Differential Diffusion of Information Systems Technology in Multinational Enterprises: A Research Model

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Recorded evidence suggests that information systems technology (IST) can be harnessed at least at a national level to create favorable market asymmetries leading to competitive advantage for the firm. Diffusion of IST over worldwide divisions of a multinational enterprise (MNE) and its ramifications, however, pose a more complex scenario. Economic analyses have been shown to be insufficient to explain why and how diffusion of technology occurs in MNEs. Cultural and political factors at both the organizational and societal (national/regional) levels also influence the diffusion process. Is IST a viable competitive weapon in a worldwide market setting? How diverse are the IST needs of the units of an MNE? Is uniform diffusion of IST across the board a necessary condition for the smooth operation and success of an MNE? How does IST diffuse within an MNE? What are the contingent factors that contribute to the differential rate of diffusion of IST across the units of an MNE? This paper proposes a research model to address these questions.

United States - 1989: A multinational oil company (MNO) employs state of the art information systems technology (IST) (e.g., multi-tier multi-vendor database management systems to support transaction processing and decision support activities simultaneously; 4GL-based information centers for end-user computing support; knowledge systems technology solving real problems; telecommunication for distributed data; distributed processing; and management/office information exchange via electronic mail) to support/integrate various corporate functions. The functional managers, especially at the tactical and operational levels, are not only computer literate but also ‘Technology-enabled.’

Singapore - 1989: As a small nation in Southeast Asia with a vibrant global economic climate, Singapore is regarded as a leader in the adoption and adaptation of state of the art technology in the region. The Singapore division of the MNO described above has an international workforce under the administrative umbrella of the world corporate headquarters and staffed by managers and executives trained and experienced in the United States. It serves the vast territory of Southeast Asia supported by IST (especially software) of the 1970s (e.g., conventional file management systems rather than database technology, little or no end-user computing activities, predominantly transaction processing ori-
ent and limited data communication activities) and is talking about consolidating its present information systems (IS) operating environment before embarking on the use of more sophisticated IST.

How can this be explained? How diverse are the IST needs of the units of a multinational enterprise (MNE)? Is uniform diffusion of IST across the board a necessary condition for the smooth operation and success of an MNE? How does IST diffuse within an MNE? What are the contingent factors that contribute to the differential rate of diffusion of IST across the units of an MNE?

Multinational organizations face a unique management environment in which issues concerning effective transfer of technology are central to the success of their mission [Keller and Chinta, 1990]. While economic factors that affect transnational transfer of technology have received substantial research attention [e.g., Marton, 1986], economic analyses have often failed to explain why certain technological transactions expected to succeed, indeed fail and why those that ought to fail, do succeed [Kedia and Bhagat 1988]. Few, if any, theoretical and empirical analyses on the constraining influences of cultural factors (both at the organizational and societal levels) involved in such transactions have been conducted so far. The role of political factors (again, organizational and societal) in mediating/moderating transfer of technology has also received little, if any, research consideration.

The objective of this paper is to examine the diffusion of information systems technology (IST) in the multinational divisions of firms. The research focuses on two crucial contemporary phenomena relevant to the business and the academic communities, namely, global competitive operation, a business reality in the 1990s and information systems technology (IST), the nucleus of the information age. Prior research suggests that IST has been successfully deployed, mostly in the United States, to create and sustain, for a reasonable length of time, favorable product/market asymmetries so that firms reap significant competitive advantage (e.g., Parsons 1983; Ives and Learmonth 1984; Cash, McFarlan, and McKenney 1988). Examples of such success stories include: the SABRE reservation system of American Airlines, CMA system of Merrill Lynch, ASAP order entry system of American Hospital Supplies, and the ATM network of Citicorp. Global markets, however, create unique problems and opportunities, and the competencies enabled by IST in this environment require scientific study. In addition, diffusion of IST over worldwide divisions of an MNE and its ramifications pose a more complex scenario than a similar task within the national subsidiaries of a corporation. In fact, the complexity of this problem is not yet well understood. Raho, Belohlav and Fiedler [1987, p. 49] assert that the ‘‘... challenge is learning to adapt new technologies in the quickest, most efficient manner in order to outpace actual and potential competitors.’’ In other words, what is critically needed is a proactive approach to harness the factors that impact diffusion of IST in the global scene so that prescriptions to formulate strategies and deploy resources for coping with and capitalizing on the diffusion of IST can be made. As a first step towards this goal, we propose a conceptual framework aimed at explaining and assessing the extent of differential rates of diffusion of IST in a multinational business enterprise.

The remainder of this paper is organized as follows. The next sections present the research model, discuss the research variables and the proposed relationships among them, and finally, implications and directions for future research are suggested.

**Background**

The focus of this research is at the confluence of three elements: Information Systems Technology (IST), Multinational Enterprises (MNEs), and Diffusion. These elements are discussed in the following sections, respectively.

**Information Systems Technology**

The thrust of this research is on information systems. This includes computing hardware/software configurations, teleprocessing (e.g., local area networks and distributed processing), database technologies, systems design and development approaches— that is, methods (e.g., structured techniques, prototyping), tools (e.g., CASE tools and 4GLs), and management. Basic data processing (transaction processing systems and information reporting systems), decision support (management and strategic/executive support systems), expert systems and neural network applications, end-user computing, and electronic mail are also included under this umbrella of IST. The term information systems technology (IST) is used instead of information technology (IT), because broader technologies that are used for information gathering and dissemination (e.g., teleconferencing, FAX, voice-mail, imaging, and multimedia) are not part of this research. In short, the scope of the