Advanced Topics in Global Information Management

Volume 3

Felix Tan

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Table of Contents

Section II: Regional Themes

Preface

This is the third volume in a series of Advanced Topics in Global Information Management. The first two volumes were edited by Felix Tan, Editor-in-Chief of the *Journal of Global Information Management*. It is indeed my honor to join Felix in this project.

Information Technology is changing the way in which business manages information. Organizations adopt this technology to provide information for deciding how to fend off new competitors, re-enforce or maintain their competitive advantage, or to enter into new markets. Products and services must be provided to a global market as quickly as possible. This has put new demands on the organization's value chain both with regards to internal operations and externally when interacting with customers and suppliers. In order to remain competitive, organizations must continually develop and employ innovative applications for managing information. Indeed, in many situations these processes are a necessary part of continuing to be a viable organization. Cross-functional information systems are now being employed to support and integrate business activities related to products, services, and customers. As the global business environment changes so too must organizations.

Information Technology, in conjunction with the Internet, is a universal mediator because it connects parties who want to be connected throughout the world. It provides a new product distribution channel and supports information asymmetry. That is, it facilitates the equal sharing of information related to a business transaction. Various forms of electronic commerce assist organizations to work with existing, and in some cases new, customers, business partners, and suppliers.

The nature of knowledge seems to be the only limiting factor to the pervasive application of Information Technology. Knowledge of how to employ the technology is limited only by imagination. The creative use of Information Technology will generate many innovative applications.

As the use of Information Technology expands globally, cultural variability becomes evident in the processes used to manage information. There are two types of culture that are affected by technology. First, corporate culture relates to shared values of individuals within an organization. With the advent of Information Technology this corporate culture must change. Required skill sets will be modified as individuals will be asked to carry out new and expanded tasks. These changes will create stress. Second, Information Technology will facilitate the interaction of individuals from different societal cultures. Currency and payment infrastructures will vary from one country to another. As individuals from different

countries interact there is the necessity to address different languages and issues relating to the compatibility of customs and conditions.

The very many issues outlined above are addressed by the chapters of this volume. Global information management involves all aspects of the management of information systems in an international setting. Research in this area is quite diverse, as exhibited in this book, and usually involves the investigation of cross-cultural issues in a multi-country context. In this volume we continue the custom established for the prior volumes by presenting chapters categorized by themes relating to either Global or Regional Perspectives.

Global Themes

The theme used to categorize the chapters included in this section is that they relate to investigations conducted with an international perspective. In Chapter I, Mol and Koppius discuss how Information Technology enables globalization. Bin, Chen, and Sun, in Chapter II, identify cultural considerations in the process of globalization through the use of Internet-based payment systems. Then, in Chapter III, Wresch investigates e-commerce initiatives in nine least developed countries and suggests strategies to expand markets. In Chapter IV, Khalifa, Limayem, and Liu present a contingency theory for e-commerce consumer retention by studying customer repurchase experiences. An interesting cultural aspect is investigated by Kersten, Kirsten, and Rakowski in Chapter V. They suggest how cultural variability may be addressed in the core of application software. Another cross-cultural investigation was conducted by Downing, Gallaugher, and Segars in Chapter VI. They determined that Information Technology selection with respect to cultural attributes will contribute positively to employee empowerment. In Chapter VII, Huang, Wei, and Lim propose a conceptual framework for employing group support systems to facilitate virtual team-building. Choi and Choi, in Chapter VIII, present their findings on the cross-cultural effects on information systems managers. In Chapter IX, Chen, Huang, and Hee provide a global perspective to automated "straight through processing" for international security trading by financial firms. In the final chapter of this section, Lee, Kang, Lee, and Lee evaluate the dynamic stages of e-tailing as an innovative venture and propose a stage model to explain e-tailing evolution.

Regional Themes

In general, the topics of the chapters in this section relate to a specific single country setting. In Chapter XI, Al-Wohaibi, Masoud, and Edwards present factors related to the implementation of information systems and Information Technology in Omani government organizations. Hocking, in Chapter XII, discusses the computerization of the creation process and access to legislation in Tasmania. Hong Kong is the setting for Chapter XIII, where Chau and Liu identify key factors that influence electronic data interchange adoption in small to medium sized enterprises. In Chapter XIV, Yoo, Suh, and Lee discuss factors that enhance member participation in virtual communities in Korea. Ratnasingam, in Chapter XV, explores inter-organizational trust in small to medium sized firms in New Zealand. Stylianou, Robbins, and Jackson, in Chapter XVI, investigate Chinese business managers' perceptions of e-commerce. In Chapter XVII, Chang and Gable identify issues related to implementation, management, and support of enterprise resource planning systems in government organizations in Queensland, Australia. The final chapter, by Seliem, Ashour, Khalil, and Millar investigates information system effectiveness in Egypt.

Acknowledgments

Section I:

Global Themes

Chapter I

Information Technology and the Internationalization of the Firm

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ABSTRACT

A key concern for all multinationals is where to find a suitable location for their business activities, bearing in mind that they must find the right balance between global integration and local responsiveness. This article contributes to the internationalization debate by asking: in what sense will information technology enable globalization? We focus on the sourcing process, an area where globalization is often claimed to be the case. Re-examination of empirical evidence shows that global sourcing is not as generally predominant as is claimed. Consequently inhibitors to global integration exist and we classify these inhibitors into three categories: geographical, relational and environmental inhibitors. We then analyze the role information technology plays in reducing these inhibitors and formulate propositions that are then illustrated in two case studies. Information technology is proposed to reduce the geographical and relational inhibitors, but it will have no effect on environmental inhibitors. However, the latter category of inhibitors will become more prominent in the future. Information technology thus shifts the balance towards global integration, but simultaneously creates new problems in managing internationalization.

INTRODUCTION

New information technology is widely seen as one of the key triggers governing the globalization of firms. The growth of the Internet has spurred global start-ups and the ability to act as if the world were borderless, so it is claimed. However, in reality most firms still operate in local environments with local partners (Rangan, 2000). While we do not question that IT potentially, and actually, influences the process of internationalization of the firm, we aim to refine this thesis beyond the simple notion that IT stimulates internationalization. We therefore focus on the underlying mechanisms that influence internationalization and analyze IT's role in those. Global sourcing strategy has been chosen as the testing ground.

