



## **Strategic use of information technology in international business: A framework for information technology application**

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### **Abstract:**

*The application of information technology (IT) to the strategy of the international firm has received limited attention. This topic is addressed by exploring the use of IT in conjunction with a popular framework - the integration-responsiveness (IR) framework - of international business strategy. The IR framework is based on the perception of managers about their operating environment. The 2 dimensions of this framework are pressures for global integration and pressures for local responsiveness. The framework demonstrates how the fit between a firm's strategic decisions and IT applications can be used to attain competitive advantage in the international environment. To attain this competitive advantage, the firm must identify the corporate strategy that best corresponds to its environment and objectives. During the development of the strategic plan, the firm should assess the level of its IT assets and develop an organizational information architecture to serve as the blueprint within which IT applications can be effectively prioritized and integrated.*

### **Full Text:**

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During the 1980s, the volume of world trade increased over two hundred percent (200%). The International Monetary Fund (IMF) estimates the current volume of world trade exceeds 7 trillion dollars. Companies, such as McDonalds Corporation (McDonalds Annual Statement 1991), are finding that their most profitable operations are located in their "overseas" markets. This increasing world trade volume has encouraged businesses to become involved in the global trade arena, and has been accompanied by a corresponding increase in the competitiveness between firms. Many of these firms are using information technology (IT) to enhance their competitiveness in this environment. New frameworks are being developed to explain the factors that contribute to the success of these multinational firms. In the information systems literature, IT's link with strategic objectives has been

discussed (Ives and Learmonth 1984, Wisemann and MacMillan 1984, Rackoff et al. 1985, Johnson and Vitale 1988, Feeny and Ives 1990), as critical to competitive success, but the connection to the international arena has yet to be fully investigated.

This study investigates the link that IT plays in facilitating the strategic plan of the international organization. It is the coordination of the overall business strategy and the IT strategy and applications of that strategy that provide firms with competitive advantage. The goal of this paper is to demonstrate how the coordination of IT with the strategic processes can provide managers and their firms with a means to achieve competitive advantage. The paper is organized as follows. The strategic use of IT in an international context is discussed in the first section. This is followed by an examination of the IR framework. The next segment reviews the dimensions used to operationalize the IR framework and examines the subgroups which compose the framework. Examples illustrate the applications of IT within the Integration-Responsiveness framework of global industries. The final section comprises implications for managers and poses questions for future research.

## STRATEGIC USE OF INFORMATION TECHNOLOGY (IT) IN A GLOBAL ENVIRONMENT

As the business environment becomes more complex and uncertain, organizations seek more information to reinforce their decision-making activities (Galbraith 1977). Galbraith contends that one of the most advantageous method to support this additional information requirement is for the organization to increase the functionality of its IT system: storage, processing, and communication. Subsequently firms are turning to strategic uses of IT as a means of responding to competitive pressures in their industry and uncertainty in their environment. Sources of this competitive pressure include deregulation, increased foreign competition, entry of competitors from other industries, changes in technology or industry structure, and successful implementation of IT initiatives of competitors (Johnson and Carrico 1988).

The international business environment is characterized by the conditions envisioned above. While becoming diversified and multinational, a company clearly needs to find a way to manage across functions, business units, products, markets, and geographical regions (Sullivan 1985). Companies operating in this international environment seek to utilize their IT assets to cope with the increased levels of complexity and uncertainty.

Literature suggests that there are many options available to the multinational firm to enhance competitive advantage through the application of IT in its overall strategy (Bartlett and Ghoshal 1989, Galbraith 1977, Johnson and Vitale 1988, Farrell and Song 1988, Ives and Learmonth 1984, Neo 1991). The use of IT as a mechanism to coordinate the firm's value chain activities is suggested by Porter and Millar (1985). International firms will utilize their IT network to disperse activities throughout their global market, seeking comparative advantage. Interorganizational systems (IOS) are becoming widely used by domestic and international firms to lock-in their suppliers and buyers (Johnson and Vitale 1988). This mechanism creates entry barriers and thus establishes competitive advantage.

