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Form, Functions, and Financial Performance Realities for the Virtual Organization

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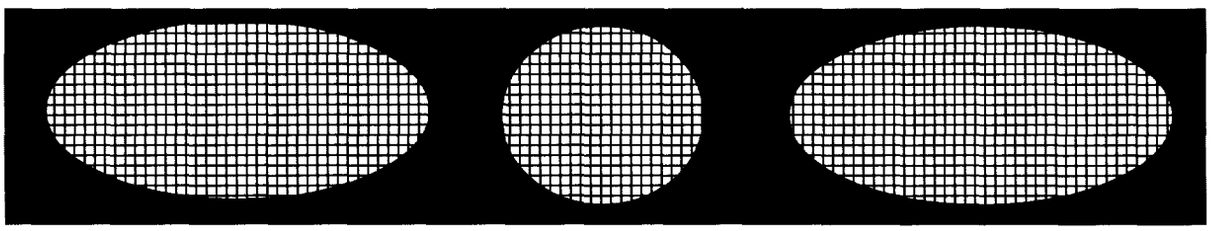

Introduction

Organizational theorists have argued that business firms of the 21st century will have to retool their organizational designs to be more competitive in the global marketplace. These new designs will have to balance a variety of control issues and requirements for strategic flexibility in global markets (Daft, 1991; 1994; Christie & Levary, 1998). The virtual organizational structure or design has often been cited as one capable of meeting these competitive contingencies (Bleecker, 1994; Davidow & Malone, 1992). This paper seeks to describe various forms of the virtual organization and discuss the implications that this structure has for enhancing the strategic flexibility, competitiveness, and cost efficiency of organizations.

Evolution, Form, and Functions of the Virtual Organization

The virtual corporation has been described as "a temporary network of independent companies, suppliers, customers, even erstwhile rivals -- linked by information technology to share skills, cost and access to one another's markets" (Byrne, 1993: 99). Virtual organizations attempt to create a network or coalition of suppliers, manufacturers, and administrative services to accomplish specific objectives. Once the objectives have been accomplished, this adhocracy of organizational and subcontracted relationships is dissolved (Christie & Levary, 1998; Galbraith, 1995). Thus, the virtual organization constitutes a natural outgrowth or evolution of both tapered and nonintegration strategies and network organizational structures.

Tapered integration, nonintegration, and control of the value chain

Harrigan (1984) has pinpointed control of the value chain as a salient objective of most organizations. As described by economists, the value chain generally has three components: raw materials acquisition, finished goods manufacturing, and distributors and customers (Porter, 1980, 1985; Fitzpatrick, 1997). Vertical integration strategies have been identified as a way organizations can more effectively control and manage their value chain activities. Harrigan (1984) points to four major types of vertical integration strategies: *(1) full vertical integration; (2) tapered integration; (3) quasi integration; and (4) nonintegration.* These strategies are differentiated by the means they use to control value chain activities. *Full vertical integration* seeks to control the value chain through direct corporate ownership of business units at each stage of the value chain. As value chain management becomes characterized by greater levels of specialization and geographical dispersion, this traditional form of vertical integration has become unwieldy (Townsend, DeMarie & Hendrickson, 1998). Therefore, other forms of this strategy have emerged to deal with this problem. *Quasi integration* seeks to control value chain activities through joint ventures with other firms or organizations. *Tapered integration* and *nonintegration* strategies assist organizations in enhancing strategic flexibility through the effective management of subcontractor and outsourcing relationships. In tapered integration strategies, the firm will have company-owned business units in two stages of the value chain and will subcontract activities

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related to the third stage of the value chain. An example would be where a firm owns a raw material fabrication and finished goods manufacturing facility but subcontracts its distribution activities to another corporation. Conversely, in nonintegration, firms subcontract business activities that comprise two stages of the value chain.