It has been suggested that firms ought to search globally for the best possible source available (Quinn & Hilmer, 1994), yet not all sourcing is global. One reason may be that the overall business strategy is only compatible with a local sourcing strategy. Another reason may be that even though a global sourcing strategy is compatible with the overall business strategy, such a sourcing strategy is not feasible due to the presence of inhibitors to globalization. Thus it is important to note that a sourcing strategy does not exist in a vacuum, but rather is shaped in part by the overall business strategy. The overall business strategy, such as cost leadership or product differentiation, puts boundaries on the set of feasible sourcing strategies. The business strategy, however, is a higher level of analysis than the one we pursue in this article. Our level of analysis is the sourcing strategy level and in particular the international aspects. The key question addressed in this article is how information technology helps to overcome these inhibitors to global sourcing.

This chapter starts by highlighting two different views on internationalization, one focusing on global integration and one focusing on local responsiveness. These two views are reflected in the literature on international sourcing as well. Some authors speak of global sourcing as a desirable strategy (e.g., Kotabe, 1992) while others stress the advantages of local networks (Nishiguchi, 1994). In the next paragraph, we review the empirical evidence from the literature and find that it reflects these two views, i.e., there is a balance between pressures to focus on global integration and pressures to enhance local responsiveness. We identify three categories of factors that determine this balance: geographical, relational and environmental factors. We then go on to analyze the role that information technology plays in changing these factors and illustrate our propositions with two firm examples. Finally, the conclusions will expand upon some of the managerial demands imposed by increased globalization.

LOCATION PARADOX

Two perspectives can be distinguished throughout the literature on internationalization of the firm, which disagree about the importance of location. One perspective posits the convergence of business models and the global integration of firms around the world, which, following Prahalad and Doz (1987), we will refer to as *the global integration view*. The other perspective is far more skeptical about the extent to which firms are heading towards one business model and denies that the global integration of

firms is indeed the only, or dominant, model. Instead it points to the importance of localized networks of production and supply and we will refer to it as *the local responsiveness view* (Prahalad & Doz, 1987).

The global integration view has gained strong impetus over the last 20 years. Levitt (1983) was one of the first authors to discuss the concept and the consequences of globalization. Levitt drew upon examples of global brands like Coca Cola to support his argument and went on to suggest that consumer homogeneity would increase over time whilst firm strategy would be adapted to meet this change. Another concept that is used in the globalization view is the borderless world (Ohmae, 1990). Ohmae (1990: 10) claimed that for many firms nationality had already disappeared as a relevant business characteristic by 1990 and that it would soon after disappear for an ever increasing number of firms. Since then, the term globalization has been very pervasive in business magazines as well as academic journals (e.g., Karimi & Konsynski, 1991). Proponents of globalization point to steep decreases in transportation and international communication costs and benefits of scale and spillovers from one country to the other. The evolving liberalization of international trade regimes makes it easier to do business across borders. Furthermore, some of the larger firms have started to coordinate their manufacturing capacity allowing them to move internal supplies from one country to the other if their products are interchangeable.

The local responsiveness view is supported by many authors as well. Rugman (2000) analyzes a host of data on various aspects of globalization and concludes that regional development is a more important process than globalization, so going global is not always possible or beneficial. As firms globalize their activities, they lose connections to local actors, while these local connections can be fruitful avenues for achieving innovation or building joint infrastructures (Grabher, 1993). The local responsiveness view can be traced back as far as Marshall's (1919) concept of industrial districts. Marshall maintains that firms can obtain benefits from locating close to one another through scale economies gained from specialized supplies. Transportation costs can be lowered dramatically if a firm and its customer are in each other's proximity and a pooled market for advanced labor develops nearby. Others (e.g., Grabher, 1993) have pointed at the more efficient common use of public resources like universities, knowledge sharing among competing firms in the same area, and spillover effects from competition. The local responsiveness view suggests that instead of or at least complementary to an integration of supplies across borders, it is possible to build an integrated network of external suppliers within close range (Grabher, 1993).

Whether or not the global integration and local responsiveness views are mutually exclusive is still being debated (Bartlett & Ghoshal, 1989). It is suggested that a corporation that is managed as a transnational (Bartlett & Ghoshal, 1989) tries to achieve both global integration and local responsiveness and if it succeeds, it has in a way overcome the location paradox. A similar point has been made by Porter (1998). However, empirical examination has shown that achieving local responsiveness and global integration simultaneously is an ardent task that may require an innovative deployment of management tools. In this article we will examine the effectiveness of one set of tools, namely information technology, as applied in international sourcing strategy.

SOURCING: GLOBAL, LOCAL OR BOTH?

Kotabe (1992) suggests that the processes that Levitt (1983) describes on the output side of the firm, are occurring on the input side as well. In this view buyers, drawing from a broad base of suppliers from all around the world, including developing countries, are adopting global sourcing practices. They are integrating their supplies across borders and in doing so are creating a more efficient supply chain. By combining the best possible sources of supply, which may be located anywhere, firms are able to create world-class products (Quinn & Hilmer, 1994).

Other authors support the local responsiveness view. Uzzi (1997) describes how a predominantly local network of suppliers is operated among owners of knitwear firms in New York, and this local network revolves around trust and embedded relations. Nishiguchi (1994) discusses the network of suppliers that Toyota has created in and around Toyota City, which allows Toyota to be very innovative in product development and flexible in its production system. In the local responsiveness view cooperation with suppliers is best achieved if they are not located on the other side of the world and integration is mainly a process of getting to know each other in person. However, it does not suggest there should be no international suppliers, merely that benefits can often be obtained from operating within the confines of a region.

What can existing empirical evidence tell us about global sourcing? Two distinct arguments have been put forward to substantiate the claim of globalization (Bartlett & Ghoshal, 1989): an increase in internationalization of firms' activities and the functional integration of activities across borders. For sourcing to be defined as global, a high degree of internationalization of the supply base is a necessity. As Monczka and Trent (1991b: 8) stated: "A firm is said to have implemented worldwide sourcing strategy if it devotes some significant systematic amount to offshore sourcing." What constitutes a significant amount is debatable however. One might be inclined to use 50% of the total sourcing volume as the cutoff point, with more than 50% being significantly international. This is an arbitrary measure at best, given large differences in country size as well as geographical constraints. Furthermore, what may seem a large percentage of international sourcing, could be a small percentage when compared to competitors in the same industry, so a relative measure would be more appropriate in any case.

