity. In Osborne’s case internal strategic dissonance occurred within the firm’s operations capabilities but also manifested, not surprisingly, in its external performance in the market.

Both the Xerox and Osborne examples are well known cases of failures of product launches. More recently, strategic dissonance has taken place within some of the major players within the industry. For example, IBM’s fortunes within the PC industry have clearly demonstrated that there is a large gulf between the ability to demonstrate a level of technological competence through the possession of patents and the ability to gain competitive advantage from the innovative artefact or process based on these patents. Having the resources to produce patentable innovation is not sufficient. Firms must also have capability to transform these patents into useful products and processes in order to benefit from their innovation capability in the marketplace. This is inherently tied to the organisational structure, as well as the mechanisms employed to facilitate communication, coordination and control across the organisation. Moreover, these facets should not be unilateral but need to be multi-lateral between the different plants, subsidiaries and functions of the firm. Thus, the relationship running through strategy, R&D and manufacturing operations is crucial to innovation based competitive success.

To illustrate, the decline in IBM’s fortunes in the late 1980s to early 1990s took place in spite of the number of patents that it generated in this period (Table 2) and the vast amounts of expenditure that it had made in R&D (Table 3).

Perhaps surprisingly given its R&D expenditure, IBM was often a ‘me-too’ company, following what other companies have pioneered but the degree to which this strategy was intentional is questionable (Carroll, 1993). Admittedly, by virtue of its size and power (in the past at least), the launch of its products in some market segments would mean that an IBM “standard” had been created. The following (Table 4) shows the ‘me-too approach’ which served IBM in the past.

However, in one year alone (1988) IBM lost one-third of its PC market share to smaller, more focused players—Compaq and Apple. Unlike IBM (and Digital who will discuss next) neither Compaq nor Apple had been labelled as ‘excellent’ companies (Peters and Waterman, 1982). Although we are not citing financial success as the sole criterion for innovation, what became clear is that

<table>
<thead>
<tr>
<th>Table 2</th>
<th>Corporations receiving most patents for inventions 1969–97</th>
</tr>
</thead>
<tbody>
<tr>
<td>G.E.</td>
<td>24,440</td>
</tr>
<tr>
<td>IBM</td>
<td>20,926</td>
</tr>
<tr>
<td>Hitachi</td>
<td>16,951</td>
</tr>
<tr>
<td>Canon</td>
<td>15,061</td>
</tr>
<tr>
<td>Toshiba</td>
<td>14,511</td>
</tr>
<tr>
<td>AT&amp;T</td>
<td>14,409</td>
</tr>
<tr>
<td>Eastman Kodak</td>
<td>13,916</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Table 3</th>
<th>IBM’s R&amp;D expenditure: 1990–1994</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year</td>
<td>Amount (Millions of dollars)</td>
</tr>
<tr>
<td>1990</td>
<td>620</td>
</tr>
<tr>
<td>1991</td>
<td>620</td>
</tr>
<tr>
<td>1992</td>
<td>600</td>
</tr>
<tr>
<td>1993</td>
<td>550</td>
</tr>
<tr>
<td>1994</td>
<td>500</td>
</tr>
</tbody>
</table>

Source: Brown, 1996.
the organisational structure that had served IBM in the past (leading to profits of $6 billion in 1986) also served as the key factor of strategic dissonance within the firm, resulting in losses of $6 billion by 1992. This hierarchical, vertically integrated, structure (which served the relatively slow development times of mainframes—the focal point of IBM’s innovations) was also the reason behind the inability to launch the range and speed of innovations required for the PC segment. IBM’s reversal of fortunes since 1992, which included annual profits exceeding $8 billion between 1998 and 2001, has been possible only by the radical reconfiguration of the entire organisation. This reorganisation has, in turn, resulted in far greater levels of proficiency within IBM’s operations manifested, inter alia, within innovation capabilities within IBM (Gerstner, 2002). It may be argued that IBM’s transition from manufacturer to a service provider, offering complete solutions to customers is an example of strategic resonance. It may equally be argued that it demonstrated IBM’s inability to compete with Dell whose operations capabilities far exceeded IBM.

