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Abstract

Despite the need for management to be able to identify the enablers and/or inhibitors of IT success on a global scale, past global IT research has failed to create "a sound and comprehensive framework of its own; one which can guide inquiry by researchers in an organized and systematic manner" (Palvia 1998). While previous frameworks have been developed (Deans and Ricks 1991; Ein-Dor et al 1993; Nelson and Clark 1994; Cummings and Guynes, 1994; and Gallupe and Tan, 1999), none of them have been accepted universally. The purpose of this paper is to examine the different frameworks previously suggested for global IT research in cumulative manner. By explicating and integrating all dimensions from these past frameworks, we provide a more comprehensive system for identifying new areas of research. More importantly, it provides the basis for reflecting on what should constitute the key dependent variables given a particular mix of independent variables.

Introduction

We are told that "the world has begun to resemble a global village." As the global village takes form, firms will begin to capitalize on the opportunities that exist worldwide. Thus, the information technology (IT) departments will need to serve and support a global workforce. Further, while planning for global information systems, executives will need to be able to identify, isolate, and then overcome potential problems that will hinder their strategies. Despite the need for management to be able to identify the enablers and/or inhibitors of IT success on a global scale, past global IT research has failed to create "a sound and comprehensive framework of its own; one which can guide inquiry by researchers in an organized and systematic manner" (Palvia 1998). While previous frameworks have been developed (Deans and Ricks 1991; Ein-Dor et al 1993; Nelson and Clark 1994; Cummings and Guynes, 1994; and Gallupe and Tan, 1999), none of them have been accepted universally. This may be due in part to the fact that each framework covers a slightly different set of factors for consideration, instead of building upon previous existing models in a cumulative tradition. Another reason concerns the integration of the combined

list of factors, should they exist. This may be due to a lack of a dependent variable that integrates the factors brought forth in these previous frameworks. While past frameworks provide a list of variables for consideration, they do not discuss the underlying objective or dependent variable that these factors are meant to predict or explain. An orientation towards a dependent/independent variable perspective provides an integrative means for organizing the list of factors. Thus, Palvia (1998) has stated that future frameworks must "address the issues of the 'dependent variable' and the 'independent variable.'" Therefore, the purpose of this paper is to examine the different frameworks previously suggested for global IT research in a cumulative manner. By explicating and integrating all dimensions in these frameworks, we provide a more comprehensive system for identifying new areas of research. More importantly, it provides the basis for reflecting on what should constitute the key dependent variables given a particular mix of independent variables.

Previous Frameworks

In order to develop an integrated framework of past research, our approach is to list what additional factors were considered in each succeeding framework being considered as opposed to what was missed. Thus, rather than contrasting on the weaknesses (i.e., what was left out in one model vz. other ones), we built a cumulative list of all factors considered relevant in global IT research.

The first model of global IT research for consideration comes from Ein-Dor et al (1992). The authors proposed a framework (reproduced in Figure 1 below) that was designed to "incorporate the variables specific to national environments into a general framework of information systems" (34). The intrinsic structure of information systems was defined as having three subsystems:

1. A structural subsystem, describing the physical IT
2. A procedural subsystem, describing the IT processes of planning, strategy formulation, development, and operations
3. A behavioral subsystem, comprising the human actors who participate in the planning, development, and use of information systems
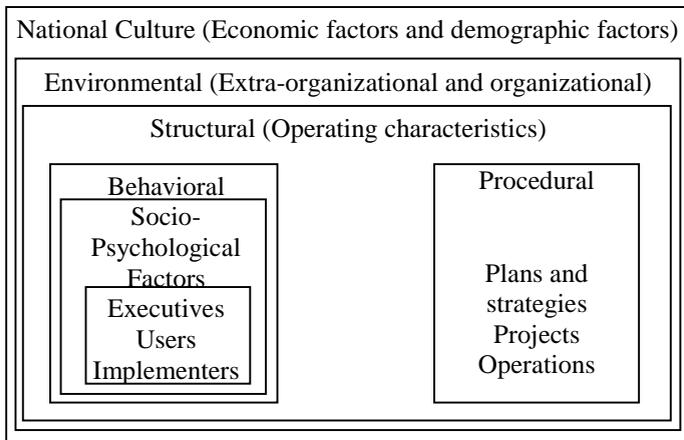
Figure 1 Framework for Global IT Research as presented by Ein-Dor , et al (1992)

These three subsystems are embedded in the environmental context of the organization, which then operates in a local environment. Three types of environmental variables were identified that affect IT in the global organization, including:

1. Economic variables such as level of employment, average income, gross national product, balance of trade, scope of international trade, encouragement of international economic ties, level of industrialization, currency, and natural resources
2. Demographic variables such as average education level, geography, computer science education, language, and internal technical personnel resources
3. Socio-psychological variables such as values, beliefs, symbols, tradition, ceremonies, ideology, leaders, family status in firms, lifestyle, opposition to change, importance of job security, employee morale, diligence and efficiency, attitudes toward technological progress, interpersonal relations and social commitment, significance of concepts of time and space, perception of concepts, and social norms

The framework was the one of the first substantial attempts by international IT researchers to list a set of factors considered important in global IT research. But, as with other frameworks, this one does not make a distinction of what the dependent variables are that links the set of factors presented.