The functional integration is also seen as a necessity to distinguish an international activity from a global one. This is demonstrated by another Monczka and Trent quote (1991a: 2): "Global sourcing ...... refers to the integration and coordination of procurement requirements across worldwide business units, looking at common items, processes, technologies and suppliers." Moving from international to global sourcing requires the firm to start integrating sourcing processes in different countries. In order to achieve functional integration across borders, a firm needs to construct some spatial organization of sourcing, in the form of an interrelated sourcing network. We will now discuss previous research results on sourcing along the two dimensions of degree of internationalization of the supply base and functional integration across borders of the sourcing function. The aim of this review is to find out, as far as sourcing is concerned, how multinational corporations balance global integration and local networks.

Internationalization of the Supply Base

To what extent do firms use international suppliers? The number of empirical studies assessing the degree of internationalization of sourcing is small (Levy & Dunning, 1993), and our own scanning of the ProQuest database led to few additions (see below). Some of these studies are based on data at the national level (Wyckoff, 1993), whereas others employ firm-level data (Kotabe, Murray & Javalgi, 1998). Table 1 summarizes the findings of a number of studies that assess the degree of internationalization.

These data aggregates do not match the high internationalization associated with global sourcing but instead reveal mainly low (0 to 10%) to moderate (10-20%) degrees of internationalization. The single study that provides a longitudinal comparison (Kotabe & Swann, 1994) suggests a considerable increase of internationalization of the supply base over time. The table shows there is no homogeneous, worldwide distribution of sources. Home countries are strongly favored as a source for companies operating within their own borders and for foreign affiliates a mix of host country and home country sourcing is applied. The larger countries by GDP standards (U.S., Japan) seem to rely on domestic sourcing to a larger degree, a result that confirms our intuitions. Min and Galle (1991) demonstrated that firms tend to look first for suppliers in countries with a small cultural distance from the home country. If we compare the outcomes across nations, it appears that Japanese firms in the U.S. use Japan as an important source, much more than European firms in the U.S. use Europe. This supports the notion that Japanese firms abroad primarily rely on their existing network of Japanese suppliers and only start to use local sources if the latter fail to provide (Kenney & Florida, 1995). That European firms to a larger extent source locally is in line with Bartlett and Ghoshal (1989). They predicted that U.S. firms operate on a global basis, Japanese firms try to replicate their existing operations in other regions, and European firms apply a multi-domestic strategy.

Functional Integration of Sourcing

Functional integration of the sourcing function across borders implies that there are coordinated efforts to find and manage suppliers across multiple countries. Table 2 summarizes some studies that address the extent to which firms integrate these efforts.

Spatial integration of sourcing can be achieved through a centralized international sourcing department, regional international purchasing offices (IPOs) or a globally integrated sourcing network. None of these three seems to be very prominent and it appears that most firms treat their international sourcing operations as an extension of their existing domestic sourcing.

Overview

This review suggests sourcing is not as global as is commonly suggested. Although some inputs of some firms are sourced from remote parts of the world, an international supply base is not the dominant situation. Furthermore, integration across borders has not really taken off. Birou and Fawcett (1993: 37) conclude in their analysis of the extent to which there is such integration:

"To date, relatively few firms have implemented truly global sourcing strategies; however, study results show that the international sourcing practices of some firms are directed at obtaining a systemwide competitive advantage."

Table 1: Summary of Quantitative Research Findings on the Supply Base. (Home applies when firms originating from country A uses a source in country A. Local applies when a firm from country A and producing in country B uses a source in country B. International applies when a firm from country A and producing in country A or B uses a source in country C. All findings have been recalculated into percentages. Note that authors use different ratios.)

† Assembly; ‡ Components; # Sourcing of services

From	Study	Firms and location	Home	Intern.	Local
1	Input-output tables of national economies	US at home	87%	13%	x
		Japanese at home	93%	7%	x
		French at home	62%	38%	x
		German at home	66%	34%	x
		British at home	63%	37%	x
		Canadian at home	50%	50%	x
2	Public data of 2,000 firms with 18,000 affiliates	US at home (1977)	93.8%	6.2%	x
		US at home (1982)	92.2%	7.8%	x
		US at home (1989)	89.7%	10.3%	x
3	Survey of 156 firms	Japanese at home	97.6%	2.4%	x
		French at home	92.0%	8.0%	x
		Swiss at home	8.4%	91.6%	x
		Benelux at home	29.3%	70.7%	x
4	Survey of 43 European and 28 Japanese firms	European in US †	37.2%	14.0%	48.8%
		Japanese in US †	53.6%	3.6%	42.6%
		European in US ‡	46.5%	11.6%	41.9%
		Japanese in US ‡	78.6%	3.6%	17.9%
5	Survey of 43 European and 28 Japanese firms	European and Japanese in US	29.9%	5.8%	64.3%
		European and Japanese at home	88.5%	11.5%	x
6	Survey of 73 European and 21 Japanese firms	European and Japanese in US †	85.7%	6.4%	7.9%
		European and Japanese in US ‡	15.9%	10.3%	73.7%
7	Survey of 149 firms	US at home	87%	13%	x
8	Survey of 40 firms	US at home	85%	15%	x
9	Survey of 100 firms	US at home #	90.2%	9.8%	x

1: Wyckoff 1993
2: Kotabe & Swann 1994
3: Buckley & Pearce 1979
4: Kotabe & Omura 1989
5: Swamidass & Kotabe 1993
6: Murray, Kotabe & Wildt 1995
7: Birou & Fawcett 1993
8: Monczka & Trent 1991b
9: Kotabe et al. 1998

There are certain firms and industries that actively engage in global sourcing while others refrain from it. For example the electronics industry is particularly advanced in global sourcing (Kenney & Florida, 1995) while machine building is much more oriented towards local networks (Lane & Bachmann, 1996). Obviously the costs and benefits of global sourcing vary greatly per product or service and for instance transporting heavyweight, low value products to the other side of the world cannot lead to competitive outcomes. Similarly it makes little sense to coordinate the supplies of local temporary labor across borders.

