

## Production functions or governance structures: Operations strategy within the firm

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### Abstract

*Since the early work of Skinner, much has been written on operations strategy; but managers still do not appear to carry out the actions in the practice of operations management. This paper is motivated by this issue, and in order to respond to this issue we will first decide how we will conceptualise the organization in which operations function performs. It is possible to think of the organization as a productive function, and this may ground one approach to strategizing within the operations function. An alternative perspective conceptualises the firm as a governance structure, and in this form, the process of strategizing within the operations function is problematic.*

*This paper reviews the alternative perspective, based heavily on the resource based view of the firm, and uses material based on the experiences of an Australian company to illustrate aspects of strategizing within the operations function.*

### Conceptualising the organization

Organizations can be usefully thought of using a number of frames. Bolman and Deal (1997) for example use four contemporary frames for their discussion of organizations; a structural frame, the human resource frame, the political frame, and the symbolic frame. Hatch (1997) refers to frames that have developed over time; the classical frame, the modernist frame, the symbolic-interpretive frame, and the post-modern frame. These alternative frames are not necessarily competitive approaches to understanding organizations; it would be more appropriate to see them as ways of bringing different aspects of a complex reality into a learning based process that, it is hoped, will lead to better performing organizations. This paper sets out to consolidate a range of views that have emerged in the literature, views that develop a frame for thinking about organizations, and particularly, a frame that can provide a useful perspective for thinking about the operations function of contemporary organizations. This view, the resource based view (RBV) of the firm, is grounded in the seminal work of Coase (1937), and a range of contemporary researchers in the field (see for example Williamson, 1985; Barney, 1996; Gagnon, 1999; and Schroeder, Bates and Junntila, 2002). Gagnon et al (1999), in particular, argued that the resource based view of the firm offered an interesting theoretical perspective for research into operations management. This paper supports this view.

While much of this paper will be directed at an exposition of the RBV of the firm, the objective of the paper is to examine the role of operations management within the organization from the perspective of the resource based view of the firm. It will then, be useful to make some preliminary comments on operations management.

## Operations management

Coase (1937) argued that an organization adopted a structure that was a response to the cost of effecting transactions in the value chain of a particular product or service that the organization sold. Key aspects of this structure were the size of the organization and how transactions within the value chain were to be managed. Three options were identified; hierarchically (within the organization), through some form of joint venture, or via the market. The dynamic nature of the firm, in response to the need to constantly assess the relative costs of the three options, determines the roles of management. Coase identified two roles for managers;

*'Initiative means forecasting and operates through the price mechanism by the making of new contracts. Management proper merely reacts to price changes, rearranging the factors of production under its control.'* (Coase, 1937 p. 351)

The first role, the development of new contracts, is a strategic role, a role that is in the modernist frame. In this role the manager must see the whole organization in its environment; an open systems view of the organization. The act of establishing a new contract sets a framework for future decisions and actions, shaping the way in which the business will conduct its transactions for the life of the contract; the governance structure for that value chain. The second role noted by Coase; reacting to price changes and rearranging the factors of production, is consistent with a closed systems view; the classical frame. The resources used to effect transactions are a given, the role for managers is to make the most efficient use of these resources. This view fits well with the classical view of operations management. The classical view held, since the work of Taylor, that the role of factory management was:

*'not as architects of competitive systems but as custodians of large, capital intensive assets. Their job was to control and coordinate all factors of production so as to minimise costs and maximise output.'* (Skinner 1986, p. 57)

This perspective served operations managers well during times of low uncertainty and low competition. As these conditions changed, particularly in the USA through the 1970s, the competitive pressure on organizations required more than a capacity to react to price changes and an ability to rearrange the factors of production. The limitations of this frame, and a perception that operations managers were being excluded from the most senior decision making processes of the organization, has motivated research into the concept of manufacturing strategy and later operations strategy.

