

The Emerald Research Register for this journal is available at
www.emeraldinsight.com/researchregister



The current issue and full text archive of this journal is available at
www.emeraldinsight.com/0144-3577.htm

A conceptual synergy model of strategy formulation for manufacturing

A conceptual synergy model

903

Kit Fai Pun

Department of Mechanical and Manufacturing Engineering, The University of the West Indies, Trinidad and Tobago, West Indies

Keywords *Strategic planning, Strategic choices, Manufacturing industries*

Abstract *With the increasing level of competition in many competitive environments, a body of research regards the ability to formulate and implement a formulated strategy as an equally important source of competitive advantage. The rate of change in both internal and external environments of manufacturing firms is increasing, which necessitates that increased attention be paid to strategic planning and strategy formulation. This paper reviews the concepts of strategy, strategic planning and strategy formulation. It then discusses the common strategy determinants and describes the characteristics of several planning frameworks and methodologies. A conceptual synergy model for strategy formulation is proposed, and its features and characteristics are presented along with a discussion of its applicability in manufacturing enterprises.*

Introduction

Recent developments of the World Trade Organisation and other international trade agreements have forced industries worldwide to face a new era of intense global competition. The new manufacturing environment, characterised by intense global competition, rapid technology changes, and product variety proliferation, calls for a strategic management of the manufacturing function (Dangayach and Deshmukh, 2001; Hum and Leow, 1996; Pun *et al.*, 2004). Manufacturing firms have to compete effectively not only in the local context, but in wider regional and global marketplaces also. They should identify competitive priorities and formulate and implement viable strategies for sustaining growth and survival.

Many scholars (Hill, 1997; Johnson and Scholes, 1997) classified strategy into three levels, namely, corporate, business, and functional strategies. Within this hierarchy, manufacturing strategy can appear in two places, first at the corporate level, taking a broad view over a set of related or separate businesses, and second, it can appear as one of the functional strategies at the business level (Mills *et al.*, 1995). From Skinner (1969, 1978) to Hayes and Wheelwright (1984) until more recent times (Barnes, 2002; Dangayach and Deshmukh, 2001; Hayes and Upton, 1998; Swamidass *et al.*, 2001), many strategy writers have emphasised the importance of manufacturing strategy (or operations strategy more generically) within the broader consideration of organizational level strategy. The contributions of manufacturing are realised through the deployment of strategic decisions in a number of manufacturing areas, so as to align the company's skills and resources with its competitive strategy and enhance its ability to compete on dimensions generally classified as quality, cost, delivery and flexibility (Platts and Gregory, 1991; Pun *et al.*, 2004). The relative importance of the competitive criteria would depend on customer demands and



International Journal of Operations & Production Management
Vol. 24 No. 9, 2004
pp. 903-928
© Emerald Group Publishing Limited
0144-3577
DOI 10.1108/01443570410532117

performance against competitors. It is the prioritising of the criteria that determines how the company would compete (Carpinetti *et al.*, 2000).

Research into strategic planning and dynamic strategy formulation and implementation has become a major focus of academia and industry to improve manufacturing and operations (Feurer and Chaharbaghi, 1995a, b). This is because, with the accelerating dynamics of competition, the key to competitiveness no longer lies in employing strategies that have been successful in the past or emulating the strategies of successful competitors (Mintzberg *et al.*, 1998; Pun, 2003). Many researchers (Barnes, 2001; Dangayach and Deshmukh, 2001) have suggested various research methods for the empirical investigation of strategy formulation and implementation. Some others (Pun, 2003; Swamidass *et al.*, 2001) also proposed different planning frameworks and methodologies pertinent to the design and management of the strategy formulation practices in manufacturing firms.

Nevertheless, the whole topic of strategy is a complex and indeed contentious subject area. There are many different understandings of the term “strategy”, with scholars unable to agree on even a basic definition (Hutchinson, 2001; Mintzberg *et al.*, 1998). Using individual planning methodologies and models separately would also lead to different strategy results and decisions (Pun, 2003). Recent work has been directed at integrating the existing models and frameworks into a more coherent and synergy approach (Hart, 1992; Pun, 2003). However, research up to date provides little guidance on how such an approach may be realised. This paper reviews the issues surrounding the conceptualisations of strategy, strategic planning and strategy formulation, and discusses the determinants and explores the obstacles to the implementation of strategic decisions in manufacturing firms. A broader definition of manufacturing firms is used which includes both manufacturers and manufacturing services companies (Pun *et al.*, 2004). Manufacturers are referred to those organisations which extract raw materials, add value through processing them, and transform intermediate materials and components into finished products. Whereas manufacturing services companies are those facilitating the production and distribution of goods and adding value through a variety of intangibles and services (e.g. engineering support, product design, logistics, and consulting) that they provide (Haksever *et al.*, 2000; Pun *et al.*, 2004). The paper describes the characteristics of selected planning frameworks and methodologies, and comes up with a conceptual synergy model of strategy formulation for manufacturing firms. The model synthesises these frameworks and methodologies from the organizational strategy, operations strategy and information strategy traditions. The implications of uses of the model in the manufacturing context are also discussed.

Conceptualisation of strategy

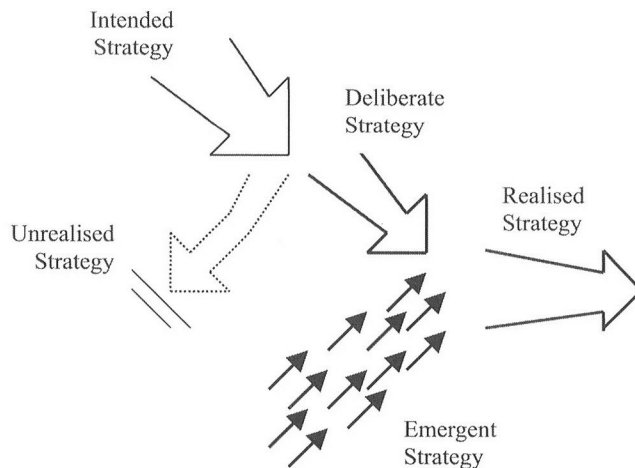
Many people use the words “strategies”, “plans”, “policies” and “objectives” interchangeably. Mintzberg (1994) defines strategy as “a plan, or something equivalent – a direction, a guide or course of action into the future, a path to get from here to there”, and as “a pattern, that is, consistency in behavior over time”. The term strategy seems to have a multitude of meanings. This is not surprising, as there is no commonly accepted and universal definition of strategy (O’Regan and Ghobadian, 2002a, b). The Greek origin of the term strategy, *strategia* means the art of war (Feurer and Chaharbaghi, 1995b). In military terms, strategy refers to “the important plan”.

Where the objective is to defeat the enemy, the strategy will be to deploy the resources available in a manner that is likely to achieve the aim. In a business environment, the concept of strategy has evolved over time.

The strategy literature reflects the complexity and diversity of strategic thought (Hutchinson, 2001). For instance, according to early scholars such as Chandler (1962), strategy is the determination of the basic goals and objectives of a firm and the adoption of courses of action including the allocation of resources necessary for carrying out these goals. Andrews (1971) argues that strategy is a rational decision-making process by which the firm's resources are matched with opportunities arising from the competitive environment. Others, such as Hofer and Schendel (1979) regard strategy as the mediating force or match between the organisation and the environment, and Aldrich (1979) state that the environment has a strong deterministic influence on the strategy-making processes in organisations. On the other hand, proponents of the resource-based view also argue that it is not the environment, but the resources of the organisation that form the foundation of a firm's strategy (Grant, 1991).

Mintzberg (1994) contends that strategies are intentional and their implementation is deliberate before they become realised. Intentional strategies that are not realised are thus discarded. It is rarely possible to realise intended strategies completely, and so the realised strategies normally diverge to a greater or lesser extent from the intended strategies. Additionally, in some cases companies do not have any specified intended strategy. The realised strategy is thus, the product of many different decisions taken individually. Therefore, strategies may be unintentional or emergent, i.e. they simply emerge from the things that a firm does (Maloney, 1997). The conceptual forms of strategy are shown in Figure 1.

Recent strategy literature also acknowledges the distinction between content (i.e. what the decisions and actions are) and process (i.e. how those decisions and actions come about) of a strategy (Barnes, 2001; Bozarth and McDermott, 1998;



Source: Based on Maloney (1997, p. 51)

Figure 1.
Basic forms of strategy

Dangayach and Deshmukh, 2001; Minor *et al.*, 1994). The content relates to the distinct elements of the strategic plan which differ from firm to firm (O'Regan and Ghobadian, 2002a). Content-related literature stresses issues of competitive priorities, which includes cost, quality, delivery speed and dependability, flexibility and innovation aspects. On the other hand, a process is a pattern or procedure in which strategy is developed and implemented (Dangayach and Deshmukh, 2001; Pettigrew, 1992). It relates to the mechanisms for the development and subsequent deployment of the strategic plan (O'Regan and Ghobadian, 2002a).