What conclusions can be drawn, given that some of the data in this sample are relatively old? The lack of recent data on global sourcing does not seem to be related to the state of global sourcing in practice. However, scholars have shifted their focus from global sourcing as such to the way it can be put into effect, and to the conditions for effective global sourcing (Kotabe, 1998). It seems this shift cannot be interpreted as the total domination of global sourcing over other forms. Although global sourcing has obviously become more important, global sourcing and local sourcing networks continue to co-exist. Perhaps this does not come as a big surprise to many observers, but what is surprising is that scholars have rarely focused on global and local processes simultaneously. Instead of discussing global sourcing with no thought for local networks, we should be asking what balance between global and local sourcing is achieved, how this balance is maintained and what processes are likely to shift this balance over time. This raises an intriguing question: what is it that determines the extent to which firms practice global sourcing.

Table 2: Empirical Research Assessing the Degree to Which Firms Have Integrated Their Sourcing Function Across Borders. (Where is the international sourcing function located?)

Authors	Sample	Findings on mode of sourcing
Giunipero and Monczka, 1990	Survey of 24 large MNCs from the United States	All 24 operate some corporate purchasing staff Only 8 operate an international purchasing department Others operate on a more decentralized basis
Frear, Metcalf, and Alguire, 1992	Survey of 135 US purchasing managers	66%: user organization (decentralized) 35%: corporate purchasing (centralized) 10%: company-owned trading operation 11%: purchasing department of subsidiaries 8%: purchasing department of JV partners
Min and Galle, 1991	Survey of 141 US purchasing managers engaging in international sourcing	38.1 %: assigned buyer in purchasing unit 34.1%: manufacturer's representative 10.3%: foreign buying office 10.3%: import broker 7.9%: trading company 7.1%: foreign subsidiary 4.8%: import merchant 0.8%: state trading agency
Handfield 1994	Survey of 97 US purchasing managers of which 56 used foreign sources	49.1%: directly between buyer and supplier 41.8%: supplier's US representative 5.5%: external trading company 3.6%: international procurement office 4.1%: face to face 1.9%: automatic order system

THREE TYPES OF INHIBITORS
TO GLOBAL SOURCING

Transaction cost economics (Williamson, 1985) has attempted to sketch the costs and benefits of contracting decisions. Williamson distinguishes between two types of costs: those related to production and those related to a transaction. Production costs of most items can differ widely across countries and if only production costs mattered, firms could be expected to use an almost exclusively international supply base, given the likelihood of production cost advantages elsewhere. This is the drive towards global integration (Prahalad & Doz, 1987) that we explained above. But, as Williamson rightly notes, with the decision to set up a contract with a supplier, parties start to incur transaction costs because markets are imperfect. Transaction costs in international transactions are higher; the different locations of the buyer and supplier, unfamiliarity and the need for local responsiveness (Prahalad & Doz, 1987) all add to the transaction costs of international transactions. To be able to determine when to use global sourcing and when to use local networks, we need to determine what the total costs of both options are. We will treat the production costs at different locations as a given amount since they cannot really be changed, at least in the short run. In other words, how can we distinguish international supply decisions from domestics ones in terms of transaction costs? Three categories of transaction cost drivers in the international context will be mentioned, similar to Luostarinen's (1989) geographic, cultural and economic distance. We propose that these categories are inhibitors to global sourcing and they are in principle mutually exclusive. Geography is solely concerned with the question 'from where to where'? The relational aspects are concerned with what happens in the buyer-supplier relation itself. Finally, the environmental aspects are concerned with what happens around the buyer and supplier, i.e., the context of the buyer-supplier relation. Figure 1 provides an overall view of the three categories.

The first category is related to *geography* and how it differs between buyer and supplier. Both people and goods are imperfectly mobile, so physical distribution costs are an obvious part of geography-related costs: they are more or less linearly related to distance. Examples are increasing difficulties in logistics and physical supply, and the problems of just-in-time delivery under a global sourcing policy (Scully & Fawcett, 1994). Other costs that should be included are the coordination costs due to exchanging information over large distances, for example the costs of synchronization of business processes. As Levy (1995) describes, long delivery time may cause a product to lose value or run out of fashion, so coordination problems between the marketing and production or purchasing functions increase with distance. Another case in point is a difference in time zones, which restricts joint work in some cases. In general, the larger the physical distance, the higher the transportation and coordination costs the firm faces in international sourcing.

The second category resides in the *buyer-supplier relation* itself and is concerned with asymmetric information between the two parties. This has been addressed extensively in the economics of information and economic behavior theory. Individuals and organizations are limited in their ability to perceive, receive, store and communicate information. These differences cause known information to be incomplete. This is expressed in a lack of information concerning a supplier's product offerings, variations

Figure 1: Three Categories of Inhibitors to Internationalization.
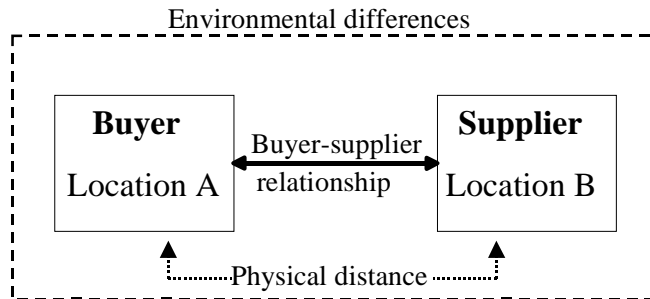
in quality standards, different business practices and language- or culture-based difficulties in buyer-supplier communication (Min, LaTour & Williams, 1994; Scully & Fawcett, 1994). An example is that frequently, buyers will not have a good overview of all available suppliers worldwide. Similarly, insufficient knowledge of a particular culture may be an obstacle in international communication. Not being able to communicate with a partner efficiently makes the building of a relationship harder. It is difficult for mutual trust to develop when partners do not know each other. This leads firms to stay within the confines of their social networks. Thus in many cases firms will not even be exposed to international suppliers, and if they are, they are less likely to choose such a supplier over a local one. Of course, as the buying firm starts internationalizing its manufacturing network through foreign direct investment, these problems may be tempered. Clearly, the more unfamiliar two firms are with one another, the more costly buyer-supplier differences are.