Avnet has used the concepts outlined by Johnson and Vitale to provide competitive advantage over their competition in the distribution area. Their electronic marketing group employs technology through the use of electronic data interchange (EDI), on-line direct order entry, and state of the art bar coding and laser scanning. These technologies have allowed them to heighten internal efficiencies and provide their customers with improved service. The company has just expanded the system into the United Kingdom and is positioned to move into the European Economic Community (AVNET Annual Statement 1991).

IT is related to a company's strategic thinking because it helps to define the range of its possibilities.

Wisemann and MacMillan (1984) developed the concept of creating a strategic information system (SIS) that is used to support the firm's competitive strategy. There is evidence to suggest that most successful SISs are not created, but are extended from existing successful corporate systems (Runge and Earl 1988). While most organizations are already successful at performing their business functions; an SIS planning process provides the opportunity for the firm to examine its organizational goals and generate options so that IT can be enabled to enhance competitive advantage.

## THE INTEGRATION-RESPONSIVENESS (IR) FRAMEWORK

In the international arena, there is no single strategy that applies to firms nor are there universal conditions of operations. The competitive position of today's multinational firm is a function of its organization, environment, varied market conditions, and to a large degree the actions of other entities. Management is responsible for the assessment of these environmental and organizational conditions and the creation of strategies that will facilitate their operating position (Hamel and Prahalad 1985, Porter 1985).

The integration-responsiveness (IR) framework, developed by Prahalad and Doz (1987), is operationalized to examine and classify firms operating in the international arena. It has been suggested as a "way of capturing the pressures on a given business" and establishes a parsimonious foundation that can be applied to firms across industry lines. The framework was developed through extensive field research and its basic components have received wide support in the literature (Doz 1985, Porter 1980, Bartlett and Ghoshal 1989).

The IR framework is based on the perceptions of managers about their operating environment. The two dimensions of this framework are pressures for global integration and pressures for local responsiveness. Pressures for global integration are industry forces that necessitate worldwide business resource deployments for strategic pursuits. Strategic decisions are made to maximize the collective organization so that activities are integrated across national boundaries. In contrast, local responsiveness pressures are industry forces that necessitate local context-sensitive strategic decisions. Firms in this classification respond to each local market or industry setting irrespective of the strategic consideration of sister business units.

The framework, as illustrated in Figure 1, depicts the two perspectives explained above plus the inclusion of the Multifocus element. (Figure 1 omitted) When perceptions of environmental pressures indicate a need to respond simultaneously to both local responsiveness and global integration pressures, "multifocal" business strategies are adopted where businesses coordinate their collective operations while maintaining a high level of responsiveness to each local content. The tradeoffs conceptualized in this strategy are included in part in many other international business strategies (Bartlett and Ghoshal 1989, Doz 1985, Hamel and Prahalad 1985, Porter 1985).

An empirical study conducted by Roth and Morrison (1990) establishes that each IR subgroup manifests a unique set of dimensions that distinguishes it from the other subgroups. These characteristics take the form of emphasis placed on certain attributes within the given dimension. The unique emphasis on particular dimensions provides the opportunity to target specific IT applications for each subgroup. These dimensions are discussed below.

## STRATEGIC DIMENSIONS AND THE APPLICATION OF IT

To operationalize the IR framework the strategic dimensions developed by Miller (1987) have been adopted. The four dimensions are complex innovation, marketing differentiation, breadth, and

conservative cost control(1). Miller notes that these dimensions are not mutually exclusive. Table 1 summarizes these dimensions, the competitive attributes, and potential IT applications. (Table 1 omitted)

Complex innovation involves the degree to which the firm introduces major new products or services, not simple or cosmetic departures from previous offerings. These novel market opportunities usually require management involvement from many functional areas of the organization and the activities range from conceptual design to new marketing concepts. The introduction of these new products into the market will require the firm to improve its information gathering and evaluation systems. These systems with the improved quality of information will help offset the complexities involved and improve decision making. IT can further play a critical role in facilitating strategy via computer aided design (CAD) and the flexibility of computer aided manufacturing (CAM) can provide a firm with limited resources the economies of scale once found in only the largest of enterprises.