The intent, if we assume that the content of many contemporary texts on operations management reflects current academic thinking on the subject, is that operations managers should be able to execute both roles (for example Slack et al, 2001). Accordingly there is a wide range of prescriptive approaches that have emerged to provide managers with the procedures for developing strategy. The process of developing strategy and the form it could take has been prescribed (see for example Wheelwright and Hayes, 1985; Berry and Hill, 1992; Voss, 1995). The competitive strategy of the firm is used to define manufacturing strategy, and, importantly, the absence of manufacturing strategy is associated with poor performance (Ward and Duray, 2000). The presence of a manufacturing strategy is related to superior performance, and processes are defined that can facilitate the development of a manufacturing strategy. Concepts have also been developed, such as quality and flexibility that enable managers to identify and articulate the competitive capabilities for the function. The concepts and processes that have been developed clearly offer

operations managers a range of techniques to improve the function through a strategic approach. Despite this, it appears that, in Australia at least, the majority of companies have not declared a strategy for the operations function, or they consider that the manager of the function is not able to contribute to a manufacturing strategy (D'Netto and Sohal 1999). Research into continuous improvement projects also indicate that these activities seem to occur without the integrating framework that would be expected in the presence of an active operations strategy (Jenkins, Hyland and Sloan 2000). These results indicate that the literature may have failed in the task of influencing managers in the operations function. These managers appear to be performing the task as a caretaking function, caring for assets provided by chance through some strategy of normative response, or by the initiatives of some other part of the organization. A role dominated by Coase's efficiency orientation.

This paper then, takes the RBV of the firm as its perspective, and explores the issue of operations strategizing. The RBV will be used to develop a better understanding of the concept of what an operations strategy can address, where this should be addressed, and to examine why the practice of operations strategy appears to be so slow in being adopted by operations managers.

## **Elements of the RBV of the firm**

The RBV of the firm is usually traced back to the work of Coase (1937) who explored the question of why individual firms could still survive, rather than having all firms consolidating under the pressure of economies of scale. Penrose (1959) continued to use the same approach when examining the factors that influenced the growth of firms. More recently Williamson (1985) linked assets to governance structures and transaction costs of the firm. This then leads into work that explores the desirable attributes of assets, now termed resources. This discussion is framed for those resources within the governance structure on the single firm. One outcome of this work is the concept of core competencies as outlined by Prahalad and Hamel (1990). These core competencies are grounded on resources that enable sustainable competitive performance. This paper will draw on much of this work to set out a way of looking at the operations function, and then the process of strategizing within that function.

### ***Governance structures***

Transactions must be executed and controlled from within a governance structure. This is the legal and operational system that manages the value chain for the entity that is in focus, the single economic firm. It is possible to define three archetypical governance structures (Coase 1937):

- Hierarchy - within the firm
- Market - managed via the pricing mechanisms of the market
- Partnership - via some form of partnership with an external organization

Briefly, the boundary of a firm is set by the capacity of the firm to execute transactions internally at a competitive cost, in comparison to the cost of executing the transactions with another firm, or through the price mechanism; a market governance structure. As firms become larger, the cost of maintaining control via hierarchical

governance structures forces the overall cost of the transaction to become unfavourable compared to one of the other two alternatives.

### ***Transactions***

The firm can sustain itself via the execution of a set of transactions that can be exchanged for a value that is greater than the cost of the transactions. This generates excess value, and this provides the firm with a profit. In executing these transactions the organization will need to use an array of resources or assets.

### **Attributes of the transaction**

Whether or not a transaction should be governed hierarchically, via partnership, or via the market is a strategic decision. This choice will be influenced at least by the following three attributes of the transaction-resource mix (Williamson, 1985):

- the specificity of the resources used
- the frequency of the transaction
- the level of uncertainty in the demand for the transaction.

Specificity is the key attribute. Resources developed for a single client, that cannot be used for alternate purposes are highly specific. Costs per transaction might in consequence be low, but if that customer is lost, or the consuming process changes, the resource is left without a market, and costs may not be recoverable. Decisions to accept high levels of specificity, in the pursuit of the lower cost structures, often available via more specialized processes, will be tempered by the uncertainties of future demand for the products of the new asset.

