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Manufacturing Strategy: Defining the Missing Link

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Summary

The primary objective of strategy is to develop and support a lasting competitive advantage. In manufacturing industries, substantial focus has been given during the early eighties to the importance of the manufacturing function's contribution to overall corporate success, and yet the apparent lack of attention (historically) to achieving that potential contribution. In this article, characteristics of competitive advantage in manufacturing firms are described, a general framework for relating such advantage to corporate, business and functional levels of strategy is given, and an approach for pursuing that potential is outlined.

OVERVIEW

Recent interest in manufacturing and the notion of a manufacturing strategy has been the result of a number of complementary developments. On the empirical front, competitive events in several world-wide manufacturing industries—such as automobiles, machine tools and electronics—have highlighted the dangers of viewing the manufacturing function as ‘neutral’ and the benefits of recognizing its potential in positively supporting business and corporate strategy. On the conceptual front, the combined practitioner and academic efforts that have more fully developed the topics of strategy, strategic planning and strategic management, have led to numerous books and articles—and even this journal—being published, providing contextual frameworks for addressing the manufacturing function and clarifying the logical need for manufacturing strategy as a counterpart to marketing strategy and financing strategy.

On the academic front, a number of business schools have begun to recognize the need for production operations as part of the core curriculum, and led by such authors as Hayes and Abernathy (1980), several academics and practitioners have voiced their support for more attention to manufacturing detail and operations with a move ‘back to the basics’. Finally, a growing number of researchers are picking up on the work of such pioneers as Skinner (1969), and examining what most managers would consider ‘elements’ of a manufacturing strategy.

With all of this activity, it seems appropriate to develop some definitions of the concept of manufacturing strategy and its relationship to other ‘levels’ of strategy, competitive advantage and overall corporate philosophy or culture. Such definitions can aid not only practitioners by providing a common language and set of guidelines for action, but also

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researchers and teachers by suggesting additional topics for investigation and linkages with other strategy concepts that are further along in their development.

The first steps in providing such definitions were stated by Skinner (1969): 'A company's competitive strategy at a given time places particular demands on its manufacturing function, and, conversely, that the company's manufacturing posture and operations should be specifically designed to fulfill the tasks demanded by strategic plans'. Although this provides a good starting point for the discussion in this article, clarifying and elaborating this concept requires a brief overview of such ideas as basic philosophies, driving forces and the competitive advantage of a company. A basic set of definitions of strategy, and particularly manufacturing strategy, is then provided, followed by some observations on why manufacturing strategy is so important and what seems to be required to realize its potential.

MANAGEMENT PHILOSOPHY, DRIVING FORCES AND COMPETITIVE ADVANTAGE

Several publications recently have described the concept of a management philosophy, often referring to it as 'company culture' (Athos and Pascale, 1981; Ouchi, 1981; Peters, 1980). Generally, philosophy is defined as the set of guiding principles, driving forces and ingrained attitudes that help communicate goals, plans and policies to all employees and that are reinforced through conscious and subconscious behaviour at all levels of the organization. A division of a leading electronics firm recently identified the following examples of such driving forces and elements of philosophy:

1. The desire for consistent and significant growth.
2. Conservatism and tradition as important considerations in all decision making.
3. Flexibility with regard to volume and mix changes and to customers' special requests.
4. Uncompromising commitment to quality, which demands that any identified opportunity for improving quality be pursued.
5. Product invention and innovation as the primary approaches to problem solving.
6. Equal and consistent treatment of all employees (including permanent employment for all).

Whether they are stated explicitly or only implied, such elements of an organization's philosophy and culture are extremely important. They serve as an umbrella over various elements of strategy, and guide decision making within the organization. Such philosophy not only establishes the context within which day-to-day operating decisions are made but also sets the bounds for the strategic options considered by the firm. Further, the philosophy guides the organization in making trade-offs not only among competing performance priorities (such as flexibility, delivery, cost, and quality) but between short-term and long-term goals and performance. Finally, the achievement of consistency among all activities of the firm tends to be linked directly to this philosophy and the degree to which it is shared throughout the organization.

The importance of the manufacturing function in the development and communication of the philosophy transcends its own functional strategy. Since the majority of the firm's work-force is under its direction, manufacturing invariably becomes the keeper of that philosophy for the entire organization. In subtle but powerful ways, manufacturing plays a

major role in setting and communicating the philosophy to the remainder of the organization. As a consequence, the need for leadership within the manufacturing function is of critical importance to the overall success and direction of the company. This is all too often overlooked, causing the company to do itself, and manufacturing, a disservice when it fails to perceive the opportunity and the need for manufacturing's contribution. Equally important, however, is recognizing (as will be discussed later) that manufacturing strategy consists of patterns of decisions in major areas of manufacturing operations. These patterns are determined in large part by the philosophy shared by the company and its employees. Thus, if patterns of decisions (and therefore manufacturing strategy) are to be changed, some parts of that philosophy and the associated driving forces in the organization must be changed first.