Marketing differentiation is the attempt to create customer loyalty by meeting the needs of the customer. Marketing can become a prime ingredient in the firm' s competitive mix. This aspect can provide the firm with the "appearance" of being unique or having product attributes that competitors fail to possess. It should be noted that the firm may not necessarily have a unique or higher quality product, but aggressive marketing by the firm can create that image. The firm may produce a product that is comparative to other products in the marketplace but they may enhance that product through other means. IT could provide the firm with that potential.

The breadth dimension refers to the scope of business offerings. The concept is the opposite of Porter' s dimension of focus. Breadth includes the variety of customers, the geographic range of the company, and the number and combinations of product offerings by the business. As the breadth of the firm widens, the business will be faced with increased levels of uncertainty. IT can help the firm expand the nature of the product offering while assisting in the management of newly created uncertainty.

In the final dimension, conservative cost control, the firm strives to control costs, cut the price on products, and minimize expenses on innovation and marketing. In this dimension IT provides the firm with the opportunity to closely monitor its operation, keeping costs under control through inventory management, accounting systems, and coordinated activities throughout the firm. This strategy encourages the firm to develop systems that will help standardize operating procedures and formalize policies. Flexibility will be reduced as the range of tasks is narrowed and performance of those tasks will become more routine (Miller 1987).

## INTEGRATING THE IR FRAMEWORK WITH STRATEGIC DIMENSIONS

The results of the empirical study by Roth and Morrison (1990) show a clear distinction between the subgroups of the IR framework. Their research surveyed CEOs and presidents from companies selected across industrial sectors that had been previously identified as global industries(2). The dimensions outlined above, highlight the distinctions between the subgroups of the IR framework. This is illustrated in Table 2. (Table 2 omitted) Clearly, IT can play a major facilitating role in allowing firms to pursue these strategies. Therefore, illustration of the application of IT within the context of the integrated framework (Table 2) can provide descriptive insight into strategic use of IT by global firms. Table 3 maps specific firms that have been successful in employing IT to support the strategic dimensions of the framework. These examples are elaborated below(3). (Table 3 omitted)

The global integration (GI) group is characterized by a high degree of global awareness, standardization, and economy of scale potentials. It is expected that these firms concentrate on

efficiencies and standardization that allow them to compete on a global level. Providing customer service, controlling overhead and manufacturing efficiency, engineering/R&D expertise, and developing new products are specific attributes highly rated by these concerns. These organizations also consider customer service and the development of unique product features as important competitive attributes.

Global integration firms are generally large entities that sell a product that is uniform or "perceived" to be uniform by its customers, even though their product may vary in detail from market to market. In many cases, the company is "selling" their image as well as their product. Kogut (1985) suggests that by focusing on competitors' locations and on technical advantage, the firm can determine where the value chain activities should be broken across borders and where new investments will yield maximum return. This analysis considers which aspects of the firm should be centralized or decentralized. Decentralized market programs that exploit the upstream value chain are the corner stone of global strategies. Yet if these activities cannot be internationally transferred, then the industry would consider competing under the multifocal or national responsive strategies.

### GI-COMPLEX INNOVATION

These firms develop products with features that conform to "global standards". In the consumer food products area, most products are developed for a domestic market and then exported due their great appeal. These products are adapted to some extent to meet local "needs" despite their "global standards." Examples include Coke, McDonalds, and Kraft Foods.

Minnesota Mining and Manufacturing Company (3M) developed IT systems that have improved quality and productivity based on the demanding criteria of the Malcolm Baldrige National Quality Awards. These systems have facilitated the innovative development of adhesives, polymers, ceramics, and fluorochemicals (products with highly standardized global demand). The improvement in quality and productivity have permitted 3M to place these products into international markets in half the time of past product innovations while reducing costs and increasing efficiencies. As a result, 3M has seen sales outside the United States grow from 37 percent of total sales in 1985 to over 49 percent of total sales in 1990 (3M Annual Statement 1991).

Boeing delivers a "standard" product worldwide from their plant in Washington state. This company designs commercial aircraft to meet the particular niche of customers throughout the globe. The various size and configuration of aircraft are models that meet the unique standards established by the world's commercial airlines. Although these aircraft vary in features, the planes are perceived to be uniform (e.g. all planes within the "747" model are considered "747s" regardless of the variance in features). The use of IT empowers Boeing to produce these airplanes with the utmost efficiency and adherence to safety principles. The IT systems also allow the company to customize individual models as required for particular customers through the use of flexible manufacturing. The same IT systems enhance Boeing's design capabilities to provide the aircraft with the latest in technological innovation while improves flight characteristics and fuel economy (Boeing Annual Statement 1991).