Part of the problem for IBM under its previous organisational structure was its inability to learn. If used appropriately, managers can harness tacit knowledge and learning in order to achieve breakthroughs in innovation (Mascitelli, 2000; Lei, 2003). As an ingredient for firm growth, learning may have strategic consequences (Hitt and Ireland, 2000; Sadler-Smith et al., 2001; Lubit, 2001) but, as Garvin (1993: p51) adds:

> “Without accompanying changes in the way that work gets done, only the potential for improvement exists” (p52—italics added by us)

New product development can provide an excellent means of learning from competitors and failure to learn can be disastrous. Carroll (1993) points to IBM’s failure to learn from Compaq:

> “Even once Compaq brought out its portable, IBM was so sure it understood the technology that it did not buy a single Compaq system to see whether there was anything to be learned from it. When IBM brought its system out more than a year after Compaq... the system was too heavy and the screen was fuzzy. It died quickly... IBM relegated itself to a tiny slice of what became a $6-billion-a-year market by the early 1990s” (p71)

IBM’s strong organisational culture (again heralded as a key feature of ‘excellent’ companies by Peters and Waterman in 1982) and which may well have been, at one point, an area of strategic resonance became, over time, a corporate millstone, resulting in strategic dissonance between IBM and its market requirements. Such entrenched culture is difficult to change and Carroll (1993) provides insight into how strategic dissonance was in place at IBM:

> “But it’s hard at IBM to do anything that hasn’t been done before. New things tend to get shot down, or at least debated to death as IBM’s marketing forces and related product groups raise objections.... Anyone at IBM wanting to do something with any kind of speed finds himself using old ideas” (p133)

Strategic dissonance was clearly evident at Digital. Like IBM, Digital had been cited as an ‘excellent’ company but the key issue behind its strategic dissonance was that of ‘Technophilia’ (Bessant et al., 2001)—the ‘love of technology’ for its own sake. DEC’s aggressive growth strategy, targeting IBM’s mainframe with the VAX 9000, was intended to reach $3 billion but never exceeded $500 million per annum in sales. In 1990, DEC introduced the MIPS architecture that, by 1994, had not proven popular and DEC’s purchase of mini-computer operations from Mannesmann and Philips resulted in an annual loss of $617 million in 1991. Weaknesses within operations capabilities manifested in poor product quality, which plagued DEC in the early 1990s. Strategic dissonance between its technologies and market requirements was a problem here because DEC continued to concentrate on minis, rather than PCs and even at the end of 1994 was banking on the Alpha chip as being the way forward for the firm (Brown, 1996). The problem is that, at this time, such technological advances were not perceived as vital, or even as a requirement by its customers. DEC concentrated on ‘fine-tuning the technology’ and failed to recognize the overall needs of the customer. In words that echo Thomke and Von Hippel’s (2002) concern cited earlier, DEC’s senior vice president, Pesatori, stated:

> “Somehow our engineering resources have become disconnected from the real needs of the market” (quoted in Brown, 1996)

More pointedly, Christensen and Overdorf (2000, p76) observe how:

> “Clearly, Digital had the resources to succeed in personal computers. Its engineers routinely designed computers