Harrigan (1984) proposes that tapered integration and nonintegration strategies provide organizations with numerous advantages relative to managing and controlling their value chain activities. In tapered strategies, firms may utilize subcontractors in value chain activities where these firms (a) possess diseconomies of scale associated with their wholly owned manufacturing activities; or (b) are desirous of maintaining technology superiority and quality in highly unstable environments. The ownership option might be recommended in situations where suppliers or distributors are unwilling to create product support networks needed to sustain new products (Harrigan, 1984). Thus, firms may enhance their competitiveness by subcontracting with other companies to take advantage of their lower production costs, state of the art technologies, or distribution infrastructures. Nonintegration strategies offer the advantage of making contracted suppliers, manufacturers, or distributors potentially captive satellites in the orbit of the nonintegrated firm by exploiting power or dependency relationships. Further, nonintegration permits firms to avoid the excessive fixed costs, asset inflexibility, and low liquidity commonly associated with full vertical integration strategies (Harrigan, 1984; Fitzpatrick, 1997).

Network structures and virtual organizations

Network organizational structures create an architecture by which nonintegration and tapered integration strategies may be managed and effectively implemented and the promise of virtual organizations may be realized. Daft (1991) visualizes the network structure as consisting of an organizational hub that links and coordinates the activities of a variety of global subcontractors or outsourcers. As noted by Dickerson (1998), the hub represents the irreducible core of the organization. For virtual organizations, the hub contains the basic functions necessary to allocate, coordinate, and manage subcontractor organizations and employees from the inception of raw materials to downstream distribution and customer service operations (Galbraith, 1995; Dickerson, 1998; Goldman, 1998). In these subcontracting arrangements, organizations outsource operations that can be performed more effectively by other firms or individuals, and outsourcers are frequently changed in order to provide the hub access to innovations or greater efficiencies (Galbraith, 1995). Management of these external affiliations is accomplished by creating serial or long-linked or reciprocating linkages between the hub and subcontractors.

Serial or long-linked relationships occur when the hub's primary mission is to coordinate the work process as it flows from one subcontractor to another. Therefore, in contrast to owning value chain activities, the hub serves as the principal coordinator of value-added activities between subcontractors. As demonstrated in figure 1, raw materials produced by one subcontractor are directly transferred to a finished goods manufacturing facility operated by another subcontractor. Finished goods are then transferred directly by the finished goods manufacturer to retailers, vendors, or distributors. The hub may also subcontract various staff support or administrative activities. These activities could include, but not be limited to, accounting, product design, marketing, and finance (Daft, 1994). IBM has partly used this structure by requiring its retailers to acquire components from raw material suppliers, assembly them into IBM PCs, and subsequently sell them to corporate customers (McWilliams, 1997). The Franklin Mint utilizes a similar serial/long linked process. This process differs from IBM's in one significant way. When the manufacturing subcontractor completes the finished products, they are shipped back to the hub for final distribution or sale to the customer. Control of these widespread and geographically dispersed activities is accomplished by linking subcontractors, virtual teams (of employees), and the hub through compatible information technologies. These technologies might include e-mail, computer and video teleconferencing, standard telecommunications, EDIs, shared data bases, shared and integrative CAD/CAM programs or systems, transaction processing systems, executive information systems, expert systems, decision support systems, group decision support, and computerized brainstorming systems (Townsend, DeMarie & Hendrickson, 1998; Eom, 1996). Hence, the

