Logistics, strategy and structure

A conceptual framework

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Introduction

The competitive environment for manufacturing firms has changed drastically in the past ten to 15 years. Customers in geographically dispersed, emerging and established global markets now demand higher quality products at lower cost in a shorter time. As a result, firms have been forced to reorganize their manufacturing activities and realign their global strategies. Organizations have moved from centralized, vertically integrated, single-site manufacturing facilities to geographically dispersed networks of resources. In order to acquire technological know-how and assets quickly, or to acquire a local presence in new and distant markets, strategic partners are increasingly part of the network structure. Organizations and partners are linked together in what we refer to as the new manufacturing enterprise. These global networks are designed to provide the speed and flexibility necessary to respond to windows of market opportunity. Finally, the trends toward volatility and uncertainty in the economic and competitive playing fields that have given rise to these new structures can be expected to continue at least into the near future (Perry, 1991). These observations are probably not news to managers or scholars. However, what may not be obvious is the increasingly important role of logistics in the efficient and effective operation of these production networks.

The objective of this paper is to develop a conceptual model of production that explicitly recognizes the emerging role of logistics in bridging new manufacturing strategies and organizational structures that have evolved in response to new competitive pressures. The model is composed of three elements: the competitive environment, strategy, and structure. The basic model premise is simple – market forces (or the competitive environment) shape the formulation and implementation of a firm's strategy (at both the business and manufacturing levels) and its organizational structure. Each of the elements in this model is characterized by a number of dimensions. Our argument is that these new manufacturing strategies and organizational forms will not be as successful as they could be without the development of

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enterprise-wide logistics practices and systems. This concept of enterprise-wide logistics is characterized by the integration of logistics activities both *within* and *between* strategically aligned organizations comprising the overall enterprise. In this paper, the manufacturing enterprise is defined as a collection of productive activities through which value is created for the customer. The enterprise may be consonant with a single multinational company or, as is increasingly the case, a set of strategically aligned companies that partner to capture specific market opportunities.

The manufacturing strategy literature has identified a number of manufacturing-related dimensions on which firms may compete. These competitive dimensions, which have been labeled "competitive priorities" in the literature, can include cost, quality, flexibility, and delivery performance among others (Corbett and Van Wessenhove, 1993; Minor *et al.*, 1994; Vickery, 1991). From a strategy perspective, these competitive priorities can be viewed as the objectives of the firm's manufacturing strategy. In the past, a firm could choose to compete on the basis of only one of these objectives. For example, a firm might choose to be a low-cost *or* high-quality producer, but not both. These two choices correspond to Porter's generic strategies of cost leadership or differentiation (Porter, 1980). In contrast, the new competitive pressures described above force a firm to compete on the basis of more than one dimension. In this paper we propose that logistics provides a way for a firm to achieve simultaneously the necessary level of performance on multiple competitive dimensions. Moreover, logistics also serves as a mechanism to integrate the geographically dispersed elements of the enterprise. In this new competitive environment, logistics must be accorded a high strategic priority and cannot be viewed merely as a cost of doing business.

We have two primary objectives in this paper. The first is to discuss how logistics can interact with strategy and structure to provide a manufacturing firm with a competitive advantage in today's demanding market environment. The second is to develop a framework that can be used as a foundation for an empirical investigation of this topic. We begin with a discussion of our framework that explicitly links logistics to the fit between manufacturing strategy and organizational structure. We then examine the implications of this framework for both manufacturing strategy and organizational structure. We conclude with a summary and implications for future research.

Conceptual framework

Our proposed framework is shown in Figure 1. The view taken in this paper is that business strategy and manufacturing strategy reflect the firm's competitive environment. Logistics has, in the past, been considered a narrowly-defined functional activity concerned with tasks such as transportation, warehousing, inventory, and materials management. A new concept, that of the "logistics environment" must also be considered. Changes in logistics capabilities, technologies, and management techniques have allowed logistics to become a primary mechanism for integrating and coordinating