Mintzberg (1987) contends that formulation and implementation merge into a fluid process of learning through which creative strategies evolve. He also identifies three types of strategy processes: planning, entrepreneurial and learning-by-experience (Mintzberg, 1994). A summary of the key characteristics of these strategy processes is given in Table I. While both content and process are separate elements of strategy, they are highly interdependent. The interrelationship is seen as so significant that a consideration of the content of strategy in the absence of the strategic process means that only a limited view is obtained (Mintzberg, 1990). Barnes (2001) argues that firms should determine the content and the process of their strategies in the light of their position in the industry and their objectives, opportunities and resources.

From strategic planning to strategy formulation

Notion of strategic planning

Strategic planning is concerned with the setting of corporate goals, the making of strategic decisions and the development of plans necessary to achieve them (Hewlett, 1999). Evered (1983) defined strategic planning as a process for generating viable directions that lead to satisfactory performance in the market place, given a variety of legal constraints and the existence of competitors. The process was perceived as the critical management function in business organisations (Mintzberg, 1994). Johnson and Scholes (1997) encapsulate the meaning of strategic planning as the direction and scope of a firm over the long term that achieves advantage for the firm through its configuration of resources within a changing environment, to meet the needs of markets and to fulfil stakeholder expectations.

In the 1960s and 1970s, Andrews (1971) and Ansoff (1976) laid the foundations for strategic planning by demonstrating the need to match business opportunities with

Planning	Entrepreneurial	Learning-by-experience
Fully conscious and controlled thought process Results relatively standardised	Semi-conscious process Long experienced and deep insight enables formulation of visions and strategy	Strategy is evolutionary process of repetitive nature Pattern of impulses from insider and outside during implementation of strategy
Fully developed strategic plans are followed by timed implementation	Vision informal and personal to preserve flexibility	Arise from dynamics of organisation and directly influence behaviour

Source: Based on Feurer and Chaharbaghi (1995b, p. 17)

Table I.
Three types of strategy process

organizational resources and illustrating the usefulness of strategic plans. Using a unidirectional approach, the strategic planning processes entail a number of well-defined steps carried out in sequence including data collection and analysis, strategy development, evaluation, selection and implementation. The process explores a variety of critical variables and suggests possible cause-and-effect relationships that impact on the operational and business performance of a firm (Mintzberg and Lampel, 1999). This helps a firm to assess its current and future position, identify critical factors and find methods of assuring success (Bailey and Avery, 1998).

Then, for a period, strategic planning fell in perceived importance as management shifted its attention to improving quality, restructuring, downsizing and re-engineering. In the 1990s, the pendulum had swung again and strategic planning was returning to its former prominent position (Maloney, 1997). As the environment is continually changing, it is necessary for strategic planning to continually change to maintain a "balance" or "fit" with the external environment (Procter, 1997; Wright *et al.*, 1996). Some recent studies (Deloitte and Touche, 1992; Hayes and Upton, 1998; Lyles *et al.*, 1993; Noble, 1999; Pilkington, 1998) have shown that many organisations engaged in strategic planning would outperform those that have no formalised planning systems. The deployment of strategic planning is altered where there is a changed perception of the problems faced by management. Nevertheless, its central theme continues to concern the future and formulate strategies to attain the multiplicity of organizational objectives and goals (Ansoff and McDonnell, 1990).

Concepts of strategy formulation

Hax and Majluf (1996) contend that strategy formulation is one of the two major cycles in strategic planning that intended to frame the key strategic issues of a firm through a sequential involvement of corporate, business and functional perspectives. The strategy formulation process would affect the second cycle of strategic and operational budgeting that deals with the final definition and subsequent consolidation at corporate level of the budgets for all the businesses and functions of the firm. The budget constitutes the legitimate output of this process, since it represents the commitments for strategy implementation.

According to Hax and Majluf (1996), there are basically two schools of management pertaining to strategy formulation. One school relies heavily on formal-analytical process while the other espouses a power-behavioral approach to strategy formulation. Those favouring the former approach tend to advocate the use of formal planning systems, management control and consistent reward mechanisms to increase the quality of strategic decision-making (Ansoff and McDonnell, 1990). They regard strategy formulation as a formal and disciplined process leading to a well-defined organisation-wide effort aimed at the complete specification of corporate, business and functional strategies. The latter rests on the behavioural theory of the firm, and emphasise multiple goal structures of firms, the politics of strategic decisions, executive bargaining and negotiation (Hax and Majluf, 1996). Strickland and Thompson (1998) argue that strategy formulation has a strongly entrepreneurial character in the sense that managers have to choose among alternative strategies and to pursue approaches, and this entails at least a small amount of adventure and risk-taking.

Operationalising strategy formulation

Determinants of strategy formulation

Pettigrew and Whipp (1993) argue that strategic planning is not just a matter of formulation, but it also includes how people interpret and deploy the strategic plan. Many researchers have employed a number of independent characteristics, factors, obstacles and problems to delineate the strategy formulation and deployment processes. For instance, Lingle and Schiemann (1994) found that there are six areas of vital importance to long-term successful strategy implementation. These areas are: market, personal, finance, operation, adaptability, and environment. O'Regan and Ghobadian (2002b) incorporate internal environment functional integration, the use of analytical techniques, resources for the strategic planning process, systems capability and creativity, and a focus on control into the external environment. Chin and Pun (2000) developed a set of 12 strategy determinants, and incorporated them into four categories including corporate, marketing, technology, and operations strengths of manufacturing firms (Table II).

Some studies also shed lights on corporate culture as an influential factor of strategy formulation and deployment in organisations (Martinsons, 1996; Mintzberg *et al.*, 1995). Strickland and Thompson (1998) contend that the stronger a company's culture, the more that culture is likely to shape the strategic actions it decides to employ, sometimes even dominating the choice of strategic moves. Moreover, other researchers and practitioners advocate the employment of core skills (Irvin and Michaels, 1989), core competencies (Prahalad and Hamel, 1990) and capabilities (Stalk *et al.*, 1992) that help a firm to point what it must do to formulate and deploy strategy.

Reactive vs proactive strategy choices

Another area of research has addressed to the proactive and reactive approaches of strategy formulation in business organisations in general and in manufacturing firms in particular (Chin and Pun, 2000; Cravens *et al.*, 2000; Lindman, 2002; Pun *et al.*, 2004). For instance, Cravens *et al.* (2000) argue that key strategy initiatives would include leveraging the business design, recognising the growth mandate, developing market vision, achieving a capabilities/value match, exploring strategic relationships, building strong products, and recognising the advantages of reactive versus proactive

Strategy determinants	Key components
Corporate strengths	Management commitment Company's mission and policies Availability of funds and capitals
Marketing strengths	Accessibility to markets Market positioning Company's reputation
Technology strengths	Product and service quality R&D and innovation capabilities Information technology and systems
Operational strengths	Company's location Workforce skills and abilities Costs of production/operations

Source: Based on Chin and Pun (2000)

Table II.
Four strategy
determinants and their
components

cannibalisation. Lindman (2002) argues that many small to medium-sized enterprises (SMEs) are apt to rely on reactive and closed new product strategies based on a study in the Finnish metal industry. Even if successful in the past, such strategies risk being unable to identify and take advantage of any business opportunities outside the present product scope.

According to Chin and Pun (2000), the proactive approach stresses the initiatives of new product development with outstanding technical features that satisfy strong marketing needs. For the adoption of this approach, a firm attempts to explicitly allocate resources to identify and seize opportunities. It would concentrate on technology, research and development (R&D), and consumer marketing. The proactive approach pre-empts competition by being the first to the markets with innovative products that competitors have difficulty of matching (e.g. Sony). On the other hand, the reactive approach relies largely on imitating the success of leading manufacturing companies and their products in markets. A manufacturing firm would wait until its competitors successfully introduce their products, and then attempts to imitate them or develop similar products with modifications accordingly (Chin and Pun, 2000).

“Proactive/reactive” is a legitimate dimension of strategy for formulation (Pun *et al.*, 2000, 2004). A list of common proactive- and reactive-oriented strategies is given in Table III. Arguably, it is rather difficult to classify strategies on a strict sense because most of them are neutral and could be proactive or reactive in applications in the manufacturing context. For instance, “joint ventures” and “product-line extension” could be reactive-oriented, while “vertical integration” could be proactive-oriented, and *vice versa*. Their classification would rely largely on the specific business and operations circumstances that the manufacturing firms face. These are concerned with corporate, marketing, technology, and operational strengths of firms.