Deans and Ricks (1991) presented a similar model for global IT research. In some sense, their factors are at a slightly higher level of abstraction thereby encompassing many of Ein-Dor et al.'s factors. Additional factors that this framework presents are the political/legal issues and two MIS areas of research: managerial/strategic and technological/application based.

The next substantial global IT model to be examined was proposed by Cummings and Guynes (1994). The authors were attempting to investigate the structure of IT activities in U.S. and non-U.S. subsidiaries of transnational corporations. To provide a framework for the study, the authors created the Transnational Information System (TIS) model. The TIS model recognized that IT activities can be affected by two different forces: the organizational structure and the environment in which the subunit operates.

The model displayed in Figure 2 represents the framework that the authors proposed. Under this model, the organizational structure was defined as "the infrastructure by which the objectives of an organization are attained" (13). Including in the framework are the different structure choices that an organization will consider.
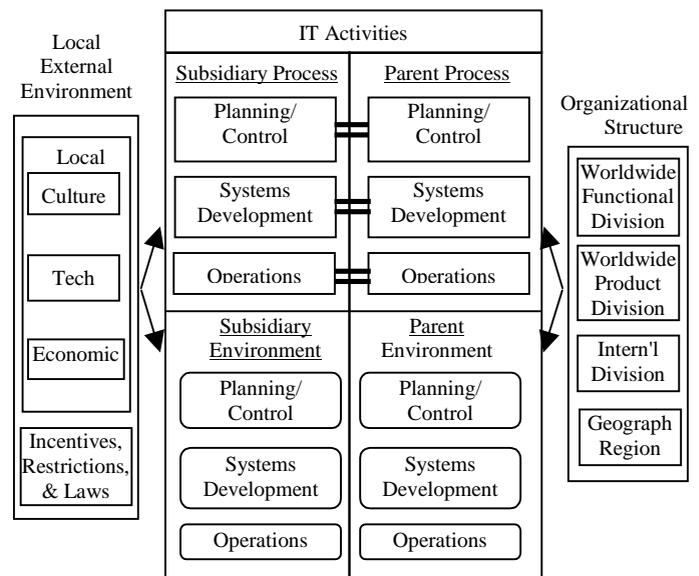
Figure 2 Global IT Research Framework proposed by Cummings and Guynes (1994)

The external environment was addressed, separating local conditions into three groups: those related to culture, technology, and the local economy. The authors were the first to incorporate legal incentives, regulations, and laws into the potential variables to affect IT. But it should be noted that Cummings and Guynes did not consider the legal considerations as part of the local cluster of factors (i.e., culture, technology, and economics). Thus, this framework does not consider differences in legal structures from a headquarters to a non-U.S. subsidiary.

In addition to the incentives, restrictions, and laws, new ideas brought forth in this framework are: 1) Examining IT activities in terms of processes and environments, 2) The role of the organizational structure as they relate to IT activities, and 3) The differences as

well as integrative linkages between subsidiaries and the parent company. In the case of the linkages, the authors denoted potential linkages of IT tasks between the parent and the subsidiary with a connecting bar, symbolizing activities that "can be performed in part, or entirely by the parent, or in part, or entirely by the subsidiaries" (15). The IT activities were defined as:

- Operations: The technical and routine tasks necessary to keep the system functioning smoothly, including technical support
- Systems development: the creation and development of systems
- Planning/control: the tasks involved in managing the IT department

These activities represent a modified set based on the Ives et al.'s (1980) framework. While Cummings and Guynes split Ives et al. category of IT development was into systems development and planning/control, they did not include the user category in their framework.

Gallupe and Tan (1999), in turn, incorporated all of Ives et al.'s categories (to be further discussed in the paper). The authors plotted global IT research on a three-dimensional map, with the axis of the Ives' et al. five variable categories, the types of research strategies utilized (including case study, field study, field test, lab study, and non-data), and the research themes of global IT (including single country, regional focus, comparative study of nations, culture/socio-economic issues, research concepts and issues, information resources management, and enterprise management). The authors, similar to Palvia, concluded with a call to action for IT researchers, encouraging researchers to "begin considering the dependent and independent variables to be studied…which can lead to a more comprehensive understanding of the field" (15).