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**Table 4**

Examples of IBM’s reactions to technological innovation

<table>
<thead>
<tr>
<th>Product</th>
<th>Pioneering company</th>
<th>Date</th>
<th>IBM’s Date</th>
<th>Gap</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mini computer Systems</td>
<td>Digital PDP-8</td>
<td>1965</td>
<td>IBM series 1</td>
<td>1976</td>
</tr>
<tr>
<td>Personal Computer</td>
<td>Apple</td>
<td>1977</td>
<td>IBM PC</td>
<td>1981</td>
</tr>
<tr>
<td>Engineering workstation</td>
<td>Apollo DN100</td>
<td>1981</td>
<td>IBM RT PC</td>
<td>1986</td>
</tr>
<tr>
<td>PC Laptop</td>
<td>Toshiba T-100</td>
<td>1986</td>
<td>IBM L40</td>
<td>1991</td>
</tr>
<tr>
<td>RISC Workstation</td>
<td>Sun Microsystems</td>
<td>1987</td>
<td>IBM RS/6000</td>
<td>1990</td>
</tr>
</tbody>
</table>

Brown (1996)
that were far more sophisticated than PCs [...] But it did not have the processes to succeed in the personal computer business. [...] In other words, although the people working at the company had the ability to design, build, and sell personal computers profitably, they were working in an organization that was incapable of doing so because its processes had been designed and had evolved to do other tasks well.”

The continued emphasis on internal capabilities, focusing on mini computers, is clearly an example of core competencies becoming core rigidities (Leonard-Barton, 1992). However, the continuation of such strategic dissonance led to the demise of Digital resulting in its purchase by Compaq.

Compaq’s demise demonstrated how strategic resonance became strategic dissonance over time due to the change of external market conditions. In short, Compaq remained committed to, but excelled in, the wrong capabilities—low cost production and not customisation:

“In 1996, Compaq surpassed $20 billion in sales, nearly seven times its revenues in 1991, the year Eckhard Pfeiffer took over as CEO [...] Compaq could proudly state that in the mid-1990s, it had an astounding figure of $1 million sales per employee annually. However, [...] Its problems began in February 1994, when its former CEO, Pfeiffer, announced that Compaq would make all its PCs on a “build to order” basis by 1996 [...] At the time of the ‘build to order’ statement from Pfeiffer, Compaq built less than 5% of its machines to order. In July 1997, Compaq announced a new business model that it promised would deliver the latest product innovation to customers at the highest quality and for a lower total cost of ownership. Known as Optimized Distribution Model (or ODM), Compaq said it was designed to meet customer-specific orders while keeping down distribution costs. Unfortunately, it did not succeed in doing so.” (Brown, 2000: p46).

The articulated mission from its then CEO may have been a valid one for Compaq. However, if operations capabilities are not in place the consequences can be dramatic and in Compaq’s case this was a key reason for the merger with Hewlett Packard. Although poor operations capabilities do not inevitably lead to the complete demise of companies they do, at the very least, create states of strategic dissonance both internally and externally for the firm for periods of time. For example, when Dell lapsed in terms of innovation speed required for developing a new product—the notebook—it paid the ultimate penalty by having to withdraw, temporarily, from this segment. In addition, because of the reduced product-life-cycles of the PC products, Dell was left with a stock of obsolete components. Similarly, when IBM was late with the ThinkPad laptops it immediately lost out to competitors, particularly Compaq and Hewlett Packard—IBM was also left with something in the region of $100 million of components that it had to design into future products (Brown, 1996).

4.1.1. Organisational responses to the change from mass production in the PC industry

In the past the computer industry had corporations such as IBM, NCR, DEC, NEC and Wang who competed against each other as huge, vertically integrated enterprises. Each produced its own chips and system software based, essentially, on its own particular system. IBM and DEC in the USA were among the most vertically integrated, capable of making almost every part of their products. They were consistently two of the worst performers in the early to mid 1990s.

More recently, outsourcing has become a major strategic issue for firms in the PC industry. As strategic resonance is tied to organisation, and the firm as a unit seems to be increasingly tied into an external network organisational form, technological firms have outsourced activities to suppliers (Quinn, 2000), formed strategic alliances and generally become more dependent on the creation of an external network of partners (Saxenian, 1991; De Vet and Scott, 1992; Bartholomew, 1997; Baptista and Swann, 1998).