Obstacles to strategy implementation

Strategy formulation would be a routine task, if a manufacturing firm can know in advance the strategies of competitors, forthcoming legislations and price changes by suppliers (Chin and Pun, 2000). However, it is rather difficult to predict any of these environmental changes and their impact on corporate objectives. Besides, ineffective strategy implementation deployment is often one of the main reasons for the failure to achieve expected or projected performance in many companies (Dean and Sharfman,

Proactive-oriented strategies	Reactive-oriented strategies
Horizontal integration	Business withdrawal or divestment
Market development	Importing technologies
Market diversification	Importing workforce
New business development	Joint ventures
New product development	Product-line extension
Product diversification	Product modification
Production automation	Product/service quality improvement
Staff education and training	Related business development
Strengthening R&D	Selective investments
Vertical integration	Subcontracting

Source: Based on Pun *et al.* (2004)

Table III.
Common proactive- and reactive-oriented strategies

1996; Mintzberg, 1994; Noble, 1999). A report by Deloitte and Touche (1992) shows that eight out of ten companies fail to deploy their strategies effectively. Wessel (1993) argues that most of the obstacles or barriers to strategy implementation fit into one of the following interrelated categories:

- (1) too many and conflicting priorities,
- (2) the top team does not function well,
- (3) a top-down management style,
- (4) inter-functional conflicts,
- (5) poor vertical communication, and
- (6) inadequate management development.

Eisenstat (1993) argues that most companies attempting to develop new capacities stumble over common organizational hurdles such as competence, coordination and commitment. McGrath *et al.* (1994) indicate that political turbulence may well be the single most important issue facing any implementation process. Sandelands (1994) also argues that people underestimate the commitment, time, emotion, and energy needed to overcome inertia in their organisation and translate plans into actions. Besides, Al-Ghamdi (1998) extends Alexanders' (1985) study and contends that communication, management support, and good information system are the key tools for smooth implementation processes. A list of recurring problems of strategy implementation is excerpted in Table IV.

Planning frameworks and methodologies for strategy formulation

Over the years, many studies culminated in a large number of strategy tools and methodologies that are still used for analysis purposes today (Feurer and Chaharbaghi, 1995b). For instance, these include the SWOT (strengths, weaknesses, opportunities and threats) analysis (Lindgren and Spangberg, 1981), the PIMS (profit impact of marketing strategy) principles (Buzzell and Gale, 1987), the Boston Consulting Group's (1973) market growth/market share matrix, the McKinsey and Company's (1986) market attractiveness/strategic position matrix and 7S framework. In parallel,

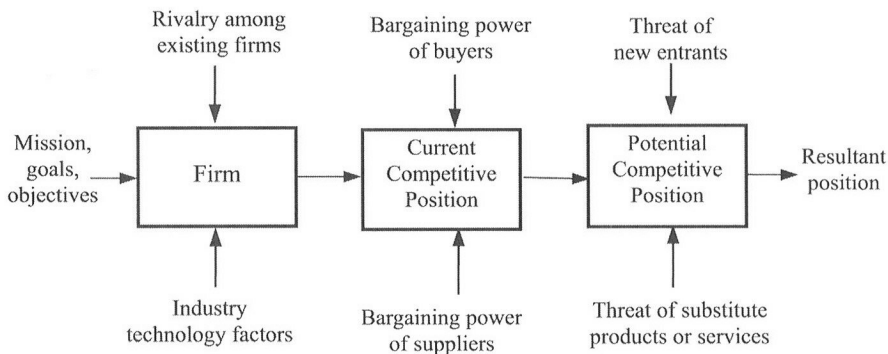
-
1. Took more time than originally allocated
 2. Major problems surfaced which had not been identified earlier
 3. Coordination of implementation activities was not effective enough
 4. Competing activities distracted attention from implementing this decision
 5. Capabilities of employees involved were insufficient
 6. Training and instruction given to lower level employees were inadequate
 7. Uncontrollable factors in the external environment had an adverse impact on implementation
 8. Leadership and direction provided by departmental managers were inadequate
 9. Key implementation tasks and activities were not sufficiently defined
 10. Information systems used to monitor implementation were inadequate
 11. Advocates and supporters of the strategic decision left the firm during implementation
 12. Overall goals were not sufficiently well understood by employees
 13. Changes in responsibilities of key employees were not clearly defined
 14. Key formulators of the strategic decision did not play an active role in implementation
 15. Problems requiring top management involvement were not communicated early enough
- Source:** Abstracted from Al-Ghamdi (1998, p. 323)
-

Table IV.
Fifteen potential strategy
implementation problems

researchers identified many strategy process types through both empirical and theoretical research, culminating in a wide range of models and frameworks (Feurer and Chaharbaghi, 1995b; Mills *et al.*, 1995; Platts, 1994).

For instance, some planning frameworks aim at identifying strategic opportunities that help firms to develop vision, reorient thinking and identify strategic possibilities for the current systems. Examples include Porter's (1980, 1998) competitive forces model, Benjamin *et al.*'s (1984) strategic opportunities framework and Porter and Millar's (1985) competitive advantages framework. Porter (1980) identified five competitive forces, including suppliers, buyers, new entrants, substitute products and existing competitors (Figure 2). An industry and competitive analysis based on the framework would help managers and executives to formulate strategies in the competitive environment of their particular industry.

Benjamin *et al.* (1984) proposed a strategic opportunities framework to raise a firm's awareness of the strategic potentials of their current products, operations and systems. This would determine the need for any significant structural changes (Figure 3). This matrix framework would help a firm to identify the strategic opportunities based on its internal and external operations and evaluate major strengths and weaknesses of its



Source: Adapted from Porter (1980)

Figure 2. Competitive forces framework

	External Operations	Internal Operations
New Products and Processes		
Traditional Products and Processes		

Source: Adapted from Benjamin *et al.* (1984)

Figure 3. Strategic opportunities framework



products, operations and systems. Besides, Porter and Millar (1985) proposed a competitive advantage framework to examine the linkage between the business unit activity and the competitive environment. The framework uses the value added chain for supporting strategic analysis, emphasising cost leadership, product differentiation and focused strategies. This assists managers in analysing the competitive context of their business strategy and identify where the firms may create a competitive advantage in defending against competitors.

Another categories of planning frameworks intend to improve the understanding of the current system functions and showing how they should be managed in firms. McFarlan and McKenney's (1983) strategic grid and Earl's (1989) strategic impact or expectancy model are typical examples that stress strategic positioning that helps firms to assess the strategic importance of their situations in the marketplace. McFarlan and McKenney (1983) conceptualised the ideas of competitive strategy that helps firms to build structural barriers, and used the value-added chain concept to determine where they could exploit the competitive opportunities. McFarlan (1984) extends the competitive strategy framework with a strategic grid tool (Figure 4) that helps firms to assess their current operations and systems strategically. Moreover, Earl (1989) proposed a strategic impact model (also known as an expectancy model) that stresses the recognition and analysis of the competitive environment and strategies. This model helps firms to identify their current position and exploit possible opportunities based on the competitive forces and the competitive advantage frameworks (Porter, 1980, 1998; Porter and Millar, 1985).

From both organizational and operations strategy traditions, the top-down process approach has universal and intuitive appeal, and has formed the basis for many observations, recommendations and refinements in the literature of how to develop manufacturing strategy (Mills *et al.*, 1996; Swamidass *et al.*, 2001). Mills *et al.* (1996) propose a manufacturing strategy process that can be divided into six phases. They are:

- (1) establishing the presence of product groups,
- (2) determining the business objectives,

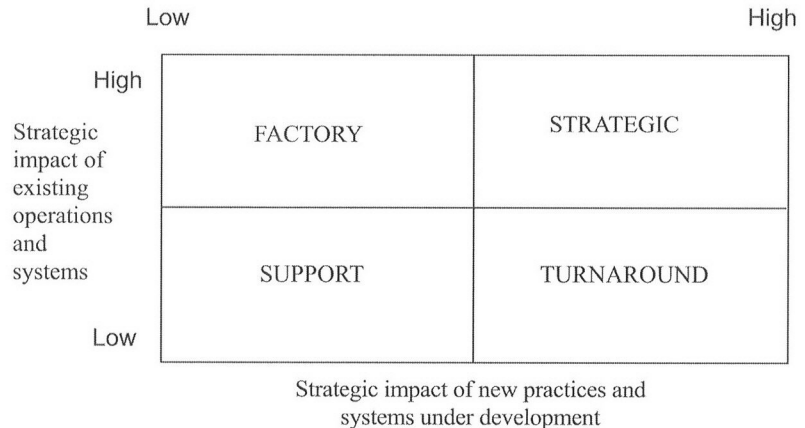


Figure 4.
The strategic grid

Source: Adapted from McFarlan (1984)



- (3) identifying current manufacturing strategies,
- (4) assessing current strategies against stakeholders' requirements,
- (5) navigating towards business objectives, and
- (6) embedding strategy-making.

