Information Systems Design Decisions in a Global Versus Domestic Context[1]

By: Noam Tractinsky
Department of Industrial Engineering and Management
Ben Gurion University
P.O. Box 653
Beer Sheva, 84105
ISRAEL
noamt@bgumail.bgu.ac.il

Sirkka L. Jarvenpaa
Department of Management Science and Information Systems
University of Texas at Austin
CBA 5.202
Austin, TX 78712-1175
U.S.A.
sjarvenpaa@mail.utexas.edu

Abstract

This study was motivated by the existence of two opposing schools of thought on managing information technology (IT) in a global context. One study proposes that managing IT in a global context is largely the same as managing IT in a domestic context. The other proposes that there is a difference. The results from interviews with 65 project managers, of whom 27 had international management experience, reflect a reality that lies somewhere between the two extremes. Using Q-methodology techniques, the project managers rated the relative importance of 33 items for decisions about the distribution of IT applications' hardware, software, and data. Although the most important factors influencing an application's IT distribution decision appear to hold across both domestic and global contexts, the global context contributes variability, unfamiliarity, and complexity that cannot be ignored. Compared with their domestic counterparts, project managers with global experience tended to be more cosmopolitan in their viewpoints, emphasized more local units' responsiveness, were more sensitive to power issues at headquarters as well as in local units, stressed the need for continuous, uninterrupted 24-hour services, and took into greater account the legal issues related to governmental regulations.

Keywords: IS management, global IS, distribution policy, IS planning, Q-methodology, IS project managers, international business

ISRL Categories: EF, EGO1, EHO111, ELO9, HB31

Introduction

The popular as well as the academic literature predicts a revolution in management thinking and practice as more and more industries are transformed into global enterprises. "The world," we are told, "has begun to resemble a global village" (Doktor, et al., 1991, p. 259). This village will be "a global marketplace for ideas, money, goods, and services that knows no national boundaries" (Hamilton, 1986, p.30). Few large firms will be able to resist selling in that village; according to Keen, ". . . there will soon be no purely domestic forms with sales of $500 million a year" (1991, p.67). Managers competing in that global village will find there are fundamental changes in the scale and complexity of the markets (Chandler, 1990). Organizational scholars, in turn, argue that the dynamics of these larger, more complex markets require new business strategies, organiza-

[1] This project was funded by the Faculty Research Grant, Graduate School of Business, University of Texas at Austin. We thank Kathy Knoll, Paul Cheney, and Bill DeLone for detailed comments on an earlier version of the paper.

tional designs, and management practices (Bartlett and Ghoshal, 1989). For example, "Good management practices do vary across borders and cultures. Truly universal rules are very few" (Aharoni and Burton, 1994, p.1).

What are the implications of globalization for information technology (IT) management? Does operating in a global context change priorities, principles, and practices of effective information systems (IS) management and design? Some argue that the global context means a substantial change in IT requirements and constraints. There are complications arising from cultures, languages, business and legal environments, inconsistent vendor support, and varying technology availability (Selig, 1982a; 1982b). Similarly, the coordination and transfer of IT technology involve far more issues and contingencies in the international than in the domestic context because of language differences, local laws, national infrastructure, availability of local IT staff, the local market size, data export controls, and so on (Cash, et al. 1988). Another similar perspective highlights, via a Delphi study, a number of IS issues for multinational corporations (Deans, et al., 1991). The issues are seen to be "truly unique to the international operating environments as opposed to being merely distance-related problems" (p.43). Still another perspective shows, after examining seven case studies, "System development efforts which might be relatively simple within a country can turn into cultural, administrative, and logistical nightmares when attempted internationally" (Roche, 1992b, p.650).

Other IT scholars accentuate the similarities between domestic and international issues in managing information systems (e.g., Emery, 1990; Moynihan, 1990; Watson and Brancheau, 1991). International IT is seen as a continuation of an ongoing trend to expand the boundaries of corporate activities; the universal applicability of IT issues is largely assumed. Emery (1990) maintains, "MIS groups that have managed to be effective in domestic operations are likely to cope well with expanded worldwide responsibilities" (p. iv). Consequently, the implications of globalization on IT management are not yet clear.

The distribution decision

To examine the differences between the domestic and global contexts, we have selected the area if IT distribution decision. On the project level, it refers to the degree to which control over a particular application's hardware, software, and data is distributed away from a central site toward the end user. Whereas most of the prior research on IT distribution decisions has focused on the organizational level, this paper focuses on the project level.

The IT distribution decision was selected for two main reasons. First, it has been one of the most central areas in IS research. "Of all the issues raised in discussion of the computer impact on society, few have been as provocative and hotly contested as that of computerization and centralization" (George and King, 1991, p.62). The debate has focused on understanding what factors influence decisions to distribute information technology. That research is drawn upon to present a model of the IT distribution decision. The second reason is that characteristics of the global context—from geographical distance to variations in technical support to government regulations—bear relevance on many aspects of the distribution decision. For example, geographical distance and government regulations increase communication costs, which might push toward decentralization; lack of technical support in certain countries might preclude decentralization; and certain government restrictions might preclude data transfer across borders, thus restricting centralized solutions (e.g., Ives and Jarvenpaa, 1991a; Roche, 1992a).

Empirical studies on distribution decisions focus on analyses of the IT distribution and its correlations with other organizational characteristics such as size and decision-making structure (e.g., Ahituv, et al., 1989; Brown and Magill, 1994; Leifer, 1988; Olson and Chervany, 1980). Few process-focuses studies (i.e., why and how distribution decisions are being shaped) exist (e.g., George and King, 1991; King, 1983). Our study is descriptive and process oriented. It explores the "how" and the "why" of the distribution decision on the project, or application, level. What factors affect it? How do organiza-

tional characteristics affect distribution decisions at the project level? Does extensive experience in global environments transform the way IT professionals approach distribution decisions, and how? Given this descriptive understanding, future research can start to build prescriptions about what should be done.

In the next section, a general model of the IT distribution decision is presented, and the organizational and environmental factors affecting the decision are discussed. Then follows the methodology for the field interviews. The paper concludes with the results and implications for both practice and theory.

A Model on IT Distribution Decision

In an organizational context, IT serves as an instrument for change on one hand; but on the other hand, it is constrained to a large extent by the organizational internal and external characteristics with which it must align. In the former situation, IT shapes the organizational form; in the latter, IT is shaped by the organizational form. These views of IT are not necessarily irreconcilable. For example, Giddens's structuration theory (Orlikowski and Robey, 1991) suggests that human action (e.g., the IT distribution decision) is both a cause and effect of social systems (e.g., organizations). George and King (1991) propose an ecological model "in which a variety of factory operate simultaneously" (p.70). They argue that external factors such as IT availability, IT expertise, legal regulations, and culture affect both what is possible and desirable regarding IT, organizational structures, and the relationships between the two.

A picture thus emerges of a constant interplay among (1) managerial intents (including, but not limited to IT), (2) organizational characteristics, (3) external environmental characteristics (including IT availability and malleability), and (4) IT decisions (including distribution decisions). The organization, its management, and the IT decisions are all embedded within an external environment, the characteristics of which affect all other factors and their relationships. As any strategy formulation, IT decisions represent an ongoing process; they are the result of the interplay of an ever-changing environment, the organization, and top management's perceptions and intents (Bjorn-Andersen, et al., 1986; Mintzberg, 1978).

As in most empirical research, only portions of the phenomena can be examined. This paper focuses on the effects of organizational characteristics, the external environment, and, to a lesser degree, managerial intents on an IT decision (namely, the application distribution decision) (Figure 1). It contrasts the domestic and global environments and how they affect IT distribution decisions. A U.S. context is assumed for our domestic (or local) discussion and a context of international operations of a U.S-based multinational form is assumed for the global discussion.

An implicit assumption in the literature's common treatment of IT distribution issues is that organizations operate in a relatively homogenous environment. Thus, variance among distribution forms is attributed mainly to endogenous organizational characteristics such as power and control structures and specific information processing and communication needs (e.g., Ahituv, et al., 1989; Lee and Leifer, 1992; Leifer, 1988; Olson and Chervany, 1980). This assumption might hold in a domestic context, where many of the exogenous factors may be equal for firms. However, in a global context, this assumption cannot be made, and external factors need to be considered. Differences in such areas as culture, IT literacy, and IT-related regulations can potentially affect organizational decisions regarding IT in general and IT distribu-

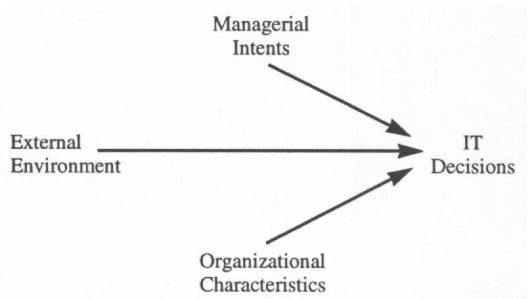

Figure 1. The Scope of the Study

tion policy in particular. The next subsection discusses some of the prominent endogenous factors that characterize the domestic context as well as the exogenous factors.

IT distribution decisions in the domestic environment

Many aspects of organizational IT can be analyzed from both a rational perspective and a behavioral or political one (e.g., Markus, 1983). Concerning decisions on IT distribution, the behavioral perspective tends to emphasize how organizational agents attempt to maintain or gain influence and the relationship between IT distribution policy and organizational power and control structures (e.g., George and King, 1991; King, 1983). The rational viewpoint emphasizes organizational attempts to guide IT decisions in a way that maximizes organizational benefits (e.g., Goodhue, et al., 1992) At the core of the rational approach are theories regarding organizational information processing and communication requirements (Daft and Lengel, 1986; Galbraith, 1973; Lee and Leifer, 1992; Leifer, 1988). An effective information system is presumably one that fits the political and rational characteristics.

