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An e-Commerce Systems Integration Framework

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E-Commerce is deploying computer and communications technologies to support an organization's sales process (Capozzoli, True, & Pritchett, 2000). It can be dichotomized as Business to Consumer (B2C) and Business to Business (B2B), is increasing at a rapid rate, and is expected to continue although estimates vary substantially. For example, Marketer.com (2001) estimates that B2C activity will grow from $60 billion in 2000 to $428 billion in 2005, and Goldman Sachs (Marketer.com, 2001) is estimating $2.1 trillion for the same period. In 2000, worldwide B2B Internet commerce surpassed $433 billion. That total is projected to reach $919 billion in 2001 and $8.5 trillion by 2005 (Gartner Corporation, 2001). The requirement of systems integration is being driven by this growth.

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The success of E-Commerce activity is directly affected by system integration efforts associated with traditional back office and web-based systems. The potential benefits of enterprise-wide E-Commerce activities (e.g., customer relationship, inventory, and process management) to an organization emphasize the need for system integration beyond individual sales transactions. Indeed, the range of business processes that represent a more complex and dynamic business arrangement in which advancing technologies should be effectively integrated into the planning process is broad. Unfortunately, many organizations are not capitalizing on the synergistic advantages of integrated systems (Maruca, 1999). Fewer than one-third of Internet retailers have integrated their back office inventory databases with their front-end web systems (Spieler, 2001). Despite the apparent lack of integration, some organizations are attempting to coordinate such customer activities. Wal-Mart has established a goods returns policy that allows a customer the option to return merchandise purchased on-line to any Wal-Mart store (Wal-Mart, 2001).

Planning for and integrating E-Commerce technologies are essential to an organization's survival. The success of a strategy depends on doing many things well and integrating those activities (Porter, 1996). According to Mintzberg (1994), an organization must do three things better than the competition: it must know itself, have robust business systems, and have both an internal and external focus. Following these guidelines is made more difficult by a rapidly changing and advancing technological environment. E-Commerce capabilities have enabled both buyers and sellers of products to obtain more and better information faster. This shifting of the

channel power structure is creating chaos in traditional business processes and in the development and maintenance of internal (e.g., employee) and external (e.g., customer and supplier) relationships. The goals of these systems are to improve financial performance and to create and sustain competitive advantages. Thus, organizations need to better understand the system as a whole. One means of accomplishing this is via planned periodic reviews of E-Commerce activities as they relate to existing business processes and systems.

Capozzoli, True, and Pritchett (2000) set forth an initial framework for describing the relationship between E-Commerce activity and systems integration that is categorized in five levels. A Level-1 company makes little or no use of computers and/or communications technology, and a Level-5 firm makes extensive, cutting-edge use of these tools (see Figure 1). The purpose of this paper is to further develop this framework for positioning organizational business processes and technological capabilities consistent with Mintzberg's and Porter's guidelines.

Framework Discussion

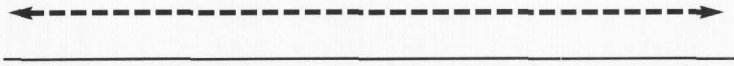
E-Commerce activities, both B2C and B2B, can address different requirements and must be identified, managed, and measured as such. Understanding these distinctions is crucial because they can influence system integration requirements, but current measurement indicators are incomplete and may give erroneous and unreliable output. Some activities that could be measured include on-line transactions (both dollar value and number of transactions), sales calls precipitated from on-line browsing, and web-site traffic. Organizations must also develop metrics that will accurately reflect how to measure progress toward the strategic goals of these activities.

E-Commerce technology is in a state of rapid change, and the velocity of this change cannot and should not be underestimated. New ways of doing business will reshape the business processes an organization utilizes and, when properly deployed, the potential for cost savings and increased revenues can be substantial. For example, technology and information system deployment has the potential to save as much as $30 billion on inventories in the packaged goods/supermarket industries (McAlister, 1994). Companies that have moved aggressively into B2B E-Commerce report cost savings on materials of up to 15 percent. Reported transaction cost savings alone, in the purchase and ownership of indirect materials, could reach almost 65 percent as buyers' internal purchasing and recordkeeping processes are simplified (Boston Consulting Group, 1999).

Not all technology will succeed in supporting strategic goals. Management must be vigilant in its search for competitive advantage through the use of information systems. At a macro level, most sales processes appear to share similar characteristics. However, at the micro level, an organization must shape the sales process to meet customer expectations and, as a consequence, each sales process will possess unique characteritics. The details of how business processes are performed and what technology is deployed to support those processes are best described as a part of the framework.

Level-1 organizations are characterized by simple business process requirements. They poorly utilize computer or communications technology and have an internal focus that is not integrated. Customer contact is handled via salesperson calls, telephone contact, mailings, and fax. Product, service, and promotional literature are usually

FIGURE 1
E-COMMERCE FRAMEWORK



Level 1	Level 2	Level 3	Level 4	Level 5
Low to no usage of E-Commerce technology				Strongly Developed E-Commerce technology

in hardcopy only. Information systems to support sales and marketing activities are typically non-existent. Back-Office-Systems (BOS) such as accounting, production, sales processing, and customer information, if they exist at all, are not integrated. While these types of organizations are at a disadvantage by not utilizing technology, the advantage is that they can easily change business processes and are not limited by legacy systems.