The driving forces that complement and implement the firm's basic philosophy usually include views on at least three fundamental elements of strategy—a dominant orientation, a diversification pattern and a perspective on growth. These driving forces, in concert with biases or preferences for alternative competitive priorities, do much to establish the context in which the competitive advantage is defined and pursued.

Dominant orientation

Some companies are clearly market oriented. They consider their primary expertise to be the ability to understand and respond effectively to the needs of a particular market or consumer group. In exploiting this market knowledge, they use a variety of products, materials and technologies. Gillette and Head Ski come to mind as examples of such companies. Other firms are clearly oriented to materials or products. They are 'steel companies', 'rubber companies', or 'oil companies' (or, more recently, 'energy companies'). They develop multiple uses for their product or material and follow those uses into a variety of markets. Corning Glass, Firestone, Du Pont, and Conoco are examples of companies with such a dominant orientation. Still other companies and businesses are technologically oriented. Most electronics companies would fall into this class. In such businesses, the dominant orientation is to follow the lead of the technology into various materials and markets.

A company often experiences considerable trauma when it ventures outside of its dominant orientation. Texas Instruments' entry into consumer marketing in the mid-seventies was an example of this. Its initial products were electronic calculators and digital watches. Although Texas Instruments may continue in some of these consumer marketing areas, it announced in mid-1981 that it was abandoning the digital watch market to emphasize more traditional components (integrated circuits).

Diversification patterns

A second and related attitude or driving force is the pattern of diversification a company follows. Diversification can be accomplished in several ways: (a) product diversification within a given market; (b) market diversification (geographic or consumer group) using a given product line; (c) process or vertical diversification (increasing the span of the process so as to gain more control over vendors and/or customers) with a given mix of products and markets; and (d) unrelated (horizontal) diversification, as exemplified by conglomerates. These decisions are closely interrelated with a company's dominant orientation, but they also reflect the company's preference for concentrating on a relatively narrow set of activities, products or markets rather than spreading itself broadly over many.

The resulting variety and diversity of businesses, and thus of business strategies, have important implications for the variety of manufacturing strategies needed. Generally speaking, the more variety in the businesses, the more likely there is to be variety in the business strategies pursued and thus in the corresponding manufacturing strategies. Recent personal observations suggest that the greater the variety of manufacturing strategies, the less likely it is that senior-level managers will view manufacturing as a potential competitive weapon, simply because there are not enough common threads that they can exploit from their position, and the less likely it is that a strong philosophy will be shared throughout the organization.

Perspective on growth

A third driving force that is important in determining the competitive role of manufacturing pertains to growth. For some, growth represents an input to the company's or business unit's planning process. For others it is an output. Every company continually confronts a variety of growth opportunities. Its decisions about which to accept and which to reject signal the kind of company it prefers to be. Some companies, in their concentration on a particular market, geographical area or material, essentially accept the growth permitted by that market or area or material. A company's acceptance of a low rate of growth, on the other hand, reflects a decision, conscious or unconscious, to retain a set of priorities in which a given orientation and pattern of diversification are more highly valued than growth.

Other companies, however, are so structured and managed that a certain rate of growth is required if they are to function properly. If their current set of products and markets will not permit that desired rate of growth, they will seek new ones to 'fill the gap'. This decision reflects their dominant orientation and diversification attitude. Among firms with an orientation that requires a certain rate of growth, two different approaches for transmitting that orientation to individual business units can be observed. Under one approach the corporation requires each business unit to meet that growth rate. Under the other, each business unit is assigned a mission 'within the corporate portfolio' that varies the growth rate expected (as well as varying the other dimensions of expected performance) by business.

The attitude toward growth is particularly important in establishing the likely perspective on manufacturing as a competitive weapon. In businesses in which growth is a primary motivating factor, the role of manufacturing often becomes one of simply 'keeping up' with that growth, as opposed to providing other characteristics to the products and services being delivered to the customers. Thus, in high-growth businesses, manufacturing's primary thrust is getting out the product, and that tends to take precedence over establishing a competitive advantage on other dimensions of manufacturing capability. In divisions or businesses where growth is not a primary motivating factor, the opportunities for establishing manufacturing as a critical input to the business strategy are generally greater.

Competitive priorities

A final set of attitudes—and in a sense those that are implied by, and integrate and summarize, the others—is embodied in the choice of competitive priorities. In its simplest form, this choice is between seeking high profit margins or seeking high output volumes. In some businesses, for example, the preference is consistently given to high volume products, even when this limits the firm to severe cost reduction pressure, and it often implies low margins. Again, most business units in a corporation adopt strategies that typically emphasize one dominant attitude (the 'generic' view within the corporation), rather than trying to cover the full range of such possibilities.

This concept of competitive priorities must be expanded and enriched, since businesses can compete in other ways than simply the *prices* of their products. If a broader set of priorities is considered, the possible roles for manufacturing strategy as a basis for competitive advantage are significantly enhanced. These priorities can include quality, dependability and flexibility—in addition to cost (price).

