

Trends and Future Directions of Net-Enabled Connectivity



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INTRODUCTION

In a global economy, organizations need to collaborate with other organizations because physical networks of suppliers and partners compete against one another rather than individual organizations. To enable more effective and efficient physical networks, organizations are using information and communications technologies (ICTs) to connect mutually dependent activities and tasks. Connected organizations may attain greater insight into the availability of critical resources, improved ability to respond quickly to events affecting the organization, and greater awareness of the variation between plans and actual results.

This contribution discusses electronic connectivity among organizations and establishes the benefits that are available to organizations that embrace connectivity. The contribution shows the evolution of connectivity from inter-organizational systems (IOSs) to Web-enabled systems. Web-enabled connectivity can include linkages at process, system, business function, and/or organization levels. The linkages can be within as well as between organizations. However, at an organizational or business level, connectivity is really about the development of certain competencies and capabilities (e.g., access and use of previously unavailable data and information) that allow organizations to compete successfully. Consequently, this contribution focuses on competencies. In addition, this contribution provides one connectivity model that depicts several competency-based connectivity components, discusses their inter-relationships, and furnishes several prominent antecedents. The model also includes the benefits derived from connectivity. Although the concept of connectivity is broad, this contribution uses an Internet-enabled supply chain to explain important connectivity concepts and demonstrate their relevance.

BACKGROUND

The Emergence of Net-Enabled Organizations

Early examples of IOSs include electronic integration in the insurance industry (Zaheer & Venkatraman, 1994) and electronic data interchange (EDI). Early IOSs used proprietary systems and enabled limited collaboration, which provided economies of scale, cost sharing, access to complementary resources, and opportunities to pool and spread risk. However, early IOSs often required extensive negotiations on specifications and cost, as well as coordinated efforts to ensure consistency of the aggregated data (Lee & Whang, 2000). Early on, proactive organizations saw the benefits of IOSs and automated numerous business transactions via EDI systems. These organizations successfully integrated their systems with in-house systems and/or with the assistance of third-party providers (e.g., MCI) that offered large proprietary networks, relieving organizations of the need to develop their own in-house systems. The resulting EDI applications allowed companies to take advantage of the synergies available through linking parts of their information systems and coordinating common processes.

With the emergence of the Internet and the World Wide Web (WWW), most organizations have moved existing IOSs to Web-based platforms and have created new IOSs (e.g., e-procurement systems) that connect, or link, organizations in new and novel ways. Their heavy reliance on Internet-based technology has resulted in two new acronyms: Net-enhanced organizations (NEO) and Net-enabled systems (NES). NEO and NES represent organizations' use of the Internet to develop systems that enable and enhance positive changes in organizational processes (Straub et al., 2002). The

Internet can greatly improve an organization's internal and external communication capabilities because it relies on common communication and programming standards, making newly developed IOSs more effective and efficient. The fact that the Internet is a public, pervasive, digital network allows organizations to scale their IOSs more gracefully. As a result, the Internet has emerged as the most popular way to electronically link trading partners and coordinate mutual activities, and it offers an attractive alternative to conventional, proprietary EDI systems. More recent advances in information and communications technologies (e.g., Web services, which are software components that permit the processing of transactions by dissimilar platforms) have further increased the availability of electronic mechanisms for connecting organizations.

Net-Enabled Business Transformation

The increase in the means to electronically link organizations has resulted in organizational transformation. The transformation manifests itself as new products and services (e.g., e-retailing), new organizational structures (e.g., flatter organizations with employees taking on more sophisticated roles and responsibilities), and even new organizational arrangements (e.g., virtual organizations in which suppliers have more responsibility for making and/or delivering products and services).

With regard to new services and organizational structures, when Charles Schwab entered the online brokerage business, the company modified its customer value chain, providing ample content and services to help customers select and purchase investment products. Additionally, to rationalize its online business with its traditional brick-and-mortar business, Schwab changed the roles, responsibilities, and compensation system for its existing sales force.

Concerning virtual organizations, Internet-based technologies allow companies to establish effective and efficient electronic connections with their supply chain partners to share important data and information that coordinate dependent activities for producing and delivering products and services. Internet-enabled systems that allow organizations to share data and information about downstream demand can reduce the "bullwhip effect," which causes huge swings in orders and inventory, at upstream supplier locations, as demand varies (Lee & Whang, 2000). It is now

recognized that changing supply chain structure and appealing to high-speed, low cost communication for sharing data and information are critical to reducing the bullwhip effect (Donovan, 2002). Other researchers (e.g., Lee, 2002) specifically recommend the use of the Internet to facilitate data and information sharing, tight coordination, and collaborative replenishment.

The Internet is playing a central role in supply chain activities as organizations build and use Internet-enabled systems. For example, some systems support an information hub, a third-party information system that collects and maintains data about an entire supply chain and, via the application, coordinates various supply chain activities, including inventory management and financing (Lee & Whang, 2000). Other systems support an information network, which permits access to all data from all organizations in the network, converts this data into some form of business intelligence (e.g., historical demand at downstream locations), and produces insight for achieving cost-saving and/or revenue generation opportunities (Cavinato, 2002).

Although academicians and practitioners have spent considerable time on understanding how to improve inter-organizational connections and earn the associated benefits; to date, much of the work has been fragmented in nature, focusing on the details of work flow processing and aspects of information sharing and trust between organizations per se. Recent efforts focus on Net-enabled business transformation (NBT), which involves converting all activities and communications to electronic exchanges through redesigned processes and incentives to enable both physical and electronic connections with trading partners (Straub & Watson, 2001). Rather than directly tying IT investments to benefits, researchers are examining how IT resources can lead to improved process capabilities that, in turn, can be leveraged to gain significant benefits for the organization (Sambamurthy et al., 2003).

Another study provides a model, containing several related resource-based constructs, or factors, including technological (e.g., system integration), organizational (e.g., process alignment), and environmental (i.e., partner readiness) resources, to suggest the positive impact of NBT on financial performance (Barua et al., 2004). According to the model, effective use of these resources leads to online information capability (OIC), the ability of organizations to exchange information on demand with their partners. OIC, in turn, increases the digitization level, the extent to which organizations are

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