The third and final category consists of *differences in the environments* of the buyer and supplier. Having to get to know these different environments induces all kinds of deliberation costs and this phenomenon is generally referred to as the 'liability of foreignness' (Kostova & Zaheer, 1999). The environment contains both business elements and institutional elements. Business elements, such as competitors, form the competitive environment, and non-market arrangements such as governments and trade unions make up the institutional environment. Political instability, regulatory and political difficulties, nationalistic attitudes, tariff barriers, trade regulations as well as different ethical standards are elements of the institutional environment that raise the need for local responsiveness (Min et al., 1994; Scully & Fawcett, 1994). Fluctuations in currency exchange rates are a part of the business environment that strongly influence sourcing decisions (Min et al., 1994). How a business system is constituted influences both the sourcing strategy of the firm as well as the location of the firm's suppliers (for Britain and Germany see Lane & Bachmann, 1996). In general, the larger the environmental differences the higher the transaction costs the firm faces in international sourcing. We posit that these three categories play a major part in determining the balance between local and global sourcing. If the strategic importance of the three categories is great (as dictated by the overall business strategy), then the leeway for strategic decision making is seriously constrained, which leads to the first proposition:

Proposition 1: The magnitude and importance of geographical, relational and environmental differences determines the feasible range of sourcing strategies in terms of local versus global.

Firms that face large and important differences when sourcing globally will be pressured to source locally. If these differences are small or not important, firms will be able to opt for a globally integrated supply chain. In the remainder of this article, we take the production cost structure of the sourcing network as a given. Instead we will focus on what happens when the costs associated with differences in location change, since that can cause the range of feasible strategies to shift. The question is in particular what happens when information technology is used to help overcome geographical, relational, and environmental differences?

IKEA AND FORD

In order to illustrate these inhibitors, two brief case studies will be presented. Both are well-known examples of internationalization, but they have never been used to examine the effects of IT on global sourcing. One concerns Swedish furniture firm Ikea (see also D'Cruz & Rugman, 1993). The other deals with Ford's 40-year-old world car project (which received a lot of public attention around 1994). In both cases the emphasis is on increases in global sourcing, IT usage and the types of management problems these firms face.

Ford Motor Company has engaged in multiple efforts to produce a 'world car'. A world car is a single platform that can be sold in different markets all over the globe without major modifications. Earlier attempts in 1960 and 1981 stranded because the two development teams operated independently on both sides of the Atlantic and there was no integration of the sourcing function across the two regions. The third attempt to build a world car (the Ford Mondeo), code name CDW27, was initiated in 1986[1]. Suppliers were involved from 1989 onwards and both the European and North American organizations contributed. Ford's world car sourcing network involved mainly suppliers in North America and Europe, although some of these suppliers originate from Japan. Of the total yearly supply volume of $2.5 billion, 140 million involves exports from Europe to North America and 260 million exports from North America to Europe. The North American share in the components of the European version of the Ford Mondeo was somewhere around 15%. This figure used to be in the range of 1-2% for older models.

Ikea has developed single source relations with suppliers in more than 50 nations. In 1991 45% of its supplies came from Scandinavia, 30% from Western Europe, 5% from Eastern Europe and the remaining 10% from the rest of the world. Over the 1990s Ikea's sourcing policy grew more international. In 1999 Ikea sourced 25% from Scandinavia, 50% from the rest of Europe, 20% from East Asia and the remaining 5% from the rest of the world (including North America). The scale of this international supply network has allowed Ikea to achieve lower costs and high quality products. Ikea's competitors are mostly local firms. Ikea operates trading companies in some of the countries that it sources from. For both cases we will illustrate the important role that IT has played to support the internationalization of sourcing activities leading to a number of propositions.

GEOGRAPHICAL INHIBITORS

The first and most obvious inhibitor to global integration for which we shall examine the role of information and communication technology is the geographical location of the buyer and the supplier. As stated, this inhibitor not only includes the costs of physical distribution, but also the costs of coordinating interorganizational business processes over distance. In terms of the two key elements of global sourcing, the former cost category corresponds to the internationalization aspect, whereas the latter corresponds to the functional integration aspect. IT is unlikely to decrease the direct costs of transportation such as fuel and transportation personnel. However, it may be very helpful in decreasing the costs of transportation related information, through electronic documents, tracking of goods or better inventory planning. This implies that total transportation costs decrease with increased usage of IT although these decreases are often marginal. Total transportation costs have always been one of the key inhibitors to internationalization of the supply base.

Functional integration involves a substantial amount of coordination of business processes, and as IT in general reduces coordination costs (Malone, Yates & Benjamin, 1987), significant changes can be expected. For example, U.S. flower importers frequently buy at the Dutch flower auctions. Upon purchase, the flowers are transported immediately to Schiphol airport and put on a plane. When they arrive in the US (especially the East Coast) they can still be sold on the same business day, thus preserving as much of their freshness as possible. One reason for this being feasible is the availability of EDI-links between the auction and large growers and buyers, thus enabling better coordination of the logistics processes involved. The introduction of the Tele Flower Auction (TFA) in the Dutch flower industry (Van Heck & Ribbers, 1998) described other advantages of IT. The TFA electronic auction system decreased the transaction costs for buyers, because they did not have to physically travel to the auction to inspect the flowers. It also allowed buyers more flexibility in their purchases because of greater market transparency. Consequently, buyers were better able to coordinate their purchasing strategies in dealing with different markets and buyers. Similarly, EDI has greatly facilitated the adoption of continuous replenishment policies (Lee, Clark & Tam, 1999), because the coordination of the logistics processes over distance is much easier. All of this points to an increase in functional integration enabled by IT.

Ikea uses electronic links to manage its supplies that are dispersed throughout the world. IT helps to trace cargo and helps to make projections of delivery times. Because suppliers deliver orders on time, Ikea can keep up its familiar no-frills approach to marketing. Goods come in pre-packed forms according to specification and customers are responsible for their final assembly at home. Since there are no assembly activities there is little need for intermediate storage of goods. In the Ford World Car project, outside suppliers also fulfilled a key role. Participating suppliers were chosen through a global search. Ford used a hierarchy of preferences: one shipping point for Europe and the U.S. was the first option, one firm with multiple shipping points the second best option, and multiple firms the worst option. Consequently a global supply chain emerged that was maintained by the rapid exchange of information on designs and deliveries, which was facilitated by Ford's global information system. This approach helped Ford to "rationalize down to the fewest number of suppliers of best-of-class components on a worldwide scale" (Dick Fite, CDW27 supply director). To achieve good integration between Europe

and the U.S., Ford relied more heavily than in the past on IT-like video conferencing. John Oldfield, head of the world car program, said about the transatlantic video link: "Without video conferencing, the amount of travelling involved and the time differences would make a project like CDW27 near impossible." In sum, both Ikea and Ford used IT to decrease the costs of distance and this allowed them to use more international suppliers and to increase the frequency and quality of communications.

