Determinants of Information Technology Adoption: An Extension of Existing Models to Firms in a Developing Country

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Advances in new information technology and changes in the global environment have made it increasingly difficult for organizations to make decisions regarding information technology adoption. Moreover, information systems in a global environment are influenced by different cultures, laws, information technology infrastructure, and the availability and role of skilled personnel. Information systems research has traditionally focused on organizations in US and UK without considering how these frameworks and models can be applied and extended to developing countries. In this study of 46 firms we examine the determinants of process-based information technology adoption in the Indian manufacturing sector. Although there are many differences like the type of organizations, and the technology available, between developing and developed countries, we found that factors that influence information technology adoption are similar. Our results showed that organizational factors like a firm’s culture and size, and environmental factors like competition faced by firms, government policies, and market forces like exchange rates and computer prices, have a significant impact on information technology adoption decisions made by firms. We also found that the role of management information systems personnel has a negative impact on adoption.

Recent advances in information technology have changed the way organizations work. Personal computers do the work done earlier by mainframes. Computers are networked together in organizations and users share programs, files and electronic messages. Telecommuting is on the rise with the ability to connect to organizational computer systems from home. The Internet has provided an environment in which information can travel across organizational as well as national boundaries. Such has been the advance in new technology that organizations find it increasingly difficult to make decisions regarding information technology adoption.

To complicate matters further, there have been significant changes in the world trade and political climate due to the North American Free Trade Agreement (NAFTA) and the General Agreement on Tariffs and Trade (GATT). These changes have opened new doors for firms to invest and expand to other countries. There has been an emergent need for a reassessment of firms’ existing information technology (IT) and the need for global information systems. Carefully crafted investments in global information technology offer firms an opportunity to increase control and enhance coordination (Ives and Jarvenpaa 1991). Organizations use information systems as competitive weapons due to decline in the cost of supporting information technologies and structural changes in the economy caused by global competition (Ives and Learmonth 1984). Confining information technology to local boundaries would be naïve because information technology has supported and enabled the globalization of businesses (Cash, McFarlan et al. 1988; Feeny, Earl et al. 1990). As the global environment and information systems change, information technology management practices must also change (Boynton and Zmud 1987).
IS research has traditionally focused its attention predominantly on USA and UK organizations without concerns for how applicable the models and frameworks developed from this research would be in an international context. (Elliot 1996)

Information systems adoption is greatly dependent on contextual and environmental characteristics like national cultures, laws, information technology infrastructure and the availability of skilled personnel (Shore 1998). Global companies in the new world marketplace have to develop large integrated global (or international) information systems linking its subsidiaries in different countries. Therefore, countries should be studied individually so that information technology adoption practices that exist can be known and understood, and new and efficient information systems developed. Although there have been a number of international studies that have identified various country specific information systems issues, there is a dearth of knowledge regarding factors that influence its adoption in developing countries.

In this paper we investigate the reasons why a firm adopts information technology. The country considered here is India, a populous nation with a mixed economy. The economy consists of a vibrant private sector as well as a large public sector. The Indian economy is a mixture of traditional village farming on one hand, and modern industries on the other. India’s GDP was $295 billion, with a real growth rate of 5% in 1997. Imports totaled $38.5 billion, whereas exports grossed $33.0 billion in 1997. Policy reforms since 1991 have extended earlier economic liberalization and greatly reduced government controls on production, trade, and investment, as well as, privatized parts of the large government-owned public sector (State Department, 1998).

The organization of this paper is as follows. In the next section, we present an outline of the theoretical framework on which we build this study. Then, we present research hypotheses, followed by details of the research methodology. This is followed by the results and a discussion of the implications of the results.

The Theoretical Framework

Information technology adoption has been considered within the areas of information technology planning, diffusion and implementation. Boynton and Zmud (1987) in their review of information technology planning methodologies mentioned that there is no one best method to view information technology planning or information technology implementation. We briefly review literature that may be relevant to information technology adoption. From a technological diffusion perspective Cooper and Zmud (1990) considered adoption as a part of their framework on information technology implementation. They used a stage model of information technology implementation which involved five stages: initiation, adoption, acceptance, routinization and infusion. McFarlan and McKenney (1982) considered information technology identification and investment as the first step in the diffusion of information technology within an organization. As an extension of Cooper and Zmud’s six stage information technology implementation model, Umanath and Campbell (1994) provided a general model for differential diffusion of information systems in multinational enterprises. Information technology adoption is characterized by adoption decision making and the subsequent investment.

MIS literature on information technology investment shows that most studies have utilized overall information systems budgets which included hardware as well as software spending (Nolan 1973; Lucas and Sutton 1977; Nolan 1979; Benbasat, Dexter et al. 1984; King and Kraemer 1984; Gurbaxani and Mendelson 1987; Schaeffer 1987; Gurbaxani and Mendelson 1990). Although information technology investment has been studied in great detail, it is important that we make a distinction between information technology adoption and information technology investment as considered in literature. In MIS literature, adoption is implicitly assumed as a decision to adopt new information technology whereas information technology investment is considered as the total investment in hardware, software, and personnel.

Most studies on information technology adoption have been conducted in developed countries like the US and Western Europe. The focus of our study is to extend existing models used in developed countries and see whether the determinants of information technology adoption are similar in developing countries. There are significant differences between organizations in developed and developing countries. Organizations in developed countries have access to more resources and face more competition than organizations in developing countries. In addition, organizations in developed countries have greater access to technology than those in developing countries. Since there are inherent differences between organizations in developed and developing countries, we consider it important to examine the applicability of models developed for information technology adoption in developing countries.

There are a few studies that have considered information technology planning and implementation in the specific countries (Pavri and Ang 1995). Countries and regions studied include China (Harrison and Farn 1990), Egypt (Kamel 1995), Estonia (Dexter, Janson et al. 1993), Hong Kong/China (Elliot 1996), Jamaica (Barrett and Walsham 1995), Mexico (Mahmood, Gemoets et al. 1995), The Middle East - Gulf States (Badri 1992), Pakistan (Hassan 1994), Slovenia (Dekeleva and Zupanic 1993), Uruguay (Hernandez, Gibson et al. 1996). While most studies have concentrated on identification of key issues in MIS in these countries, some studies have investigated strategic planning aspects of MIS (Azuma and Mole 1994; Pavri and Ang 1995). Studies on information systems in Indian organizations have identified important information systems issues facing managers in India (Palvia and Palvia 1992), and the implication of policy changes in the Indian telecommunication sector on management decision makers (Jain 1993). While studies have been conducted on information systems issues in specific countries, there has
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