Power and Control Structures

Power and control issues take into account the balance of power and authority within the organization. Power, "the ability to get things done the way one wants them to be done" (Salancik and Pfeffer, 1977, p. 4), is usually organized around scarce and critical resources. One such classic resource is information (e.g., Feldman and March, 1981; Kling, 1978; Markus and Robey, 1983; Salancik and Pfeffer, 1977). Informational technology can become a mechanism for exerting power and maintaining organizational control structures. Indeed, organizational politics and control considerations are often seen as the major determinants of IT distribution decisions in organizations (King, 1983); there is a "strong and observed tendency toward the use of computing technology to reinforce the decision authority status quo" (George and King, 1991, p. 70). Moreover, this is not only a description of the state of affairs, but a prescriptive approach to distribution decisions: ". . . control must be recognized as the most important issue in making centralization/decentralization decisions" (King, 1983 p. 343).

Information Processing and Communication Requirements

Huber (1991) minimizes the notion of political motives dominating managerial intents, claiming, "The external environments of many organizations are sufficiently competitive that, in order to survive, the organization must adopt and properly use rationality-enhancing communication and decision-making technologies" (p. 51). Huber's approach is in line with the information processing theory of organizational design. Though to a certain degree information processing and communication capabilities can serve organizational politics as well, organizational information processing theory has traditionally emphasized more rational elements in analyzing organizational needs in processing and communicating information (e.g., Galbraith, 1973; Tushman and Nadler, 1978). The design of information systems depends on the organization's information and communication requirements (Galbraith, 1973). For example, decentralizing the information processing capabilities is sensible if a major portion of the organizational information processing is specialized (e.g., Goodhue, et at., 1992; King, 1983; Leifer, 1988). If, however, information from various units needs to be integrated, then a more centralized system will be required (e.g., von Simson, 1990).

Improved communication capabilities can greatly enhance the organization's ability to effectively manage interdependence (Rockart and Short, 1989). The importance of selecting the appropriate IT for the purpose of organizational communications is highlighted in the works of Daft and Lengel (1986), Daft, et al., (1987), Markus (1987), and Zmud, et al. (1990). Communicating decisions and information is,

therefore, a major challenge to modern organizations and is likely to be considered increasingly when IT distribution decisions are being made.

IT distribution decisions in a global context

The assumption that the IT distribution decision is determined largely by the organization's internal characteristics—power and control structures, information processing, and communication—is rather prevalent in past work on IT distribution in a domestic context. It is common also in the few articles published on global IT. For example, there is argument for the need for alignment between the evolving global business strategy and structure and the evolving global IT strategy (Karimi and Konsynski, 1991; Siong Neo, 1991).

A study of 109 U.S. multinationals found that in nearly half of the organizations the locus of IT decisions was somewhat inconsistent with the locus of organizational decisions across national borders (Jarvenpaa and Ives, 1993). One force leading to less alignment appeared to be the economics of computing. Minimizing the total IT budget worldwide became a goal. Other external forces mentioned as leading to misfits were insufficient supply of IT personnel, lack of reliable software and hardware vendor support, and the difficulty of coordinating global IT development projects because of culture, language, local market size, and time zone differences.

The claim that external factors influence global IT decisions more than domestic decisions is supported by a host of other studies (e.g., Deans, et al., 1991; Roche, 1992b). The idea is that factors treated as constants in domestic projects, or even ignored altogether (e.g., language, culture, time zone, communication reliability), become variables to be considered in global projects. This entails added complexity and uncertainty that organizations find difficult to cope with. Some of these external factors such as governmental regulations are powerful, leaving organizations with little discretion (Hambrick and Finkelstein, 1987). Organizations that ignore or try to play down the importance of the environment run the risk of failing to adapt to it (Pfeffer and Salancik, 1978). Lachman, et al. (1994), for example, note, ". . . organizational adaptations to pressures and constraints by the environment are essential because organizations depend on their environment for necessary inputs and outputs" (p. 43). Environment can be de-emphasized only when it is favorable to the values and norms embedded in the business practices and systems (Rosenzeweig, 1994). The embedded systems values are likely to reflect not only the goals of the system, but also the personal values of their designers and champions (Dagwell and Weber, 1983; Kumar and Bjorn-Andersen, 1990). Since the designers and champions often come disproportionately from the headquarters, the systems tend to reflect the dominant nationality of the headquarters. In the diverse global context, the headquarter's values are likely to be more incongruent, on average, with the local foreign context than with the local domestic context. The "not invented here" and "unsuitable for our environment" arguments are hence likely to be heard more often across foreign subsidiaries than across domestic ones. Discussed next are the external factors.

Diversity of National Cultures

Differences in management and work practices increase in a global environment, where members of organizations come from more than one nationality and culture (Hofstede, et al., 1990). As social entities, the subsidiaries of multinationals "come to reflect the values, norms, and locally accepted practices of the societies in which they operate" (Rosenzweig and Singh, 1991, p. 345). Information systems "have built-in value biases reflecting the value priorities of the culture in which they are developed" (Kumar and Bjorn-Andersen, 1990, p. 535). For example, in Japan, cultural emphasis is on non-contractual arrangements, trust, and human relationships. This might at least partially explain the lack of IT use in Japan for monitoring, control, and evaluation purposes (Gurbaxani and Whang, 1991). By contrast, assuming a Western culture, IT can be seen largely as a

control and monitoring mechanism (Lee and Leifer, 1992). Hence, the distribution decisions of global IT have to take into account explicitly the highly heterogeneous cultural environments—the various culturally bound business practices, working patterns, and values.

Governmental Requirements

The global environment poses threats and obstacles that project managers do not often encounter within the United States. There are problems such as government import regulations, non-existence of copyright laws, unreliable power sources, and communication lines (Ives and Jarvenpaa, 1991). There are descriptions of how state-imposed controls can upset the natural balance of centralization and decentralization (Roche, et al., 1992). For example, some governments mandate local processing of all locally gathered data; this, in turn, requires the existence of a local data center. Regulations on transborder data flow (TDF) may also affect a distribution decision (Kand and Ricks, 1989). The recent privacy proposals from the European Community have been seen by some as a threat to centralized global information systems involving financial information about customers (Markoff, 1991). All in all, some factors of the global environment may influence distribution decisions in the direction of greater centralization (e.g., when needs for securing corporate databases are high), whereas others may influence it toward greater decentralization (e.g., when governments prohibit processing of certain data outside their borders or restrict the flow of information from country to country).

Other External Factors Affecting IS Service Capability

The ability to provide its organization with reliable and consistent computing and communications services is one of the major objectives of any IS function. Though the issues of reliable power sources and communication lines are taken for granted within the U.S., and high-quality IT support appears to be manageable, they can quickly become major impediments when global IT applications are involved (Ives and Jarvenpaa, 1991a). Global IT applications must be running 24 hours a day (midnight in the U.S. is midday somewhere else), posing major challenges for maintenance activities of centralized applications, which also require a third-shift support and a multilingual help desk (Bozman, 1992). By contrast, distributed systems might run into problems because of unreliable infrastructure, incompatible vendor offerings, or lack of skilled labor in some countries (Jarvenpaa and Ives, 1993).

Economics of Computing

During the early years of organizational computing, economic considerations were a major factor in determining a firm's IS distribution decision, particularly centralized computing decisions. The advent of mini-and microcomputer technology, however, changed the balance of the debate in favor of the decentralized approach (King, 1983). The importance of the economic factor seems to have dissipated through the years: "many organizations have chosen and stayed with less economical arrangements [of IS distribution]" (King, 1983, p. 337). However, early work on global IT has found that the search for scale economies in computing has been a very common initial driver for global IT applications (Ives and Jarvenpaa, 1991b; Roche, 1992b).

Figure 2 provides a schematic contest for the factors discussed above. Internal organizational characteristics (e.g., power, information processing, and communication requirements) are embedded in an economic context. In a broader context, cultural and other environmental factors affect the organization. The discussion above suggests that the importance of these external factors on IT solutions is greater in the global than in the domestic context. The next section describes the methodology used to assess this claim.