Finally, Nelson and Clark (1994) proposed a framework for global IT. The purpose of the research was to introduce a framework to guide cross-cultural IT research programs. The framework created (reproduced in Figure 3) encompassed five major components:

- Cultural context, including: perceptual differentiations such as age, language, religion, or status of the other person; cognitive frames, or how the information extracted from the perceptions is processed and evaluated; and patterns of action, differing according to emphasis on different kinds of behavior. The differences along the dimensions of cultural variations lead to variations in structure (organizational processes), management (strategic planning context), and decision processes and structures (decision context) of an organization.

- Organizational Processes. By using general system theory, the flows of money, people, capital, and information are managed differently within organizations. The way in which they are controlled comes in part from the culture, but predominantly from the organization.
- Strategic planning context, or strategies that the company utilizes to control the flows of the organization and to generate and allocate resources
- Decision context, including both the structure of the decision context, such as the decision entity's difficulty, complexity, and uncertainty, the technology and other decision aids available to the decision entities; and the process of decision making, such as information acquisition and communication, decisional, and implementation processes
- The result of organizational processes and decision context is performance outcomes that can be characterized in terms of their form and quality.
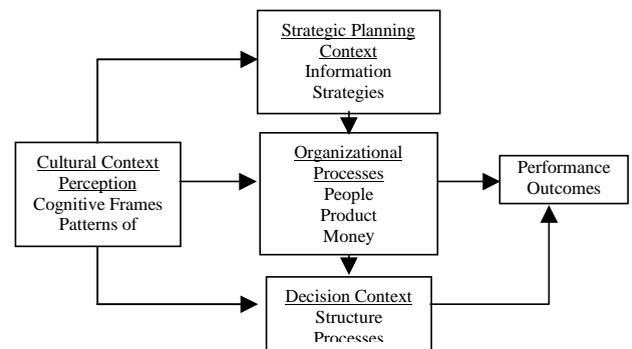
Figure 3 Global IT Research Framework Proposed by Nelson and Clark (1994)

According to the authors, the interactions between elements of the framework will create a large number of research projects. The new concepts presented in this framework were the differentiation of the strategic planning context from the organizational processes and decision context.

A New Integrated Framework

Having examined the contributions of each framework, we are now in position to integrate all the key factors/ideas in a new cumulative model. We categorize the factors into three main dimensions: local factors, IT activities, and organizational context. In the case of local factors, we've found that four main forces have been identified that affect IT:

- Technological, specifically the availability and reliability of hardware, software, and communications networks. As an independent

variable, technological forces can include (but not necessarily be limited to): vendor support in foreign subsidiaries, price and quality of telecommunications in the country, level of information technology sophistication in the country, data security, integration of technologies, international protocol standards data utilization, changes in telecommunications technology, software development, integrated services digital networks, and computer integrated manufacturing.

- Social/culture. While culture can be defined in a variety of ways, it essentially represents the "collective programming of the mind which distinguishes the members of one human group from another" (Hofstede, 1980). As such, it is contextual and is beyond the influence of the organization (Nelson and Clark 1994). Social/culture forces defined as an independent variable can include (but not necessarily be limited to): values, beliefs, symbols, tradition, ceremonies, ideology, leaders, family status in firms, life style, opposition to change, importance of job security, employee morale, diligence and efficiency, attitudes toward technological progress, interpersonal relations and social commitment, significance of concepts of time and space, perception of concepts, social norms, local cultural constraints, and language barriers.

- Economic, including the availability of both monetary and non-monetary resources in a country, not including technology. Economic forces defined as an independent variable can include (but not necessarily be limited to): level of employment, average income, gross national product, balance of trade, scope of international trade, encouragement of international economic ties, level of industrialization, currency, natural resources, currency restrictions and exchange rate volatility, export restrictions, the national infrastructure, and availability and cost of personnel.

- Political/legal, examining the issues of the restrictions and incentives that government imposes, both formally and informally on global corporations. Political/legal forces defined as an independent variable can include (but not necessarily be limited to): transborder data flow restrictions, legal restrictions on hardware/software, telecommunications deregulation, and banned usage of telecommunication equipment

Using the Ives et al (1980) framework, the second dimension of IT activities can be distinguished as processes, the information subsystem, and the environments. The three environmental variables are:

- The user environment, or "the environment surrounding and including primary users," with possible variables including characteristics of the user, of the user's organization, and of the user's task.