However, this does not negate the issue of strategic resonance because part of the remit of managing strategic operations is in developing relationships within the supply network. Firms cannot simply abdicate all responsibility in areas such as quality, delivery speed and reliability and customisation by outsourcing. The management of integration within the supply chain towards a ‘seamless’ supply activity has become a key priority for many firms (Handfield et al., 1999; Frohlich and Dixon, 2001; Towill, 1997). The range of processes in managing strategic supply will include developing outsourcing strategies (Ellram and Billington, 2001), examining the amount and types of suppliers (Watts et al., 1992; Krause and Ellram, 1997), and moving towards delegated supplier tiers and/or the development of supplier associations (Hines, 1994; Hines et al., 2000). For outsourcing to succeed there must be an enterprise wide view of the firm, both internally with all key functions and externally with essential supply chain partners, and again strategic resonance is key here. Moreover, buyers must acknowledge that they are not singular actors in the supply network (Cousins and Stanwix, 2001).

4.2. The car industry

Strategic dissonance has been evident within the automobile industry with many examples of product failures from the Ford Edsel to the present day. As we have noted, the lean thesis (Womack et al., 1990) highlighted major failings in operational areas in non-lean (largely US and European plants).
Sometimes, strategic-level business decisions may lead to strategic dissonance within the firm’s innovation processes. The key issue for the car industry is over-capacity and in such conditions, merger and acquisitions will often take place (Porter, 1980). Strategic decisions related to mergers and acquisitions have an impact on innovation. For example, the union of Renault and Nissan, by which Renault invested $5.4 billion for a 37% interest in Nissan, has impacted the minivan alliance between Ford and Nissan. Since 1992, Ford and Nissan co-produced the Nissan Quest and the Mercury Villager. However, as a result of the link with Renault, Nissan then announced that it planned to end its relationship with Ford by 2004.

Other business decisions may result in dissonance within operations capabilities. The remarkable turnaround at Chrysler between 1991 (when it was almost bankrupt) and 1996 owed a great deal to internal strategic resonance manifested in innovation. Innovative products included the development of new models such as the Chrysler Concorde, the Eagle Vision and the Dodge Intrepid, as well as the success of existing, but modified designs of minivans and Jeeps. Innovative processes also developed. In 1991, Chrysler’s development time from design to product launch was in the region of 5 years. (Brown, 1996). By contrast, the launch of the Viper and Neon, took only 30 months to introduce, demonstrating the intense learning that Chrysler had undertaken concerning Japanese approaches (Brown, 2001). This learning further enabled both the Chrysler Cirrus and Dodge Stratus models to come to market less than 3 years after the project had won formal approval within Chrysler. However, the merger that took place between Daimler and Chrysler in 1999 has dramatically threatened these capabilities. The merger of Daimler-Chrysler created the world’s fifth-largest car company by volume with combined annual revenues of around $130 billion. However, there are major differences both in the organizational structures and the innovation processes that reside 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 of ensuring strategic resonance is evident in the differing supply networks and the merger may threaten one of the major foundations upon which Chrysler’s success in innovation was built—its strategic relationships with suppliers. The Daimler-Chrysler exemplifies part of the strategic puzzle for firms: Innovation is strategically important each firm but given the over-capacity evident within the automobile industry there are valid, strategic reasons why the merger took place. However, by its very nature this may threaten the strategic innovation capabilities of both firms within the merger.

4.2.1. Organisational responses to the change from mass production in the Car industry

In recent years, firms have developed a number of approaches in order to deal with the changing market conditions that require greater amounts of innovation, flexibility and responsiveness than had been the case with mass production. Speed of innovation within the industry has become an issue and a number of players have focused on enhancing the speed of the innovation process. For example, Renault’s reorganisation, in the late 1990s, of its development process was a fundamental change to its past approach. Renault’s Technocentre was designed to house 7500 engineers, designers and supplier staff and to bring together the group’s entire car development staff, formerly split between numerous Parisian locations. Renault’s intention was to reduce product development times to a target of 24 months (Brown, 2000).