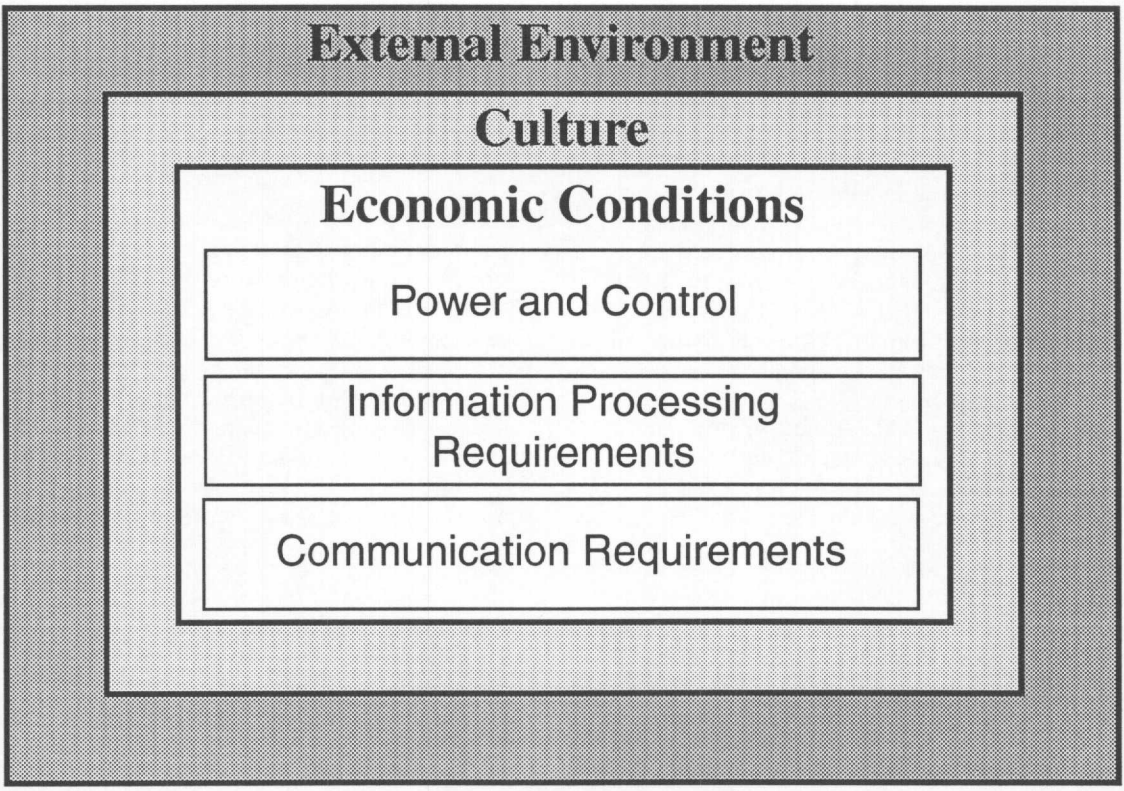

Figure 2. Factors Affecting IT Distribution Decision

Research Methodology

Before describing the research method, the reason for adopting a non-traditional approach to studying IT distribution decisions is outlined.

Respondents

Project managers were chosen as our informants because we assumed them to be experienced and up-to-date with many of the factors that affect the distribution decision. Choosing project managers entailed that the unit of analysis is a project rather than an organization. More specifically, the unit of analysis is the distribution decision of an IT application. The IT application distribution decision refers to the degree to which control over data, hardware, and processing logic of a specific application is distributed away from a central site toward the end user.

The main disadvantage of concentrating on project managers and therefore on the project level is the risk of losing important information on distribution decisions that are made at higher levels of the organization (e.g., architectural principles or standards). We believe that these risked are mitigated to an extent because the project managers are those who carry out organizational policies and thus should be familiar with them and their importance.

Method[2]

Q-methodology was used to pursue the possible variants in viewpoints among project managers with differing backgrounds. Q-methodology is recommended for in-depth study of con-

[2] Please contact either of the authors for the writeup on Q-methodology or for a copy of materials used in the interviews.

crete situations in which subjective judgments of a study's participants are of primary importance (cf., Brown, 1980; McKeown and Thomas, 1988; Stephenson, 1953). Although it is impossible to draw generalizations from Q-methodology with regard to the proportion of the population that shares certain views, it is, for example, quite useful in identifying relationships among the viewpoints of various population archetypes. Moreover, Q-methodology explicitly assumes that subjects' responses are subjective, and its use of various statistical techniques reflects this assumption. Next, the statements used in the Q-methodology (Q-Sample), the project managers who participated in the study (P-Sample), and the procedure for the field interviews are discussed.

Q-Sample

The Q-sample typically consists of 30 to 60 statements (i.e., items) to be rank-ordered according to a predefined (usually quasi-normal) distribution. A set of 41 statements (items) was first developed based on factors that were mentioned either by IS professionals[3] or by the IS literature as being important on the application's distribution decision. We pretested the statements with four Ph.D students, one MBA student, and one practitioner, all of whom had prior systems experience. The pretests led to various wording changes on the statements.

We then pilot-tested the Q-sample using the full study procedure (see below) with 18 project managers. Of the 18, eight had substantial international experience, having managed the development and implementation of systems with major international user communities and having experienced extended foreign assignments. They were asked to sort the statements in reference to a common one-page description of a procurement information system. Although all 18 managers completed the sort, two problems developed. First, they spent most of the interview sorting the cards, not discussing their rationale for the sort. The sorting was taking too much time, and many managers found it tiresome. Second, those who had never developed a procurement information system had trouble relating to it. Their confidence in their answers appeared to be much higher when they related their rationale to systems they had developed.

Based on the pilot, some items were stated more concisely, and redundancies were reduced. A few items were added for a new total of 33 (see Appendix A). The items added were ones that several project managers had identified as missing from our set. To verify the exhaustiveness of the final 33 statements, we asked each project manager in the main study whether other important items were left out. They mentioned no items that were not at least partially already covered. We also dropped the one-page project description.

P-Sample

In Q-methodology terms, P-Sample is the selection of people for a Q-study. Given our interest in contrasting the views of project managers experienced in developing and managing international IT application and those experienced only in domestic systems, participants were solicited primarily from firms with both extensive U.S. and international operations. This was to decrease variance in aspects that were not directly related to the study (such as the size of projects managed, organizational size, and corporate culture). It might also have restricted the range of study-related factors with which our global and domestic participants deal. For example, corporate culture and working procedures of all the participants might reflect those of global firms even for the domestic project managers. We therefore expected any results concerning differences between domestic and global project managers to be manifested conservatively.

Twenty-three firms' senior IS managers or systems development managers were contacted. Each was asked to provide two to five seasoned project managers with experience in large IS projects where systems had been implemented in multiple sites of plants, either

[3] None of these IS professionals were included in this study. The interviews were part of other studies conducted by the second author from 1990 to 1992.

domestically or globally. We wanted the project managers to fall into two categories: (1) those whose experience was primarily in a domestic context and (2) those who had had substantial experience in developing and managing systems used in multiple countries. Thirteen of the firms agreed to participate. The rest declined for reasons such as: No project managers who had international experience, no experience in multi-site systems, or a company policy prohibiting them from being involved in university research.

The participants in the main study were 47 experienced project managers drawn from 13 large companies in the Southwest. Seven of them had substantial experience (referred to as SG) in developing global systems in a multitude of countries outside North America (including multi-year assignments abroad). Twelve had played a major management role in developing a system implemented in multiple locations outside North America (referred to as G). Twenty-eight had only domestic experience (referred to as L). On average, the 47 managers had worked for their present employer for 11 years and served for the last seven years as a project manager or leader.

Procedure

Project managers were interviewed by one or two of the researchers for one to one-and-one-half hours each. After describing their role, background, and experience within the firm, they discussed the largest project they had managed during the past five years. Managers with global experience discussed their largest global project. They were then asked to sort the Q-statements to reflect a quasi-normal distribution of agreement with the statements (Appendix B includes the shape of the distribution as it was presented to the project managers). In sorting the statements, the participants were asked to respond to the following question: "How much importance should be given to this factor [statement] in determining the distribution of a new information system (the degree to which control for the application's data, hardware, and software is centralized or decentralized, or some compromise or combination of both)?" Subjects were asked to verbalize their thoughts when sorting the cards and to explain the rationale for their sorting after completing it. They were then asked to relate their rationale to the project they had described earlier in the interview.

Results

This section is based on two sources: analysis of the Q-sorts and the interviews with the project managers. The first analysis is based mainly on the 47 Q-sorts of the main study.[4]

Item rankings

The Q-sorts of project managers were analyzed first to understand the differential importance of the items (i.e., statements) in making distribution decisions at the project level. Table 1 reveals the Q-sort items, in descending order of importance based on the 47 responses, and the mean rank-order of each item for two groups: 19 project managers with global experience (SGs and Gs) and 28 project managers without any global experience (Ls). Below are some of the most salient observations from Table 1, supplemented with our interview notes.[5]

Overall ranking

The joint item ranking of the domestic and global project managers indicates that the most important items concerned decision making and control (Table 1). The five items that belong to this category were ranked in the top quartile. Also of significance were items related to information processing and communication requirements. Economic factors were ranked in the middle in regard to their importance. Factors

[4] The main findings of pilot study were in agreement with the findings of the main study.

[5] These observations cannot be tested statistically because the rankings were derived by means of a Q-sort, thereby violating the independence of individual item rating.

Table 1. Overall Item Means and Ranks, and Ranks by Groups— Main Study

Response Item	Overall Mean	Overall Rank	Global Rank	Local Rank
Criticality of the system for organization-wide coordination and control.	7.06	1	1	1
Ensuring data security.	6.83	2	4	2
Amount of data sharing and routine communication needed among organizational units.	6.81	3	3	3
Providing reliable and consistent services to all relevant units.	6.60	4	1	5
Capability for disaster recovery.	6.30	5	5	6
Local units' daily information requirements.	6.28	6	8	4
Criticality of the system for local units' responsiveness to their environment.	6.23	7	7	7
Degree of standardization required across the organization's operations.	6.00	8	13	8
Interdependence of local units' activities.	5.57	9	11	14
Providing the organizational units with information for 24 hours a day, 7 days a week.	5.55	10	6	17
Accessibility of local information by corporate management.	5.53	11	17	9
Minimizing software costs.	5.53	11	14	11
Diversity of information processing requirements among local units.	5.49	13	14	13
Top management's beliefs about how the company should be run.	5.45	14	10	15
Maximizing return from existing hardware and software base.	5.34	15	19	10
Minimizing hardware costs.	5.30	16	19	12
Minimizing communications costs.	5.19	17	16	15
Local units' ability to run independently.	5.02	18	9	23
Complying with government data sharing regulations.	4.87	19	11	25
Availability of IS expertise in local units.	4.64	20	21	19
Amount of non-routine and interpersonal communication needed among organizations units.	4.49	21	27	18
Computer literacy in organizational units.	4.45	22	22	24
Reducing and/or preventing backlogs of software development work.	4.32	23	24	22
Size of local units and their markets.	4.19	24	28	20
Local units' perceived need for independence.	4.15	25	26	26
Complying with government constraints on the purchase of computing equipment and services.	4.11	26	17	29
Differences in work ethics, practices, and conditions among organizational units.	4.02	27	24	27
Local versus corporate financial sponsorship of the system.	4.00	28	31	21
Cultural differences among organizational units.	3.68	29	28	28
Language differences among organizational units.	3.34	30	23	31
Industrial and economic development in areas where organizational units are located.	3.12	31	32	30
Stability of the government in areas where organizational units are located.	2.83	32	33	32
Use of different monetary systems among organizational units.	2.70	33	30	33

that related to the balance of power in the organization, to cultural diversity, and to the external environment were ranked toward the end of the list. Generally, there was agreement that meeting the information requirements of the business objectives and developing high reliability systems were key issues. One project manager argued that "business policy must drive the design decisions, not technology fads." Another stressed the importance of reliable service and secured data: "The reliability criterion must be met—or none of the other things matter," and "if you cannot secure the data, what's the value of the system?"