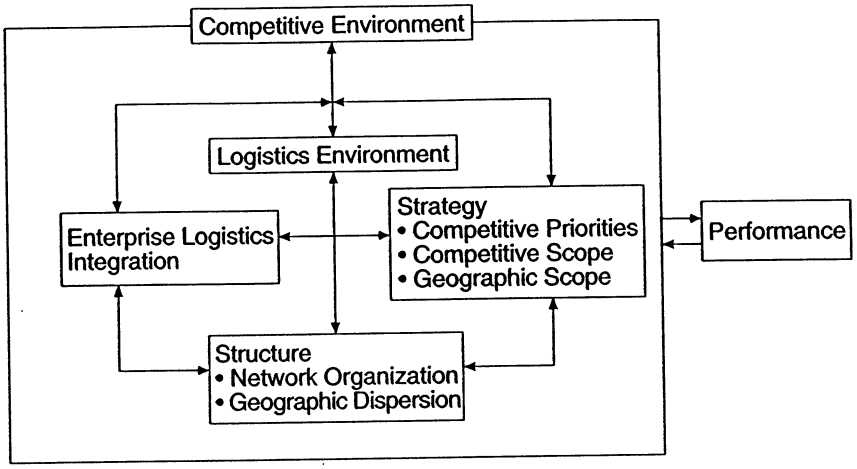

Figure 1.
The proposed framework

activities across stages of a supply chain. The notion of logistics as such an influential variable may be unfamiliar or untested. We argue that as firms become less and less hierarchical, as they become more and more geographically dispersed, and as customers become more and more demanding, logistics can provide a coordinating role that will provide a firm with a competitive advantage. The range of available choices in these new areas of logistics comprises what we refer to as an industry's logistics environment. Our view is that the logistics capabilities of a firm must also change to reflect changes in its logistics environment. If air transportation to deliver time-sensitive products to customers is the norm in an industry, it is likely that any individual firm serving that market must use air transportation to remain competitive. This framework links a firm's strategy, structure, and logistics capabilities and their influence on performance within the constraints of the industry's competitive and logistics environments. There are three principal constructs in this framework: strategy choices, structure choices, and logistics choices. The degree of fit among these constructs affects the firm's performance. In other words, we expect that various combinations of strategy, structure, and logistics choices will result in higher firm performance than other combinations of these constructs. Below we examine each of the elements of this framework in more detail.

Competitive environment

The competitive environment encompasses the demands made by the market, including the price, characteristics, and features of the product; the location of customers; the time requirements of customers; and the variability in demand. It also refers to the relative importance of each of these attributes and the extent to which these attributes are changing or stable over time. The competitive environment might also include those economic and technological trends which shape the global marketplace and the capabilities of managers.

Logistics environment

A manufacturing firm operates within a competitive environment, as described above. It also operates within a technological environment, which might refer to "the industry trends in new technology development and adoption by firms to achieve competitive capabilities" (Parthasarthy and Sethi, 1992). A related idea is that of the industry's logistics environment. We are treating logistics as a variable, like technology, that may provide a firm with a competitive advantage that may not be attainable otherwise. This logistics environment may then be conceptualized as a set of choices available to firms within an industry that relate to areas of logistics activities, such as transportation, warehousing, purchasing, and management techniques. The advantage a firm may have in logistics derives from the extent to which it possesses these logistics capabilities relative to those of the other firms in the industry.

Strategy

In our framework, strategy refers primarily to business strategy, which specifies how a business unit will achieve and maintain competitive advantage within its industry. We are particularly interested in this paper with those elements of strategy that relate specifically to manufacturing capabilities and decisions. Therefore, one element of strategy that we consider is the set of competitive priorities that define a firm's strategic manufacturing capabilities. However, we want to go beyond the traditional bounds of what is generally known as manufacturing strategy. We also consider what we term "competitive scope," which is the range of competitive priorities in which a firm chooses to excel. To recognize explicitly the growing importance of the globalization, we also consider the geographic scope of a firm's strategy, which is the extent to which a firm's customers are located over a wide geographic area.

Our first category of strategy choice is the specification of the dimensions on which a firm chooses to compete. In the manufacturing literature, these competitive dimensions are referred to as *competitive priorities*. Competitive priorities can also be thought of as the areas in which a firm chooses to excel in order to meet customer demands. There are a number of different operations-related competences described in the literature as competitive priorities, but the most traditional list includes cost, quality, flexibility, and delivery (either speed or reliability). Other lists have included speed, time, and innovation as well (Corbett and Van Wessenhove, 1993; Miller and Roth, 1994). These lists are closely related to the idea of generic strategies from the business strategy literature (Porter, 1980). Cost, as a competitive priority, would correspond to cost leadership, while the others (quality, flexibility, speed, etc.) would correspond to differentiation.