Proposition 2: IT alters the geographical inhibitors to global sourcing, by enabling more internationalization as well as improved functional integration.

RELATIONAL INHIBITORS

The second category of inhibitors deals with the relational inhibitors between buyer and supplier. Following the two elements of our definition of global sourcing, we make a distinction between inhibitors that deal with the internationalization aspect, those related to buyer-supplier relations, and inhibitors to functional integration, those related to the internal management of the entire international network of suppliers. IT reduces the costs associated with the search for, and evaluation of, potential suppliers, especially when buyers and suppliers would not normally link up (Barua, Savindran & Whinston, 1997). The World Wide Web or a dedicated electronic market can serve as means to find, as yet, unknown suppliers. For many international suppliers a web site in another language, such as English, is easy to construct when compared to the effort of building a relationship with a buyer by means of oral communication. Thus, information technology broadens the scope of the sourcing process in the sense that more suppliers are now able to compete for the firm's order and that the pool of suppliers becomes more diverse.

On the functional integration side, there are benefits as well. By using information technology, standardization of communication can be obtained. Many would even argue that this standardization is indispensable. Through the use of standardized communications, problems related to language and business practice differences will, other things being equal, be lessened, as room for misunderstanding will be reduced. Should problems arise, then technologies such as videoconferencing or shared workspaces on an intranet should, again other things being equal, enable these problems to be solved faster, thus lessening their impact. The ease with which integration across borders can occur will drive many firms towards a more integrated, networked form of organization. This is echoed by Cantwell and Santangelo's (1999) contention that firms that invest heavily in IT are able to manage their international processes more flexibly. Similarly, Pinsonneault and Kraemer (1993) found that when organizational decisions were centralized, IT caused further centralization and that a similar effect occurs for decentralization. All of this points to increased functional integration in sourcing through IT.

Ikea has developed routines that allow it to communicate efficiently with suppliers. It uses English as the language to communicate with suppliers and to an increasing extent international business partners share this language. Designs can be exchanged and discussed through electronic links. New technology allows for the visualization of goods. The local trading companies are also mainly steered by electronic links with headquarters. While long distance communication used to be much harder, IKEA is now organized globally. Similarly Ford had learned from its earlier experience that integration

across borders would be important. To make the global engineering project viable, a worldwide communication infrastructure was needed, particularly one that would allow for sufficient communication with external suppliers. Ford invested in networked computers for problem-solving, real-time multi-site simultaneous engineering, and information transfer as well as a global inter-company e-mail system. The global scale of production allowed Ford to reduce the number of times certain operations, like calculations, had to be performed. Both Ikea and Ford increased the global scale of operations. By using IT they managed to solve communication problems that existed previously.

Proposition 3: IT alters the relational inhibitors to global sourcing, by enabling more internationalization as well as improved functional integration.

ENVIRONMENTAL INHIBITORS

Earlier it was noted that the internationalization of the supply base is constrained by environmental factors. For foreign firms those environmental factors are usually very 'sticky': it is impossible to change them and difficult to alter them. While we can use IT to communicate the risks of doing business in a particular country, it does not help to lessen these risks. A single firm abroad is usually not big enough or important enough to change policies or politics, and even if the exceptional condition arises where a foreign firm can influence trade regulations, this is much more likely to be done by face-to-face contact and negotiations than through electronic links. If the firm cannot bring about any large-scale change in these environmental conditions, then the introduction of IT will not have an impact on the degree of internationalization of the supply base. With regards to global integration of the sourcing function, a similar argument can be put forward. Firms are often not in a position to improve the infrastructure arrangements in a particular country and neither can they do much about the extent of currency fluctuations. This means that the environmental pressures towards local or global sourcing are largely fixed and IT does not change these pressures.

In the late 1990s Ikea came under pressure from some non-governmental organizations and the public at large following a Swedish documentary. The documentary revealed that some Ikea suppliers in developing countries, and in particular subcontractors of Ikea suppliers, hosted terrible working conditions and used child labor. Officially child labor is forbidden, but due to strong pressures from Ikea to cut costs, the subcontractors of Ikea's suppliers used children aged 14 and below to produce goods. The company stated that it was unaware of such practices and objected to them. Obviously, some other countries are less strict in maintaining their labor policies than Sweden is and Ikea cannot be blamed for that. However, one of the criticisms launched at Ikea was that it was trying to monitor suppliers from a distance, i.e., the Swedish headquarters or national trading companies, and was unable to track what was really happening at shop-floor level. Commentators argued that a global supply base obliges a firm to deal pro-actively with these issues, and monitoring from a distance is often not sufficient. Ford was also faced with local forces. Some 90% of the elements of the three cars are identical but certain differences remain due to different supplier processes in the U.S. and Europe, which made it tough to achieve the desired component commonality. Furthermore local conditions and mandates forced a number of changes. Most of the

problems arose when Ford had to re-engineer the Mondeo for the North American market and encountered U.S. federal standards and market conditions. Thus both Ford and Ikea were faced with the fact that their local environments posed demands that a completely global system cannot handle. Their responses should come in the form of local responsibilities or product designs. IT seems of little help in achieving such localization.

Proposition 4: IT does not alter the environmental inhibitors to global sourcing, neither the internationalization nor the functional integration.

Earlier we stated that the more the firm sources globally, the more likely it is that it will have to confront pressures towards local responsiveness. Firms that have a highly international supply base have to deal with multiple environments simultaneously. Functional integration becomes more complex as the organization becomes more international. The usage of IT increases the feasibility of a global sourcing strategy over a local sourcing strategy (Propositions 2 and 3). Since using IT does not alter the environmental forces, we can conclude that under similar circumstance higher IT usage implies more global sourcing and thus a higher likelihood of encountering environmental inhibitors to global sourcing. Paradoxically using IT will help the firm to globalize its sourcing, but will simultaneously pose new demands in the form of the need to manage environmental differences.