A number of techniques have been employed by firms to bridge the operations-design gap that resulted from mass production. These techniques include quality function deployment (QFD), robust design (Taguchi methods), failure-mode-effect analysis (FMEA) and wider applications of CAD/CAM. Other tactical approaches have included reducing the actual number of development phases, minimising the number of parts used (thus avoiding ‘over-design’) and ensuring a high percentage of standard parts in the design process. However, whilst these measures have gone some way to facilitate the innovation process, manufacturing’s role in design and innovation launches is much more profound than mere parts reduction and other tactical approaches. None of these techniques address the creation of strategic resonance because they are, essentially, tactical remedies for reducing the potential for faulty products within the production process, or for streamlining the development process in terms of costs and time to market (e.g. CAD). These measures do not address the more profound challenges and issues brought about by mass production in innovation. The strategic importance and involvement from operations remains underplayed in such approaches.

Other innovation enhancing approaches are often linked to rectifying organisational problems both within and outside the firm, caused by mass production. Schilling and Hill (1998: p67) narrate how:

“Until recently, most US companies used a sequential process for new product development, whereby development proceeds sequentially from one functional group to the next. ...Embedded in the process are a number of gates, where decisions are made as to whether to proceed to the next stage, send the project back for further work, or kill the project. Typically, R&D and marketing provide input into the opportunity identification and concept development stages, R&D takes the lead in product design, and manufacturing takes the lead in process design. ...one problem with
such a system emerges at the product design stage, when R&D engineers fail to communicate directly with manufacturing engineers. As a result, product design proceeds without manufacturing requirements in mind. A sequential process has no early warning system to indicate that planned features are not manufacturable. Consequently, cycle time can lengthen as the project iterates between the product design and process design stages”.

In this case, some attempt to facilitate communication and knowledge sharing is made by bringing R&D and marketing functions together. However, there remains the lack of direct communication between R&D engineers and manufacturing engineers so product design and the supposedly accompanying process design can fall into dissonance. Furthermore, the sequential progression and transfer of responsibility from one functional group to the next, suggests that an organization employing such a strategy remains closer to the mechanistic model of management where responsibilities, rights and obligation are precisely defined and attached to each team. Problems spotted at each gate are likely to be pushed backwards/sideways to the previous stage where it is always someone else’s responsibility to correct the fault since implicitly, they created it. So strategic resonance may be alluded to but it is still far from existing in the practice described above.

Perhaps the biggest breakthrough in rectifying problems associated with mass production has been in the development of cross-functional teams. These can be formulated and managed in numerous ways. Some firms successfully innovate using cross-functional teams to focus on a particular product development within the automobile industry. Some firms will use cross-functional teams and not limit them to a particular product but will have a more fluid, ad-hoc arrangement. This approach works well at Toyota:

“Cross-functional teams... work well within individual projects, but the temporary, personal nature of these teams makes it hard for them to transmit information to teams on other projects. Toyota, by contrast, seems to go to the opposite organizational extreme...Toyota has added a number of twists to ensure that each project has the flexibility it needs and still benefits from what other projects have learned. The result is a deftly managed process that rivals the company’s famous production system, lean manufacturing, in effectiveness”. (Sobek et al., 1998)

Whilst cross-functional teams seem to have gone someway to rectifying the intrinsic organisational problems in innovation, the formation of such teams may not be enough.

