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# **GLOBAL DIFFUSION OF INFORMATION TECHNOLOGY: A REGIONAL PERSPECTIVE**

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## **ABSTRACT:**

This study investigates some important dimensions of Information Technology (IT) transfer and the development of a global IT policy. Information Technology professionals employed in New England corporations are surveyed to provide a regional perspective on these dimensions. The analysis of 62 responses obtained from a survey questionnaire demonstrates that significant differences exist between the perceptions of IT professionals in different industries, with varying levels of experience, and positions in the organizational hierarchy. Implications of these differences are discussed in the paper. Since New England corporations have traditionally played a defining role in global technology diffusion, it is argued that the views of these professionals are important to understand the growing importance of information technology in the emerging multinational context. [This research was supported by a grant from the Center for International Business Education jointly sponsored by Bentley College and Tufts University.]

## **INTRODUCTION:**

The phenomenal growth of information technology in the United States in the last two decades has rapidly transformed the U.S. economy from a "service economy" to an "information economy" and the business organizations based in New England states have played a pivotal role in this transformation. Europe, Japan and the Newly Industrialized Countries (NICs) of East Asia have become strong competitors of the U.S. in information technology; Less Developed Countries (LDCs) are also making a determined effort to develop the information sector of their economies. Due to the growing competitive pressures from Japan and Western Europe, the IT industry in the United States has become a crucial industry and multinational issues relevant to the trade, diffusion and application of this technology have acquired strategic importance in recent years. The views of information technology professionals in New England corporations on these issues have a defining influence on the long term direction of global IT exchange due to the success these companies have achieved in international business (IB) operations. Information Technology professionals tend to attach varying levels of importance to the global issues, depending on their experience, the industry in which they are employed, and other related characteristics. A proper understanding of the views of IT professionals on the global issues such as information technology transfer, applications of IT for economic development, national IT policy, and transborder data flow is extremely

important. In the prevailing business climate characterized by fierce competition and rapid change in the global marketplace, a proper understanding of these issues is becoming a competitive necessity. In recent years, numerous corporations in New England have become globally recognized leaders in both international business and information technology, and companies in other parts of the country can benefit from the experience of New England companies. Information Technology professionals in these companies are directly affected by the global changes taking place in the IT industry and their views on these changes are likely to have a defining influence on the direction of this technology in the U.S. and abroad. Therefore, the primary objective of this research is to determine the perceptions of IT professionals in New England companies on the emerging multinational issues in information technology, investigate the differences in these perspectives in various categories, and examine the implications of these differences. Numerous studies of global issues in information technology have been conducted in recent years and a number of relevant issues have been brought into focus from the points of view of the developed and developing countries. In these studies, important global issues in IT are identified, categorized, quantified and measured from different angles and perspectives with methodologies ranging from phenomenology to laboratory simulations. This study enhances the foundation created in the previous work in three ways. First, it measures and interprets the perceptions of the IT professionals in a region of the U.S. that has played an historically important role in both international business and information technology. Second, it examines how the perceptions are influenced by the professional experience and industry background of the professionals; and third, it attempts to explain how the differences in the perspectives of various categories of IT professionals on global issues in information technology are likely to influence the future of this technology in the rapidly emerging multinational business climate.

### **NEW-ENGLAND INFORMATION TECHNOLOGY COMPANIES IN INTERNATIONAL BUSINESS:**

Business organizations in New England have developed the reputation of being dynamic innovators of information technology and aggressive participants in international business operations. Among the world's largest IT companies and recognized global leaders, at least ten are located in New England. These and numerous other small and medium size companies in systems, software, and information technology services have been responsible for the "Massachusetts Miracle" and similar phenomena across other New England states. Although the computer hardware industry has declined in recent years, the rapid growth of software, computer services and other microelectronic industries has continued the economic revitalization of New England after the severe recession of the early 1980s. At the same time, innovative approaches to international business with transfer of information on satellite networks rather than traditional goods and services, has provided corporations a distinct competitive advantage.

The enormous experience accumulated by New England companies in international business and information technology can prove valuable to other regions of the country in formulating and implementing successful international business strategies. How New

England IT professionals perceive the opportunities and challenges of multinational issues in IT can also provide a foundation for a long term global IT policy for the United States. Some of these issues are addressed in this study.

### **METHODOLOGY, ANALYSIS AND INTERPRETATION:**

Leading corporations in the New England area were identified from the "Million Dollar Directory of America's Leading Public and Private Companies" (1992 edition) published by Dun and Bradstreet, and from the 1993 mailing list of the New England Computer Assisted Systems Engineering (NECASE) users' group. A survey questionnaire, to be completed by Information Technology professionals, was mailed to 300 companies identified from these sources. The survey instrument, designed to collect information on a five point Likert scale, contained 14 questions related to the transfer of information technology and a global information technology policy for the donors and receivers of IT.

Crosstabulations were performed on the data to determine the differences between various categories. Statistically significant differences are found (at a <10%) in the perceptions of respondents on a number of dimensions. The results of the analysis are summarized and discussed in the following section. This discussion includes the possible causes of the significant differences in the perceptions of highly experienced, less experienced, and computer versus non-computer industry professionals.