Over the 1990s Ikea has increasingly globalized its supply base aided by IT tools. When it started sourcing from developing countries, Ikea encountered things it did not come across in Sweden or similar countries. It found out that labor practices may differ in developing countries and that getting adjusted to those practices requires more than simply setting some rules. Ford has also significantly internationalized its supply base and production process, particularly over the last ten or so years. Information technology has been a key enabler of internationalization at Ford. The kinds of problems that Ford still encountered were related to trade issues such as local content regulation but especially to national standards and local market conditions. As Ford changed its strategy from avoiding those issues, through localized production and sourcing, to confronting them, through global supplies, it started encountering more of those problems. Ford and Ikea managed to increase their global reach but both found out that this created new and different managerial demands. Using IT helps the multinational firm to solve some problems, but it will create new ones as well.

Proposition 5: The extent of IT usage is positively related to the likelihood of encountering environmental inhibitors to global sourcing.

CONCLUSION

An examination of multiple empirical studies has revealed that sourcing has so far mainly been uni-regional or bi-regional and not as global as is commonly thought. Neither does the internal organization of sourcing conform well to the global model, which suggests a strong functional integration across borders. In fact, the more appropriate view is to see every sourcing strategy as a balancing act between the local and the global, which is strongly determined by differences between buyer and supplier in three

categories: geography, relation and environment. How big the differences between buyer and supplier are, and how important these differences are to the product under consideration, will determine the feasibility of a particular strategy. IT is a useful way to decrease those inhibitors to internationalization of the supply base and functional integration that are related to geography or located within the buyer-suppler relation. However, IT will not influence environmental inhibitors to global sourcing, and especially not the institutional inhibitors in the environment. As the degree of international sourcing increases, firms will actually have to face these inhibitors more often. The case studies of Ikea and Ford confirmed all of these propositions. Learning how to deal with these environmental inhibitors when setting up global electronic sourcing is a key managerial capability. Future research should address how management can develop this capability.

Another issue that should be addressed in future research is how global information systems can be supported by an equally global management structure and culture that includes an integrated sourcing function. Management should not only focus on the opportunities that global integration provides, but be equally concerned about the consequences of local behavior. This may require firms to go further than simply instructing their own employees about desired behaviors. The Ikea case showed that firms that forget to manage beyond the first tier of suppliers are bound to run into trouble at some point. Since ethical and regulatory demands upon foreign firms are usually greater than upon local firms, and being multinational severely increases organizational complexity (Kostova & Zaheer, 1999), a wider range of tools has to be developed. From a research perspective it may be interesting to look at the interaction between global information systems and global management practices and how it develops over time.

Another interesting avenue for future research concerns the impact of the Internet on sourcing relations. Ford is working in new ways to improve the information exchange with its suppliers and reduce transaction costs. It participated in ANX, the Automotive Network Exchange, and is now collaborating with multiple competitors to build more advanced electronic marketplaces in the Covisint initiative. It is interesting to note that those efforts are still implemented on a region-by-region basis. Starting with the U.S. these systems are slowly expanding to Europe and Asia, often in an adapted form. The Internet era raises interesting research questions. Perhaps it is true that the Internet opens up the opportunity to look for the best possible sources in the world, but do firms subsequently use that opportunity? Or, alternatively, do they continue to expand on the basis of their existing social networks (Rangan, 2000)? Only empirical testing can resolve that debate but it seems unlikely that local networks will suddenly become unimportant. Thus the question is, in what situations will local networks remain of importance? This article has pointed at the importance of analyzing environmental pressures to answer that question. The local and the global continue their struggle.

ACKNOWLEDGMENTS

ENDNOTES

[1]   It is important to note that the case discussed here concerns the development of a car between 1986 and 1993/1994. Reports in the business press in late 2000 scrutinized Ford for the failure of its Ford 2000 program. This was an organizational change program started in 1995, which led to an overly centralized organization that failed to pay attention to local demands. While Ford Mondeo was a forerunner to Ford 2000, it is not a part of that program. Thus this article is not concerned with Ford 2000, but with the period preceding it. In fact Ford 2000 appears to be an illustration of a wrong balance between global and local, in particular the lack of functional integration across borders.

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Chapter II

Cultural Differences in E-Commerce:
A Comparison Between the U.S. and China

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ABSTRACT

This chapter discusses the importance of identifying cultural problems of the online globalization and points out that payment and logistic systems and language are the primary factors that every firm should take into account in the process of their online globalization. Next, the chapter identifies the characteristics and trends of the Internet and e-commerce in China. In the third part, the chapter differentiates e-commerce in the U.S. with China through analyzing Internet users' behaviors especially their attitudes toward different payment systems in these two countries. Finally, it discusses how to remove language barriers to enhance net growth. In conclusion, this chapter will suggest some recommendations on how to expand business via the Internet by reducing the gap between the two cultures.

CULTURAL PROBLEMS IN ONLINE GLOBALIZATION

The Internet has made it easier than ever to market products and services across the globe. Most American companies today are so focused on their domestic market that

they do not pay any attention to the overseas markets. Nevertheless, e-commerce is global in nature and the international markets represent immense potential.

While the United States is undergoing an historic development in the introduction of e-commerce, the rest of the world including China is trying to catch up. According to the Jupiter Globalization Report published in January 2001, the U.S. share of the global Internet population will drop from 36 percent today to approximately 24 percent in 2005. During the same period, Chinese Internet users will increase tremendously (Jupiter Globalization Report, 2001).

American companies such as Microsoft, Intel and Compaq all opened offices in China in the 1990s. This trend continued as Net Economy companies opened their Chinese offices at the end of 20th century. However, many hurdles—especially significant cultural differences between the two countries — are limiting those companies' local reach of e-commerce and in some cases blocking it entirely.

Sometimes culture is defined as the combination of language and the habits of people in a certain place. Therefore, when a company decides to internationalize its business through the Internet, it should identify the potential problems concerning cultural differences across borders. However, what do cultural differences really mean? Or in other words, what specific elements should be taken into account while thinking of potential cultural barriers? According to our investigation, online cultural problems include the following sides: 1) language; 2) values; 3) infrastructure. Of course, these are broad-based categories. In each side, there should be subcategories. For example, in infrastructure, more elements should be discussed, and the word "infrastructure" is based on an environment consisting of payment system, logistic system, laws, taxation, etc.