Among the least important were items that related to external issues such as cultural and language differences among organizational units and political instability. For example, several global managers explained that culture is largely an educational issue; once it is understood, it can be managed. Others saw the globalization of data as culturally independent. However, they still felt that the processing logic and the interfaces would need to be tailored to local legal requirements, cultures, and work practices. Overall, however, the combined data from both global and domestic managers suggest the low ranking of external items.

It was surprising to find that the four items pertaining to power and politics were ranked in the middle or bottom: 14th, 18th, 25th, 28th out of 33. Our respondents further explained: "Top management influences people's mind-set and the options they consider;" "politics gives you a range of tolerance—the boundaries within which you operate;" and "top management's beliefs mold the corporate culture." Several agreed that in the past they had a relatively narrow set of acceptable design options. Now the senior management had become somewhat more open-minded. Hence, though issues of power and politics were considered, they did not rank among the most critical items. One manager posited the following question: "If business requirements argue for a distributive application, should we put it on a mainframe because that fits with top management thinking of systems control?"

Domestic versus global ranking

We compared responses of the project managers with global experience (SG and G) to those of the managers without global experience (L). Both domestic and global groups emphasized internal over external factors in the top quartile of the ranked items (the first eight items in Table 1). In the top quartile, the two groups had seven overlapping items. All these factors were related to either internal information processing and communication requirements or to decision making and control considerations. The information processing and communication item that was in the top quartile of global—but not domestic—was "providing the organizational units with information for 24 hours a day, seven days a week." By contrast, the decision making and control item that was in the top quartile of domestic—but not global—managers was "degree of standardization required across the organization's operations."

In the second quartile, more differences existed between domestic and global groups. The global managers ranked two items related to the power balance between headquarters and local units higher than did the domestic managers: "local units' ability to run independently" and "top management's beliefs about how the company should by run." The domestic managers ranked "accessibility of local information by corporate management" higher than did the global managers. One global manager noted, "The corporate people would not know what to do with local data, even if they had access to it; to them, it is non-essential." An external item, "complying with government data sharing regulations" was in the second quartile of global—but not domestic—managers' rankings. By contrast, several items on economics appeared in the second quartile of domestic managers—but not global managers. Global managers appeared to de-emphasize costs because they saw IS applications as key enablers of doing business overseas. One manager remarked, "It is not just a matter of cost, but systems allowing you to be in markets you might not be in otherwise." Another mentioned, "International systems are integral, the life blood, to running our global business."

That is, project managers saw their companies investing in global systems because they were strategic (a necessity to continue doing business internationally) and hence were committed to them, regardless of costs. Other reasons were given for why costs were not important. One project manager acknowledged that in his company, costs were never rolled up on the global level. Another explained that because his company had no charge back to users in country units, any cost figures were extremely crude. Corporate international administration absorbed the costs of global systems.

Among managers with global experience, items under cultural diversity and external environmental constraints were ranked in the middle rather than in the high end. The highest ranking (11th out of 33) external environment item was "complying with government data sharing regulations," and the next highest item, "complying with government constraints on the purchase of computing equipment and services," was ranked 17th out of 33. Others such as the "industrial and economic development. . ." and "stability of the government. . ." were ranked much lower (31st and 32nd out of 33). Regarding transborder data flow, one global manager commented, "It is hard to get a handle on data privacy issues in Europe. You get a different answer, depending on who you ask." Another noted, "We run into difficulties with human resources systems in some countries but not in others." However, others explicitly stated that it had been a rare exception to run into data sharing regulations; moreover, one claimed "you should never develop for the lowest common denominator. Government rules can change under pressure." In complying with purchasing constraints, one global project manager explained that in his experience "government constraints cause a delay, but rarely cause a different type of architecture." Others disagreed. Yet they still did not rate the item high. One explained, "If there are government constraints on what hardware and software can be purchased, the decision is immediately made for you, so you don't even tend to think of it." Common comments regarding the low ratings of "government stability" and "industrial and economic development" were of the kind "Systems people tend to discount economic instability issues. We cannot do anything about them." Another remarked, "We did not care about economic instability until we ran into problems with hyper inflation in Brazil."

Looking at all 33 items, the ranking of several showed a clear difference between the two groups (see Table 2). Most notably, several items were ranked considerably higher by the global group than by the domestic group: government data sharing regulations; language differences among organizational units;[6] providing the organization with around-the-clock information; local units' ability to run independently; and government constraints on the purchase of equipment and services. Several global project managers mentioned the importance of balancing the needs of central and local units: "Your accommodate local requirements no matter what. If you don't accommodate, they will surely reject the system." Another stated, "We must accommodate at least some of the culturally motivated change requests to get cooperation." Others argued, "Often you have to manage central management and local management meeds with equal priority," and "local units have to feel independent to be responsive to their customers." However, the global group ranked as considerably less important than did the domestic group "accessibility of local information by corporate management," "local versus corporate financial sponsorship of the system," "amount of non-routine and interpersonal communication needed," and "size of local units and their markets."

Taken together, the differences in rankings across the two groups suggest tentatively that domestic managers appear to emphasize interdependence and standards among units as well as economics, whereas global managers appear to emphasize relatively more the independence of units and local units' ability to respond to their environment. One manager

[6] The issue of language was mitigated by many firms having a corporate language that all managers were expected to read and speak. Also, most of the global systems developed were for internal firm uses, not for interactions with customers, suppliers, or other external firm stakeholders.

Table 2. Most Notable Differences in Mean Rankings Between Global and Domestic Project Managers

Response Item	Global Managers Mean Ranking	Domestic Managers Mean Ranking
Items ranked *higher* by global project managers:		
• Providing the organizational units with information for 24 hours a day, 7 days a week	6	17
• Local units' ability to run independently	9	23
• Complying with government data-sharing regulations	11	25
• Complying with government constraints on the purchase of computing equipment and services	17	29
• Language differences among the organizational units	23	31
Items ranked *lower* by global project managers:		
• Accessibility of local information by corporate management	17	9
• Maximizing return from existing hardware and software base	19	10
• Local versus corporate financial sponsorship of the system	31	21
• Amount of non-routine and interpersonal communication needs	27	18
• Size of local units and their markets	28	20

acknowledged, "The headquarters will never be able to provide as good leadership and support to overseas locations as to domestic locations; the local units have to be able to help themselves. Also, while sharing across units is important, the local units have to be able to analyze their local market and respond accordingly." Another manager explained, "We try to make global IT solutions look non-corporate."

Different vantage points of project managers

After analyzing the relative importance of the items for the global and domestic groups, the Q-sorts were correlated and factors analyzed to allow the different vantage points of the project managers to emerge.[7] Four factors were extracted[8] (Appendix C); project managers can be viewed as "representatives" of the factors on which they are highly loaded.

The interpretation of the rotated factors was aided in two ways. First, the factor scores were calculated for the four factors (see Appendix D). Second, interview notes were consulted to shed more light on the possible meaning of each factor. We compared opinions of project managers who had similar loadings on a factor in order to find a common viewpoint. The opinions of project managers who had very low loadings, or negative loadings, on a factor were consulted in order to understand what is not the viewpoint expressed by that factor.

[7] The reader is reminded that in Q-sort, factors represent perspectives of individuals who performed a Q-sort. That is, people who have similar viewpoints with regard to the issue at hand are expected to be similarly loaded on the various factors. It is possible that people will agree on certain aspects of an issue, but not on others, in which case they will be similarly loaded on factors that represent their shared perspectives, but not on factors that represent views they do not share.

[8] The factors were rotated using the VARIMAX procedure so that each viewpoint is orthogonal to the others.

Table 3. Number of Project Managers in Each Factor by Manager's Experience

	Factor 1 31.8% "Technical Orientation"	Factor 2 8.6% "Control"	Factor 3 7.2% "Continuous Operations"	Factor 4 6.7% "Government Constraints"
Experience				
Substantial Global (7)	*1*	*0*	*2*	*1*
Global (12)	*3*	*2*	*2*	*1*
Domestic (28)	12	9	1	0
Total (47)	**16**	**11**	**5**	**2**

Table 3 presents the number of project managers with substantial loadings (more than 0.5) on each of the four factors, broken down by experience. The number of project managers that belong to each experience category appears in parentheses below the category label. Table 3 also contains the percentage of explained variance for each factor and a short label that reflects our interpretation of that factor.

An interesting observation is that project managers were not polarized with regard to the first two factors. That is, we found that virtually all of them were loaded on these factors from one end of the factor to its middle, but no one was loaded on the other end of the factor.[9] This means that most project managers share a substantial degree of agreement with respect to the most important aspects of IT distribution decisions, regardless of their background. Nevertheless, some differences do exist, and they are discussed below.