Cost as a competitive priority can be interpreted as the firm's intention to be the lowest cost producer in its industry. It is a readily understood competitive dimension and probably needs no further discussion.

A firm for which quality is a competitive priority would attempt to gain a competitive advantage on the basis of the quality of its products. Quality can be

defined in a number of different ways (Garvin, 1987), but we consider two broad conceptualizations of quality: performance quality, which refers to the performance and features of a product; and conformance quality, which refers to conformance to specifications or the absence of defects. A firm for which quality is a competitive priority may choose either or both as a competitive priority, although performance quality is most likely to be a source of competitive advantage (Parthasarthy and Sethi, 1992). A high level of conformance quality in the current competitive environment usually is expected by customers and would therefore probably not be a way of differentiating a firm from its competitors.

Flexibility can also have different interpretations, but we choose to consider two different categories: design flexibility and volume flexibility. Design flexibility is the "capability to make rapid design changes and/or introduce new products quickly." Volume flexibility refers to the "capability to respond to swings in demand" (Miller and Roth, 1994). Flexibility can also refer to a firm's ability to deal with uncertainty (Gerwin, 1987). Innovation in either product or process development is often considered to be an element of flexibility, as well (Parthasarthy and Sethi, 1992).

Finally, delivery performance as a competitive priority generally has two dimensions. The first is speed. Delivering products to customers quickly can offer a number of competitive advantages, and there are many firms for which delivery speed is crucial to success. Overnight delivery and fast food restaurants are two industries that are based on delivery speed. Increasingly, time is becoming important to customers. The other dimension of delivery performance is delivery reliability, or the capability to deliver the product to the customer on time, when it is promised. On-time delivery is particularly important for firms operating in a just-in-time environment, where early delivery is often just as bad as late delivery.

A firm's choice of competitive priorities can depend on its manufacturing strengths, its market environment, and other organizational attributes such as structure, technology, and logistics capabilities.

Competitive scope refers to the breadth of a firm's strategy. Early research in manufacturing strategy held that a firm could emphasize one, or at most a few, competitive priorities simultaneously. The idea was that the skills and capabilities needed to excel at one competitive priority were often inconsistent with the skills and capabilities needed to excel at another competitive priority. For example, a firm might choose to compete on cost, but this choice would imply that it could not compete on quality. Similarly, a high degree of flexibility would also preclude cost competition. These trade-offs were driven by different demands placed on equipment, labor skills, and management approaches by each of these competitive priorities (Hayes and Wheelwright, 1979; Skinner, 1969). The trade-off mentality is probably best illustrated by the well-known "product-process matrix" relating product characteristics to process types. A firm that veered off the "diagonal" matching the prescribed process and product types did so at its own peril (Hayes and Wheelwright, 1979).

More recent research in manufacturing strategy has recognized that changes in technology, managerial thinking, and global competition have, to a large extent, eliminated the idea that trade-offs are necessary (Corbett and Van Wessenhove, 1993; Ferdows and De Meyer, 1990; Hayes and Pisano, 1994). It is now possible to achieve high flexibility and low cost simultaneously, for example.

We define the construct of competitive scope to be the extent to which a firm attempts to emphasize and excel at more than one competitive priority in its manufacturing strategy. Our motivation for including competitive scope in our framework is to consider explicitly the differences between firms that choose to emphasize one competitive priority (e.g. cost) and those that attempt to excel at several (e.g. cost, quality and delivery speed). Higher levels of competitive scope would be indicated by a greater number of priorities emphasized and a greater magnitude of the importance of these competitive priorities.

Geographic scope relates to the area covered by a firm's strategy. It relates specifically to the markets a firm chooses to serve. Another change in the competitive environment is the presence of increased foreign competition. There are both increased threats to US companies from foreign firms and increased opportunities to serve foreign markets. The construct of geographic scope specifies the extent to which a firm's markets are dispersed geographically. A firm whose markets extend over a wide area would exhibit a higher level of geographic scope than a firm that serves a market in only a single geographic area. For example, the geographic scope of a firm whose customers are located entirely within the USA would be lower than that of a firm whose customers are split equally between North America, Europe, and Asia. Note that this construct refers to the location of the firm's markets and customers, not the location of the firm or the firm's production facilities. This element is similar to the "geographic market focus" element of what Kotha and Orne (1989) refer to as "organizational scope" in their discussion of generic manufacturing strategies.