### ***Resources***

The terms assets, resources, activities, competencies and dynamic capabilities are used in literature (for example Williamson, 1985; Prahalad and Hamel, 1990; Teece et al, 1997; Barney, 1996). Barney (1996) settles on the use of the term resource, suggesting that the difference in meaning behind the other terms does not add much to the debate. While this argument is convincing for the equivalence of the terms asset and resource, it is not so convincing for the concept of competency and capability. In this paper we will use the term resource wherever possible. The concepts of competency and capability will be differentiated. Competency is a demonstrated ability to effect a transaction. This might require a resource, but it might also require skills that are not necessarily formalized or made explicit. Capability is the possession, but not execution of a competency. It is evident that there is increasing abstraction as we move from assets to resources and then to competencies and capabilities.

### **The attribute of specificity and the concept of fit**

Specificity of resources is seen to be a crucial attribute of any process for the execution of transactions (Williamson, 1985). Working from this proposition it follows that the resources that are most highly specialized to the transactions of the firm, are the resources that are most likely to sustain the competitive capability of the firm (see below for the interpretation by Barney, 1996). The corollary of this conclusion is that resources that are non-specific, that are in effect tradeable, will be more efficient if governed via a market arrangement, rather than through the internal structure of the firm (hierarchical governance). Scale economies, absent internal complexity, should lead to overall lower costs of adding value; these cost reductions

in the perfect market, should be at least partially available to other firms in the value chain.

The centrality of the notion of resource specificity in the transactional view of the firm leads to the argument that the firm must achieve high levels of internal fit, or coordination, if it is to achieve a sustainable competitive position (Porter 1996). This notion of 'fit' however must be combined with a constant challenge of specificity at the process and the unit operations level. Where resources are separable, and are no longer specific within that value chain then the high-powered incentives of markets should be able to facilitate a more economic transaction outside the firm. Specificity thus becomes a key issue as operations managers review the scope and complexity of all processes; internal and external.

This purposeful process of integration in the pursuit of tighter fit; and higher levels of specificity of resources; is of course not without risk. The environment and the market will change, and these changes may occur rapidly. Resources that are highly specific, well integrated to other resources or resources within the value chain will need to rapidly adapt to change in the overall process output. This is no easy, or obvious problem. Work in the innovation field has demonstrated the challenge that successful firms face when confronted with innovation in the internal or external processes (Anderson and Tushman, 1990; Tushman and Anderson, 1997).

The firm exists, as a unified organization, because the costs of the governance structures are lower in this state than those that would need to be developed to control one based on market structures. A petroleum refinery operates under unified governance because the costs of setting up and monitoring contracts between the unit operations of the process, between distillation, and cracking, for example, exceed economies that could be gained through unified governance at the separate unit operation level and a market relationship between different unit operations. Where the costs of establishing and monitoring a governance structure is lower, such as in the logistics function, then market systems of governance may be used. Making the transition from hierarchical to market systems of governance requires managers to destroy the efficient, high 'fit', organizations that deliver value to the organization. It would be surprising if managers responsible for efficient operations could simultaneously conceptualise the systems required for market or partnership governance structures.

### **What needs to be fitted: resources**

Resources will then be assembled to achieve results that cannot, for a lower price, be achieved by a third party. Arguing from the transaction view of the firm, this will be achieved via the development of a set of resources that are highly specific to the identified transactions. When the resources are not specific, then the high-powered incentives of the market form of governance should be more economic. These, non-specific resources become candidates for change. Barney (1996) proposed that resources could be evaluated using a set of four criteria. .

- Value - does the resource enable the firm to more effectively respond to environment threats and opportunities?
- Rareness - is the resource widely used by competing companies.  
Incorporation of a rare resource may enable a temporary competitive

advantage, and thus profitability to be achieved. The resource, once recognized, may then become widely used, and thus will become enabling.