Pun *et al.* (2000) also developed a strategy configuration process framework that configures strategy from identifying strategic prerequisites, competitive priorities and decision areas, via determining strategic directions, choices and options, and finally, securing business transformation. The framework predominantly regards strategy as an elegant process in which functional strategies would be aligned with corporate level strategy (Figure 5).

Hayes and Wheelwright (1984) proposed a four-stage framework in the development of manufacturing's strategic role. Within this framework, they postulated a four-stage level of manufacturing effectiveness whereby the manufacturing function can play a more proactive role in leading other functional areas in the contribution to the development of the overall corporate strategy. Incorporated the four-stage framework, Swamidass *et al.* (2001) proposed an alternative process model of manufacturing strategy development, and used a 4 × 4 matrix to examine core competences and capture the relationship between the strategic role of manufacturing and the process of manufacturing strategy development (Figure 6). Typical alternatives are a coherent pattern of actions, process improvement programmes and/or the pursuit of core manufacturing capabilities.

Pettigrew and Whipp (1993) advocate a framework of analysis to examine the importance of the strategy development process, its content and the context within which strategy is developed. This framework comprehends many aspects of strategy and the interrelatedness of factors/determinants that affect strategy formulation and execution (Table V). The framework proposes that these factors be overlain by a multi-level approach, and this would be at the firm, sector and national context (Hutchinson, 2001). Barnes (2002) stresses the content of business and manufacturing strategies, and incorporates external and ownership factors in his study of the complexities of the strategy formulation process. Based on Pettigrew and Whipp's (1993) (Figure 7) manufacturing strategy paradigm, Mills *et al.* (1995) proposed a contingency framework for reviewing and analysing the strategic roles and factors relevant to the design of a manufacturing strategy process. The framework consists of "process, content and context" of a strategy. Process refers to how a strategy is made

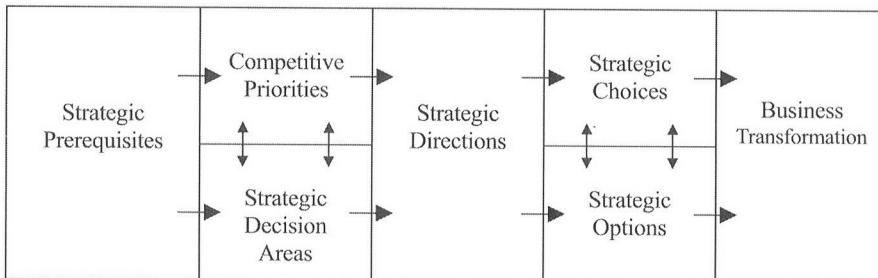


Figure 5.
Strategy configuration process model

Source: Based on Pun *et al.* (2000, p. 320)



	Alternative Manufacturing Strategy Development Processes			
Strategic Role of Manufacturing	Process 1: Patterns of Incremental Actions	Process 2: Adoption of Improvement Programme	Process 3: Top-down Planning/Audit	Process 4: Core Competency Development
Stage 1: Internally Neutral	Most likely combination of Process 1 and Stage 1			
Stage 2: Externally Neutral		Most likely combination of Process 2 and Stage 2		
Stage 3: Internally Supportive			Most likely combination of Process 3 and Stage 3	
Stage 4: Externally Supportive				Most likely combination of Process 4 and Stage 4

Figure 6. Alternative process model of manufacturing strategy development

Source: Based on Swamidass *et al.* (2001, p. 1298)

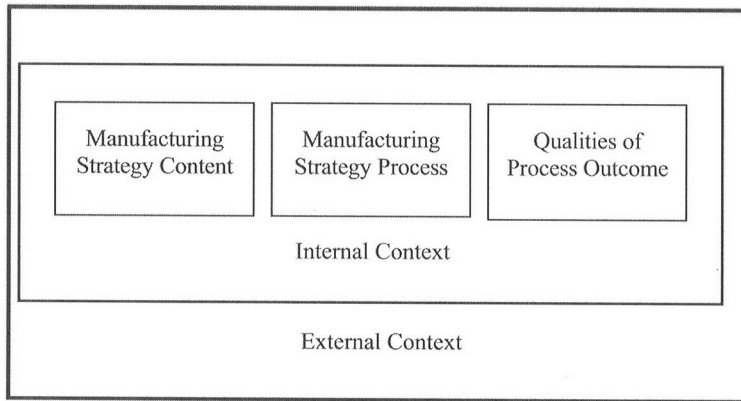
Forces	Components of forces
Process	Change managers Models of change Formulation and implementation Pattern through time
Content	Assessment and choice of products and markets Objectives and assumptions
Context	
Internal/Inner	Resources Capability Culture Politics
External/Outer	Economic/business Political Social

Table V. Pettigrew and Whipp's trinity of forces

Source: Abstracted from Hutchinson (2001, p. 270)

while content is the constituents of the strategy. The context includes both internal factors (e.g. the firm's structural, cultural and political facets) and external factors (e.g. economic, social, political and competitive environments). The design of which is contingent on the content model(s) chosen and the required qualities of the outcome of the process.





Source: Adapted from Mills *et al.* (1995, p. 19)

Figure 7. Contingency framework of manufacturing strategy process

In the context of strategy alignment and information strategy, Venkatraman (1991) proposes an IT-induced reconfiguration model which analyses the technology strategy connection and establishes the architecture for various levels of strategic transformation. The model has later been modified by Burn (1997) to access potential impact of any practices and systems (Figure 8). Furthermore, Henderson and Venkatraman (1992) developed another model that identifies four components for strategic business alignment, namely,

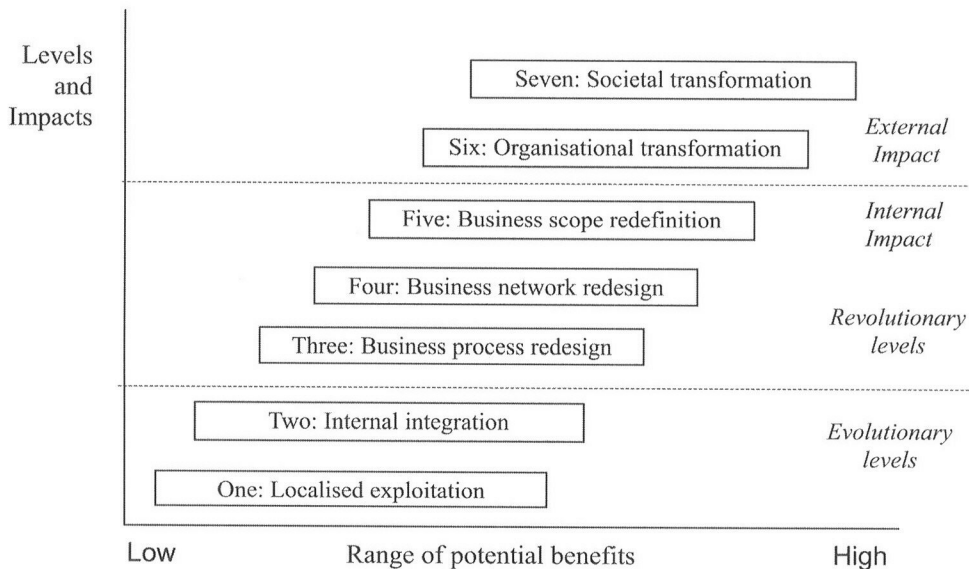


Figure 8. IT-induced reconfiguration model

Source: Adapted from Burn (1997)



- (1) business strategy,
- (2) IT strategy,
- (3) organizational infrastructure and processes, and
- (4) IT infrastructure and processes (Figure 9).

Management analyses a strategy based on external and internal alignments, and the results are compared to determine the cross-alignment relationships.

The various planning frameworks and methodologies provide a set of diversified aids and references for manufacturing firms to formulate and deploy their strategies. Using the organizational, operations and information strategy traditions, ten planning frameworks and models are selected for comparison. They could be grouped under three categories, namely strategic opportunities, strategic positioning, and process-content. A sketchily description of them in a chronological order is depicted in Table VI.

Synergy of strategy formulation and configuration

Need for a holistic approach

The increasing complexity of business issues requires the close cooperation of people from different areas and functions within the organisation. This optimises the use of the knowledge base that is available in addressing the issues and enhances the level of creativity in the development of solutions (Feurer and Chaharbaghi, 1995b). The change in the understanding of strategy formulation and implementation is reflected in the increasing amount of research that is directed towards organizational learning (Garvin, 1993; Senge, 1990), knowledge management (Davenport and Prusak, 1997), and the importance given to the redesign of business processes in the context of strategic change (Hammer and Champy, 1993).