### GI-MARKET DIFFERENTIATION

The following firms utilize IT to provide a unique advantage while serving customers whose "needs" are perceived as highly standardized throughout the global market.

Du Pont is a company that has utilized Electronic Data Interchange (EDI) in the global marketplace. Its customers, in the U.S. and elsewhere, use EDI to conduct business with Du Pont as well as execute business operations that they had to previously perform themselves. This added value has "locked-in"

these customers to the Du Pont family. This extra service to their customers has been so successful that Du Pont itself is becoming more efficient in data management and the services that they offer (Carlyle 1988).

IBM controls their global sourcing and logistics from a central facility in Colorado. This complex is responsible for the coordination of components and subassemblies that are manufactured and utilized in assembly plants worldwide. This global sourcing provides IBM with cost saving and economies of scale as well as intangible political benefits mentioned earlier. IBM's global network allows product/country managers worldwide to inform the center of their product needs and requirements for subassemblies for their regional plants. The center then coordinates the production, shipping, and assembly of the required parts. This massive operation is controlled with the use of sophisticated databases and a computer network that links operations throughout the globe. Through the coordination of global operations, IBM has reduced uncertainty in their complex operation while creating competitive advantage matched by few, if any, competitors(4).

#### GI-BREADTH

The ability to offer a wide range of products and services to a global market differentiates this subgroup.

General Electric's 1985 acquisition of RCA resulted in the creation of a global electronics giant, the Consumer Electronics Group. The synergy of the merger created a substantial product line that was supported via GE's extensive database network. GE was able to offer many more products and services than before the merger. Additionally, computing functions, payroll processing, and MIS were incorporated into a single service. More importantly, the increased breadth of products and consequent buyers has permitted the company to develop its 1-800 Answer Center that was in time adopted by other GE divisions and quickly embraced by other firms, e.g. Ford Motor Company (Bartlett and Ghoshal 92).

#### GI-CONSERVATIVE COST CONTROL

These firms utilize global economies of scale and integration of value chain activities to control overhead and create manufacturing efficiencies.

Liz Claiborne fashion apparel is a firm that uses interorganizational information systems to exchange information with suppliers and obtain up-to-the-minute feedback from clients and customers on their global fashion products. Since fashion products are fairly standardized on a global basis, the continuous input to management allows them to make rapid styling changes, keeping up with the current trends, while optimizing their value chain to keep costs to a minimum. The system also provides them with the ability to stay in constant communication with the sub-contractors who perform most of their manufacturing. They further employ computer-based quality and inventory controls which facilitate the use of just in time (JIT) inventory practices, thereby reducing costs and the potential of out-of-style inventory (Farrell and Song 1988)(5).

Klockner & Co. AG, a German Transportation carrier, disseminated information technology across its operations utilizing information systems standardization. This standardization of information and systems facilitated the use of an electronic highway which allowed the rapid transfer of information, reducing the time and costs associated with material tracking. An additional benefit of dispersing IT across its global operations was the ability to centrally plan while acquiring continuous input and feedback. This standardization has reduced costs and increased operating efficiencies (Runyan 1989).

The multifocal (MF) group is characterized by what Bartlett and Ghoshal (1989) term the

"transnational" organization. These firms must balance the advantages inherent in global firms with the demands of operating in unique markets. They consider important many of the same attributes as do the global integration firms. The difference occurs in the focus of the specific attributes. For instance, complex innovation is defined mainly by new product development and the development of unique product features, whereas the global integration group concentrates on developing engineering and R&D. Multifocal firms find it of greater importance to offer a broader range of products as well as controlling channels of distribution and emphasizing advertising and promotion. The importance of these attributes confirms the fact that these firms operate in varied conditions in different markets and the products and activities they provide must be flexible enough to adapt to those different conditions (6).

The multifocal or transnational company endeavors to optimize both strategies to its own advantage, acquiring the advantages of the global integration firms while seeking the specific markets of the local responsive strategy. These firms offer a broad range of products that will appeal to the "tastes" of consumers in the different markets they serve. Firms of this type will continuously adapt their products and techniques to meet the changing demands of their constituents.