In some businesses the basis of competitive advantage is superior *quality*—either by providing higher quality in a standard product (for example, Mercedes-Benz) or by providing a product that has features or performance characteristics that are unavailable in competing products. In discussing quality, it is important to differentiate between actual quality and perceived quality (the latter often more a function of selling and advertising approaches), as well as between quality defined as the absence of *defects* and quality defined in terms of *performance* capabilities.

Another dimension that some businesses use in establishing competitive priorities is that of *dependability*. Although the products of such firms may be priced higher than the products of others, and may not have some of the features and workmanship found in other products, they do work as specified, they are delivered on time, and the company stands ready to mobilize its resources instantly to ensure that any failures are corrected immediately. IBM, Caterpillar and Sears have often been cited as examples of companies whose typical strategies emphasize this competitive priority.

Still another major priority that can be used as a basis for competitive advantage is *flexibility*. Two important aspects of flexibility are product flexibility and volume flexibility. A business that competes on the basis of product flexibility emphasizes its ability to handle difficult, non-standard orders and to lead in new product introduction. Often it is smaller companies that adopt this as a primary competitive priority. Still other businesses compete through volume flexibility, emphasizing their ability to accelerate or decelerate production very quickly. Successful companies in highly cyclical industries like housing or furniture often exhibit this trait as a primary priority.

In summary, within a given industry different companies (different business units) emphasize each of these four competitive dimensions—price, quality, dependability and flexibility—to varying degrees. It is both difficult (if not impossible) and potentially dangerous for a company to try to compete by offering superior performance along all of these dimensions simultaneously. Instead, a business must attach definite priorities to each, and those priorities determine how that business will be positioned relative to its competitors—in terms of its competitive advantage. It is the specification and clarification of these priorities and their pursuit in the manufacturing function that determine the competitive role of that function.

Practically every decision a senior manager makes will have a different impact on each of these four dimensions. Thus, a wide range of decisions confronts the organization, and trade-offs must be made among them. Unless these trade-offs are made in a consistent manner over time, the business will slowly lose its competitive distinctiveness. Without such consistency, it does not matter how much effort the organization puts into formulating and expounding its 'strategy'; it will not have an effective one.

THE CONCEPT OF MANUFACTURING STRATEGY

The word strategy has been used so extensively in the past few years that it has lost much of its uniqueness and meaning when applied to the practice of management. However, some

Table 1. Characteristics of strategy

Time Horizon. Generally, strategy is used to describe activities that involve a long-term time horizon, both with regard to the time it takes to accomplish such activities and the time it takes to observe their impact

Impact. Although the consequences of pursuing a given strategy will not be clear until considerable time has elapsed, the ultimate impact will be relatively greater than the impact of shorter-term tactics or operating activities

Concentration of effort. The concept of strategy usually implies concentrating one's activity, effort, or attention on a fairly narrow range or dimension of pursuits. Implicitly, focusing on certain activities means that one must reduce the effort in other directions

Pattern of decisions. Although some companies need to make only a few major decisions in order to implement an entire strategy, most strategies require a pattern of decisions across a variety of subareas. Certain types of decisions must be repeated over time, and a number of secondary or supporting decisions are needed to implement the strategy

Pervasiveness. An organization's strategy embraces a wide breadth of resource allocation processes and day-to-day operations. In addition, the need for depth requires that all levels of an organization act instinctively in ways that reinforce the strategy

general characteristics are associated with the term when talking about strategy in a business setting. Five of the most important characteristics are summarized in Table 1.

As outlined in Figure 1, there are three primary levels of strategy in a manufacturing firm—corporate, business and functional—corresponding roughly to the organizational units charged with formulating and pursuing each level of strategy.

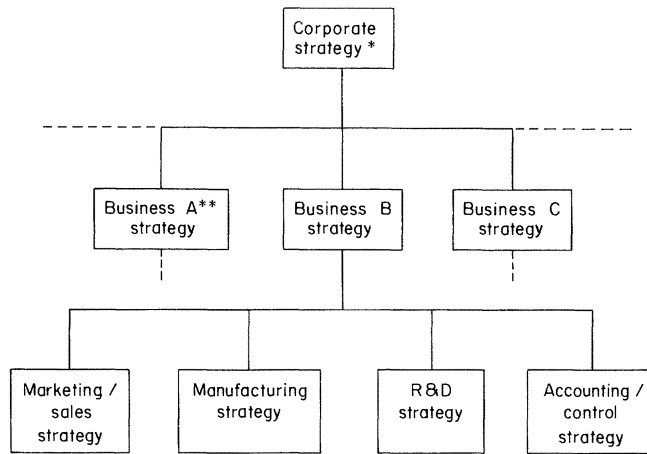
*Corporate strategy*¹ specifies two areas of overall interest to the corporation: the definition of the businesses in which the corporation will participate (and, by omission, those in which it will *not* participate), and the acquisition of corporate resources and their commitment to each of those businesses. In very large diversified companies it may be necessary to specify for each of several sectors or groups, a strategy (the businesses in which the sector or group will and will not participate, and an allocation of resources).