Many planning frameworks and methodologies could stand by themselves on their application domains. However, there is no universal agreement that the various methodologies and models are appropriate for manufacturing firms. Mintzberg (1994) contends that firms achieve superior results if they could:

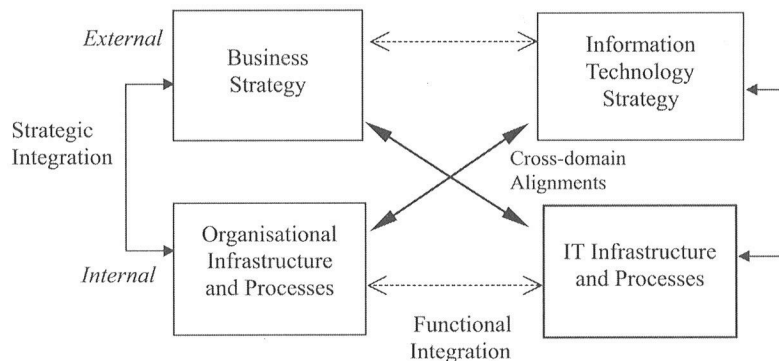


Figure 9.
Strategic alignment model

Source: Adapted from Henderson and Venkatraman (1992)

Model/framework	Competitive forces model	Strategic opportunities framework	Competitive advantages framework	Strategic impact model	IT-induced reconfiguration model	Strategic alignment model	Contingency framework	Strategy configuration model	Alternative strategy development processes
Advocates	Porter (1980)	McFarlan and McKenney (1983)	Porter and Millar (1985)	Earl (1989)	Venkatraman (1991); Burn (1997)	Henderson and Venkatraman (1992)	Millis <i>et al.</i> (1995)	Pun <i>et al.</i> (2000)	Swamidass <i>et al.</i> (2001)
Categories	Strategic opportunities	Strategic positioning	Strategic opportunities	Strategic positioning	Strategic opportunities	Strategic opportunities	Process-oriented	Process-oriented	Strategic opportunities
Research orientation	Theoretical	Theoretical	Theoretical	Theoretical	Theoretical and empirical	Empirical	Theoretical and empirical	Theoretical and empirical	Theoretical and empirical
Purposes	Identify five competitive forces	Conceptualise the ideas of competitive strategy	Examine the linkage with competitive environment	Analyse the competitive environment and strategies	Analyse the technology/strategy connection	Identify four components for strategic business alignment	Identify process, content and context of manufacturing strategy development	Configure the seven core elements for strategy development	Examine the evolving forms of manufacturing strategy development
Main Features	Examine major forces and their impact Leverage differences in strategic resources and competitive forces	Assess current operations and systems Evaluate strategic impact of new practices and systems	Use the value added chain for supporting strategic analysis Emphasise cost leadership, product differentiation and focused strategies	Work with the competitive forces and the competitive advantage frameworks Identify current position and exploit possible opportunities	Establishes an architecture for various level of strategic transformation Assess the potential impact of any practices and systems	Examine the impact on strategic alignment process Determine the six crossalignments and identify any misfits	Analyse the strategic roles and factors relevant to the design of a strategy Stress the chosen content and the required qualities of outcome	Develop a configuration process and examine through the core elements relationship between the strategic role of business alignment and transformation process of manufacturing strategy development	Use matrix to identify core competences Captures the relationship between the strategic role of manufacturing and the process of manufacturing strategy development

Table VI. Contrasting main features selected planning frameworks and methodologies

- (1) select from a wide range of strategic capabilities rather than concentrating on a single capability or process, and
- (2) adjust their characteristics to the requirements of the environment by changing their strategies and strategic capabilities

There has been an increasing awareness for a more integrated approach to strategy formulation and implementation (Hart, 1992; Pun, 2003). Pun (2003) argues that many strategy methodologies and models have distinct features with each contributing ingredients and attributes that are important for holistic, maximally useful strategy formulation.

Features and characteristics of the model

In an attempt to integrate the various strategy models and frameworks into a holistic system, the author proposes a conceptual synergy model of strategy formulation for manufacturing firms. It attempts to synthesise various frameworks and methodologies (as discussed above) from the organizational strategy, operations strategy and information strategy traditions. A diagrammatic representation of the synergy model is shown in Figure 10. It is composed of ten building blocks including the Porter's (1980, 1998) competitive forces model, Benjamin *et al.*'s (1984) strategic opportunities framework, and Porter and Millar's (1985) competitive advantages framework, McFarlan and McKenney's (1983) strategic grid, Earl's (1989) strategic impact model, Henderson and Venkatraman's (1992) strategic alignment model, Mill *et al.*'s (1995) contingency framework, Venkatraman's (1991) and Burn's (1997) IT-induced reconfiguration model, Pun *et al.*'s (2000) strategy configuration process model, and Swamidass *et al.*'s (2001) alternative strategy development process model. The synergy

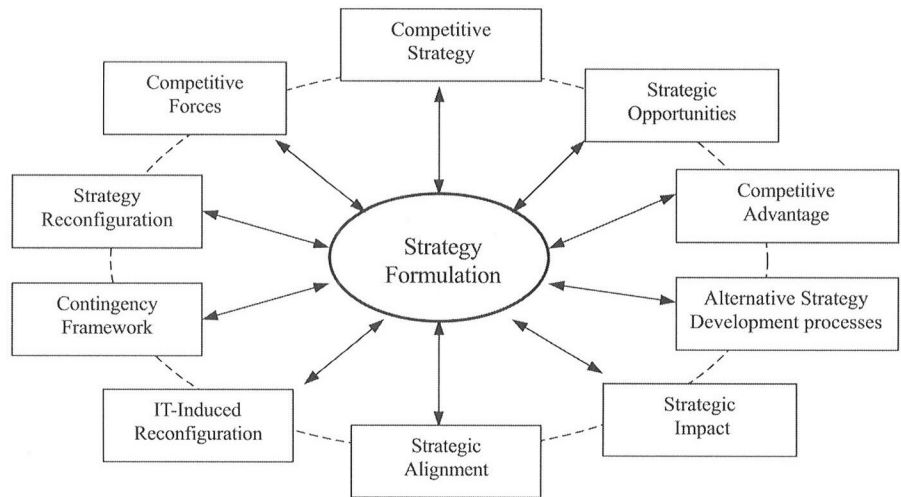


Figure 10.
A diagrammatic representation of the conceptual synergy model

Keys:
 ↔ Integration of the SF process with IT links and systems
 - - - Cross-alignment of various models, frameworks and tools



of these building blocks provides the theoretical groundwork for assisting manufacturing firms to configure strategies with respect to various strategic prerequisites and the considerations of competitive priorities, strategic choices and options, and business transformation.

The synergy model addresses strategy contents, processes and contexts interlocking the strategic planning functions with information technology links. Figure 11 shows the main process components of the model. The fact that many interactions are at work could lead to a complex picture. Two steps have been taken to simplify the model while retaining its vital components. First, it is presumed that the main impact of sectoral, national and market factors enters the strategy process from business strategy and objectives. Second, no attempt has been made to create a picture where every aspect of the model can be seen to interact with every other, albeit in particular circumstances.