#### MF-COMPLEX INNOVATION

The ability to introduce unique products into varied regional markets that are managed on a global basis characterizes these firms.

Proctor and Gamble (P&G) manages complex networks of relationships among technical and marketing managers worldwide to develop products that are tailored to specific markets. These networks provide the company with the ability to access worldwide expertise and leverage the corporate intelligence of its global organization. This ability allows the company to "tailor" global products to meet the needs of specific markets throughout the globe. Even though the product(s) are modified, their ability to meet the requirements of each specific market makes them unique to that market. This capability facilitated the creation of new global liquid detergents that soften water for the Europeans, improved cleaning ability for the American market, and provide the Japanese with the desired cold water cleaning power. This process saved P&G not only developing and marketing expenses but manufacturing expenses as well (Bartlett and Ghoshal 1992).

#### MF-MARKET DIFFERENTIATION

The use of IT systems enhance the ability of these firms to support the varied "needs" of customers in different market environments.

Benetton, the Italian clothing company, uses an order entry system, computer-aided design, and an international network to track, coordinate, and help market their products in 2700 stores throughout the world. Stores are tied together via the network while local agents in each country (region) keep track of inventory and demand while monitoring style, color, and size by region. Orders are then routed to the plant that makes that product and style. In the factories, a mainframe computer generates shipping orders to be filled from inventory and helps plan product runs based on demand, inventory, and reorder quantities. The computers also maintain records on unassembled clothing components that can be transferred between factories to maintain schedules. On the factory floor, the computers take the design requirements from the individual countries, CAD helps create the design specifications, and then generates cutting stencils that minimize wasted material. Their on-line capabilities allow them to make up-to-the-minute changes in products tailored for a specific region and provides the ability to transmit that information back to their agents to help plan advertising and coordinate distribution activities

(Freedman 1985)(7).

#### MF-BREADTH

The ability to offer a broad range of "tailored" products characterize the Multifocal breadth firm.

Citicorp' s use of technology in the finance industry gave them a competitive advantage despite not being the first to enter the market. The network established allowed Citicorp to coordinate the activities of their automatic teller machines (ATMs) and permitted them to capture the largest share of that market. Citicorp has continuously modernized their network and expanded the system, providing sustained competitive advantage. This expansion has allowed them to offer similar services to customers throughout the world, and as a result, they have recently expanded their operations into a global brokerage network. The network has provided Citicorp with the ability to offer a varied product to suit the "needs" of customers in distinct markets while coordinating services on a global level. This network, called Street Sense, is the first computer-based trading system for brokers and money managers which includes market data, portfolio management software, and order entry and execution. The system is also being upgraded to allow customers to send and receive data while placing orders from their own computers (Tichy and Charan 1990).

#### MF-CONSERVATIVE COST CONTROL

IT is a facilitator for firms that utilize the comparative advantages present in each market area to disperse their manufacturing operations.

SmithKline Beecham uses the efficiencies of coordinated global manufacturing while maintaining strong customer loyalty via local brand names in their consumer brands division. Where some products, such as Aquafresh toothpaste, are sold in over fifty countries, other products, like the Odol line, is sold mainly in Germany. These global manufacturing efficiencies give them the flexibility to produce both "global" products as well as the ability to conform other products to local desires. The clinical laboratories division has pioneered a system that has given them competitive advantage in the substance abuse testing market. The company has developed bar code technology for positive identification of samples and linked the doctors' offices to their labs via a computer network. This network has cut the amount of paperwork required by the doctor' s staff and decreased the time from pick up to return of the results while increasing accuracy. These unique features have contributed to a ten percent increase in customer ratings and increased their volume of business over 14% in the second quarter of 1991 (SmithKline Beecham Second Quarter Statement 1991).

The local responsive (LR) group focuses on competing in a narrow market segment while concentrating on superior service and product quality. Specific attributes that were highly rated include customer service, controlling overhead and variable costs, producing high-priced products for market niches, and developing engineering and R&D expertise (Roth and Morrison 1990). This group can be further characterized as seeking strategies that allow them to remain flexible and responsive to the needs of their customers.