[9] The loadings of virtually all project managers ranged from high positives to very low negatives; there were no substantial negative loadings on these factors (see Appendix C).

Factor 1: Technical Orientation

We labeled the first factor "technical" (as opposed to "social"), to suggest that the viewpoint it represents stresses the traditional technical aspects of IT distribution decisions, which are dominated by the need to provide reliable and robust systems to support organizational decision making, information processing, and communication needs. "If the service is not reliant. . . if people cannot get to data when they need it, it doesn't do any good to anyone," said one project manager, who later added, "If the company needs to do something, culture won't stand in its way. It is just something we have to address." Indeed, scores of external factors (e.g., two items on governmental regulations) and those dealing with local requirements as opposed to interunit needs (e.g., diversity of information processing requirements among local units, criticality of the system to local units' responsiveness to their environment, local units' daily information requirements) were low among people who are loaded on Factor 1.

The interpretation of Factor 1 is consistent with the opposition to it, the more "social" approach of project managers, who regarded external and "soft" factors to be of relatively high impor-

tance. This approach is represented particularly by a project manager who said, "I used to think that the task-oriented things are most difficult. Now I thing the people-oriented issues are most important. . .Unless you accommodate and understand people problems, your project will be a failure. . . Your solutions must be acceptable to your customer's way of thinking. Culture alignment is most important." The people who loaded weakly on Factor 1 ("technical") appeared to be more cosmopolitan. They were aware of a wider, more diverse range of considerations that go beyond the traditional aspects of the distribution decision. They appeared to emphasize more the dissimilarity rather than the similarity of organizational units. And they appeared to be politically astute, emphasizing top management needs, "Top management pulls strings here. You have to be in alignment with them."

Of the 16 project managers who represented Factor 1 (i.e., loaded highly on Factor 1), 12 had only domestic experience (43 percent of domestic managers), and four had global experience (21 percent of global managers), implying a relatively higher proportion of domestic experience among people who loaded highly on Factor 1.

Factor 2: Control

The second factor was labeled "control." Highly loaded on this factor were project managers who stressed issues related to the organization's means to control its IT operations from a cost point of view. The project managers who loaded on this factor scored higher than the others on all of the four cost items. Yet, it appears that the cost issue is subordinated to the higher purpose of top management control over organizational resources. According to one such manager, "The cost pressure comes from organization power and government regulations . . . the directive is the maximum advantage of the existing technology base." Perhaps it is an issue of following top management directives: "We are simply implementors of high-level decisions." Another manager, also highly loaded on Factor 2, works in an IS department whose staff was reduced from 130 to 40 during the last seven years because of a depressed economy. In her words, "Currently we are vary cost conscious . . . [we] try to concentrate on the organization's needs rather than unit's and single users' [needs]." A third remarked, "Listening to top management does not always lead to the best system, but . . . it you don't have their support, you cannot implement your project." However, the project managers who loaded on this factor de-emphasized the needs of local units. The project managers had the lowest scores for items such as "local units' ability to run independently," "interdependence of local units' activities," and "cultural differences among organizational units." For example, one project manager uttered, "Local units do not have perceived needs. Management tells them what their needs are."

By contrast, project managers who did *not* load on Factor 2 stressed issues such as units' need to be responsive to their environment while minimizing the importance of top management access to local units' information. One such project manager said, "I do not care about [top] management philosophy; top management philosophy rides on fads, not on business needs," and "I oppose micromanagement by top management." She also said, "I am not a financial person: hardware costs are less important than people." Another remarked, "To me, the most important element is allowing the local units to be responsive to their problems and opportunities. The trend is toward more decentralized solutions. We need to improve the local units' flexibility." Another project manager who did not load on Factor 2 emphasized, "If the local units thousands of miles away from corporate headquarters do not want the application, corporate is not going to be successful in forcing the application."

Similar to Factor 1, a higher proportion of domestic project managers (nine out of 28, or 32 percent) loaded on Factor 2 relative to global managers (only two out of 19, or 11 percent). In summary, Factors 1 and 2 were more representative of domestic project managers' viewpoints than those of global managers.

By contrast, Factors 3 and 4 are more reflective of vantage points of global project managers. Factor 3 is represented by four global project managers and only one domestic; both global project managers who loaded on Factor 4 had global experience. One interesting item where Factors 1 and 2 differ from Factors 3 and 4 is "criticality of the system for organization-wide coordination and control." On average, this was the most important item for the 47 project managers (see Table 1). Yet, it appears that project managers who loaded on Factors 3 and 4 saw it as relatively less important.

Factor 3: Continuous Operations

Project managers who loaded on Factor 3 stressed issues related to the application's smooth and continuous operations. As one member of this group put it, because of the time difference, "Between Dallas and Tokyo, the system cannot be down." Another global manager said, "First, we wanted to standardize all countries [on the same application] and then have a system [that] runs 24 hours, seven days [a week]."

The project managers who loaded highly on Factor 3 stand out in the relative importance that they placed on some external items. They ranked the following items in about the middle, whereas other project managers ranked them very low: industrial and economic development in areas where organizational units are located and language differences among organizational units. However, they rated relatively low other external items such as computer literacy in organizational units and the availability of IS expertise in local units. Perhaps the first two items (industrialization and language) represent difficulties that are harder to overcome in the short term, whereas the latter tow items (computer literacy and IS expertise) might be more easily overcome by means of personnel transfers and structural solutions such as setting up a centralized global IS development and support organization.

For example, one global project manager with this viewpoint headed an international development team of seven people. His team had no permanent home base; instead, its members flew all over the world installing and upgrading common systems of order processing, shipping, invoicing, sales, product analysis, and so on. The lack of IS expertise in many local units was addressed by the existence of his flying IT team, selecting robust commodity technology for the applications, and "design[ing] systems that did not require computer specialists to be around." According to him, the main goal of the global systems was to have "applications that ran 24 hours, seven days" and "standardize all countries on key information."

Factor 4: Government Constraints

Two project managers, both with global experience, represented Factor 4. The most salient items in this viewpoint relative to the other three were those concerning government regulations and constraints: complying with government data sharing regulations and complying with government constraints on the purchase of computing equipment and services. "No matter what we think, we have to comply with government regulations," said one project manager. Another one concurred, "Even if you get management approval for the system, but not the government's, you still cannot do anything." He claimed that the nature of the application makes a difference here; governmental regulations tend to be more specific on communications technology than on computing technology.

Two other items in which these two project managers stood out relative to the other project managers concern the issue of power balance in the organization. This group had the highest scores on the items "local units' perceived need for independence," and "top management's beliefs about how the company should be run." Taken together with the emphasis put on government regulation, it appears that this viewpoint is characterized by project managers aware of the political forces at work around the systems development process, both within and outside the organization, and their potential effects.

Discussion

This study was motivated by the existence of two rival positions concerning the effects of globalization on IT management. One school of thought proposes that managing IT in a global context is largely the same as managing IT in a domestic context (the "Global is Similar" school) and the other proposes that there is a difference (the "Global is Different" school). The results suggest that internal factors dominated distribution decisions on the project level in both the global and domestic contexts. At first reading, our findings might be interpreted to support the "Global is Similar" school. For example, the results appear consistent with Emery's (1990) claim that "the domestic versus international dimension should be simply another parameter in the general vie of information systems" (p. iv). Some elements stand at the core of the application distribution in both U.S. domestic operations and the international operations of the U.S.-headquartered firms. These core elements are related to organizational decision making and control as well as information processing.

Yet, the picture is more complex than what it might at first appear. Project managers with global experience tended to hold different viewpoints than did their domestic counterparts. The differing viewpoints, coupled with across-the-board agreement on core elements, suggest that IT professionals who have experience managing projects in a global environment do have a broader and more "social" vantage point of the distribution process. The global project managers are more cosmopolitan: they tend to consider aspects of the distribution decision that go beyond traditional control and information processing and communication issues to consider the variability of the external environments across borders. The internal issues also take a shape that inherently crosses boundaries with the external environment. The global managers ranked much higher than the domestic managers the requirement for 24-hour information and communication services and the local units' ability to be independent of and responsive to their own environments. The domestic project managers, by contrast, tended to view the distribution decision as a technical issue and did not consider power, cultural, and regulatory issues.

The answer to the question of what difference globalization makes to IT decisions depends, we believe, on some properties of the global context itself: variety, familiarity, and complexity. As there is an increase in scope and quantity of factors relevant to IT distribution decisions in particular, and to other IT issues in general, the more there is a difference between domestic and global IT. In other words, the "Global is Different" viewpoint appears to gain increasing support the more the following conditions are true: (a) a global IT system is to be implemented across countries that vary in their global context; (b) more factors and hence more relationships among factors are relevant to making application-related decisions (i.e., fewer factors can be ignored); and (c) the project manager is more familiar with this variety and complexity. These three factors—variety, complexity, and unfamiliarity—are highly interrelated. The complexity increases as variety increases, and the difficulty in managing complexity increases with the lack of familiarity with the cultural, economical, legal, and political aspects of the countries involved.

The first contingency factor, variety, refers to the degree to which the application involves a set of countries that vary significantly on the dimensions constituting the global context (e.g., government regulations, culture, availability of IS personnel, geographic locations). For example, a project manager with most of his experience in the U.K. and Europe belittled the importance of national culture (his firm is a large petrochemical conglomerate), "What matters more than the culture of the country is the culture of the discipline [chemical versus production]." Several European countries share, relatively speaking, similar cultural elements with the U.S., particularly when compared with countries on other continents. The lack of variety in cultural contexts will promote the "Global is Similar" viewpoint. In contrast, a project manager for a large computer manufacturer was dazed by the cultural differences among distributors in Europe, Australia, and Japan. These differences seemed critical in the firm's decision to decentralize many of its IT applications on

the country level. This reversed an earlier decision of centralized IT field support when the firm had operations only in North America and Europe. An increase in the variety of the firm's operating environments promoted the "Global is Different" school.

