Telecommunication Technologies: Use and Investment Patterns in U.S. Multinational Corporations

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Telecommunication technology enables multinational corporations (MNCs) to efficiently transfer the information necessary for coordinating global operations and remaining internationally competitive. However, few published studies have empirically examined the relationship between the organizational characteristics of MNCs and their use of telecommunication technologies. This study investigated whether use of, and investment in, telecommunication technologies by MNCs is related to firm and industry characteristics.

Results from 105 U.S. MNCs reveal that the use of certain telecommunication technologies like teleconferencing networks and messaging systems differ significantly across firms with different degrees of international involvement and size; and, to a limited extent on industry characteristics. However, other technologies like inter-organizational systems and transmission media do not differ based on these characteristics. Moreover, the relative investment in such technologies as a whole differs in terms of a firm’s degree of international involvement and its industry type, but not in terms of its size. Reasons for these differences are explored. The study also highlights the growing importance of building information platforms for integrating organizational systems using a wide variety of computing and communication technologies. Implications for IS/telecommunication executives and researchers are discussed.

In their bid to compete effectively in today’s global environment, many American multinational corporations (MNCs) are implementing global telecommunication networks linking their worldwide operations together. Quick and ready access to information is vital for coordinating global operations and maintaining flexibility (Chismar, 1994). Business analysts have suggested that the long term survival of MNCs in the international marketplace may be closely tied to their ability to communicate quickly and efficiently (Deans and Karwan, 1994). In an insightful analysis, Keen (1988) predicted that:

The ability of a multinational corporation to manage complexity and volatility will depend almost entirely on its telecommunications architecture. (p. 266)

Other information systems researchers (e.g., Steinbart and Nath, 1992) and practitioners (e.g., Hopper, 1990) have also recognized the importance of modern telecommunication technologies for enabling MNCs to efficiently transfer information worldwide.

MNCs, relative to purely domestic firms, face more complexities due to greater geographic dispersion, more intense global competition, existence of tariff- and non-tariff trade barriers, higher cultural diversity, and a multitude of political climates (Alavi and Young, 1992; Ohmae, 1989). In dealing with such complexity, MNCs need to move away from rigid, single dimensional strategies towards more flexible, multi-dimensional strategies (Keen, 1992; Bartlett and Ghoshal, 1987). Results based on the responses of 250 managers from some of the world’s largest firms suggest that MNCs, in moving toward multi-dimensional strategies, are faced with the task of optimizing efficiency, responsiveness and learning simultaneously in their worldwide operations (Bartlett and Ghoshal, 1987). There is growing evidence that telecommunication technologies can enable MNCs to achieve such integrated, multi-dimensional strategies effectively and efficiently (Steinbart and Nath, 1992).

The fact that multinational corporations differ from purely domestic firms—in strategy and structure—creates
unique demands on international communication and computing technologies (Senn, 1994; Ives and Jarvenpaa, 1990; Iyer and Schkade, 1987). In addition to helping MNCs achieve multi-dimensional strategies, telecommunication technologies can also impact their global structure by providing simultaneous centralization and decentralization (Keen, 1992). Economic studies of the demand for international telecommunications have shown a clear relationship between demand and levels of international trade (e.g., Rea and Lage, 1978; Vernon, 1977) and the activities of multinational firms (Antonelli, 1985). These and other studies indicate that firms most likely to succeed in today’s highly competitive international environment are those MNCs that have taken the lead in adopting communication technologies and have integrated them with their corporate strategy and structure.

While literature exists on technical aspects of global telecommunication (e.g., Sankar and Prabhakar, 1992), few published studies have empirically examined the use of telecommunication technologies by U.S. MNCs. As a result, managers of MNCs find little direction from the research literature to aid them in understanding the role of telecommunications in transacting global business. Our study aims to fill this apparent gap in the literature. The results of this study will provide insight into telecommunication use, a factor considered critical for achieving global competitive advantage. The results will also enable managers to make broad comparisons of technology use and investment patterns based on organizational characteristics like firm size, level of international involvement and type of industry. Such comparisons can, when used appropriately, provide a basis for the re-evaluation of existing telecommunication strategies.

The purpose of this study is to investigate relationships between the characteristics of MNCs and their use of telecommunication technologies. The use of telecommunication technologies represents a broad concept, referring to a number of possible factors like the types of technologies used, the amount of time the technologies are used, the volume of communications across the technologies, the investment in the technologies, and the capacity and relative sophistication of the telecommunications infrastructure. Data on time and volume of usage are extremely difficult, if not impossible, to obtain for a large sample of firms. Also, usage capacity and relative technological sophistication more accurately reflect the firms’ potential for use rather than actual use. Therefore, in this study, we focus on two aspects of use: the types of technologies used and the investment into the technologies.

Section 2 provides some background on the research issues, including a brief review of the relevant literature and the hypotheses tested. The next two sections describe the research framework and methodology. Then, results of the data analysis are presented and their implications for research and practice discussed. Finally, the last section reviews the major findings from the study and provides some directions for future research.

### Background and Hypotheses

This paper is part of an ongoing study of telecommunications management in U.S. multinational corporations. Results from other aspects of this study are available elsewhere (Chidambaram and Chisn, 1993; Chisn and Chidambaram, 1992). The first article—involving interviews with executives from 27 MNCs—focused on the key challenges faced by telecom executives in managing global networks while the second article examined the effect of telecommunication on the structuring of multinational corporations. In this current paper we delve further into the relationships between organizational characteristics and the use of telecommunication technologies.

A synthesis of the literature, presented below, suggests that an MNC’s degree of international involvement, its size, and the type of industry it operates in affects its need for coordination and communication. Several authors (see for example, Roche, 1992; Ghoshal and Bartlett, 1990) posit that firms with different levels of international business, of different sizes and in different industries have, by definition, different levels of complexity and different coordination needs. This implies that MNCs with differing needs for coordination and communication will use different telecommunication technologies and invest in such technologies at different rates. Specifically, in this study we are primarily interested in this question:

**What, if any, is the relationship between the use of, and investment in telecommunication technologies by U.S. MNCs and their organizational and industry characteristics?**

While our previous efforts—examining how telecommunication influences corporate structure and what the key challenges are in managing global networks—were empirical, they were primarily exploratory and hence did not involve hypotheses development or testing. However, based on our previous findings and recent research in the area (see for example, Steinbart and Nath, 1992) we developed a set of hypotheses that were tested in this study. The discussion below elaborates on these hypotheses.

### Degree of International Involvement

In implementing global strategies, multinational corporations face complex and dynamic coordination problems (Senn, 1994; Egelhoff, 1991; Bartlett and Ghoshal, 1987). A major contributing factor to these problems is the firm’s degree of international involvement. Coordination problems increase with greater geographic and temporal dispersion of personnel, resources and activities. Hence, MNCs, relative to purely domestic firms, face greater complexities due to the greater geographic dispersion and the more intense competition. And, the greater the degree of international involvement,