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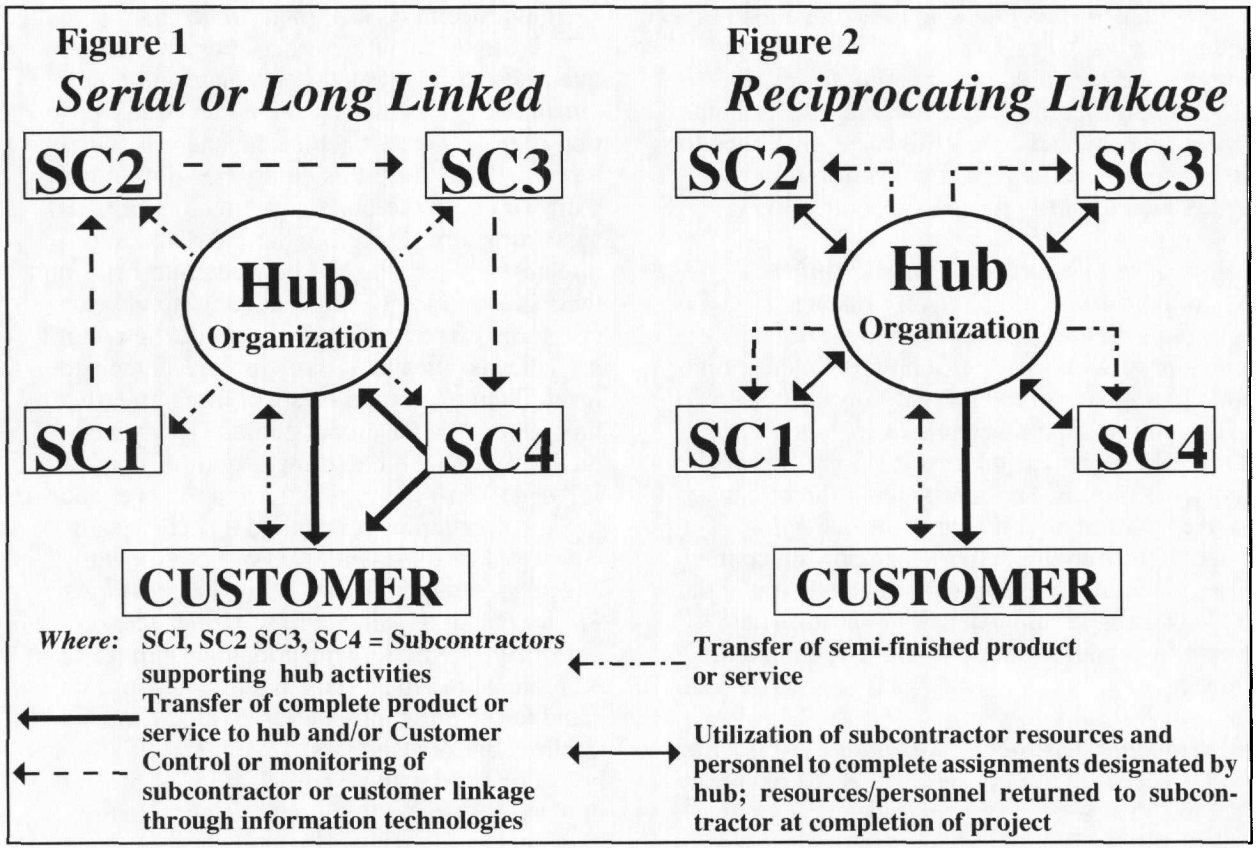
hub transforms or replaces its investment in bricks (*i.e. buildings, production facilities and other fixed assets*) with an investment in bytes (*information technologies*) (Goldman, 1998).

Figure 2 describes reciprocating linkages between hub organizations and their subcontractors. Reciprocating linkages between hub and subcontractors exhibit two distinct forms. The first is the traditional form of subcontracting where the hub is the direct recipient of various subcontractor outputs or activities. The hub coordinates the sequencing of these subcontractor activities or outputs and assumes the responsibility for compiling or combining them prior to final delivery to the customer. Motion picture production companies would typify this type of reciprocating linkage. The second form requires the hub to maintain a potentially large central facility. Subcontractors send their employees to the hub for purposes of performing or finalizing componentized work on various products or services required or sold by the firm. Upon completing their work at the hub, these employees return to their subcontractor organizations (Dickerson, 1998). General contractors in the construction industry and the subcontractors they employ would typify this type of reciprocating linkage. Like their serial or long-linked counterparts, reciprocating forms of the virtual organization rely heavily on the use of information technologies to coordinate and integrate subcontractor/hub activities.