The second contingency factor, complexity, increases with an increase in the number of relevant factors that interact in a system decision. A culture is a good example. Hofstede, et al. (1990) maintains, "Organization cultures reflect nationality, demographics of employees and managers, industry and market; they are related to organization structure and control systems; but all of these leave room for unique and idiosyncratic elements" (p. 311). In the global context, these different elements affecting culture are likely to vary from one local site to another. Hence, global project managers have to deal with more factors, consider more interrelationships among those factors, and weigh more potential effects on the final product. The more they are willing and able to deal with this complexity arising from local context, the more they tend to see a difference between domestic and global IT.

Familiarity is a third contingency impacting how different global IT management is from domestic IT. The global context introduces a series of issues that may not be familiar to a project manager. Neither traditional IS education nor living in a homogeneous environment prepare one to deal with multiplicity of languages, work practices and ethics, and government regulations—some of which might be based on a totally unfamiliar philosophy of politics and behavior. A project manager who spent some time implementing an application in an Asian country was surprised to find out that people's attitude toward their jobs was much different from what he had grown accustomed to in the U.S. This meant that work was done slower, reports were not as reliable, and so on. Workers had a strong sense of local patriotism, despite being employees of the same firm. The global context conceals many such surprises to an unprepared project manager. For example, government regulations concerning the use of certain hardware or handling transborder data flow change not only from country to country, but also from time to time within countries. Many of the unfamiliar factors might be dismissed because of ignorance. One project manager recalled how, after implementing an application, he had been informed that the application violated local country laws; he had not known enough to ask about such law. Unfamiliarity breeds uncertainty of how to respond, what the options are, and the likely outcomes of options. Unfamiliarity masks the variety and complexity of the global contexts and hence promotes the "Global is Similar" school. By contrast, familiarity of the variability and complexity of differing local environments promotes the "Global is Different" school.

The above contingency argument seems to be in accordance with the expectations of the resource dependence theory. The theory suggests the following: The effective organization is one which responds to the demands from its environment according to its dependence on various components of the environment" (Pfeffer and Salancik, 1978, p. 84). At the project level, this study found that global project managers are more attentive to external items than the domestic managers. Surviving the variability and complexity of the global environment might demand that an organization, at both project and senior management levels, is familiar and should pay more attention to the unique local demands and constraints.

Implications for practice and education

Global firms, wishing to improve systems development decisions and practice, are challenged to accommodate pressures posed on global project managers by the global contexts' variety, complexity, and unfamiliarity. Our study suggests that broadening project managers' views of the local development contexts is likely to be a major discriminating factor between global project managers and those who lack such global experience.

Developing a cadre of global project managers calls for the upgrading of the firm's personnel functions. Firms competing across borders are

only as transnational as their managers and their resource policies (Adler and Bartholomew (1992). Global management [including global technology management] is a frame of mind, not a particular organization design (Bartlett and Ghoshal, 1989). This holds implications both for recruiting and training systems developers and project managers (Denning, 1992; Keen, 1992).

Global firms recruiting for the new breed of IT professionals will probably have to look for hiring outside their home country. Most notably, firms might recruit IT professionals globally to compensate for shortages in adequate recruits. In addition, such a recruiting policy is likely to increase heterogeneity and diversity among the firm's IT professionals, building more versatile IT cadres and providing team members with a first-hand experience of various aspects of the global environment.

In another vein, global firms need to embark on training programs to "cosmopolitanize" their project managers. Clearly, educating all project managers with the finest detail of every potential global factor that might impact or interfere with their work is an unnecessary, even impossible task.

Therefore, the two-tier approach might be useful for educating and training global project managers. In the first, more general tier, project managers should be sensitized to the existence of other working environments (i.e., in different countries) and to the possibility that these environments differ on various factors (e.g., in different countries) and to the possibility that these environments differ on various factors (e.g., technical, cultural, economical, political, regulatory). Such a program of increasing awareness of potential differences might serve as a first step toward broadening IT professionals' views of global projects and increasing their sensitivity to potential pitfalls in the global environment.

In the second tier, more specific training programs should be offered when IT professionals are assigned to manage specific global projects. In this case, a more focused training program should be put in place that concentrates on the factors that characterize the countries involved in the particular project. Such programs need not be made on the fly. Rather, a firm could compile in advance a global-factors inventory for each country in which it operates or foresees itself operating. A specific training program can be generated from that inventory and be adopted to the specific project.

Besides training and development programs that increase project managers' sensitivity to the different technical, social, and political contexts and their ability to interact with managers from different historical and cultural backgrounds, they should be introduced gradually to global projects. Just as they generally assume responsibility to increasingly larger and more complex projects, so should they gradually assume responsibility for global projects that involve less familiar and more varied settings.

In addition, an organization might deal with the increased complexity and variability of the global context by shifting responsibility for many of the issues from the project manager to the higher management levels of the organization. Thus, organizational IT policy might address many of the global issues, define procedures for managing global projects, and determine the circumstances under which project managers might be in the best position to deal with the external factors.

Limitations and future research

The revealed differences in emphases between global and domestic project managers, as they appear in this study, mark only the lower bound for the actual differences. First, all of the participants in the study came from global firms, so that even domestic project managers might have been exposed in one way or another to their global context. Second, our sample is biased toward organizations that are relatively centralized in the approach to managing technology globally; highly decentralized global companies have few common or similar IT applications across country operations (Jarvenpaa and Ives, 1993). Third, the global managers in the study were all from U.S.-based multinationals in manufacturing industries. Future studies from the other perspectives (i.e., through the eyes of the units abroad) might

reveal misperceptions, missed opportunities, and miscalculations of the global project managers, which will lend more support to the "Global is Different" school.

Future studies would also benefit from investigating a more focused decision. We opted for quite a general definition of the application distribution decision because we felt that we could not afford to increase the complexity of our interviews. As previous studies have shown, though, a more multidimensional approach toward distribution decisions (e.g., hardware versus software versus data) can often gain new insights (King, 1983; Olson and Chervany, 1980). A focused investigation would also help in exploring the implications of specific design decisions to different local contexts.

Further research on how and at what level the external items enter the IT management decisions is needed. Various contingencies that affect the importance of items should be studied. For example, the relative influence of national and industry (e.g., manufacturing and service) items should be examined. The size of the organization is another contingency. Large multinationals, as opposed to small ones, can develop slack to buffer themselves from environmental constraints and particularly from environmental fluctuations (Lachman, et al., 1994).

Future research should continue to take a process-oriented view of the distribution decision. In this study, we were able to explore the different vantage points of managers. Future work should explore issues such as the impact of different organizational IT distribution approaches on successful global IT operations. Additionally, the validity of global project managers' perceptions of the importance of external items should be further investigated and compared with those of their supervisors on the one hand and their overseas subordinates and colleagues on the other hand. One might also study whether individuals with certain vantage points get global assignments or whether the assignments shape their vantage points.

Another area where more work is needed is studying which IT models and theories have universal applicability. For example, culture and language may not alter the technical design, but may significantly affect the functional requirements of the applications. The recent work of Rosenzweig (1994) promotes the view of Kiggundu, et al. (1983) that theories and relationships have universal applicability as long as the phenomenon is restricted to closed technical systems. In situations of open socio-technical systems, variables, relationships, and management practices are culturally bound.

Conclusion

In conclusion, as Kuhn (1970) tells us, it is not surprising to find that researchers in an academic field are polarized in their views. Such polarity arises not only because the process of early fact-gathering is "a far more nearly random activity than the one that subsequent scientific developments make familiar" (p. 15), but also because researchers bring to their interpretation of the phenomenon their own intellectual histories, analytical approaches, and research tools. We suspect that the debate over IT globalization is not exceptional in this regard. The results of this study lend some support to one camp—namely, that there is no substantial difference between global and domestic IT in regard to the most important factors in IT distribution decisions. Yet, the differences in project managers' vantage points suggest an intermediate view of global IT. We have proposed that these conditions depend on three variables: variety, familiarity, and complexity. Future research should concentrate on studying these variables and their effects on managing IT across borders.

References

Adler, N.J. and Bartholomew, S. "Managing Globally Competent People," *Academy of Management Executive* (6:3), 1992, pp. 52–65.

Aharoni, Y. and Burgon, R.M. "Is Management Science International: In Search of Universal Rules," *Management Science* (40:1), January 1994, pp. 1–3.

Ahituv, N., Neumann, S., and Zviran, M. "Factors Affecting the Policy for Distributing Computing

Resources," *MIS Quarterly* (13:4), December 1989, pp. 389–401.

Bartlett, C.A. and Ghoshal, S. *Managing Across Borders: The Transnational Solution*, Harvard Business School Press, Boston, MA, 1989.

Bjorn-Andersen, N., Eason, K., and Robey, D. *Managing Computer Impact: An International Study of Management and Organizations*, Ablex Publishing Corporation, Norwood, NJ, 1986.

Bozman, J.S. "Data Center Maintenance: There's No Time for Downtime," *Computerworld*, April 13, 1992, pp. 1, 14.

Brown, S.R. *Political Subjectivity*, Yale University Press, New Haven, CT, 1980.

Brown, C.V. and Magill. S.L. "Alignment of the IS Functions With the Enterprise: Toward a Model of Antecedents," *MIS Quarterly* (18:4), December 1994, pp. 371–403.