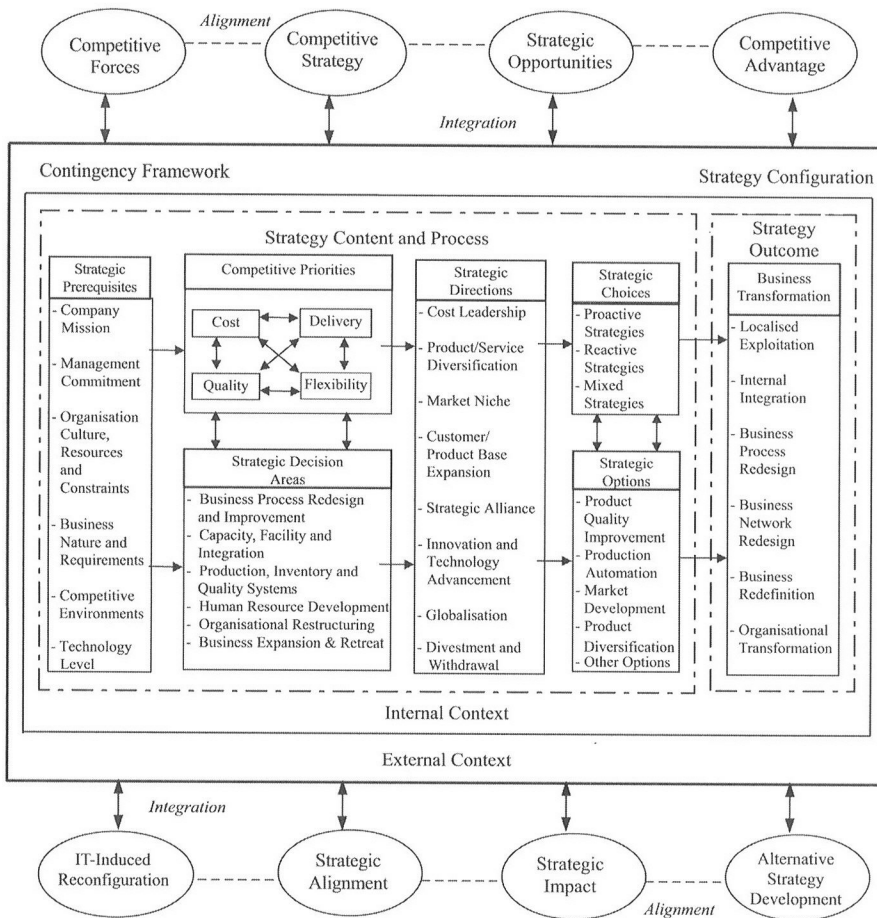


Figure 11. The synergy process of strategy formulation and configuration

Built upon the skeleton of the strategy configuration process model, the synergy model applies the competitive forces model to provide a basis for examining a firm's current and future position. Strategic prerequisites (e.g. company mission, organizational resources and technology level) competitive priorities (e.g. cost, quality delivery and flexibility) are examined using the strategic opportunities framework. Both competitive advantages framework and strategic alignment model are used to examine the strategic decision areas that may potentially produce competitive advantage, emphasising the determination of strategic directions (e.g. cost leadership, product or service differentiation, market niche, and strategic alliance). Moreover, the strategic grid and the alternative strategy development matrix are employed to reaffirm the firm's position, while the impact model is used to evaluate the strategic choices and options. The synergy model makes use of the IT-induced reconfiguration to embrace the conceptualisation for the technology-strategy connection. Besides, it adopts the principles of the contingency framework to achieve a set of desired process outcomes. Table VII summarises the audit, formulation and execution stages of strategy formulation and configuration process in the manufacturing firms. These stages are discussed separately below.

- (1) *The strategy audit stage.* This stage is the most documented stage in the strategy process and generally concentrates on defining the manufacturing task and assessing the ability of current strategy to achieve that task (Mills *et al.*, 1995). To achieve consistency with business and other functional strategies and credibility of strategy choices, it is essential to have the involvement of chief executive officer (CEO) and senior representatives from various functions. For instance, credibility within manufacturing and widely within other functions can be assisted by creating an awareness of the process across the firm and especially within manufacturing at an early stage. The procedure includes education on the strategy principles being used in the process, and the means of gathering and comparing audit data. Comprehensiveness of the strategy is not a major issue, but any deficiencies will be identified in this stage. It is necessary for this stage to enable firms to construct the strategy that displays consistency over time.
- (2) *The strategy formulation stage.* The aim of this stage is to generate an action plan and accompanying procedures. The plan would assist the consistency and credibility of strategy choices, and these procedures would enable iterations with business and other functional strategies by the involvement of CEO and other functional managers. Mills *et al.* (1995) argue that the achievement of consistency requires methods of predicting interactions between options in different decision areas over time. For instance, the credibility within manufacturing, the quality of strategy proposals and the ease of subsequent implementation would be improved by wider involvement in the creation and evaluation of strategy alternatives.
- (3) *The strategy execution stage.* In this stage, consistency of the strategy choices and its credibility are still assisted by regular feedback of progress and dissemination of the content of new strategy (Mills *et al.*, 1995). Execution and deployment of new strategies often requires assistance from different functions and individuals who have not been directly involved in the strategy process.

Process outcome	Strategy audit stage	Formulation stage	Execution stage
Consistency with businesses and functional strategies	Participation: involvement of CEO and function heads and wide awareness within the business that the process is active	Procedure: the possibility of iterations with business and functional strategies Participation: regular feedback on progress to CEO and function heads	Participation: regular feedback on progress to CEO and function heads
Credibility within the business	Procedure: methods for deriving the manufacturing tasks from the business strategy Participation: awareness of the strategy process at an early stage	Participation: deep involvement in the creation and checking of strategic options	Participation: wide and deep dissemination of the strategy
Credibility within manufacturing	Point of entry: wide education of the strategy principles being used Procedure: method of capturing past strategies	Procedure: tests for comprehensiveness Participation: methods for recognising the scale and longevity of options	Procedure: means of achieving widespread understanding of the strategy
Comprehensiveness		Procedure: methods of predicting the effect of options in terms of interactions between decision areas	
Consistency over time			
Consistency between parts of the strategy			

Source: Based on Mills *et al.* (1995, p. 42)

Table VII.
The strategy audit, formulation and execution in manufacturing

Implications of uses in manufacturing firms

Using the synergy model helps manufacturing firms to identify opportunities and barriers throughout the strategy formulation and configuration process. These would have five implications, which have been elaborated as follows.

- (1) The CEO and function heads should take the initiative to develop short- and long-term company goals and objectives incorporating the competitive priorities and success factors (e.g. product or service quality, customer services and market accessibility). After identification of the internal growth opportunities and external linkages, management should provide adequate resources and budgets to match goals, and motivate people involvement to meet the corporate, business and functional needs (Pun *et al.*, 2000). The organizational capabilities (in terms of corporate, marketing, technology, and operational strengths) and business requirements on productivity and profitability should be aligned with any chosen strategic direction (e.g. product differentiation, market niche, and market leadership).
- (2) In order to avoid falling into the trap of developing separate and distinct strategies and procedures, detailed implementation should be planned and key performance measures should be defined. The strategic options (e.g. proactive, reactive, or mixed strategies) should meet constraints of time, budgets and resources and other legal, ethical and environmental concerns. These would also support the business transformation and bring benefits from localised exploitation, via internal integration, to process and network redesign, and to business redefinition and organizational transformation (Henderson and Venkatraman, 1992; Pun *et al.*, 2000).
- (3) The quality of a formulated strategy depends on the quality of knowledge used (Feurer and Chaharbaghi, 1995c). This in turn hinges on how effectively the process of knowledge acquisition is managed within the organisation. Strategy formulation and implementation would therefore be regarded as a constant learning process and the quality of strategy directly depends on the quality of the organisation's cognitive and behavioural learning mechanisms.
- (4) The synergy model would help management to establish the parameters for strategy formulation and performance measures, allowing them to quantify and measure progress. Besides, it would help define realistic goals based on a detailed analysis of the markets, competition, technology and other significant factors. The CEO, function heads and middle management would identify from this where misfits occur. Performance measurement systems could provide the necessary feedback loop within the organizational learning process. The design of which would encompass all stages of the strategy formulation and implementation process and the organisation's value system (Feurer and Chaharbaghi, 1995c, d; Neely *et al.*, 1994).
- (5) Any formulated strategy should be treated as part of individual responsibilities rather than a central function. By transferring the ownership of strategy, this would substantially improve the quality of knowledge used for strategy formulation and would dramatically reduce potential conflicts and the timeframe for strategy implementation (Feurer and Chaharbaghi, 1995b; Pun, 2003).

Many manufacturing firms achieve stunning results by implementing planned changes with preferred strategy choices, while others might have been disappointed. Lack of appropriate approach for integrating strategy formulation, deployment and performance measures is always one of the major causes of process deficiencies in many firms (DeFeo and Janssen, 2001a, Neely *et al.*, 1994). For instance, many of their improvement goals would be applied to manufactured goods and services, and strategic responsibilities are often limited to local or intradepartmental processes. As a result, individual departments would pursue their own goals but fail to integrate them with overall organizational goals.

Many deficiencies could be corrected through the integration of a firm's core competencies and improvement initiatives in the strategy formulation process. DeFeo and Janssen (2001b) argue that firms should encourage interdepartmental cooperation and empower managers and employees by providing them with authority to carry out planned activities. Using the synergy model, the formulation of strategy would be expedited and success would be communicated throughout the firm with respect to assessing its competitive priorities and achieving corporate objectives.

Conclusion

While much has been written on strategic manufacturing and manufacturing strategy, the progression of thinking is that manufacturing can be more proactive in leading other functional areas in the contribution towards the development of corporate strategy (Hum and Leow, 1996). There is no one strategy that is optimal for all firms. The strategy formulation process appropriate for a firm can be quite different from one suitable for addressing the strategic tasks of a highly diversified corporation (Pun, 2003). This paper reviews the concepts associated with strategy, strategic planning and strategy formulation and discusses various frameworks and methodologies advocated in facilitating strategy formulation in manufacturing firms. The review verifies a growing cognizance that no single strategy process or single planning model can guarantee any manufacturing firms to gain sustainable competitive advantage.