- Imitatability - can the resource be imitated? Sustainable competitive advantage will be dependent on the development of resources that have low levels of imitatability.
- Organization - has the business developed an organization that can capture the advantages of its resources?

Resources that fail to meet these criteria might be more effectively governed via market systems.

Resources that are more abstract, the skills of engineers in composite materials for example, are resources that are likely to be rare and difficult to imitate. The capability to develop these resources is deemed in recent literature to be a critical skill for organizations. Teece (2000), for example, argues that dynamic capabilities are crucial to sustainable competitive performance. This capability closes a process, grounded on resources and capabilities, as the locus of learning in a process of double loop learning (Argyris & Schön 1974, Argyris, 1982).

*'In the end, wealth creation in a world of heightened competition comes down to developing and owning difficult to replicate (intangible) assets, and orchestrating them astutely. The latter capability is what I have referred to elsewhere as dynamic capabilities.'* (Teece 2000, p. 3)

This view also returns us to the view of Coase (1937), that organizations need a management structure that can look to the future and develop and assemble resources to meet the needs of some unknown future; develop governance structures in the terminology of Williamson (1985); as well as efficiently operate the existing resources of the firm.

*'Initiative means forecasting and operates through the price mechanism by the making of new contracts. Management proper merely reacts to price changes, rearranging the factors of production under its control.'* (Coase, 1937 p. 351)

The view that dynamic capabilities are central to the successful management of knowledge indicates that the view of Coase is still valid:

*'Dynamic capabilities are the capacity to sense opportunities, and to reconfigure knowledge assets, competencies, and complementary assets so as to achieve sustainable competitive advantage.'* (Teece 2000, p. 27)

The challenge for operations management is the level to which the two roles, determining *governance structures* and managing *efficient operations* can be incorporated into the function

### **Strategic operations management**

According to Hamel and Prahalad (1989) almost every strategic management theory and nearly every corporate planning system is premised on a strategy hierarchy in which corporate goals guide business unit strategies and business unit strategies guide functional tactics. In this hierarchy, senior managers identify strategy and it is up to other managers to implement it. They further argue that this hierarchy undermines competitiveness by fostering an elitist view of management that tends to disenfranchise most members of the organization. This disenfranchisement means that many stakeholders including employees fail to identify with corporate goals or involve themselves tactically in the competitive positioning of the company. This then results in the inability of managers to distinguish between the intermediate tactics and long-run strategic intentions of global competitors (Hamel

and Prahalad 1985). In Hamel and Prahalad's (1985) view, few organisations bother to distinguish between the intermediate tactics and long-run strategic intentions of their competitors and they do not understand their own vulnerability until they can understand the intentions of their rivals and then reason back to potential tactics.

Campbell and Alexander (1997) argue that many managers believe there is a structure and order to strategy development that should be followed. Typically, using the MOST approach (mission, objectives, strategy, tactics), strategists begin by choosing a mission -- a long-term purpose for the organization. Then they should define short-term and mid-term objectives that will move the organization on a path toward the mission. A strategy can then be developed to achieve the objectives using short-term operating decisions, or tactics, to implement the strategy. However they argue that tactics need to be worked out before the strategy can be determined, and the strategy needs to be clear in order to define the objectives. As Mintzberg (1994) argued strategy making does not occur in isolation. It does not occur because a meeting is held with that label. Rather, strategy making is a process interwoven with all that it takes to manage an organization.

In creating strategy Campbell and Alexander (1997) argue that most of the insights important for strategy formulation reside in the heads of the operating managers and although operating managers often are not the best strategists, excluding them from strategy development means excluding their insights as well. Also, tactics are not only about implementing today's strategy but also about discovering tomorrow's strategy because tomorrow's insights arise from today's operating experiences. Unless implementation is also viewed as being part of strategy development, tomorrow's strategy is likely to be short on insights. Insights give meaning to tactics, which in turn make strategies achievable and allow objectives to be set with the knowledge that they can, with a fair wind, be achieved. Bhide (1986) maintains that opportunities to gain lasting advantage through major strategic moves are rare in any business. He argues that most organisations need to be vigorous and nimble. Many organisations he argues are learning the limits of strategy and concentrating on tactics and execution.