Numerous advantages and disadvantages have been attributed to organizations that combine subcontracting or outsourcing with the extensive use of information technology. The use of information technologies permit hubs to leverage and integrate specialized knowledge, creative capabilities, and resources across subcontractors and outsourcers (Goldman, 1998). Thus, hub organizations gain strategic advantage through crafting more rapid and flexible changes in their product design, supply chain, and distribution management activities (Davidow & Malone, 1992; Chase & Garven, 1989). This use of an organizational hub to manage subcontractors and outsourcers serves to (a) enhance global competitiveness; (b) increase work force flexibility; (c) develop interorganizational synergies in key organizational functions; and (d) reduce administrative overhead (Daft, 1991; Christie & Levary, 1998; Bleecker, 1994). Both administrative overhead (variable costs) and fixed asset investment in



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hub-owned buildings, machinery and other capital-intensive technologies (i.e., fixed costs) can be minimized by using short-term rental or leasing agreements (Goldman, 1998) or by making them the responsibility of subcontractors (Fitzpatrick, 1997). However, these benefits may in part be offset by certain disadvantages associated with virtual organizations. Daft (1991) notes that organizations relying extensively on subcontracting and outsourcing frequently experience: (1) loss of hands-on control by the hub, (2) reduced organizational participation, and (3) weakened employee loyalty. Additionally, virtual organizations adopting the serial or long-linked or reciprocating formats may experience some significant situational disadvantages. Serial/long-linked forms may be forced to absorb significant transshipment costs as components, work-in-process, or semi-finished products are shipped between many subcontractors prior to completion. Reciprocating forms of subcontracting may also create significant competitive counterintelligence problems as subcontractors are permitted to develop unique insights into hub operations through frequent visitations and completion of work at hub locations (Nugent, 1992; Galbraith, 1995).

While firms may be able to achieve many generic advantages through use of the aforementioned serial or reciprocating forms or structures, specific efficiency and cost containment revenue and competitiveness outcomes for these forms are largely contingent on the methodologies used to manage subcontractors.

Managing subcontractor relationships

In their desire to effectively manage *tapered* or *nonintegration* strategies, virtual organizations have used many different techniques for integrating subcontractor and hub activities. These integrating mechanisms include (1) formal contractual linkages, (2) joint ownership, equity positions, and interlocking directorates, and (3) differential methods for managing global outsourcing activities among subcontractors. Each of these approaches has the potential for affecting organizational/hub cost containment, revenue, strategic flexibility, and control objectives.

Maximizing contractual advantage for the hub

Dickerson (1998) proposes that the degree of control that hubs have over subcontractors is a function of the size differential between the two parties. She recommends that in developing outsourcing relationships, hubs should attempt to use subcontractors possessing smaller sized operations. This permits the hub to maintain a stronger bargaining position in contract negotiations. This is evidenced by the ability of the larger hub to compel the smaller subcontractor to accept lower prices for goods and services, assume responsibility for R & D and product support activities and expenditures, invest in fixed assets, and accede to contract termination policies that favor the hub. With respect to this latter issue, the hub may more easily cancel contracts to switch to more technologically advanced or commercially beneficial suppliers for purposes of maximizing their competitive advantage. However, a potential disadvantage of this size-sensitive contracting is the failure to maintain affiliations that generate economies of scale in subcontractor activities and thereby lower overall costs for the hub. The emergence of this condition erodes one of the principal benefits or criteria for implementing tapered integration strategies (Harrigan, 1984).

Japanese interlocking directorates/joint raw material design teams

In a desire to control their value chain activities, Japanese manufacturing hubs have frequently sought to better coordinate and control outsourcing activities by taking an equity position in their subcontractors. Japanese manufacturers will then use this equity position to ease their way onto the boards of directors of their subcontractors. Therefore, an interlock2ing directorate is established between hub firms and their subcontractors. Hubs are able to (1) exercise more effective control over subcontractor activities by means of participating in their-top level planning committees; (2) more effectively link subcontractor output and delivery schedules to HUB manufacturing requirements (i.e. JIT or just-in-time production); and (3) encourage the creation of raw material design teams composed of representatives of both the hub and subcontractor (Kotler et al, 1985; Morgan & Morgan, 1991; Fitzpatrick, 1997). The purpose of these interorganizational design teams is to create raw materials that are custom fabricated to the hubs' production requirements and quality control standards. This latter activity has helped many Japanese firms avoid significant downstream transformational, quality control,

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and customer service expenses typically associated with the use of generic raw materials acquired through suppliers (Fitzpatrick, 1997); Morgan & Morgan, 1991). Many American firms, such as IBM, Ford, and DEC, have recently attempted to use these techniques to achieve similar benefits (Kelly, Port, Treece, DeGeorge & Schiller, 1992).