- The IT development environment, or "the development methods and techniques and their characteristics, and the organization and management of IT development and maintenance."

- The IT operations environment, including "the resources necessary for IT operations," including the hardware, software, database, procedures/documentation, organization and management of IT operations, and the operations personnel

While managing the environments, IT creates an information subsystem, containing possible variables such as ISS content, presentation form, and time of presentation. Additionally, IT manages the environment and the subsystem using three classes of processes:

- The development processes, "by the selection and application of organizational resources yields the information systems"

- Operations processes, or "the physical operation of the ISS"

- Use processes, "focusing on the usage of the ISS by the primary user"

The last dimension incorporates the organizational contexts as suggested by Nelson and Clark (1994). Adapting the contexts to this framework, the three organizational corresponding types of variables are:

- Strategic Planning Context: Three main types of variables exist, including organizational strategies (global responsiveness, national responsiveness, or local responsiveness); structural strategies (metaorganization, transnational, multinational, international, or global); governance of organization (user autonomy, user partnership, central control).

- Organizational processes: Two main types of variables exist, including information acquisition and communication (degree of information sharing, communication patterns, procedural order, and task orientation) and decisional processes (comprehensiveness, decision rules, and consensus decision making)

- Decision contexts: Two main types of variables exist, including the structure of the decision and the processes used in making the decision

By combining the three dimensions of local factors, IT activities, and organizational context, a pictorial representation of the framework is presented in the Appendix in Figure 4.

The proposed framework has several strengths. The first is that it represents the first comprehensive framework that builds on all past global IT frameworks. As such, the integration of all relevant factors provides the opportunity to consider research areas that have not been delineated in the past. More importantly, it provides a basis for reflection on what constitutes the key dependent variable or variables for a particular mix of factors from each of the three dimensions. Rather than presume that we can tell researchers what ought to be the key dependent variables that integrates each specific intersection in our framework, we would suggest that it ought to be used as a guide for future theory explication. For example, what would constitute the key dependent variable for the intersection of the political/legal (local dimension), use environment (IT activities dimension), and organizational process/communication patterns (organizational context dimension)? This intersection provides the research context for the possibility of violating trans-border data flow laws. To the best of our knowledge, there has not been any critical discussion of what constitutes the key dependent variables for managing illegal trans-border data transmission.

The next step for validating this framework is to empirically test its adequacy at categorizing the existing global IT research. This includes determining what, if any, dependent variables were used for a particular intersection as well as assessing its adequacy. By using this approach, suggestions for future research directions can be offered.

In conclusion, previous global IT frameworks were examined in a cumulative process. A comprehensive research framework was developed using the perspective that new areas of research can be determined in terms of both the combination and interaction of key factors from each dimension and the determination of the key dependent variables that integrates these factors. Our perspective, congruent with those of Palvia and Gallupe and Tan, are that greater focus on the dependent variable is vital for progress in global IT research. We believe our framework provides a good starting point for this exploration.

References

Cummings, Maeve L. and Guynes, Jan L. "Information System Activities in Transnational Corporations: A Comparison of U.S. and Non-U.S. Subsidiaries," *Journal of Global Information Management,* 2 (1), 1993, pp. 12-26.

Deans, P. Candace and Ricks, David A. "MIS Research: A Model for Incorporating the International Dimension," *High Technology Management Research,* 2 (1), 1991, pp. 57-81.

Ein-Dor, Phillip, Segev, Eli, and Orgad, Moshe. "The Effect of National Culture on IS: Implications for International Information Systems," *Journal of Global Information Management*, 1 (1), 1993, pp. 33-44.

Gallupe, R. Brent and Tan, Felix, B. "A Research Manifesto for Global Information Management," *Journal of Global Information Management*, 7 (3), 1999, pp. 5-18.

Hofstede, G. *Culture's Consequences: International Differences in Work-Related Values.* Beverly Hills, CA (1980): Sage Publications.

Ives, Blake, Hamilton, Scott, and Davis, Gordon B. "A Framework for Research in Computer-Based Management Information Systems," *Management Science*, 26 (9), 1980, pp. 910-934.

Nelson, Klara G. and Clark, Thomas D. "Cross-Cultural Issues in Information Systems Research: A Research Program," *Journal of Global Information Management*, 2 (4), 1994, pp. 19-29.

Palvia, Prashant. "Global information technology research: Past, present and future," *Journal of Global Information Technology Management*, 1 (2), 1998, pp. 3-14.

Figure 4 Proposed Research Framework for Global IT Strategic Research