Structure

Organizational structure has been defined and classified in a number of ways in the literature. A very simple way of describing organizational structure differentiates between organizations on the dimension of centralization or decentralization (Ghoshal *et al.*, 1994). A second approach categorizes multinational corporations into "pure" structures, including worldwide functional, international division, worldwide product division, geographic region, and matrix. The differences in these types lie primarily in the relationship of a foreign operation to the corporate head office (Habib and Victor, 1991). Another scheme classifies organizational structure into functional, project, and matrix categories. A fourth approach is the mechanistic-organic continuum of structures (Burns and Stalker, 1961). Each of these methods in some way differentiates organizations in terms of how tasks are

allocated among organizational units and how decision-making authority is specified.

Our approach differs in a number of respects from these earlier methods of classification. We are concerned primarily with how structure is related to manufacturing. We are also concerned with structure as it relates to an entire supply chain, although we may focus on a single firm within that supply chain. In our framework, two constructs consistent with these objectives specify structure. The first is the extent to which the firm of interest is part of a larger network structure. The second is the geographic dispersion of the supply chain of which the firm is part. The supply chain includes the firm's suppliers, distributors, and customers, in addition to the firm itself. We discuss each of these constructs below.

Organizational structure involves "decisions relating to division of task, authority, and a set of coordination mechanisms" (Parthasarthy and Sethi, 1992). Traditionally, structure has been considered within a single firm or organization. In our conceptualization, structure refers to groups of firms – the firm plus its suppliers and customers – in other words, the supply chain. We are therefore interested in task, authority, and coordination mechanisms integrating these two attributes across distinct firms or organizational units. In addition, we are also concerned with the spatial or geographic attributes of structure.

A *network structure* is a difficult concept to define precisely, although the idea is probably relatively easy to grasp intuitively. In the literature there are a number of articles that have examined the concept (Ghoshal and Bartlett, 1990; Jarillo, 1988; Jarillo and Ricart, 1987; Miles and Snow, 1986, 1992; Powell, 1990; Saxenian, 1991; Snow *et al.*, 1992; Storper and Harrison, 1991; Thorelli, 1986). Some authors take the position that there is a continuum of organizational forms with vertically integrated hierarchies at one extreme, perfectly competitive markets at the other, and networks somewhere between the two endpoints (Jarillo, 1988; Jarillo and Ricart, 1987; Thorelli, 1986). A second view is that a network is a distinct organizational type that cannot be considered to fall at some point between the other two (Powell, 1990). Although these two perspectives seem to be quite different, it is apparent that these authors often talk about some of the same things when discussing the idea of a network. There is not a clear consensus in the literature of exactly what constitutes a network, but three dimensions can be drawn from prior research to differentiate networks from other types of organizations: vertical integration, flexibility, and cooperation. We can consider the three basic types of organizations discussed above (hierarchy, market, and network) with respect to how each will differ along these dimensions.

We define vertical integration as the extent to which the firm owns the stages of the supply chain, from raw materials to distribution. We would expect a hierarchy to show high levels of vertical integration, while a network and market firm would show low levels of vertical integration.

The second dimension is flexibility. This term has a number of different interpretations. Because we are concerned with interactions between components of a supply chain, one definition might be the ability to react to changes in circumstances relating to suppliers and customers. We would probably expect that a network firm would show a good deal more flexibility than a hierarchy, but possibly not quite as much as a firm that engages in purely market-oriented transactions. It is important to recognize that "flexibility" in this context is somewhat different from "flexibility" as a manufacturing strategy competitive priority.

The third dimension is the idea of cooperation or relationships between firms. The relationship dimension is probably the most important defining characteristic of a network, and unfortunately, probably the most difficult to specify precisely. There are a number of attributes discussed in the literature that can characterize this dimension. Control or power relates to the extent to which one firm can influence other firms in a relationship. Information exchange relates to the extent to which firms in a relationship share information regarding production processes, technology, or costs. Interdependence refers to the degree to which the success of each firm in a relationship depends on the actions of the other firms. Time horizon refers to whether transactions are expected to be one-time or ongoing. Goal consistency refers to the extent to which firms in a relationship share similar objectives, or at least the extent to which objectives are complementary or supportive. Formality is the extent to which transactions between firms are governed by formal contracts or informal arrangements. In Table I, we have summarized from the literature the expected differences between markets, networks, and hierarchies along these dimensions. From an operational perspective, a firm would exhibit network structure to the extent that it corresponds to the "ideal" description characterized by the "Network" column in Table I.