Domestic businesses are the prime component of this subgroup. They are interested in appealing to "their" niche, the local market, and in many cases receive special treatment from their respective governments. Their share of the market is usually small and specialized, which makes them less vulnerable to competitors.

#### LR-COMPLEX INNOVATION

The introduction of new products into a highly competitive market niche characterizes these firms.

Despite its size and global operations, Unilever develops product and marketing innovations in national subsidiaries. The products are developed for their respective markets, but, in many cases, these products become global brands. Unilever's strategy, dispersed R&D, is based on the idea that expertise on a given topic is concentrated in certain areas and that the advantage is to link that expertise via communication networks. Product development teams have the ability to access the expertise of other product teams while concentrating on specific tasks. This approach has produced global products such as Snuggle fabric softener which originated in the German market (Bartlett and Ghoshal 92).

#### LR-MARKET DIFFERENTIATION

The highly competitive nature of the local markets drive the firm to provide superior levels of service and product offerings.

Brown Boveri utilized their company network to take advantage of the technical expertise that resides in particular countries. Brown Boveri is highly decentralized. Most decision making is made at the local level with general direction originating at the headquarters level. This company used the concept of product teams and business units, coordinated through an information network, to divide their R&D activities over their European operations. For instance, Germany became the center for nuclear energy research, Switzerland for turbines and alternators, and France for electric motors. By coordinating these activities in each country, the firm was able to leverage their position with each individual government. This leverage gave the company the ability to move products across the respective borders. Adaptations of specific technologies or modifications to products were made for its own needs by each affiliate in national development centers. These modifications were carried out simultaneously in several national companies as required by the local customers. The management of the individual country company would have the discretion to import products and control the changes for the local market but the coordination of activities was left to the parent firm. These actions helped the company improve their expertise and product quality while allowing the reduction of expenses and improvement of customer service and satisfaction with tailored products (Doz 1985).

#### LR-BREADTH

The ability to provide comprehensive services and products to local markets provides local responsiveness firms with the ability to compete in a particular market niche.

The recent joint venture between NationsBank and Dean Witter Securities has produced a hybrid banking/securities firm designed to offer a diversity of services to the customers of both firms that were previously unavailable under either single entity. By anticipating the desires of the local market, Nations Securities will draw upon the resources of Dean Witter's electronic sales network and the customer database of NationsBank to provide a wide assortment of investment product and services to cater to specific market groups. The merger electronically links the banking offices with the investment services to provide services to customers unmatched by competitors in either area(8).

#### LR-CONSERVATIVE COST CONTROL

These firms seek unique product features and customer service that will differentiate them from their global competitors in their specific market(s) while utilizing technology to minimize costs and maximize service.

Nucor Steel, was the first of the specialty steel mills in the United States. The micro-mills use state of the art, computerized manufacturing plants to produce a specialty, high grade sheet steel. The combination of efficient operations and effective scheduling allows them to minimize costs while meeting particular requirements that are beyond the scope of traditional large steel producers. The success of these mills is due to the efficiencies of their state-of-the-art production facilities and computerized planning and control systems that afford them the flexibility to meet specific manufacturer' s requirements. Their lowcost based approach to steel production has given them the advantage in the domestic market where imports once dominated (Nucor Annual Statement 1991).

The discussion of the subgroups above demonstrates that the groups may not be very different when viewed with respect to Miller' s dimensions. Yet each group applies the dimensions toward different goals and objectives while placing varying weight on specific elements within each dimension, in essence tailoring the dimension to its precise requirements. The identification of which position a firm aspires for in the international market is of critical importance when IT applications are considered. The framework identifies the dimensions where IT applications can prove most beneficial. It should be recognized however, that IT can limit as well as facilitate strategy. For instance, a firm seeking comparative advantage will disperse its value chain activities. Unless that firm has the IT infrastructure to control and coordinate those activities then the venture will not prove beneficial and could in fact damage operations. Therefore, IT should be considered while the decision is being made as to the initial direction the firm seeks to pursue, and not relegated to a later stage of the decision process.