As discussed previously, the dominant orientation frequently defines the businesses in which a corporation will participate, using such dimensions as materials, markets and technologies. The second element of corporate strategy—the acquisition and deployment of resources—usually results in a strong finance function at the corporate level. This function (along with the treasurer) is normally concerned with acquiring financial capital, and allocating it as part of the firm's capital budgeting procedures. The portfolio concept is aimed in large part at improving such resource allocation (Haspeslagh, 1982). Human resources are important too, and personnel has strengthened its corporate-level activity as firms have recognized the importance of acquiring and deploying valuable human resources.

The second major level of strategy outlined in Figure 1, that of *business strategy*, generally refers to two critical tasks carried out by each 'strategic business unit' (SBU), or strategic planning unit (SPU). First, it specifies the scope or boundaries of each business in a way that operationally links the business strategy to the corporate strategy. Second, it specifies the basis on which that business unit will achieve and maintain a competitive advantage.

The first element of business strategy—clarifying the scope of the business—involves specifying the product/market/service subsegments to be addressed by the business unit (most often a division). This specification is important if the corporation is to prevent direct

¹ Several aspects of these definitions for strategy at the primary organizational levels were first suggested to the author by Dan R. E. Thomas, lecturer at Stanford.



* Might also refer to group or sector levels in a large diversified organization.
 ** Most often refers to a division or *strategic business unit* (SBU).

Figure 1. Levels of strategy

competition among its own business units, many of which may be in the ‘steel’ business or the ‘semiconductor’ business. It is also important because it focuses the efforts of each business unit on a basis which, if appropriate, enhances the competitive position of the unit for the customer subsegments being served, complementing the desired competitive advantage. Examples of such a desired competitive advantage would include ‘low cost/high volume’, ‘product innovation and unique features’, and ‘custom service in selected niches’ (Porter, 1980). To be effective, this advantage must fit the business unit’s resources, recognize competitors’ strategies, and fit the definition of the product/market/customer segments to be pursued.

Functional strategy, the third level in Figure 1, must be developed and pursued if each function is to support business strategy. A business might have four functional strategies—a marketing/sales strategy, a manufacturing strategy, a research and development strategy, and an accounting/control strategy—although in another business, different functions, such as distribution, field maintenance, or quality assurance might be more appropriately defined. A functional strategy specifies how that function will support the desired competitive advantage (business strategy) and how it will complement the other functional strategies.

To be effective, each functional strategy must support, through a consistent pattern of decisions and trade-offs on competitive priorities, the competitive advantage being sought by the business strategy. For example, decisions in such areas as pricing, packaging, distribution and field service—all subparts of the marketing strategy—should be very different if the desired competitive advantage were high volume/low cost than it if were unique features/custom service. Similarly, decisions in the area of research and development—technologies to be pursued, degree of state-of-the-art, applications development versus basic research, and manufacturability of design—or in the area of manufacturing—facilities, automation, vertical integration and capacity levels—would constitute subparts of the R & D and manufacturing functional strategies, respectively.

The manufacturing functional strategy

As implied by the preceding definitions of strategy, an effective manufacturing operation is not necessarily one that promises the maximum efficiency, or engineering perfection, but rather one that fits the needs of the business, that is, one that strives for consistency between

Table 2. Decision categories composing a manufacturing strategy

1. Capacity—amount, timing, type
2. Facilities—size, location, focus
3. Technology—equipment, automation, connectedness
4. Vertical Integration—direction, extent, balance
5. Workforce—skill level, pay, security
6. Quality—defect prevention, monitoring, intervention
7. Production planning/materials control—computerization, centralization, decision rules
8. Organization—structure, reporting levels, support groups

its capabilities and policies and the business's competitive advantage. Translating the business strategy into an appropriate collection of bricks, mortar, equipment, people and procedures requires resources, time and management perseverance to ensure that the large number and variety of manufacturing decisions are complementary and mutually supportive.

Because of the diversity of manufacturing decisions made in different businesses, an organizing framework that groups them into major categories is a useful tool in both identifying and planning the functional strategy for manufacturing. One framework that has proved particularly helpful in working with a variety of firms is summarized in Table 2 (Hayes and Wheelwright, 1983). This framework specifies eight categories into which manufacturing related decisions can be grouped.

It is the collective pattern of decisions in the eight categories of Table 2 which determines the *structure and capabilities* of a manufacturing organization. Like any piece of equipment, a manufacturing organization will be able to do certain things well and to do other things only with difficulty—and probably poorly. These inherent strengths and weaknesses are the direct result of the patterns of decisions pursued by the organization, just as the capabilities and limitations of an airplane are a function of the patterns of decisions its designers and producers adopt for it.