We also consider in our conceptualization of structure the *geographic dispersion* of the manufacturing enterprise. Geographic dispersion, in this framework, refers to the extent to which the productive units in the supply chain are dispersed geographically. Kotha and Orne (1989) refer to a similar

Table I.
Expected differences in organizational structure forms

	Hierarchy	Market	Network
Vertical integration	High	Low	Low
Flexibility	Low	High	Medium
Relationships			
Control	High	Low	Medium to low
Information exchange	Low	Low	High
Interdependence	Low	Low	High
Time horizon	Long	Short	Medium
Goal consistency	Low	Low	High
Formality	High	High	Low

concept as "geographic manufacturing scope" in their model of generic manufacturing strategy. Operationally, a firm with a high level of geographic dispersion would exhibit a low proportion of productive units within any individual geographic region. There are three reasons for including geographic dispersion as a dimension of organizational structure. First, it is another specification of how tasks are allocated within the manufacturing enterprise. Second, the extent to which the productive units are either concentrated or dispersed geographically most likely has a significant effect on the decision-making authority and coordination within the firm. Finally, the idea of geographic dispersion reflects the recent trend toward the location of manufacturing facilities in different regions in the world.

Enterprise logistics integration

Logistics has traditionally been defined as the process of planning, implementing and controlling the efficient flow and storage of goods, services and related information as they travel from point of origin to point of consumption. Some of the activities that are included in the logistics domain include transportation, warehousing, purchasing and distribution. Within this model, the locus of logistics control has been the individual firm. Moreover, as in many other areas of management, logistics activities have traditionally been divided along functional boundaries. For example, transportation, purchasing, and warehousing might be separate departments. There has been a recognition that logistics activities should be integrated more within the entire domain of the business, not simply relegated to a narrow functional role. A trend in manufacturing is the increasing use of strategic partnerships and cooperative agreements among separate firms that work together to produce and distribute products. The network organization is one manifestation of this trend. The implication is that it is now groups of firms working together as supply chains that are often the competitive unit. Consideration of logistics integration must therefore also extend outside the boundaries of the individual firm. In this section, we discuss a new approach to logistics management, enterprise logistics integration, that incorporates the integration of logistics activities both within and across firm boundaries.

We refer to logistics integration across functional boundaries within a firm in the remainder of this discussion as "internal integration." What we refer to as internal integration was formally termed "integrated logistics" and recognized by an A.T. Kearney study that introduced three stages of logistics development, each of which reflects increasing integration of logistics activities within the firm (Bowersox, 1987). Implicit in the recognition of the stages of integrated logistics was the notion that benefits, especially cost benefits, will be realized by companies that operate their logistics processes as an integrated system rather than by optimizing functional subsystems. This systems approach *within the firm* has been the underlying premiss of much of current logistics management, thought, and practice.

The extent of internal integration would be reflected by the extent to which logistics activities interact with other functional areas, as well as by the extent to which logistics is or is not a separate functional unit. For example, indications of higher levels of internal integration would include increased coordination of logistics activities with other departments in the firm, increased communication (electronic and interpersonal) between logistics and other departments, increased importance of logistics in the overall business strategy, and a blurring of the formal distinction between logistics and other areas of the firm (McGinnis and Kohn, 1990).

A second area of logistics integration, which we refer to as "external integration," is the integration of logistics activities across firm boundaries. Internal integration reflects the traditional paradigm in manufacturing of the single firm as the unit of analysis. We recognize that it is becoming much more common to think of the manufacturing enterprise in terms of the entire supply chain, which increasingly consists of many separate firms banded together in network arrangements. This form of manufacturing organization would necessarily require a greater number of inter-firm supplier-customer interactions, as well as changes in the nature of these interactions. Logistics activities are significant elements of many of these inter-firm interactions. External integration, although a relatively new concept, has been the subject of a good deal of research in logistics management, although it known by a variety of terms, including "supply chain management" (Berry *et al.*, 1994; Carter and Ferrin, 1995; Cooper *et al.*, 1997; Larson, 1994; Thomas and Griffin, 1996), the "seamless supply chain" (Towill, 1997), "supply chain integration" (Armistead and Mapes, 1993), "enterprise logistics" (Fox, 1991; 1992; Wasik, 1992), "enterprise-wide logistics management" (Drew and Smith, 1995), and "integrated logistics" (Drew and Smith, 1995; Gustin *et al.*, 1995; Larson, 1994). It should be emphasized that "integrated logistics" here refers to integration across separate organizations and therefore differs from the original meaning of "integrated logistics" discussed above (Bowersox, 1987).