## IMPLICATIONS FOR RESEARCH

While the use of IT for competitive advantage has received much attention in the last 10 years, very few researchers explicitly consider competitiveness in a global context. However, it is such a context that is imminent for most larger corporations in the 21st century. It is imperative that IS researchers study global environments in which the role of IT is very critical. This study provides an early attempt to operationalize strategy for firms competing in such an environment. Anecdotal evidence is used to illustrate the application of IT to support the strategic components of the framework. While appropriate for this stage of research, future work must operationalize in a more rigorous sense, the various constructs implicit in this study. For instance, validation of the integrated framework as a comprehensive representation of strategic orientation needs to be preformed. Various functions and applications of IT need to be examined with respect to the framework in an attempt to identify consistent patterns of usage across differing strategic groups. The elusive notion of success, which was assumed in the examples illustrated, needs to be operationalized and examined within the context of the framework. Structural complexities that might inhibit certain "IT solutions" in global enterprises need to be identified.

While the descriptive work here highlights some important dimensions, it is only a first step toward deriving strong prescriptive guidelines for managers wishing to exploit the power of IT in a global context.

## SUMMARY AND CONCLUSIONS

This paper represents an exploratory examination of IT applications as they relate to a developed international strategic framework. Information is a vital element to the successful operation of international firms. With the growing trend in international trade, the understanding of IT applications as a facilitator of a firm' s strategy is a critical element to managers. The link between IT and international business strategy is one that can define the boundaries of the firm and facilitate its success or failure. The ability to coordinate and control the dispersed activities of these global firms is essential to the attainment of competitive advantage in the global marketplace.

The framework demonstrates how the "fit" between a firm's strategic decisions and IT applications can be used to attain competitive advantage in the international environment. The cases illustrate examples where firms tailored the "fit" of their environment, goals, and IT capabilities. To attain this competitive advantage the firm must identify the corporate strategy that best corresponds to their environment and objectives. During the development of the strategic plan, the firm should assess the level of their IT assets and develop an organizational information architecture. This information architecture serves as the blueprint within which IT applications can be effectively prioritized and integrated.

The practitioner should find the classification framework useful in planning and possibly for identifying potential IT opportunities. The ability to identify successful applications and extend them to IT systems that are closely tied to corporate strategy can provide the firm with "first mover" advantages and lead to a sustainable market position. In addition to the match between the corporation's strategy and the IT innovation, managers should examine their organization's structure, seeking a "fit" between the environment and the resources and objectives of the firm. For instance, a highly centralized firm would not be able to compete in a national responsive environment as well as a decentralized firm. The framework and examples provide managers with a guide and illustrations of successful applications. At the very least, the classification scheme provides a useful insight into the important dimensions of operations in the international environment.

The framework serves as a guide to explore the possibilities among the strategies and IT options. This guide does not suggest that the categories defined are mutually exclusive and that combinations of strategies can not be applied within the same firm. The international trade environment continues to grow more complex with the organizing of "regional" trade blocks, such as the European Community and the North American Free Trade Agreement. These blocks provide both pitfalls and opportunities for the astute business manager. The opportunity to expand operations into neighboring countries provide markets and cost advantages but the lack of sophisticated infrastructure for computing and telecommunications presents challenges as well. As global trade expands and the competition between firms increases, demands placed on managers will escalate and strategic planning and IT linkages will become increasingly important to the attainment of the corporate goals. This framework is but a starting point that can advance the understanding of IT's strategic link to the success and operations of international firms and their environment.

## ENDNOTES

1 There is considerable supporting research for these dimensions in the strategy, management, and international business literature (Doz, 1985; Porter, 1980; Bartlett and Ghoshal, 1989; Roth and Morrison, 1990)

2 For an indepth review of the process see Journal of International Business Studies, Fourth Quarter, 1990)

3 All examples do not fit exclusively into one unique dimension. In some cases, the example will represent multiple dimensions but is used to illustrate the dimension that it represents the best.

4 Personal interview with IBM management (April 1992).

5 The IBM and Liz Claiborne examples combine the dimensions of market differentiation and conservative cost control.

6 Varied customer desires, market conditions, and government regulations include some of the forces in

the operating environment.

7 The Benetton example also illustrates the use of conservative cost control by a Multifocal firm.

8 Personal interview with NationsBank management (October 1992).

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