Kurtzman (1994) also argues for the role of operations managers in strategy. He makes the point that often companies confuse manufacturing strategies with tactics. He maintains that deciding to make or buy a component is not strategic, rather it is tactical. If this point is accepted then it goes to the heart of what can be regarded as an operations strategy. The task for operations managers is to identify the transactions and their attributes, to assemble the appropriate value chain, and to effect the transactions. This at the highest level will require an ability to define the system of governance for the whole value chain of the organization. Capacity decisions, locations decisions, human resource decisions, all become a matter of tactics. This view is at odds with the view expressed in this paper. The two roles for management, governance structures and efficiency, are different. Strategy and tactics however are concepts that are becoming increasingly difficult to define in useful terms. If the 'make or buy' decision is not strategic, then according to the RBV little else is.

## The Case Study

In this exploratory work we have chosen a case study to illustrate the issues raised in the literature. An overview of 30 years of change in the organisation is provided in Table 1.

During the thirty years overviewed in Table 1 Hawker de Havilland (HdH) had three changes of ownership, in the seventies and eighties it was part of the Hawker Siddeley group based in the UK in the nineties it was part of BRT and in 1998 it was purchased by the Tenix group and is now owned by Boeing Aerospace. As such HdH has been a strategic business unit of a multi-national corporation apart from the three years it was operated by Tenix. During its history HdH has changed from a military aircraft manufacturer, to an aircraft assembler supported by government offset rules, to an aerospace component manufacturer with mainly commercial, not defense, customers. As such they have changed from being a protected player in an industry to a world-class supplier in a highly competitive industry. During the operational transition the governance structure remained fairly stable with the corporate owner setting strategy and managers responding to meet the performance criteria set by senior corporate managers.

During this change in market positioning the operations managers needed to reduce costs and become a lean, highly efficient manufacturing and design operation. As can be seen from the table under “intervention tools used” in the late 80s early 90s and again in the mid-nineties corporate drove change through its vision and mission. Senior corporate managers would set the vision and mission and the performance and then it was up to the operational managers to devise the tools, techniques and tactics that would achieve these goals. The first area to be modified in most cases was the organisational structure as the firm downsized its workforce and introduced contract designers and engineers, then multi-skilling, and then team, the structure had to operate with fewer people and this meant a different governance structure to allow for flexibility. Developing the concept, and building effective contracts, for a range of resources (people) was a key part of this change. As the new organisational structure evolved the operations managers set about creating a learning organisation (see Griggs and Hyland 2002) that would provide the capabilities and competencies necessary to continue operating.

In examining the operations managers’ response to the changes that they had to implement it is evident that they were not only aware of corporate strategy; they were also interacting with it. As their response has had a positive impact on the strategic business unit it is evident that they have introduced tactics that supported the strategies put forward by senior managers. It is also the case that there were, at times, excellent communication channels between the strategic corporate managers and the operations managers. The operations managers were also able to acquire the necessary resources to implement their strategies. For example HdH needed to keep abreast of the latest advanced in composite materials and manufacturing technologies, all their raw materials are imported and all their products are exported. To stay at the technological leading edge HdH were active in two Cooperative Research Centres, the CRC for Advanced Materials and the CRC for Intelligent Manufacturing Systems. both these CRCs required funding by HdH but they were a source of new ideas and highly creative employees.