External integration would be reflected by the extent to which the logistics activities of a firm are integrated with the logistics activities of its suppliers, customers and other supply chain members. For example, as just-in-time strategies have become more prevalent, many companies have created dedicated "inter-firm logistics" relationships that link their manufacturing functions with particular suppliers of components. Indications of higher levels of external integration would include increased communication (both computer and interpersonal) with suppliers, customers and other supply chain members; greater coordination of the firm's logistics activities with those of its suppliers, customers and other supply chain members; and more blurred organizational distinctions between the logistics activities of the firm and those of its suppliers, customers and other supply chain members.

We have described internal and external logistics integration above. Enterprise logistics integration is the extent to which a firm implements both internal and external integration. Enterprise integration would be

characterized by integration of logistics activities across functional departments within the firm, as well as integration of logistics activities with the logistics activities of other supply chain members. As we noted above, prior studies have examined concepts that have similar terminology (e.g. enterprise logistics and enterprise-wide logistics management), but they examine primarily what we have referred to as external integration. Our concept of enterprise logistics integration is different. We recognize that neither internal logistics integration nor external integration are new concepts. However, considering these two distinct dimensions of logistics integration in combination is a new extension to previous thinking in logistics management.

Clearly, within the new manufacturing enterprise, the locus of process control must span the broad range of activities connected through the supply chain. An organization's performance is only as good as the weakest link in its supply chain. The notion of enterprise logistics reflects the needed integration of logistics activities among proximate *and* non-proximate organizations or organizational units within the enterprise. This concept of enterprise logistics integration reflects the growing importance of logistics as a coordinating mechanism among multiple units of the enterprise and, ultimately, as a source of customer value and competitive advantage.

Performance

We consider two categories of performance in our framework: internal measures of performance and external measures of performance. Internal measures of performance relate to the efficiency and effectiveness of the internal manufacturing and logistics process within the firm. These categories of performance reflect competences in specific areas of manufacturing and logistics, including cost, delivery speed and reliability, quality, flexibility, customer service, and distribution. Internal performance measures are more under the control of the firm and therefore might provide a more direct indication of the effects of the relationship between strategy, structure and logistics.

External performance measures reflect the assessment of a firm by factors outside of the firm's boundaries. These measures would include conventional indicators of business performance, such as market share, return on investment, and sales growth. They might also include non-financial measures such as customer satisfaction.

Linking the elements

An underlying conceptual theme of our framework is the idea of fit. "Fit" has generally been invoked with respect to the relationship between strategy and structure (Galbraith, 1977; Galbraith and Kazanjian, 1986; Miles and Snow, 1984). The basic idea is that strategy and structure should be consistent. The implication of the fit paradigm is that there are certain combinations of strategy or structure variables that are more "appropriate" in some sense. More specifically, a strategy-structure fit implies that certain forms of structure are

better for implementing certain forms of strategies than others. Fit can also be thought of as a process of aligning the organization with its environment, where strategy is the alignment mechanism. Moreover, a firm that exhibits a fit between its strategy and structure can be expected to perform better than a firm that does not exhibit a strategy-structure fit (Miles and Snow, 1984). It is interesting to note that this expectation of greater performance under "fit" conditions appears to be an implicit assumption; consequently, performance is often excluded from models in a good deal of the research in this area (Parthasarthy and Sethi, 1992).

We extend the domain of fit to include the effects of logistics integration on the relationship between strategy and structure. In more formal terms, this framework suggests that greater performance will result when there is a fit between environment, strategy, structure and logistics capabilities. We are particularly concerned with the implications of logistics integration choices as they relate to particular dimensions of strategy and structure. Several implications follow directly from the idea of a fit between logistics integration choices and strategy and structure choices. These implications are discussed in the following section.