Cash, J.I., McFarlan, W.F., and McKenney, J.L. *Corporate Information Systems Management*, Irwin, Homewood, IL, 1988.

Chandler, A.D. "The Enduring Logic of Industrial Success," *Harvard Business Review*, March–April 1990, pp. 130–140.

Daft, R. and Lengel, R. "Organizational Information Requirements, Media Richness and Structural Design," *Management Science* (32:5), May 1986, pp. 554–571.

Daft, R., Lengel, R., and Trevino, L. "Message Equivocality, Media Selection, and Managerial Performance: Implications for Information Systems," *MIS Quarterly* (11:3), September 1987, pp. 355–366.

Dagwell, R. and Weber, R. "Systems Designers' User Models: A Comparative Study and Methodological Critique," *Communications of the ACM* (1983), pp. 987–997.

Davis, G.B. and Olson, M.H. *Management Information Systems: Conceptual Foundations, Structure, and Development*, McGraw-Hill Book Company, New York, NY, 1985.

Deans, P.C., Karwan, K.R., Goslar, M.D., Ricks, D.A., and Toyne, B. "Identification of Key International Information Systems Issues in U.S.-Based Multinational Corporations," *Journal of Management Information Systems* (7:4), Spring 1991, pp. 27–50.

Denning, P.J. "Educating a New Engineer," *Communications of the ACM* (35:12), December 1992, pp. 82–97.

Doktor, R., Tung, R.L., and von Glinov, M.A. "Incorporating International Dimensions in Management Theory Building," *The Academy of Management Review* (16:2), April 1991, pp. 259–261.

Emery, J.C. "MIS and Global Organizations," *MIS Quarterly* (14:1), March 1990, pp. iii–iv.

Feldman, M.S. and March, J.G. "Information in Organizations as Signal and Symbol," *Administrative Science Quarterly* (26), June 1981, pp. 171–186.

Galbraith, J.R. *Designing Complex Organization*, Addison-Wesley, Reading, MA, 1973.

George, J.F. and King, J.L. "Examining the Computing and Centralization Debate," *Communications of the ACM* (34:7), July 1991, pp. 63–72.

Goodhue, D.L., Wybo, M.D., and Kirsch, L.J. "The Impact of Data Integration on the Costs and Benefits of Information Systems," *MIS Quarterly* (16:3), September 1992, pp. 293–311.

Gurbaxani, V. and Whang, S. "The Impact of Information Systems on Organizations and Markets," *Communications of the ACM* (34:1), January 1991, pp. 59–73.

Hambrick, D.C. and Finkelstein, S. "Managerial Discretion: A Bridge between Polar Views of Organizational Outcomes," *Research in Organizational Behavior* (9), 1987, pp. 369–406.

Hamilton, A. "The Financial Revolution," *The Free Press*, New York, NY, 1986.

Hofstede, G., Neuijen, B., Ohayv, D.D., and Sanders, G. "Measuring Organizational Cultures: A Qualitative and Quantitative Study across Twenty Cases," *Administrative Science Quarterly* (35), 1990, pp. 286–316.

Huber, G.P. "A Theory of the Effects of Advanced Information Technologies on Organizational Design, Intelligence, and Decision Making," *Academy of Management Review* (15:1), 1991, pp. 47–71.

Ives, B. and Jarvenpaa, S.L. "Applications of Global Information Technology: Key Issues for Management," *MIS Quarterly* (15:1), March 1991a, pp. 33–49.

Ives, B. and Jarvenpaa, S.L. "Wiring the Stateless Corporation: Empowering the Drivers and Overcoming the Barriers," *SIM Network*, September/October 1991b.

Jarvenpaa, S.L. and Ives, B. "Organizing for Global Competition: The Fit of Information

Technology," *Decision Sciences* (24:3), 1993, pp. 547–580.

Kane, M.J. and Ricks, D.A. "The Impact of Transborder Data Flow Regulations on Large United States-based Corporations," *Columbia Journal of World Business* (24), Summer 1989, pp. 23–29.

Karimi, J. and Konsynski, B.R. "Globalization and Information Management Strategies," *Journal of Management Information Systems* (7:4), Spring 1991, pp. 7–26.

Kedia, B.L. and Bhagat, R.S. "Cultural Constraints on Transfer of Technology Across Nations: Implications for Research in International and Comparative Management," *Academy of Management Review* (13:4), 1988, pp. 559–571.

Keen, P.G.W. *Shaping the Future: Business Design Through Information Technology*, Harvard Business School Press, Boston, MA, 1991.

Keen, P.G.W. "Planning Globally: Practical Strategies for Information Technology in the Transnational Firm," in *The Global Issues of Information Technology Management*, P. Palvia, S. Palvia, and R. Zigli (eds.), Idea Group Publishing, Harrisburg, PA, 1992.

Kiggundu, M.N., Jorgensen, J.J., and Hafsi, T. "Administrative Theory and Practice in Developing Countries: A Synthesis," *Administrative Science Quarterly* (28), 1983, pp. 66–84.

King, J.L. "Centralized Versus Decentralized Computing: Organizational Considerations and Management Options," *Computing Surveys* (15:4), December 1983, pp. 319–349.

Kling, R. "Automated Welfare Client-Tracking and Service Integration: The Political Economy of Computing," *Communications of the ACM* (21:6), June 1978, pp. 484–493.

Kuhn, T.S. *The Structure of Scientific Revolutions* (2nd ed.), The University of Chicago Press, Chicago, IL, 1970.

Kumar, K. and Bjorn-Andersen, N. "A Cross-Cultural Comparison of IS Designer Values," *Communications of the ACM* (33:5), May 1990, pp. 528–538.

Lachman, R., Nedd, A., and Hinings, B. "Analyzing Cross-National Management and Organizations: A Theoretical Framework," *Management Science* (40:1), January 1994, pp. 40–55.

Lee, S. and Leifer, R.P. "A Framework for Linking the Structure of Information Systems with Organizational Requirements for Information Sharing," *Journal of Management Information Systems* (8:4), Spring 1992, pp. 27–44.

Leifer, R. "Matching Computer-Based Information Systems with Organizational Structures," *MIS Quarterly* (12:1), March 1988, pp. 63–73.

Markoff, J. "Europe's Plans on Privacy Upset Business," *New York Times*, 1991, p. C4.

Markus, M.L. "Power, Politics, and MIS Implementation," *Communications of the ACM* (26:6), 1983, pp. 430–444.

Markus, M.L. "Toward a Critical Mass Theory of Interactive Media-Universal Access, Interdependence, and Diffusion," *Communication Research* (14:5) 1987, pp. 491–511.

Markus, M.L. and Robey, D. "The Organizational Validity of Management Information Systems," *Human Relations* (36:3), 1983, pp. 203–226.

McKeown, B. and Thomas, D. *Q Methodology*, Sage University Paper Series on Quantitative Applications in the Social Sciences, 07–066, Sage Publications, Beverly Hills, CA, 1988.

Mintzberg, H. "Patterns in Strategy Formation," *Management Science* (24), May 1978, pp. 934–948.

Moynihan, T. "What Chief Executives and Senior Managers Want From Their IT Departments," *MIS Quarterly* (14:1) , March 1990, pp. 15–25.

Olson, M.H. and Chervany, N.L. "The Relationship Between Organizational Characteristics and the Structure of the Information Services Function," *MIS Quarterly* (4:2), June 1980, pp. 57–68.

Orlikowski, W.J. and Robey, D. "Information Technology and the Structuring of Organizations," *Information Systems Research* (2) June 1991, pp. 143–169.

Pfeffer, J. and Salancik, G.R. *The External Control of Organizations: A Resource Dependence Perspective*, Harper and Row, New York, NY 1978.

Roche, E.M. *Managing Information Technology in Multinational Corporations*, Macmillan Publishing Company, New York, NY, 1992a.

Roche, E.M. "Managing Systems Development in Multinational Corporations: Practical Lessons from Case Studies," in *The Global Issues of Information Technology Management*, S. Palvia, P. Palavia and R. Zigli (eds.), Idea Group Publishing, Harrisburg, PA, 1992b.

Roche, E.M., Goodman, S.E. and Chen, H. "The Landscape of International Computing," in *Advances in Computers*, Volume 35, M.C. Yovits (ed.), Academic Press, Harcourt Brace Jovanovich, Boston, MA, 1992.

Rockart, J.F. and Short, J.E. "IT in the 1990s: Managing Organizational Interdependence," *Sloan Management Review*, Winter 1989, pp. 7–17.

Rosenzweig, P.M. "When Can Management Science Research be Generalized Internationally?" *Management Science* (40:1), January 1994, pp. 28–39.

Rosenzweig, P.M. and Singh, J.V. "Organizational Environments and the Multinational Enterprise," *Academy of Management* Review (16:2), April 1991, pp. 340–361.

Salancik, G.R. and Pfeffer, J. "Who Gets Power—And How They Hold on to It: A Strategic-Contingency Model of Power," *Organizational Dynamics*, Winter 1977, pp. 3–21.

Selig, G.J. "A Framework for Multinational Information Systems Planning," *Information & Management* (5) June 1982a, pp. 95–115.

Selig, G.J. "Approaches to Strategic Planning for Information Resource Management (IRM) in Multinational Corporations," *MIS Quarterly* (6:2), June 1982b, pp. 33–45.

Siong Neo, B. "Information Technology and Global Competition," *Information & Management*, (20), 1991, pp. 151–160.

Stephenson, W. *Study of Behavior*, University of Chicago Press, Chicago, IL, 1953.