<i>Timeline</i>	<i>Business environment</i>	<i>Organisation structure</i>	<i>Organisation focus</i>	<i>Intervention tools used</i>	<i>Outcomes</i>
1970s and 1980s	Mostly military for Australian government, offset rules	Functional, large support (>1:1)	Functional excellence, entry level training	Business restructure Merger/acquisition/ divestment	Business growth Pre-eminent position in Australia
Late 1980s	Multisector (by acquisition) Australian focus, no commercial offset rules	Functional + more design focus Separate groups for large projects	As above + more R & D, commercial	Vision, strategy, quality circles	Structure of programs and technologies for future established
1990-1992	Change of ownership Focus on niche areas →commercial	Design/build teams Cellular manufacture in autonomous divisions	Process excellence	Systems redesign TQM	Departure from some business sectors Focus on financial management
1993-1996	Global downturn, but some new products launched Price Pressure	Operations at unit level → customer focus Less Support	Frontline leadership Current workforce upskilling	Systems redesign TQM Enterprise agreement	Downsize, restructure whilst remaining profitable
1996 – mid 1998	Rapid increase in production volume Global business	Team based structures Lower support ratio (0.5:1)	Agile teams Start of learning organisation	Vision/mission Enterprise agreements Multilevel team building	Growth, right sizing Competency enhancement
1998+	Change of ownership Commercial and military mix, continuous cost pressure	Networked teams? Virtual multisite organisation	Knowledge focus Rapid adaptation	n.a	Global profitable growth

Table 1 An overview of change at Hawker de Havilland (Sloan, Beckett and Hyland 2002)

The operations managers at HdH were able to identify the resources and transactions that were required and the capabilities and competencies they needed to design and to assemble the appropriate value chain. They were able to identify their needs and put in place structures, not strategies, to ensure that they were able to operate in a way that delivered value to the corporate entity. While at times they were forced to accept difficult decisions made at corporate level they were able to establish contracts and structures that enabled the operation to continue to function productively. Not only were they reactive to corporate strategies, they were able to put in place pro-active tactics such as multi-skilling and organisational learning that help build a range of competences and capabilities the operation needed to survive.

## Concluding remarks

In the period reported above, HDH engaged in significant transformation in the technologies of assemblies, in its relationship with major clients, and with its ownership structures. During this period there was no evidence to suggest that the efficiency role of operations management could at any time be displaced by some more strategic role. During this period the technology of the process was transformed, the governance structure of the organization within the full value chain was transformed, but simultaneously and continuously, the need to achieve competitive economics of production were a significant factor in many decisions. The roles of the operations managers in this organization contained aspects of both setting internal contracts, interacting with radical changes to value chain governance structures, and operating efficiently. The content of the active roles however was biased to a need to operate efficiently, the setting of new contracts took place elsewhere. Operations managers were closely involved with these decisions, not as leaders but as participants. The concepts of contracts, governance structures, and efficient operations are more useful for making sense of this period than the concepts of whether the managers were engaged in strategizing about the operation of the firm. When looked at using these constructs, the case amply demonstrates that operations managers have a clear role, while they must manage efficiency; the decisions they take as they renew the structures of the value chain interact with the overall governance structures that define the nature of the organization.

## References

- Anderson, P. and Tushman, M.L. 1990, 'Technological discontinuities and dominant designs: A cyclical model of technological change', *Administrative Science Quarterly*, vol. 35, Dec, pp. 604-633.
- Argyris, C. 1982, *Reasoning, Learning, and Action*, Jossey-Bass Limited, London.
- Argyris, C. and Schön, D.A. 1974, *Theory in Practice: Increasing Professional Effectiveness*, Jossey-Bass Ltd., London.
- Barney, J.B. 1996, *Gaining and sustaining competitive advantage*, Addison-Wesley, Sydney.
- Berry, W.L. and Hill, T. 1992, 'Linking Systems to Strategy', *International Journal of Operations & Production Management*, vol. 12, no. 10, pp. 3-15.
- Bhide, A. 1986, 'Hustle as strategy', *Harvard Business Review*, Sep-Oct, pp. 59-65.
- Bolman, L.G. and Deal, T.E. 1997, *Reframing Organizations 2nd ed.*, San Francisco, Jossey-Bass Publishers.