A review of Table 2 can help clarify several key management issues related to the notion of a functional manufacturing strategy. The first four decision categories generally are viewed as structural or strategic in nature because of their long-term impacts, the difficulty of reversing or undoing them once they are in place, and their tendency to require substantial capital investment when altered or extended. In fact, this latter aspect has led many organizations to view their capital budgeting process as the mechanism by which these 'strategic' manufacturing decisions get reviewed. The last four decision categories often are viewed as much more tactical in nature because of the myriad of on-going decisions they encompass, the need to link them to specific operating aspects of the business, and their tendency not to require large capital investments at a single point in time. However, these are included in Table 2 because recent empirical evidence suggests that the cumulative impact of patterns of decisions in these categories can be as difficult and costly to change (if not more so) than the first four categories (Abernathy, Clark and Kantrow, 1981; Hayes, 1981; Wheelwright, 1981).

Some subareas in which decisions are made within each of these categories are also shown in Table 2. For example, decisions regarding the technology incorporated in specific pieces of manufacturing equipment, decisions defining the degree of automation in the production and material handling processes, and decisions specifying how different production stages will be connected are part of the *technology* category.

Various categories of decisions also are closely interrelated. A factory's total annual

capacity depends on whether the production rate is kept constant (*level*) over time or it is changed frequently in an attempt to ‘chase demand’. Similarly, work-force policies interact with location and production process choices, and purchasing policies interact with vertical integration choices. Decisions regarding organizational design also are highly dependent on vertical integration decisions, as well as on the company’s decisions about how various plants are located, specialized and interrelated.

Only infrequently will an organization make a basic change in any one of these categories (that is the traditional definition of a structural strategic decision), but, depending on the industry and the firm’s approach to its business, it probably will make numerous decisions that fall into these categories during the course of every year. It is critical that the decisions made be consistent with the decisions made at other points in time and in other categories, and that over time they lead to the kind of manufacturing strategy and capabilities required for the business strategy to be effective. *It is this pattern of structural decisions over time that constitutes the ‘manufacturing strategy’ of a business unit.* More formally, a manufacturing strategy consists of a sequence of decisions that will enable a business unit to achieve its desired competitive advantage.

As a business strategy evolves, change usually becomes necessary in *all* of these structural categories if *consistency* is to be preserved. The root cause of many a ‘manufacturing crisis’ is that a business’s manufacturing policies and people—workers, supervisors and managers—have become incompatible with its plant and equipment, or that both have become incompatible with its competitive needs. Even more subtly, plants may still be consistent with policies, but the manufacturing organization that attempts to co-ordinate them all is no longer doing its job effectively. The manufacturing organization is particularly crucial, because it is the glue that keeps manufacturing priorities in place and welds the manufacturing organization into a competitive weapon.

Defining manufacturing strategy as a pattern of decisions suggests criteria that might be used to evaluate the appropriateness of a given manufacturing decision (and strategy). Such criteria generally fall into one of two subgroups, as suggested in Table 3. The first group relates to the notion of consistency. One manufacturing strategy is considered ‘better’ than another to the degree that it incorporates the types of consistency outlined in Table 3: internal consistency (within the manufacturing function and across functions in the business unit), and external consistency (between the manufacturing function and the environment of the business unit). The other group of criteria indicates the degree to which the factors and activities most important to the competitive success of the business are emphasized.

There are three important aspects that can be summarized at this point. First, a manufacturing strategy is determined by the pattern of decisions actually made (that is, by

Table 3. Criteria for evaluating a manufacturing strategy

A. Consistency	
1.	Between the manufacturing strategy and the overall business strategy
2.	Among the manufacturing strategy and the other functional strategies within the business
3.	Among the decision categories that make up the manufacturing strategy
4.	Between the manufacturing strategy and the business environment (resources available, competitive behaviour, governmental restraints, etc.)
B. Emphasis (focus) on competitive success factors	
1.	Making trade-offs explicit, allowing manufacturing to prioritize activities
2.	Directing attention to opportunities that fit the business strategy
3.	Promoting clarity regarding the manufacturing strategy throughout the business unit

what managers do), not by what the business says its manufacturing strategy is. Second, the more consistent that pattern is in supporting the desired competitive advantage (business strategy), the more effective the manufacturing strategy. Third, although individual decisions are usually made in support of specific products, markets or technologies, over the long term the major function of a manufacturing strategy is to assemble and develop the *set of manufacturing capabilities* that will allow the business to pursue its current (and future) strategy. Being able to move from the level of specific decisions to developing general capabilities—and back again—is an important management skill that is central to developing and implementing effective manufacturing strategy.

The concept of a corporate manufacturing strategy

Given the above description of a functional manufacturing strategy at the business unit level, three options can be considered regarding the concept of a *corporate manufacturing strategy*.