Level-2 organizations can also be characterized by simple business process requirements; however, they have begun to integrate computer and communications technology. The process is still internally focused, but the organization begins to see the benefit of integrating part or all of its internal systems. Customer contact via phone is enhanced through on-line systems. These on-line systems are more supportive of critical business processes. The integrated systems support order-taking, order-tracking, customer information, and more extensive marketing and sales reporting. These types of organizations are also at a disadvantage because they do not fully leverage technology investments. The advantage is that with a minimal investment, they can realize benefits in the form of improved business process support and systems integration. Also, they have overcome the first hurdle of change management by taking the first step.

Level-3 organizations are characterized by moderately complex, business process requirements and continue to integrate computer and communications technology. The organization also begins to incorporate an external focus in systems development and customer support. Internal systems become tightly integrated and introduce improved levels of customer support by coupling sales, inventory, production, and customer information. Externally focused systems are deployed. Systems such as Electronic Data Interchange (EDI) and web-based company information are developed to increase efficiency. EDI is deployed to support B2B activity. Web-based systems are primarily used as an information-mart and begin to replace hardcopy as a means to convey product and service information. Email is used to support and improve internal and external communication. The advantages are that these organizations begin to benefit from systems integration via improved customer relationships, sales force and inventory management, as well as increased customer access to company/product information. However, commitments in terms of manpower and capital to continue to support existing and future systems increase. In addition, process and technological changes begin to increase in complexity, at a higher cost of time and money.

Level-4 organizations are characterized by complex business process requirements and the introduction of web-based technologies. This level continues to see expansion of externally focused systems on the web. These web-based systems increase in capability from being an information-mart to include sales order processing. The web storefront has been created, but remains a stand-alone system that is not integrated with the organization's internally focused information systems. The advantages are that these organizations continue to benefit even more from systems integration through improved customer relationships, sales force and inventory management, and customer access to company/product information. The addition of the web as a more automated retail channel allows for better customer service and the potential for increased sales from a larger market-base. Still, similar to a Level-3 organization, the system continues to grow in complexity. The difficulty in creating a truly integrated system that is effective increases because legacy based back-office and new web-based front-end systems are operating in parallel. To provide a linkage between these two inherently incompatible systems, expensive and hard-to-maintain interfaces must be developed.

Level-5 organizations are characterized by very complex and exhaustive business process requirements. They have utilized a wide array of computer and communications technology to develop a highly integrated system that encompasses business process requirements for both internal and external information uses. The advantages of this level are that it is one seamless, holistic system, and the organization recognizes the need for internal and external query and reporting requirements through a seamless flow of information. Customer support is improved by permitting access to internal information such as order status, inventory avail-

ability, customer sales history, and accounting information. Return on the system technology and process investment can now be maximized. However, it requires extensive commitment from the entire organization to operate and maintain. Changes in the system to accommodate internal (e.g., business strategies and resource allocation) and external (e.g., customer demands and competitive actions) business needs will require significant investigation and analysis of direct and indirect effects on the system's components, as well as extensive planning for change management and organizational design.

A summary of the associated relationships between business process support and system integration for each of the framework levels is presented in Table 1. It should be noted that further advances in technology might necessitate a redefinition of the levels.

Conclusion

As an organization progresses from one level to the next, increasing amounts of capital and human resources, better business processes, advanced technological capabilities, and strategic expertise are required. Not all organizations are able to meet the requirements to pursue a Level-5 status. Some organizations will be more motivated than others to employ E-Commerce, depending on the nature of their industries (i.e., competitors' strategies and market demands); thus, the commitment to E-Commerce may be a reaction to external forces as much as internal strategies. Nevertheless, the choice to integrate or not to integrate is not a binary one (Gulati & Garino, 2000). Without integrated systems, business processes operate in a sub-optimum manner. Different companies will need to follow very different paths in deciding how closely or loosely to integrate their Internet initiatives with traditional operations, keeping in mind that systems integration is a long-term objective. In the E-Commerce world, the payback of system development is based on strategy not just on return on investment (Knill, 2000).

A company that becomes satisfied with its position in the marketplace and ceases to invest in new technology might find itself behind competitors who succeed in updating, adapting, and integrating new technological advancements. New technologies must be incorporated into systems to sustain competitive advantage. Certainly, a company can regress to a lower level if it does not continuously address changes in its business processes and integrative links with emerging technologies.

Future Direction

The goal of this paper was to extend an existing E-Commerce framework by providing a uniform way of assessing an organization's state of systems integration, of conducting research, and for reporting findings. Further development of a framework will allow better assessment of what level of systems integration is appropriate for an individual organization. Without further development, industry benchmarking for strategic direction and the comparison of research results will continue to be difficult.

Future research in the area of E-Commerce should continue to focus on integrated systems via specific business process components, both internal (e.g., employee portals) and external (e.g., channels of distribution). The framework should be applicable across organizational types and business processes. More thorough evaluations of the framework should also aim to develop quantifiable metrics and proactive management strategies.

TABLE 1
AN E-COMMERCE SYSTEMS INTEGRATION FRAMEWORK

			Low to no usage of E-Commerce technology			Strongly Developed E-Commerce technology	
			Level 1	Level 2	Level 3	Level 4	Level 5
			←				→
	PROCESS SUPPORT		Sales Visit Phone Contact Fax Hard copy literature	On-line order system Customer database	Web-based literature Sales and production systems are integrated (EDI)	Web-based sales	Customer initiated queries supported for sales history and product availability
TECHNOLOGY USAGE	INTERNAL FOCUS		No BOS integration	Some BOS integration	BOS integrated with other internal systems Begin to utilize externally focused systems	Web system not integrated with BOS	Web system integrated with BOS
	EXTERNAL FOCUS		Non-existent	Non-existent	EDI Web-based company information	Web storefront	Customer interacts with internal systems via Web
			Systems Integration →				

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