The process of strategy formulation is dynamic and relies significantly on the maturity levels of management leadership, employee involvement, organizational culture, and more importantly, the way how the strategy formulation link to its implementation and performance measures in the manufacturing firms (McAdam and Bailie, 2002; Platts *et al.*, 1998). This paper has made an attempt to set forth a conceptual synergy model for strategy formulation by synthesising various strategy models from the organizational strategy, operations strategy and information strategy traditions. This is a holistic approach to strategy formulation and implementation encompassing the important ingredients from associated strategy models and concepts. Built upon the "process, content and context" of manufacturing strategy, the model addresses objectively the translation of corporate mission and objectives into action plans, the assessment and selection among various strategic alternatives, and measures of the results and performance. It is anticipated that using the model would help managers and policy makers to:

- (1) identify the competitive priorities,
- (2) determine the key process components of strategy formulation, and
- (3) monitor the execution of strategies in their organisations.

Further research could test empirically the efficacy and the potential use of the model. Empirical investigations could be ensured through acquisition of timely and properly processes data using surveys and interviews. The investigations would examine the cause-effect relationships among the determinants and process components of strategy formulation and configuration in large manufacturing firms and SMEs, separately and collectively. In order to reveal sector-specific characteristics, comparative evaluations of strategy formulation and implementation would be performed across different manufacturing sectors. Moreover, case studies are suggestive to investigate the detailed strategy formulation processes in leading manufacturing firms in the wider regional and global contexts.

References

- Aldrich, H.E. (1979), *Organisations and Environments*, Prentice-Hall, Englewood Cliffs, NJ.
- Al-Ghamdi, S.M. (1998), "Obstacles to successful implementation of strategic decisions: the British experience", *European Business Review*, Vol. 98 No. 6, pp. 322-7.
- Alexander, L. (1985), "Successfully implementing strategic decisions", *Long Range Planning*, Vol. 18 No. 3, pp. 91-7.
- Andrews, K.R. (1971), *The Concept of Corporate Strategy*, Richard D. Irwin, Homewood, IL.
- Ansoff, H.I. (1976), *Corporate Strategy*, McGraw-Hill, New York, NY.
- Ansoff, H.I. and McDonnell, E. (1990), *Implanting Strategic Management*, 2nd ed., Prentice-Hall, Englewood Cliffs, NJ.
- Bailey, A. and Avery, C. (1998), "Discovering and defining the process of strategy development", in Ambrosini, V., Johnson, G. and Scholes, K. (Eds), *Exploring Techniques of Analysis and Evaluations in Strategic Management*, Prentice-Hall, London.
- Barnes, D. (2001), "Research methods for the empirical investigation of the process of formation of operations strategy", *International Journal of Operations & Production Management*, Vol. 21 No. 8, pp. 1076-95.
- Barnes, D. (2002), "The complexities of the manufacturing strategy formation process in practice", *International Journal of Operations & Production Management*, Vol. 22 No. 10, pp. 1090-111.
- Benjamin, R., Rockart, J.F., Scott-Morton, M.S. and Wyman, J. (1984), "Information technology: a strategic opportunity", *Sloan Management Review*, Vol. 25 No. 3, pp. 3-9.
- Boston Consulting Group (1973), "The experience curve reviewed", *Perspectives*, No. 135.
- Bozarth, C. and McDermott, C. (1998), "Configurations in manufacturing strategy: a review and directions for future research", *Journal of Operations Management*, Vol. 16, pp. 427-39.
- Burn, J.M. (1997), "Hong Kong as a hub for regional and international business", in Burn, J.M. and Martinsons, M.G. (Eds), *Information Technology and the Challenge for Hong Kong*, Hong Kong University Press, Hong Kong, pp. 3-26.
- Buzzell, R.D. and Gale, B.T. (1987), *The PIMS Principles – Linking Strategy to Performance*, The Free Press, New York, NY.
- Carpinetti, L.C.R., Gerolamo, M.C. and Dorta, M. (2000), "A conceptual framework for deployment of strategy-related continuous improvements", *The TQM Magazine*, Vol. 12 No. 5, pp. 340-9.
- Chandler, A.D. Jr (1962), *Strategy and Structure*, The MIT Press, Cambridge, MA.

- Chin, K.S. and Pun, K.F. (2000), "A strategic review on strategic product development direction for Hong Kong manufacturing industries: proactive or reactive?", *International Journal of Operations and Quantitative Management*, Vol. 6 No. 2, pp. 79-97.
- Cravens, D.W., Piercy, N.F. and Prentice, A. (2000), "Developing market-driven product strategies", *Journal of Product & Brand Management*, Vol. 9 No. 6, pp. 369-88.
- Dangayach, G.S. and Deshmukh, S.G. (2001), "Manufacturing strategy: literature review and some issues", *International Journal of Operations & Production Management*, Vol. 21 No. 7, pp. 884-932.
- Davenport, T.H. and Prusak, L. (1997), *Working Knowledge: How Organisations Manage What They Know*, Harvard Business School Press, Harvard, MA.
- Dean, J.W. and Sharfman, M.P. (1996), "Does decision process matter? A study of strategic decision-making effectiveness", *Academy of Management Journal*, Vol. 39 No. 2, pp. 368-97.
- DeFeo, J.A. and Janssen, A. (2001a), "Why strategic deployment?", *Measuring Business Excellence*, Vol. 5 No. 3, pp. 4-5.
- DeFeo, J.A. and Janssen, A. (2001b), "Implementing a strategy successfully", *Measuring Business Excellence*, Vol. 5 No. 4, pp. 4-6.
- Deloitte and Touche (1992), *Building Global Competitiveness: Imperatives for the 21st Century: A Research Report*, Deloitte and Touche, London.
- Earl, M.J. (1989), *Management Strategies for Information Technology*, Prentice-Hall, Englewood Cliffs, NJ.
- Eisenstat, R. (1993), "Implementing strategy developing a partnership for change", *Planning Review*, Vol. 21 No. 5, pp. 33-6.
- Evered, R. (1983), "So what is strategy?", *Long Range Planning*, Vol. 16 No. 3, pp. 57-72.
- Feurer, R. and Chaharbaghi, K. (1995a), "Researching strategy formulation and implementation in dynamic environments", *Benchmarking for Quality Management & Technology*, Vol. 2 No. 4, pp. 15-26.
- Feurer, R. and Chaharbaghi, K. (1995b), "Strategy development: past, present and future", *Management Decision*, Vol. 33 No. 6, pp. 11-21.
- Feurer, R. and Chaharbaghi, K. (1995c), "Strategy formulation: a learning methodology", *Benchmarking for Quality Management & Technology*, Vol. 2 No. 1, pp. 38-55.
- Feurer, R. and Chaharbaghi, K. (1995d), "Performance measurement in strategic change", *Benchmarking for Quality Management & Technology*, Vol. 2 No. 2, pp. 64-83.
- Garvin, D.A. (1993), "Building a learning organisation", *Harvard Business Review*, pp. 78-91.
- Grant, R.M. (1991), "The resource-based theory of competitive advantage: implications for strategy formulation", *California Management Review*, Vol. 33 No. 3, pp. 114-35.
- Haksever, C., Render, B., Russell, R.S. and Murdick, R.G. (2000), *Service Management and Operations*, 2nd ed., Prentice-Hall, Upper Saddle River, NJ.
- Hammer, M. and Champy, J. (1993), *Re-engineering the Corporation*, Harper Collins, New York, NY.
- Hart, S. (1992), "An integrative framework for strategy-making processes", *Academy of Management Review*, Vol. 17, pp. 327-51.
- Hax, A.C. and Majluf, N.S. (1996), *The Strategy Concept and Process: A Pragmatic Approach*, 2nd ed., Prentice-Hall, Englewood Cliffs, NJ.
- Hayes, R.H. and Upton, D.M. (1998), "Operations-based strategy", *California Management Review*, Vol. 40 No. 4, pp. 8-25.