Differential effectiveness of traditional global outsourcing and KANBAN clustering

• *Global outsourcing*

Many major corporations have sought to gain access to technological innovations and achieve economies in their supply chain through the implementation of a global outsourcing policy. General Motors has adopted a raw material procurement policy of seeking out the cheapest source among global suppliers. Contracts with these vendors are often short term, and GM frequently changes subcontractors to secure the cheapest source of raw materials. (Kerwin, Treece, Peterson, Armstrong & Miller, 1992). Short-term contracts with raw material vendors also permit global outsourcers to take advantage of emergent technological innovations by frequently switching suppliers (Harrigan, 1984). The Ford 2000 strategy attempts to achieve lower costs in raw material acquisition by limiting their purchases of raw materials to a smaller number of worldwide suppliers or subcontractors. This permits these suppliers or subcontractors to increase production volume, generate experience curve benefits, and subsequently pass along these cost savings to Ford in terms of lower prices or quantity discounts (Kerwin, Treece, Peterson, Armstrong & Miller, 1992; Treece, Kerwin & Dawley, 1995; Fitzpatrick, 1997). While this type of strategy may permit manufacturers to secure lower-priced raw materials at the point of their creation, they must still absorb significant transshipment costs in transporting these materials to finished goods manufacturing facilities located at the hub. The more geographically dispersed these supplier operations are from hub facilities, the more raw material acquisition costs are inflated by transshipment expenses.

• *KANBAN clusters*

Japanese manufacturers have developed an alternative to traditional raw material outsourcing relationships with subcontractors. This relationship is called the KANBAN. The objective of the KANBAN is to reduce both transshipment costs and facilitate the creation of JIT production scheduling (Kotler et al, 1985; Morgan & Morgan, 1991). The KANBAN concept is based on both the continuity and close geographical proximity of the supplier or manufacturing hub relationship. Japanese manufacturers require their suppliers to locate in geographical proximity to their principal manufacturing facilities. Therefore, a manufacturing firm will have clusters of principal suppliers concentrated around their production facilities in the same industrial park (Kotler et al, 1985). This practice has been implemented by manufacturers in both Japan and other areas of the world where they have located their manufacturing facilities to take advantage of lower variable operating costs (Morgan & Morgan, 1991). This system permits these hub companies to experience cost benefits commonly associated with JIT. Since raw materials are transported over shorter distances, manufacturing hubs do not need to maintain significant raw material inventories to buffer the firm against lengthy transshipment intervals or delays. Thus, shipping and inventory carrying costs are reduced, and hub facilities do not have to construct warehouses to store safety stocks of raw materials. This latter factor permits hubs to avoid significant expenditures on fixed assets and permits them to lower their fixed costs.

• *Dell Computer vs. Compaq Computer*

The relative effectiveness of KANBAN clusters and traditional global outsourcing policies can be observed by comparing the subcontracting or raw material acquisition policies and cost structures of Dell and Compaq Computer corporations during 1997. Compaq uses a global outsourcing policy similar to Ford and General Motors. Computer components are purchased from suppliers and subcontractors worldwide to take advantage of local efficiencies and variable cost advantages. In contrast, Dell Computer has emulated the Japanese KABAN system. Dell insists that all its suppliers warehouse the bulk of Dell-required components in facilities located within 15 minutes of a Dell factory. Dell assists its suppliers in streamlining their component inventories by having their customer service representatives suggest or market standard system configurations to

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buyers. Therefore, suppliers are able to reduce the number and variety of components they warehouse. Dell does not request raw material from these subcontractors or suppliers until an order for a computer is placed and paid for by a customer. This latter purchasing policy and the close proximity of suppliers permits Dell to develop a JIT production scheduling system. JIT, the avoidance of retail vendors in its value chain, and the marketing of standard system configurations permit Dell to avoid maintaining extensive inventories of finished goods (McWilliams, 1997). Since safety stocks of inventory are not needed, inventory carrying costs (i.e. additional variable costs) and the need for Dell-operated raw material storage facilities (i.e., additional fixed costs) are avoided. The proximity of suppliers also reduces their raw material shipping expenses and subsequently lowers raw material prices to Dell. Therefore, Dell's overall cost structure and break-even point are lowered. Dell estimates that the cost benefits attributable to the use of JIT and KANBAN clusters permits them to undercut competitor prices for finished computers by 10% to 15% (McWilliams, 1997; Forest, Arnst & Rebello, 1993).