- Campbell, A. and Alexander, M. 1997, 'What's Wrong with Strategy?', *Harvard Business Review*, Nov-Dec, pp. 42-51.
- Coase, R.E. 1937, 'The nature of the firm', *Economica*, vol. 4, no. Nov, pp. 386-405.
- D'Netto, B. and Sohal, A.S. 1999, 'Changes in the production manager's job: past, present and future trends', *International Journal of Operations & Production Management*, vol. 19, no. 2, pp. 157-181.
- Gagnon, S. 1999, 'Resource-based competition and the new operations strategy', *International Journal of Operations & Production Management*, vol. 19, no. 21, pp. 125-138.
- Griggs H. and Hyland P. 2002 'Organisational Restructuring- The case of the learning organisation :contradiction or necessity' Proceedings of the 3rd European Conference on Organisational Knowledge, Learning & Capabilities, Athens Greece
- Hamel Gary and Prahalad C.K. 1985, 'Do you really have a global strategy?', *Harvard Business Review*, Jul-Aug, pp. 139-148.
- Hamel Gary and Prahalad C.K. 1989, 'Strategic Intent', *Harvard Business Review*, May-Jun, pp. 56-69.
- Hatch, M.J. 1997, *Organization Theory: Modern, Symbolic, and Postmodern Perspectives*, Oxford University Press, Oxford.
- Jenkins, R., Hyland, P. and Sloan, T. 2000, "CI in the process of developing manufacturing strategy", in Boer, H., Berger, A., Chapman, R. and Gertsen, F., (Eds.) *CI Changes; From suggestion box to organisational learning*, Ashgate, Aldershot, pp. 209-228.
- Kurtzman, J. 1994, 'Real strategy', *Harvard Business Review*, Feb-Mar,
- Mintzberg, H. 1994, 'The Fall and Rise of Strategic Planning', *Harvard Business Review*, Jan-Feb, pp. 107-114.
- Penrose, E.T. 1959, *The theory of the growth of the firm*, Basil Blackwell, London.
- Porter, M. 1996, 'What is strategy?', *Harvard Business Review*, Nov-Dec, pp. 61-78.
- Prahalad C.K. and Hamel G. 1990, 'The Core Competence of the Corporation', *Harvard Business Review*, May-Jun, pp. 112-124.
- Schroeder, R.G., Bates, K.A. and Junntila, M.A. 2002, 'A resource-based view of manufacturing strategy and the relationship to manufacturing performance', *Strategic Management Journal*, vol. 23, pp. 105-117.
- Skinner, W. 1986, 'The productivity paradox', *Harvard Business Review*, Jul-Aug, pp. 55-59.
- Slack, N., Chambers, S. and Johnston, R. 2001, *Operations Management, 3rd. ed.*, Pearson Education, Sydney.
- Sloan, T.R., Hyland, P.W. and Beckett Ron 'Learning as a Competitive Advantage: Innovative Training in the Australian Aerospace Industry', *Int. J. Technology Management*, vol. 23, no. 4, pp. 341-352.
- Teece, D.J. 2000, *Managing intellectual capital: Organizational, strategic, and policy dimensions*, Oxford University Press, Melbourne.

- Teece, D.J., Pisano, G. and Shuen, A. 1997, 'Dynamic capabilities and strategic management', *Strategic Management Journal*, vol. 18, no. 7, pp. 509-533.
- Tushman, M.L. and Anderson, P. 1997, *Managing strategic innovation and change*, Oxford University Press, Oxford.
- Voss, C.A. 1995, 'Alternative paradigms for manufacturing strategy', *International Journal of Operations & Production Management*, vol. 15, no. 4, pp. 5-16.
- Ward, P.T. and Duray, R. 2000, 'Manufacturing strategy in context: environment, competitive strategy and manufacturing strategy', *Journal of Operations Management*, 18, pp. 123-139.
- Wheelwright, S.C. and Hayes, R.H. 1985, 'Competing through manufacturing', *Harvard Business Review*, Jan-Feb, pp. 99-109.
- Williamson, O.E. 1985, *The Economic institutions of capitalism*, The Free Press, New York.