- Hayes, R.H. and Wheelwright, S.C. (1984), *Restoring Our Compelling Edge: Competing through Manufacturing*, Wiley, New York, NY.
- Henderson, J.C. and Venkatraman, N. (1992), "Strategic alignment: a model for organizational transformation through information technology", in Kochan, T.A. and Useem, M. (Eds), *Transforming Organisations*, Oxford University Press, Hong Kong.
- Hewlett, C.A. (1999), "Strategic planning for real estate companies", *Journal of Property Management*, Vol. 64 No. 1, p. 264.
- Hill, T. (1997), "Manufacturing strategy: keeping it relevant by addressing the needs of the market", *Integrated manufacturing Systems*, Vol. 8 No. 5, pp. 257-64.
- Hofer, C.W. and Schendal, D. (1979), *Strategic Management: A New View of Business Policy and Planning*, Little Brown, Boston, MA.
- Hutchinson, J. (2001), "The meaning of 'strategy' for area regeneration: a review", *The International Journal of Public Sector Management*, Vol. 14 No. 3, pp. 265-76.
- Hum, S.H. and Leow, L.H. (1996), "Strategic manufacturing effectiveness: an empirical study based on the Hayes-Wheelwright framework", *International Journal of Operations & Production Management*, Vol. 16 No. 4, pp. 4-18.
- Irvin, R.A. and Michaels, E.G. (1989), "Core skills: doing the right things right", *The McKinsey Quarterly*, pp. 4-19.
- Johnson, G. and Scholes, K. (1997), *Exploring Corporate Strategy*, 2nd ed., Prentice-Hall, Hertfordshire.
- Lindgren, U. and Spangberg, K. (1981), "Corporate acquisitions and divestments: the strategic decision-making process", *International Studies of Management & Organisation*, Vol. 11, pp. 24-47.
- Lindman, M.T. (2002), "Open or closed strategy in developing new products? A case study of industrial NPD in SMEs", *European Journal of Innovation Management*, Vol. 5 No. 4, pp. 224-36.
- Lingle, J. and Schiemann, W. (1994), "IS data scatter subverting your strategy", *Management Review*, Vol. 83 No. 5, pp. 53-6.
- Lyles, M.A., Baird, I.S., Orris, J.B. and Kuratko, F.F. (1993), "Formalised planning in small business: increasing strategic choices", *Journal of Small Business Management*, Vol. 31 No. 2, pp. 38-50.
- McAdam, R. and Bailie, B. (2002), "Business performance measures and alignment impact on strategy", *International Journal of Operations & Production Management*, Vol. 22 No. 9, pp. 972-96.
- McFarlan, F.W. (1984), "Information technology changes the way you compete", *Harvard Business Review*, Vol. 62 No. 3, pp. 98-103.
- McFarlan, F.W. and McKenney, J.L. (1983), *Corporate Information Systems Management: The Issues Facing Senior Executives*, Richard D. Irwin, Homewood, IL.
- McGrath, G., Dampney, C. and More, E. (1994), "Planning for information systems integration: some key challenges", *Journal of Information Science*, Vol. 20 No. 3, pp. 146-60.
- McKinsey and Company (1986), *The 7S Framework*, Company Publication, London.
- Maloney, W.F. (1997), "Strategic planning for human resource management in construction", *Journal of Management in Engineering*, Vol. 13 No. 3, pp. 49-56.
- Martinsons, M.G. (1996), "Cultural constraints on radical re-engineering Hammer and Lewin meet Confucius", *Journal of Applied Management Studies*, Vol. 5 No. 1, pp. 85-96.

- Mills, J., Platts, K. and Gregory, M. (1995), "A framework for the design of manufacturing strategy process: a contingency approach", *International Journal of Operations & Production Management*, Vol. 15 No. 4, pp. 17-49.
- Mills, J., Platts, K., Neely, A., Richards, H., Gregory, M. and Bourne, M. (1996), *Creating a Winning Business Formula*, Department of Trade and Industry/Engineering and Physical Sciences Research Council, London.
- Minor, E.D., Hensley, R.L. and Wood, D.R. (1994), "A review of empirical manufacturing strategy studies", *International Journal of Operations & Production Management*, Vol. 15 No. 1, pp. 5-25.
- Mintzberg, H. (1987), "Crafting strategy", *Harvard Business Review*, Vol. 87 No. 4, pp. 66-75.
- Mintzberg, H. (1990), "The design school: reconsidering the basic premises of strategic management", *Strategic Management Journal*, Vol. 11, pp. 171-95.
- Mintzberg, H. (1994), "The fall and rise of strategic planning", *Harvard Business Review*, Vol. 72 No. 1, pp. 107-14.
- Mintzberg, H. and Lampel, J. (1999), "Reflecting on the strategy process", *Sloan Management Review*, pp. 21-30.
- Mintzberg, H., Ahlstrand, B. and Lampel, J. (1998), *Strategy Safari*, Free Press, New York, NY.
- Mintzberg, H., Quinn, J.B. and Voyer, J. (1995), *The Strategy Process*, Prentice-Hall, Englewood Cliffs, NJ.
- Neely, A., Mills, J., Platts, K., Gregory, M. and Richards, H. (1994), "Realising strategy through measurement", *International Journal of Operations & Production Management*, Vol. 14 No. 3, pp. 140-52.
- Noble, C.H. (1999), "Building the strategy implementation network (implementation is a vital and often neglected, phase of strategic planning)", *Business Horizons*, Vol. 42 No. 6, p. 19.
- O'Regan, N. and Ghobadian, A. (2002a), "Effective strategic planning in small and medium sized firms", *Management Decision*, Vol. 40 No. 7, pp. 663-71.
- O'Regan, N. and Ghobadian, A. (2002b), "Formal strategic planning: the key to effective business process management?", *Business Process Management Journal*, Vol. 8 No. 5, pp. 416-29.
- Pettigrew, A.M. (1992), "The character and significance of strategy process research", *Strategic Management Journal*, Vol. 13, pp. 5-16.
- Pettigrew, A. and Whipp, R. (1993), *Managing Change for Competitive Success*, Blackwell, Oxford.
- Pilkington, A. (1998), "Manufacturing strategy regained: evidence for the demise of best practice", *California Management Review*, Vol. 41 No. 1, pp. 31-42.
- Platts, K.W. (1994), "Characteristics of methodologies for manufacturing strategy formulation", *Computer Integrated Manufacturing Systems*, Vol. 7 No. 2, pp. 93-9.
- Platts, K.W. and Gregory, M.J. (1991), "Manufacturing audit in the process of strategy formulation", *International Journal of Operations & Production Management*, Vol. 10 No. 9, pp. 5-26.
- Platts, K.W., Mills, J.F., Bourne, M.C., Neely, A.D., Richards, A.H. and Gregory, M.J. (1998), "Testing manufacturing strategy formulation process", *International Journal of Production Economics*, Vol. 56 No. 7, pp. 517-23.
- Porter, M.E. (1980), *Competitive Strategy: Techniques for Analysing Industries and Competitors*, Free Press, New York, NY.
- Porter, M.E. (1998), *Competitive Advantage: Creating and Sustaining Superior Performance*, 2nd ed., Free Press, New York, NY.

- Porter, M.E. and Millar, V.E. (1985), "How information gives you competitive advantages", *Harvard Business Review*, Vol. 63 No. 4, pp. 149-60.
- Pralahad, C.K. and Hamel, G. (1990), "The core competence of the corporation", *Harvard Business Review*, Vol. 68 No. 3, pp. 79-91.
- Procter, T. (1997), "Establishing a strategic direction", *Management Decision*, Vol. 35 No. 2, pp. 143-54.
- Pun, K.F. (2003), "A synergy model for strategic planning in manufacturing enterprises", *The West Indian Journal of Engineering*, Vol. 26 No. 1, pp. 29-43.
- Pun, K.F., Chin, K.S., Gill, R. and White, A.S. (2000), "Management issues of strategy formulation: an empirical study of Hong Kong manufacturing enterprises", in Moore, D.L. and Fullerton, S. (Eds), *International Business Practices: Contemporary Readings*, The Academy of Business Administration, Ypsilanti, pp. 316-24.
- Pun, K.F., Chin, K.S., White, A.S. and Gill, R. (2004), "Determinants of manufacturing strategy formulation: a longitudinal study in Hong Kong", *Technovation*, Vol. 24 No. 2, pp. 121-37.
- Sandelands, E. (1994), "All talk and no action? Perish the thought", *Management Decision*, Vol. 32 No. 5, pp. 10-11.
- Senge, P.M. (1990), *The Fifth Discipline: The Art and Practice of the Learning Organisation*, Boubleday, New York, NY.
- Skinner, W. (1969), "Manufacturing: missing link in corporate strategy", *Harvard Business Review*.
- Skinner, W. (1978), *Manufacturing in Corporate Strategy*, Wiley, New York, NY.
- Stalk, G., Evans, P. and Schulman, L. (1992), "Competing on capabilities: the new rules of corporate strategy", *Harvard Business Review*, Vol. 69 No. 2, pp. 57-69.
- Strickland, A.J. and Thompson, A.A. (1998), *Crafting and Implementing Strategy: Text and Readings*, Irwin/McGraw-Hill, Boston, MA.
- Swamidass, P.M., Darlow, N. and Baines, T. (2001), "Evolving forms of manufacturing strategy development: evidence and implications", *International Journal of Operations & Production Management*, Vol. 21 No. 10, pp. 1289-304.
- Venkatraman, N. (1991), "IT enabled business reconfiguration", in Scott-Morton, M.S. (Ed.), *The Corporation of the 1990s: Information Technology and Organizational Transformation*, Oxford University Press, Hong Kong.
- Wessel, J. (1993), "The strategic human resource management process in practice", *Planning Review*, Vol. 21 No. 5, pp. 37-8.
- Wright, P., Kroll, M.J. and Parnell, J. (1996), *Strategic Management: Concepts and Cases*, 3rd ed., Prentice-Hall, Englewood Cliffs, NJ.

Further reading

- Hill, T. (1985), *Manufacturing Strategy: The Strategic Management of the Manufacturing Function*, Macmillan, London.