The first option is to consider that such an overall manufacturing strategy exists only if each business within the company adopts the same functional manufacturing strategy. Reflection on Figure 1 and Table 2 suggests that this is not a particularly useful definition. Since the strategy for every business has unique characteristics and aspects, its functional manufacturing strategy should also be different. Even in firms where several businesses employ similar or ‘generic’ business strategies (that is, pursue similar desired competitive advantages), differences will arise that require corresponding differences in the manufacturing strategy.

A second and much more useful definition of corporate manufacturing strategy can be described using Table 4. In one sense, this second definition simply clarifies and corrects the first, but does so in a manner consistent with the levels of strategy identified in Figure 1. As shown in Table 4, each business unit has its own manufacturing strategy (indicated by the columns) covering the eight major decision categories (represented by rows) in manufacturing.

Within a corporation, the business strategies often have elements in common. Therefore, it is possible to identify corporate-wide policies regarding certain types of manufacturing decisions that are common across all the businesses in which the company engages. These are shown in Table 4 by the cross-hatched areas, and the column on the far right of the Table suggests manufacturing policies that might be adopted corporate-wide. For example, the firm might specify certain size and location characteristics for its individual manufacturing facilities, or certain personnel policies independent of the business or division they serve.

With this definition, a corporate manufacturing strategy consists of those subparts of each of the eight decision categories that are held constant across the firm’s businesses. The proportion of decisions held constant in this manner will vary significantly from one company to another and from one decision category to another. In some corporations, for example, decisions regarding work-force policies may be left entirely to the individual business unit. In others a strong corporate culture concerning the work environment may dictate an extensive set of work-force policies common across all of the corporation’s business units. The firm’s corporate manufacturing strategy thus becomes simply an enumeration of those areas that will be held constant—independent of the specific business—and the decisions and policies specified for them.

A third definition of a corporate manufacturing strategy is sometimes found in practice. This definition identifies those areas of manufacturing activity and concern in which it is advantageous to have a corporate-wide perspective rather than leave them to the individual

Table 4. The concept of a corporate manufacturing strategy

Dimensions of manufacturing strategy*	Individual business strategies			Examples of generic corporate-wide guidelines
	Business A*	Business B*	Business C*	
1. Capacity†	× × × × × ×	× × × × × ×	× × × × × ×	Justification required for investment Timing of additions relative to business cycle
	○ ○ ○ ○ ○ ○	/ / / / / /	+ + + + + +	
	○ ○ ○ ○ ○ ○	/ / / / / /	+ + + + + +	
	○ ○ ○ ○ ○ ○	/ / / / / /	+ + + + + +	
2. Facilities†	× × × × × ×	× × × × × ×	× × × × × ×	Size and location of new facilities Handling of old facilities
	× × × × × ×	× × × × × ×	× × × × × ×	
	× × × × × ×	× × × × × ×	× × × × × ×	
	○ ○ ○ ○ ○ ○	/ / / / / /	+ + + + + +	
	○ ○ ○ ○ ○ ○	/ / / / / /	+ + + + + +	
3. Technology†	× × × × × ×	× × × × × ×	× × × × × ×	Type of production process organization preferred (e.g. assembly line) Relative level of technology advancement
	○ ○ ○ ○ ○ ○	/ / / / / /	+ + + + + +	
	○ ○ ○ ○ ○ ○	/ / / / / /	+ + + + + +	
	○ ○ ○ ○ ○ ○	/ / / / / /	+ + + + + +	
	○ ○ ○ ○ ○ ○	/ / / / / /	+ + + + + +	
4. Vertical integration†	× × × × × ×	× × × × × ×	× × × × × ×	Motivation (e.g., cost) Pricing of internal transfers
	○ ○ ○ ○ ○ ○	/ / / / / /	+ + + + + +	
	○ ○ ○ ○ ○ ○	/ / / / / /	+ + + + + +	
5. Work force†	× × × × × ×	× × × × × ×	× × × × × ×	Relative pay scales Hiring, promotion, and layoff policies
	× × × × × ×	× × × × × ×	× × × × × ×	
	× × × × × ×	× × × × × ×	× × × × × ×	
	○ ○ ○ ○ ○ ○	/ / / / / /	+ + + + + +	
6. Quality†	× × × × × ×	× × × × × ×	× × × × × ×	Reporting relationships Philosophy on warranty
	× × × × × ×	× × × × × ×	× × × × × ×	
	○ ○ ○ ○ ○ ○	/ / / / / /	+ + + + + +	
	○ ○ ○ ○ ○ ○	/ / / / / /	+ + + + + +	
7. Production planning/ materials control†	× × × × × ×	× × × × × ×	× × × × × ×	Computer support Charges for inventory
	× × × × × ×	× × × × × ×	× × × × × ×	
	× × × × × ×	× × × × × ×	× × × × × ×	
	○ ○ ○ ○ ○ ○	/ / / / / /	+ + + + + +	
	○ ○ ○ ○ ○ ○	/ / / / / /	+ + + + + +	
8. Organization†	× × × × × ×	× × × × × ×	× × × × × ×	Job classifications Staff/line relationships
	○ ○ ○ ○ ○ ○	/ / / / / /	+ + + + + +	
	○ ○ ○ ○ ○ ○	/ / / / / /	+ + + + + +	

* Each column represents the manufacturing strategy (pattern of manufacturing decisions) that complements a specific business strategy.