#### **Information Technology Transfer:**

The mean scores on each of the nine statements in this category indicates a general support for technology transfer between U.S. and other countries among the New England IT professionals and a general acceptance of the role of the U.S. government, United Nations and multinational corporations in a smooth transfer of this technology. However, a high level of support is found for the need of information technology transfer from the U.S. to the countries of the former Soviet Union. The progressive economic climate of New England and a heavy involvement of companies from this region in Europe may be the primary factors behind this enthusiasm. Digital Equipment, Xerox and Lotus Development Corporation already have extensive facilities in Eastern Europe and are entering the opening markets in Russia and other Commonwealth of Independent States (CIS) countries.

Some important differences have, however, been observed on the issues of technology transfer among the experience and industry group categories of responses. Senior and highly experienced IT professionals support unrestricted transfer of technology between the U.S and other countries while junior level and less experienced professionals are not as supportive of such exchange. Professionals with ten or more years of experience also believe that European countries impose greater restrictions on information technology transfer to other countries, as compared to the United States. This perception is not shared by less experienced professionals. Highly experienced IT professionals agree more strongly than the less experienced that an unrestricted transfer of IT from the United States to the developing countries will accelerate global economic growth. Highly

experienced professionals also think that multi-national corporations should assume greater responsibility in facilitating the transfer of information technology across the national boundaries.

Experienced professionals in large corporations have a better understanding of larger organizational processes and global issues while the less experienced professionals tend to concentrate on technical issues. Similarly, more experienced professionals, at the higher levels of the organizational hierarchy, have greater faith in the market mechanism and free enterprise system as the most efficient and equitable solution to global economic, social, and political problems. The belief in the unrestricted transfer of technology between nations may be a manifestation of this larger economic philosophy. Experienced IT professionals realize the necessity of vigorous participation by U.S. corporations in the export and investment opportunities abroad. A rapid growth of investment by U.S. corporations in the emerging markets of China, India, Southeast Asia, Eastern Europe, and the former Soviet Union countries is an evidence of this realization.

Experienced IT professionals do not perceive the transfer of technology as a threat to their jobs and positions in organizations, while less experienced professionals may perceive the export of technology as a threat. These perceptions may be created by the prevailing business climate where information technology companies are restructuring through massive retrenchment of middle level managers and computer professionals. Importing programmers and systems professionals from foreign countries and exporting jobs to off-shore operations have also been common strategies in this restructuring process. The insecurities created by these changes may have contributed to the diminishing of the enthusiasm for technology transfer among less experienced IT professionals.

Information Technology professionals in the computer/electronics and manufacturing industries are more positive about the desirability of IT technology transfer while the professionals in the service industry do not share this optimism. Dissemination of services in the international markets has been an important issue in the negotiations conducted under the Uruguay round of General Agreement on Tariffs and Trade concluded in 1994. Protection of domestic markets in legal, insurance and telecommunications services in many countries such as Japan and India, indicates that the services are inherently difficult to export and globalization of service industry is a complex task. These are considered some of the reasons behind the perceptions among the service industry IT professionals that international transfer of technology is less desirable.

### **Global IT Policy:**

Although the IT professionals in the computer/electronics industry do not agree with this assessment, professionals in manufacturing and service industries believe that there is a distinct possibility of the multinational corporations (MNCs) dominating the computer industry of less developed countries. It is strongly felt among IT professionals that the gap between the "information haves" in the industrialized world, and the "information

have nots" in the developing world is growing rapidly and the consequences of the glaring disparities can be serious for the emerging new world order. Significant differences are found in this study on the question of whether the U.S. government should implement a coherent national information technology policy to provide resources to U.S. computer companies so that they can more effectively compete with Japanese and European companies. Computer industry IT professionals support the idea of a national IT policy while the professionals in other manufacturing and service industries are not greatly enthusiastic about such policy. Again, the decline in the relative position of the U.S. computer industry in global markets in recent years and its adverse consequences to the employment levels in the computer industry may be the driving force behind these motivations.

## **CONCLUSION:**

This paper makes two unique contributions to the MIS research in global issues. First, it provides a much needed regional perspective on these issues and fills a glaring gap in global IT research. Most of the studies of global IT issues published in the literature focus either on individual countries or a number of countries in a geographical region. This study compliments this research by focusing on an important region within a country. Second, it discusses the possible causes and implications of the differing views held by IT professionals in various industries and other categories. The findings of this study strongly suggest that the perceptions of younger and less experienced IT professionals are different from the views of established and more experienced professionals on the global issues in information technology. These differences are likely to have profound implications for global trade, investment, and personnel flows in the computer hardware and software industries.

There are three possibilities inherent in these differences. First, as the younger professionals mature over the years, their views are likely to change and conform more to the perceptions of more experienced professionals. Second, as the fortunes of the U.S. computer industry shift again in the positive direction, less experienced professionals will view the global transfer of technology and software personnel more positively. Third, and perhaps the most significant, possibility is that these views will not change and as younger IT professionals assume leadership positions in large corporations, they will exercise a retrograde influence on global exchange of information technology.

[Note: References and full paper available upon request.]