5. Discussion

Many firms in recognizing the shortcomings of the large functional or product divisional structures they adopted in an era of mass production, have attempted to embrace various new structures which are flatter and focus more on ‘core competencies’ only to find that these changes in themselves are insufficient. For example, many firms have struggled to adapt to the current era of production that includes aspirations of being Lean (Womack et al., 1990; Womack and Jones, 1996), Agile (Kidd, 1994) and possessing mass customization capabilities (Pine et al., 1993). In our opinion the problem is that although the physical structures and boundaries between functions have been dismantled to a degree (especially within lean production) a cognitive division still remains which manifests itself in behavioral outcomes which still relate to the clearly defined, hierarchical physical structures of the past. Indeed one of the criticisms of the lean paradigm is that the focus of the lean literature has remained on operations capabilities (as important as these are) at the expense of some of the strategic factors listed earlier. Thus, although the discussion of the changes in manufacturing paradigms has been explored in terms of these capabilities, the impact of these changes in terms of the firm’s strategic formulation and implementation remains a glaring omission (Brown, 1996).

The rapid pace of technological advancement and the failure of more established firms (normally larger as a result) to grasp the opportunities it affords is often cited as a problem. Yet, many large firms do this very well and continue to rank in the Fortune 500 over many decades. It might be that the organizational structures in the former remain locked into the mass manufacturing paradigm where R&D functions remain quite remote from the other operational level of the firm, whilst the latter have successfully adopted more flexible, flatter structures where R&D and production facilities are co-located in the same area and they are able to communicate horizontally to one another rather than vertically via some senior level of management. However, this is likely to be only a partial reason. Another may be that, in the former, technological advancement may be seen only as advancing understanding (as in blue-skies research or the very linear science push approach) whilst the latter may recognize technological advancement as both a body of understanding and practice (Nelson, 2000) reducing the cognitive gap between researchers and scientists and engineers and line managers. The latter may also recognize that innovative products, processes and equipment need to build upon and extend from existing operational competencies, whereas the former might only recognise the path-dependent nature of progression within its own functional area. Yet, organisational practices will inevitably exert some degree of constraint upon what, within the bounds of our new understanding, can be embodied in new products and processes for competitive
success. As Patel and Pavitt (1997) and Pavitt (1998: p441) express it:

‘The firms’ knowledge base both determines what it makes, and the direction in which it searches…there are clear cognitive limits on what firms can and cannot do’.7

Therefore, in order for technological improvements to reach the market place, there has to be some matching of advances in technological understanding to that of practice and some mechanisms for integrating these two elements (Malerba and Orsenigo, 2000). The clear cognitive division between the roles and responsibilities of R&D, manufacturing and marketing functions need to be blurred so that they are diffused across the whole organisation beyond any technical definition (Burns and Stalker, 1961) or functional-specific myopia (Brown and Bessant, 2003).

The attainment of strategic resonance in the current era relies not only on the more conventional discussion of technological capabilities and competences, but also on breaking the established mindset of traditional organizational architectures. There is already evidence of this from the last decade, as witnessed by the evolution of the multidivisional or M-form that characterised much of the latter half of the twentieth century. Organisations have eliminated bureaucratic organizational layers through down-sizing (Nelson et al., 1996), divested non-core businesses and strengthened core ones through acquisitions or endogenous growth. Many moved from internal hierarchies to various networks (Bartlett and Ghoshal, 1989; Hedlund, 1986).

Such changes have been necessitated by the pace of competition in hi-tech sectors and need to find coping mechanisms that enable firm to maintain a grasp on both the breadth of technological fields required to produce products and processes today, and the depth of knowledge required in each of these numerous fields (von Tunzelmann, 1995; Wang and von Tunzelmann, 2000). As a result, the organizational boundaries of the firm have become increasingly fuzzy and strategic resonance becomes more crucial not only between the elements of the internal network of the firm, but also within its external network of partners. This creates further challenges for the large firm’s organizational abilities.

Although we are not advocating a prescriptive panacea that will apply in all cases we would state that for strategic resonance to occur within the strategic process of the firm the following factors are necessary features to rectify the strategic issues brought about by the change from craft to mass production.8 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. Such senior-level presence is not common in many firms (Hayes and Wheelwright, 1984; Hill, 2000).