† Each row represents behaviour or practices and policies in that decision category that are consistent across businesses and behaviour not consistent across all businesses.

business unit. For instance, in their initial response to the U.S. Occupational Safety and Health Act (OSHA), a number of companies established a corporate-level position to oversee their conformity to the Act, because no single operating unit had enough experience or motivation to address it adequately at the time it was passed. Subsequently, many of those efforts were decentralized; now they are more likely to be part of individual business unit manufacturing strategies. A similar approach has been used frequently in dealing with energy usage.

Another example of where a corporate-wide perspective is often useful is technology development, particularly manufacturing process technology. Often a company thinks it will need a certain capability in the future, although no single business unit needs it at the

present time. The company may choose to pursue that technology and develop an in-house capability at the corporate level so it will be available when it is needed by one or more individual businesses.

This third definition of corporate manufacturing strategy is very consistent with the second definition outlined in Table 4. It suggests additional dimensions of manufacturing strategy and/or subcategories of the eight primary decision categories that at a given point in time cut across several businesses. Thus this definition can be considered an extension of the one described immediately above.

THE ROLE OF MANUFACTURING IN DEFINING THE DESIRED COMPETITIVE ADVANTAGE

Thus far the implicit assumption has been that after others define the desired competitive advantage, manufacturing responds with what is required to deliver on that advantage. Although that may be a worthy first step for many firms, recent competitive performance suggests that manufacturing can and should take a more proactive role in defining the desired competitive advantage if manufacturing is to become a significant competitive weapon.

In its simplest form, such a proactive contribution can be viewed as manufacturing taking an equal role—as compared with other functions—in defining the business strategy. In this form, manufacturing would give its perspective on major issues facing the business, the strategies being proposed by other functional heads, and the options open to manufacturing. Before this can occur, the status and credibility of manufacturing managers within the firm need to be raised from what often has been a second-class status, to that of other managers. A variety of steps can be used to establish such increased stature: individual management selection and training, altered career paths, a different organizational structure, and modified planning and decision-making procedures.

Helpful though such actions might be, they omit important aspects of management that are tied to the character, philosophy, and ‘culture’ of an organization. The task of top management is much broader than simply developing a set of marketing, production, engineering, organizational and control policies that support the chosen business strategy. To be really effective, management must work toward the development of a culture—a set of ingrained attitudes—that helps to communicate its goals, plans, and policies to all employees, and that reinforces these policies with everybody’s subconscious behaviour. Observations from both the perspective of an academic and that of a practitioner may help one to understand this better.

From the academic perspective, it is useful to observe what has happened to the field of policy and strategy over the past decade. Historically, the field of business policy included not only what is currently referred to as strategy formulation, but also what might be termed ‘management philosophy’, that is, basic attitudes toward people and toward certain ways of conducting business, independent of particular strategies and the type of competitive advantage being sought, (see, for example, Andrews, 1980). In a business school curriculum today, what is typically referred to as business policy is primarily concerned with topics relating to business and corporate strategies like those defined earlier. The emphasis is on analytic tools for product/market positioning, selecting competitive advantage, and allocating resources (see, for example, Porter, 1980).

This shift in academic emphasis is perhaps best captured in the PIMS project, now part of the Strategic Planning Institute. When initiated by General Electric in the late fifties and early sixties, PIMS was part of a broader project aimed at determining how *structural characteristics* (such as market share and growth) and *management behaviour* (such as basic attitudes and philosophies) affected business results. Subsequently, management behaviour was dropped from study, not because it was considered unimportant, but because it proved to be extremely difficult to measure, analyse and control. The *structural characteristics* dimension remained and now dominates the PIMS project. Although details of the PIMS analyses often are debated, the view that structural characteristics are the primary determinants of success and thus the very heart of strategic management, has become widespread. It also forms the core of the field of economics called industrial organization theory, which seeks to explain business success in terms of *industry* structure.

A second perspective relating to manufacturing's potential contribution in defining a company's desired competitive advantage comes from a handful of leading firms that have experienced continued success over several decades. Such companies as S. C. Johnson, the Timken Corporation, Caterpillar and IBM are representative of this group. The management of each of these firms believes, as illustrated by what they say and what they do, that certain policies, philosophies and attitudes should pervade the entire organization and that *they are more important than strategy*. These firms have clear statements of belief (creeds) relating to people and management practices. These beliefs take precedence over and serve as screens for all strategic plans and decisions.