Additionally, the proximity of suppliers or subcontractors in KANBAN clusters permit Dell to benefit from the rapid reduction in raw material prices attributable to the technological aging process (McWilliams, 1997). Technological aging refers to the tendency for existing technologies to have relatively short life cycles before they are supplanted by more innovative technologies. Therefore, at market introduction, a technology will command its highest price. However, this price erodes as consumers await the introduction of more innovative products or advanced technologies. Firms such as IBM and Compaq, which use geographically dispersed supplier networks, must purchase raw materials from suppliers/subcontractors weeks in advance of their use in hub factories, because of lengthy transport times between supplier and hub factory locations. For companies like Dell, KABAN clusters permit them to order materials and components within hours of product assembly. Such components are on average 60 days newer and are obtained at a lower market price. Dell has estimated that their ability to secure raw materials later in the technological aging process permits them to achieve a 6% differential profit advantage based upon cheaper raw material prices (McWilliams, 1997).

Electronic Commerce and the Electronic Linking of Value Chain Activities

In a recent marketing survey, 46.7% of U.S. companies reported that they plan to purchase and install e-commerce systems to facilitate commercial activities ranging from internal procurement and supply chain management to Web-based selling activities (James, 1999; Borck, 1999). Increasingly, the trend has been for the control of e-commerce networks among value chain partners to become centralized at hub locations. This centralization of control over the e-commerce linkage is largely attributable to the hub's capability for more effectively dealing with network outages, safeguarding customer data, handling security breaches, and providing product information or pricing updates (Borck, 1999). In dealing with supply and distribution stages of the value chain, hub-managed e-commerce links have been found to permit (1) the more effective targeting of suppliers possessing raw materials better designed or configured to production requirements; (2) the exploitation of core competencies associated with traditional *storefront* operations in order to target new market niches; and (3) the reduction of operating expenses through more efficient use of human resources (Preston, 1999; Holt, 1999; McWilliams, 1997).

Holt (1999) notes that firms in the forest products, metals, and textile industries have used e-commerce systems to streamline relationships with principal suppliers. A variety of e-commerce systems have permitted these types of manufacturing hubs to better specify the product characteristics and engineering standards of their raw materials. This allows them to more rapidly locate needed materials among their network of suppliers (Holt, 1999) and reduce the potential requirement to transform generic raw materials to match their production processes (Fitzpatrick, 1997; Morgan & Morgan, 1991). This latter contingency has significant implications for reducing raw material transformation costs among hub manufacturers.

Walgreen found that its core business (retail pharmaceutical sales) was threatened by a variety of Internet startups and retail pharmaceutical companies that had moved to capture the Web-based prescription market through aggressive acquisition strategies (Preston, 1999). To counter this competitive threat,

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Walgreen used information technologies to link its customer prescription and insurance data bases with Web-based customers to "extend and enhance a key brick and mortar competitive advantage" (Preston, 1999: 7) commonly associated with traditional retailing operations. In the insurance industry, successful hubs have found that exploitation of e-commerce requires them to organize Web-based sites and product offerings to serve specific market niches (Hoffman, 1999). The use of focusing or niche strategies permits hubs to enter new markets at lower cost compared with firms competing across large numbers of market segments (Porter, 1980; Hofer & Schendel, 1978; Fitzpatrick, 1997). In establishing e-commerce links to serve these smaller markets, hubs are able to substitute technologies for substantial investments in fixed assets (e.g., buildings, storefront operations) and organizational personnel. This substitution of "bytes for bricks" significantly reduces both the variable and fixed costs of these e-commerce hubs (Goldman, 1998) and thereby lowers their break-even point. According to the Giga Information Group, the use of e-commerce by hubs resulted in approximately $15.2 billion in cost savings during 1998 (Anonymous, 1999).