Rushman, M.L. and Nadler, D.A. "Information Processing as an Integrating Concept in Organizational Design," *Academy of Management Review* (3:3), 1978, pp. 613– 624.

von Simson, E.M. "The `Centrally Decentralized IS Organization," *Harvard Business Review* (4), July–August 1990, pp. 158–162.

Watson, R.T. and Brancheau, J.C. "Key Issues in Information Systems Management: An International Perspective," *Information & Management* (20), 1991, pp. 213–223.

Zmud, R.W., Lind, M.R., and Young, F.W. "An Attribute Space for Organizational Communication Channels," *Information Systems Research* (1:4), 1990, p. 440–457.

About the Authors

Noam Tractinsky is a lecturer of information systems at the Department of Industrial Engineering and Management, Ben Gurion University. He received his Ph.D. from the University of Texas at Austin in 1993. His current research interests include computer-supported decision making, global information systems, human-computer interaction, and computer-mediated flow of information between citizens and government agencies.

Sirkka L. Jarvenpaa is an associate professor of information systems at the University of Texas at Austin. She served as a Marvin Bower Fellow at Harvard Business School the calendar year of 1994. She received her Ph.D. in management information systems and her M.B.A. from the University of Minnesota. Dr. Jarvenpaa serves as the associate editor for the following journals: *Management Science*, *Information Systems Research*, *MIS Quarterly*, *DataBase*, and *Journal of Computer-Mediated Communication*. Dr. Jarvenpaa has published over 30 articles and numerous case studies. Her current research projects focus on global information technology, electronic commerce, and the use of IT in radical organizational transformations.

Appendix A

33 Q-Sort Items for the Study[10]

I. Power Balance Between Local and Corporate Organizational Units

1. Local units' perceived need for independence.
2. Top management's beliefs about how the company should be run (Feldman and March, 1981; Davis and Olson, 1985).
3. Local units' ability to run independently (King, 1983).
4. Local vs. Corporate financial sponsorship of the system.

II. Information Processing and Communication Requirements

1. Diversity of information processing requirements among local units (King, 1983).
2. Interdependence of local units' activities (Galbraith, 1973).
3. Providing reliable and consistent services to all relevant units (Ives and Jarvenpaa, 1991a).
4. Local units' daily information requirements (King, 1983).
5. Amount of data sharing and routine communication needed among organizational units (Galbraith, 1973; Daft and Lengel, 1986).
6. Amount of non-routine and interpersonal communication needed among organizational units (Galbraith, 1973; Daft and Lengel, 1986).
7. Providing the organizational units with information for 24 hours a day, seven days a week (Ives and Jarvenpaa, 1991a).
8. Reducing and/or preventing backlogs of software development work (Davis and Olson, 1985).

III. Decision Making and Control Considerations

1. Degree of standardization required across the organization's operations (Karimi and Konsynski, 1991).
2. Criticality of the system for organization-wide coordination and control (King, 1983).
3. Criticality of the system for local units' responsiveness to their environment (von Simson, 1990).
4. Capability for disaster recovery (Davis and Olson, 1985).
5. Ensuring data security (Davis and Olson, 1985).
6. Accessibility of local information by corporate management (Galbraith, 1973; Karimi and Konsynski, 1991).

IV. Economic Considerations

1. Minimizing hardware costs.
2. Minimizing communications costs.
3. Maximizing return from existing hardware and software base.
4. Minimizing software costs.

   (The need to minimize computing costs in general is presented in King, 1983).

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[10] The categories (e.g., power balance between local and corporate unit) were only introduced to improve the readability of this appendix. The items were categorized on the common sense basis. The project managers did not deal with the categories, only with the items. This paper is not about categorization and the validation of categorization.

V. Cultural Diversity

1. Cultural differences among organizational units (Kane and Ricks, 1989; Kedia and Bhagat, 1988).
2. Language differences among organizational units (Cash, et al., 1988).
3. Differences in work ethics, practices, and conditions among organizational units (Kedia and Bhagat, 1988).
4. Computer literacy in organizational units.

VI. External Environmental Constraints

1. Complying with government data sharing regulations (Ives and Jarvenpaa, 1991a).
2. Complying with government constraints on the purchase of computing equipment and services (Ives and Jarvenpaa, 1991a).
3. Industrial and economic development in areas where organizational units are located.
4. Stability of the government in areas where organizational units are located.
5. Size of local units and their markets (Cash, et al., 1988).
6. Use of different monetary systems among organizational units.
7. Availability of IS expertise in local units (Ives and Jarvenpaa, 1991a).

Appendix B

Instructions for Q-Sort

In front of you are 33 items. They represent factors that have all been proposed as having importance in influencing where the control for an information system should be (for instance, a single firm-wide solution versus solutions determined at the departmental level). Your goal is to rate these items based on your understanding of their relative importance in making this decision. You will position the proposed factors according to the scheme in the figure. In placing each item, you should respond to the following question:

How much importance should be given to this factor in determining the distribution of a new information system (the degree to which control for the application's data, hardware, and software is centralized or decentralized, or some compromise or combination of both)?

		Least Important		**Neutral**		**Most Important**		
-4	-3	-2	-1	0	+1	+2	+3	+4
item	item	item	item	item	item	item	item	item
item	item	item	item	item	item	item	item	item
	item	item	item	item	item	item	item	
		item	item	item	item	item		
			item	item	item			

Appendix C

Factor Loadings for Q-Sorts

Project managers' experience* and factor loadings**

* SG=substantial global experience, G=global experience, L=local experience only.

** To improve readability, only loadings of 0.5 and above are reported.

Global/Local	Factor 1	Factor 2	Factor 3	Factor 4
SG			.672	
SG				
SG			.542	
SG				
SG				.797
SG	.590			
SG				
G		.719		
G	.537			
G		.619	.569	
G			.536	
G	.601			
G				
G	.639			
G				.558
G				
G				
G				
G				
L				
L				
L				
L	.602			
L			.705	
L		.612		
L	.501			
L				
L				
L	.517			
L	.606			
L		.649		
L				
L	.517	.599		
L	.725			
L	.730			
L	.648	.577		
L		.745		
L		.619		
L		.740		
L				
L	.759			
L		.612		
L	.722			
L	.510			
L	.664			
L		.607		

Appendix D

Assigning Factor Scores

The scores of project managers that represented a particular viewpoint were merged for each of the 33 items in the Q-sort. The higher the loading of a person on a factor, the higher the weight of his/her individual score in composing the group's average. Because there was a different number of project managers on each factor, the scores were then normalized within a factor, yielding the same mean (0) and standard deviation (1) for each factor, to facilitate comparisons among factors. For convenience, we assigned numbers for the normalized scores that corresponded to the distribution chart that the project managers had to follow while sorting the items (see Appendix B). For example, the two highest normalized scores in each factor were assigned a +4, the next three were assigned a +3, the next four were assigned a +2, and so on until the lowest two scores were assigned a score of -4. The process generated four new, synthetic Q-sorts, each of which represented different viewpoints of the IT distribution decision. The scores of the 33 items were then analyzed for each of the four factors and compared with the scores of the other factors. Large differences in scores of an item between factors (about 3 points) or an extreme item score (i.e., 4 or 3), suggested an item that could help to define a factor to distinguish it from other factors. (A detailed discussion of the process of calculating final factor scores is presented in Brown, 1989, p. 239-247.)

Final Scores for Factors 1, 2, 3, and 4

Category	Factor 1	Factor 2	Factor 3	Factor 4
I. Power Balance				
1. Local units' perceived need for independence.	-2	-2	-3	2
2. Top management's beliefs . . .	0	1	-2	3
3. Local units' ability to run independently.	1	-1	0	0
4. Local versus corporate financial sponsorship . . .	0	0	-4	-3
II. Information Processing and Communication Requirements				
1. Diversity of information processing requirements . . .	3	0	2	-2
2. Interdependence of local units' activities.	2	-1	1	0
3. Providing reliable and consistent services . . .	2	3	3	4
4. Local units' daily information requirements.	3	1	2	1
5. Amount of data sharing and routine communication . . .	4	2	2	1
6. Amount of non-routing and interpersonal . .	1	-2	-2	-1
7. . . . information for 24 hours a day, 7 days a week.	0	1	4	-1
8. . . . backlog of software development work.	0	0	-3	-4
III. Decision Making and Control Considerations				
1. Degree of standardization . . .	2	1	3	0
2. . . . organization-wide coordination and control.	4	3	1	1
3. . . . local units' responsiveness to their environment.	3	0	2	0
4. Capability for disaster recovery.	1	2	3	3

5. Ensuring data security (Davis and Olson, 1985).	2	4	4	4
6. . . . local information by corporate management.	1	1	1	2
IV. Economic Considerations				
1. Minimizing hardware costs.	-1	4	-2	-1
2. Minimizing communications costs.	-1	2	0	0
3. Maximizing return . . .	0	2	0	-3
4. Minimizing software costs.	-1	3	-1	-1
V. Cultural Diversity				
1. Cultural differences . . .	-2	-3	-1	-1
2. Language differences . . .	-3	-3	1	-3
3. Differences in work ethics, practices and conditions . . .	-2	-4	-1	1
4. Computer literacy in organizational units.	-1	-1	-3	1
VI. External Environment Constraints				
1. Complying with government data-sharing regulations.	-2	0	1	3
2. . . . government constraints on the purchase . . .	-3	-1	0	2
3. Industrial and economic development . . .	-3	-2	0	-2
4. Stability of the government . . .	-4	-3	-1	-2
5. Size of local units and their markets	1	-2	-2	-4
6. Use of different monetary systems . . .	-4	-4	-1	-2
7. Availability of IS expertise in local units.	-1	-1	-4	2