Strategic and structural implications of logistics integration

The proposed framework suggests a number of strategic and structural implications of logistics integration choices. In this section we examine a subset of these implications, specifically those related to enterprise logistics integration. We limit consideration of logistics choices in this manner, in order to emphasize the importance of what is a relatively new and what would probably be considered to be a more "advanced" approach to logistics management. The unit of analysis is a firm or business unit with some degree of manufacturing capability. It is expected that the extent of enterprise logistics integration found in the industrial environment would vary widely. Our objective is to examine the likely effects of the implementation of enterprise logistics integration on a firm's performance.

Implications for strategy

A firm's strategic choices involve the specific areas in which it chooses to compete (its competitive priorities), the breadth of these competitive dimensions (competitive scope), and the breadth of the geographic locations of the markets it chooses to serve (geographic scope). Our proposed framework suggests that logistics integration choices can interact with these strategic choices to affect a firm's performance. Enterprise logistics integration serves as a coordinating mechanism among supply chain members and, in some sense, becomes the organizational "intelligence." Enterprise integration is characterized by cross-functional integration within a firm and cross-firm integration across a supply chain. The manufacturing strategies of firms today are increasingly reflecting attempts to excel on a number of competitive dimensions. Competitive advantage can be gained from excelling at both cost and quality; flexibility and

delivery; or possibly any combination of the four. Enterprise logistics integration links logistics activities to other functional areas within the firm and to the logistics activities of other firms. We expect that the additional linkages and coordination capabilities inherent in the enterprise integration approach would allow a firm to excel at a wider range of manufacturing competences. Therefore, the first implication related to strategy would suggest that competitive scope, enterprise integration and performance will be positively related.

We include an explicit geographic component of strategy to reflect the growing importance of global competition in the operations of firms. A firm that serves markets over a wide geographic area will likely need an advanced logistics capability. As noted above, enterprise integration is posited to provide a number of advantages, both internal and external, to the firm when compared to the other levels of logistics integration. Therefore, another implication that follows from our framework would be a positive association between geographic scope, enterprise integration and performance.

Implications for structure

Organizational structure provides the framework in which to implement strategy. The underlying theme of this paper is that changes in the competitive environment have forced changes in the strategy and structure of manufacturing firms. It is becoming more common for networks of firms to band together to produce and distribute products in response to these environmental changes. Networks require much higher levels of interaction and coordination between supply chain members than traditional hierarchical organizations. Enterprise logistics integration provides a coordination infrastructure that allows the logistics function to become the repository of the organizational intelligence shared by the network elements. Network firms are characterized by flexibility, cooperative relationships and relatively low levels of vertical integration. Our expectation, therefore, is that enterprise logistics integration provides the organizational mechanisms that support these inter-organizational interactions. Therefore, we would expect that the performance of a firm that is part of a network structure will be higher if it also employs an enterprise integration approach to logistics.

Another trend in the structure of manufacturing enterprises is the establishment of production and other supply chain facilities across a wide range of geographic locations. The location of foreign manufacturing facilities owned by a firm may provide a number of advantages, including access to a foreign market, availability of cheap labor, and the availability of new technology. Another trend is toward increased global sourcing. Raw materials and components are likely to be purchased from foreign suppliers and sold to foreign manufacturers. Distance and time increase the difficulty of establishing and maintaining effective interactions between supply chain members. The coordination mechanisms, both internal and external to the firm, that are characteristic of enterprise integration enable more effective management of

this added complexity. Therefore, we expect enterprise logistics integration to enable higher levels of performance in geographically dispersed firms.

Conclusion

In this paper we have argued that a new and expanded role for logistics will be required in the new manufacturing enterprise. Enterprise-wide logistics integration will provide the bridge that is necessary to maintain a proper fit between strategy and structure in the new competitive environment. It is interesting that much of the reported work on time-based competition, agile manufacturing and mass customization, for example, focuses on the re-engineering of activities and processes within the confines of the factory, ignoring the critical importance of logistics and material transport outside the factory walls to the achievement of competitive goals. As competition shifts from head-to-head competition between firms to competition between supply chains, competitive success will depend increasingly on the ability to coordinate and integrate the production activities at geographically dispersed and organizationally distinct locations. This "new" enterprise logistics will place a high a priority on inter-firm integration of logistics activities and sustainable commercial success.

There is a dearth of scientifically designed studies that have explored the link between strategy and logistics. Our view is that changes in the competitive environment necessitate a rethinking of the role of logistics. This paper has proposed a framework that will provide a conceptual basis for research to explore this area empirically. The results of research based on our framework should enable the development of concepts that explain how logistics can provide a competitive advantage in today's changing environment.

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