Once again, Dell represents an excellent example of how-e-commerce can be used to reduce costs and expand profits through the streamlining of business processes and sales channels. E-commerce has permitted Dell to reduce their number of telephone sales representatives from 700 to 30 (a considerable savings in administrative overhead and variable costs). Electronic commerce has also been used to replace retail vendors in Dell's value chain. The elimination of vendors and direct sellers has permitted them to improve accounts receivable turnover compared with Compaq. Compaq, which relies on value-added retailers as part of their distribution channel, takes 35 days to convert an actual computer sale to cash. Since sales through Internet or e-commerce tap credit cards immediately, Dell is able to convert sales to cash in less than 24 hours (McWilliams, 1997).

Conclusions and Managerial Implications

Virtual organizations have been heralded as form that can assist firms in meeting the competitive challenges and complexities of the 21st century. This paper has documented that the specific cost, financial performance, and strategic flexibility that derive from these types of organizations are in large part due to two factors: the specific type of outsourcing or subcontractor methodology selected by hub organizations, and the effectiveness of the hub's management of this relationship. However, the ability of managers to create, administer, and effectively exploit various types of hub outsourcer relationships may be contingent on the strategic objectives, core competencies, strategic constraints, and resources possessed by their existing hub enterprise. For example, many organizational hubs are joining the competitive stampede to exploit the projected cost and revenue bonanza offered by e-commerce. Often, e-commerce is viewed as a competitive opportunity to enter new markets with limited resources, assets, and costs (Hoffman, 1999; Goldman, 1998). Nevertheless, a recent survey by Jupiter Communications suggests that unless Web-based marketing efforts are carefully focused on newly emerging market segments, e-commerce might cannibalize sales of existing retailing activities (Woods, 1999). With an improperly focused strategy, firms may at best be protecting their existing market share and revenue base. Additionally, the survey suggests that this market share maintenance strategy may be possible only if the e-commerce retailer can maximize the competitive advantages of its existing core competencies. These core competencies consist of "offline assets, which include an existing customer base, a trusted brand name, customer data, and a sales and distribution infrastructure" (Woods, 1999: 12).

Competitive strategies, goal priorities, and organizational size may also constrain a firm's ability to exploit the competitive benefits of some types of virtual organizational structures. As noted, KABAN clusters offer firms unique advantages in minimizing shipping time and transshipment costs from their suppliers. This form of the virtual organization also enables firms to lower costs due to the technological aging processes associated with raw materials. However, not all firms may be in a position to exploit these competitive advantages. For instance, suppliers may be unwilling to locate raw material warehouses close to manufacturing hubs unless these hubs are willing to guarantee large volume and sustained purchasing. This might preclude smaller-sized hubs from initiat-

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ing a KANBAN cluster-type of virtual organizational structure. Additionally, locking a manufacturing hub into a long-term relationship with a single raw material supplier may inhibit the hub from rapidly changing vendors to take advantage of technological innovations available through other firms (Harrigan, 1984). These contingencies have profound implications for the type of competitive strategy that hubs may be able to implement. High-volume purchasing from single-source KANBAN clustered suppliers may enable hubs to implement cost structures commensurate with *overall cost leadership* strategies. However, forgoing the opportunity to exploit technological innovations through global outsourcing may preclude their ability to effectively implement *differentiation* strategies (Porter, 1980; 1985).

Therefore, prior to finalizing a design for the virtual organization, managers should (1) clearly delineate their definition of target markets and the firm's overall business strategy; (2) prioritize their strategic performance goals/objectives; and (3) select a structure capable of meeting these market and strategic parameters. Thus, in the 21st century, one of the guiding principles of contingency theory still remains viable: *The selection of a specific form of organizational structure should be contingent upon its strategy* (Chandler, 1962).

Dr. Fitzpatrick's teaching, management consulting, and publishing are in the areas of strategic planning and decision-making, competitive intelligence systems, organizational design, and general management. Dr. Burke's interests and teaching lie in strategic and general management.

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