Second, there needs to be much greater cohesion and less organisational ‘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 including Dell (Dell and Fredman, 1999; Hodgetts, 1999) as well as at Chrysler (Levin, 1995)—although in Chrysler’s case this cohesion has been threatened as a result of the merger with Daimler. 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, manufacturing 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.

The importance of these manufacturing/operations strategies is pivotal to innovation because all of the following, are typically, ‘business level’ strategic concerns related to the firm’s operations—the nature of the supply chain; the degree of vertical integration and buyer–supplier relations for the firm; the degree of manufacture, as opposed to assembly, within the firm; adding to, or reducing the firm’s manufacturing/operations capacities within new and existing plants; levels of productions of existing products and models of the firm’s product portfolio; new product development in existing markets; entering totally new product markets both by repositioning existing products or by developing new products.

The degree to which these strategic factors are shared between business and operations strategies can then serve as part of the necessary criteria by which strategic resonance may be judged.

6. Conclusions

In our discussion of strategic resonance we are considering a concept which is, largely, more appropriate for use in the Schumpeter mark II model of cumulative innovation by larger, established firms, than to his mark I model of creative destruction by new entrants. Similarly, we

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7 This does not negate the fact that we also agree with Brusoni et al. (2000) assertion that ‘firms know more than they do’. Firms may deliberately wish to know more than they do, so that they can purposefully engage in partnerships and alliances with a network of other organisations and firms (See Pavitt, 2001). But we would like to add that firms that ‘know more than they do’ might also outsource certain activities because their organisational capabilities lag the dynamism of their technological capabilities and they cannot take on the activity themselves.

8 Again, we are grateful to one of the referees who mentioned that the paper would benefit from insights as to how strategic resonance may be ‘operationalised’ within firms.
see strategic resonance being of greatest use to those companies that are dealing with largely incremental change, or the incorporation of new technologies that increase the sophistication of the established core product’s underlying features. The application of strategic resonance is best seen within the wider transformation process from craft to mass through to the current range of manufacturing paradigms. We would not necessarily advocate its use within other high-volume industries such as biotechnology or pharmaceuticals. Such exploration provides opportunities for future research.

Strategic resonance sits between the two scalar polarities of Burns and Stalker’s (1961) mechanistic and organic management. We envisage that an organisation with strategic resonance would have a fairly well defined stratified managerial and divisional structure within which there are established routines and behaviours that meet the current broad strategic aims (closer to the mechanistic model). We advocate the need for senior-level operations personnel as a necessary (but of course not sufficient) element to the stratified management structure. This presence is important to feed into, and form part of, the process of decision making that might threaten operations capabilities and, subsequently, innovation outcomes. Yet, at the same time in recognition of the ‘contributive nature of special knowledge and experience to the common task of concern’ (Burns and Stalker, 1961: p. 121) higher-level management devolves some autonomy to the various divisions and facilitates the creation of communication channels. The divisions are encouraged, through these channels, to continually exchange ideas, concerns and other types of information. A result of this may be the definition and re-definition of individual tasks to tackle the ‘realistic nature’ (op cit) of the individual tasks. Responsibility is shared across the organisation recognising that knowledge about the technical or commercial nature of the task may be located anywhere in the organisation.

Thus, orders and instructions are replaced by information, advice, and the sharing of knowledge through constant dialogue (embodying elements of the organic system). In this manner, the generation of resonance between functions should be created so that they are able to adapt to the challenges they face individually, together in a mutually beneficial manner. These outcomes then need to be discussed with central management who refine the specific strategic objectives with in broader aims in this new light. Furthermore, if we perceive the organisation in the Marshallian perspective of consisting of an internal organisation and an external organisation, then by extending our consideration of this communication to suppliers and the customers (as the external organisation), strategic resonance in all its aspects will be achieved:—between the firm’s strategy and its operations capabilities; across all functions and all levels within the firm and between the market and the firm’s operations capabilities.

References


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