In these companies the pervasive understanding of the philosophy and its implications leads to reinforcing behaviour at all levels and makes the likelihood of consistency and prioritized efforts much greater. It is not uncommon in such firms to find that allegiance to the company supersedes allegiance to a profession. Employees use common terms and have a set of common examples (or 'folklore') to guide their behaviour. There tends to be a 'company' way of doing things. There is a sense of tradition and continuity within the firm, and, finally, former employees tend to retain a strong sense of pride and loyalty in the company and feel a common bond with other 'alumni'.

Clearly, there are risks associated with too much attention to philosophy and not enough to strategy, just as when the reverse is true. It is the balance of both that can provide a base for manufacturing to be a truly equal partner in the strategy formulation process. In addition, this balance seems to be excellent insurance against the type of disaster that can occur when manufacturing strays too far afield or falls out of step with the other functions. Finally, this balance tends to ensure a more appropriate trade-off between long-term and short-term actions.

Such an overriding philosophy (or culture) specifies the kind of company it is, how it is viewed by competitors, stockholders, employees and the public, and the values these groups desire to share. It bears repeating that this concept is particularly important in its implications for manufacturing, because such a philosophy is effective only to the extent that it is shared by the people in the organization, and the majority of a company's people tend to belong to the manufacturing organization. Recognizing that manufacturing is the major 'keeper' of the corporate philosophy appears to be a prerequisite to manufacturing's making a major contribution to the definition of strategy and the organization's desired competitive advantage.

In addition, a well-understood philosophy can be a valuable guide to the development of each business's manufacturing strategy and supporting activities. It links the organization's driving forces and attitudes to individual businesses, and it provides a mechanism for

viewing decisions often seen as tactical (workforce, quality, production planning/materials, etc.), in their strategic context. As an illustration of the perceived importance of such a philosophy in certain management groups, it is interesting to note that as of early 1981, none of the three Japanese-owned TV manufacturing facilities in the United States had yet adopted quality circles. Although quality circles were being used extensively in TV plants in Japan, the view of Japanese management was that their U.S. plants were not yet ready for them. They felt that their philosophy of business had to become ingrained and pervasive in their American plants before it would be possible to achieve the full long-term benefits of the circle concept; without that philosophy it would be just another 'motivation' technique aimed more at window dressing than real improvement.

A strong company philosophy can make one further contribution. As suggested in earlier sections, a major component of effective manufacturing strategy involves anticipating and providing capabilities that will be required for future competitive advantage. Such a philosophy can help guide manufacturing in this task—admittedly never an easy one from a forecasting viewpoint—and enable it to contribute to the definition of future business strategy by identifying capabilities that might be developed and ways in which they might become a base for a new or modified competitive advantage. Thus, a strong philosophy can serve as the glue that makes strategy development an interactive process, with inputs and perspectives from all functions, and ensures consistency and integrity of the individual components.

CONCLUSIONS

Perhaps the basic test of whether a company has a strategy at the level of each individual business and its functions is not whether it is clear about what it wants to do, but whether it is clear about what it does *not* want to do, and whether it consistently reinforces those desires through the pattern of decisions it makes over time.

Although the notion that manufacturing can be a competitive weapon, rather than a set of ponderous resources for simply getting today's products made, is not new, its practice is not very widespread. Most manufacturing-based businesses appear to content themselves with trying to minimize the negative impact that manufacturing could have on the accomplishment of the business strategy. Even in many well-managed firms, the role of manufacturing is essentially a *neutral* one, with the view that marketing, sales, and R & D are much better bases for achieving a competitive advantage.

Once the attitudes and competitive priorities are identified for a business, the task for manufacturing is to structure and manage itself in such a way as to mesh with and reinforce that strategy. Manufacturing should be capable of helping the company do what it wants to do without wasting resources in lower-priority pursuits.

It is surprising that general managers sometimes tend to lose sight of this concept, since the need for priorities permeates all other areas of management. In a sense, it is the fundamental task of general management. Marketing management segments markets and focuses product design, promotion, and pricing around the needs of chosen segments. Business strategy formulation is itself essentially a process of deciding where and how the company is going to focus its attention and resources. Similarly, manufacturing strategy involves the focusing of attention and resources within the manufacturing function.

Though it is possible to chalk up to manufacturing inexperience the belief of many general managers that manufacturing should be capable of doing everything well, it is less

easy to explain why many manufacturing managers themselves either try to be good at everything at once, or focus on the wrong thing. They, more than anyone, should know that all-purpose tools generally are used only when a specific tool is not available. Perhaps they fall into the trap because of too much pride or too little time or a reluctance to say 'no' to their superiors. What is needed is a statement of manufacturing strategy that reflects the true priorities of the business strategy, and one that allows the manufacturing organization to be a major contributor to that competitive advantage.

It is to be hoped that the development of the strategy field—sparked by the efforts of academics and practitioners alike—will pursue the various aspects of manufacturing strategy at an increasing pace, changing references to it as a 'missing link' to references to it as the 'distinctive link' in many firms.

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