This chapter only discusses the most important aspects including language, payment system and logistic system. While discussing the behavior of Chinese online shoppers, values and their attitude will also be involved. For one thing, as the saying goes, "Rome was not built in a day", even if you track down all the cultural differences, you can NOT resolve them immediately. Also, the cultural differences between the U.S. and China are somehow "unique".

Concerning cultural difference, the first element that should be taken into account is language.

Chinese people who surf the web often don't use English as their first language. Their cultural outlook and value system is different from the system predominant on the web. Therefore, in this chapter, the Internet and e-commerce strategies in China are discussed as a case study of unique cultural e-commerce strategies.

CURRENT STATE OF CHINA'S E-COMMERCE

The China Internet Network Information Center (CNNIC) in January 2002 claimed that the number of Internet users in China had reached 33.7 million, with 6.72 million using leased lines and 21.33 million using dial-up connections. The "Statistical Report on Internet Development in China" said the number of users accessing the Internet via both means was only 5.65 million. Additionally, another 1.18 million people were connected through appliances such as mobile telephones and various home information appliances.

According to the reports made by CNNIC in the past three and a half years, we can see clearly the development of Internet in China (see Exhibit 1 and Exhibit 2) (CNNIC, 2002).

In terms of the Internet population, China had 33.7 million users by January 2002 (a 27.2 percent increase from the previous year) (CNNIC, Statistical Report on Internet Development in China. In the U.S., there are 168 million Americans who are now online, according to Nielsen/NetRatings, but data is not available as to how many of these who do not use English to access the Internet (Global Research, 2001). However, the statistics that only 2.5 percent of the whole population are on line in China reflects the fact that China's e-commerce is still fledgling, while in the U.S., the above exhibit from Jupiter's report shows that internet users now comprise half of the whole U.S. population.

In China, women Internet users are increasing rapidly. According to the "Statistical Report on Internet Development in China" by CNNIC, 38.7 percent of the Internet users in China are women. Internet users in China tend to be younger than those in the U.S. In China, 52.9 percent of the users are in their 20s and 30s while in the U.S. those with ages from 18 to 54 comprise 60 percent of the total users. Among those people in China who access the Internet at least once a day, 74.9 percent of them use the Internet to check e-mail and every Internet user possesses 2.3 free email accounts on average; 51.3 percent of them use it to surf the Web (CNNIC, 2001).

Most Internet users in China are very conscious of the time spent online as the dominant telephone carrier, China Telecom, still charges per-minute telephone fees. Although a lot of large corporations such as China Unicom have been formed and introduced to enter into the field of telephone and Internet business, the existence of monopoly seems to be a fact that cannot be denied.

In China, almost every telecommunication company issues its own calling cards that can be used in accessing the Internet, however, a separate per minute fee is still charged by the telephone carrier—mainly China Telecom. In the U.S., due to the flat-rate access to Internet, American Internet users care nothing about the time spent online.

Only 31.9 percent of Chinese Internet users have had some experience of buying online. In the U.S. 82 percent of the Internet users purchased at least one product or service online (NetSmartAmerican.com, 2000). The most popular goods for Chinese online shoppers are books and magazines, purchased by 58.7 percent of those who

Exhibit 1: Internet Users in China (in Thousands).
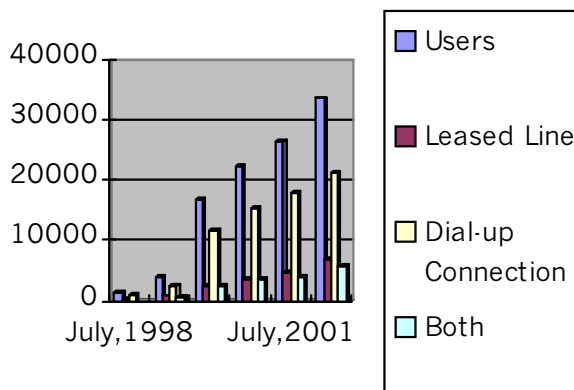
Exhibit 2: Internet Hosts in China (in Thousands).
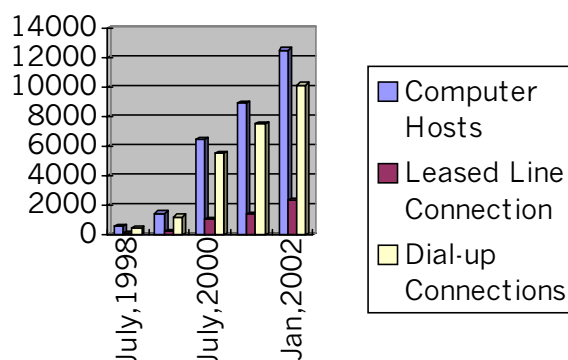
shopped online at least once. Computer-related products were ranked the second item that Internet users bought. Cases in the U.S. are quite similar to that of China.

Different Payment and Logistic Systems in the U.S. and China

For online shopping behaviors in the U.S. and in China, payment options are analyzed here. Most U.S. shopping sites offer only credit card payment either online or off-line (meaning that a customer must call a given telephone number to provide a credit card number or fax credit card information to a given fax number). According to the report by NetSmartAmerica.com, 70 percent of those who have shopped online at least once paid with a credit card. On the other hand, the most common method of payment among Chinese online shopping sites in 2000 is cash payment upon the delivery and receipt of ordered goods, reflecting the Chinese culture of cash-based payment. The pick-up/payment can be done by hourly workers hired by those shopping sites. Most of the shopping sites established their branch offices in the big cities of China.

Statistics show that payment methods for online shopping in China are as follows: cash and carry 39.16 percent; credit card 19.87 percent; post offices remittance 17.58 percent; Internet 12.54 percent; bank remittance 4.87 percent; EMS 3.35 percent; bank accounts transfer 2.63 percent. Statistics also show that payment method that users prefer when for over RMB1000 (approximately USD 121) are as follows: cash and carry 48.74 percent; credit card 22.08 percent; Internet: 9.18 percent; post offices remittance 5.63 percent; bank remittance 5.30 percent; EMS 4.90 percent; bank account transfer 4.17 percent. The primary obstacles of online purchase are also listed here: security can not be guaranteed 31.76 percent; quality of products, after service and creditability of the merchant can not be guaranteed 28.33 percent; inconvenient payment 13.34 percent; delivery is time wasting, the channel is not expedite 10.14 percent; unattractive price 7.74 percent; unreliable information 7.28 percent; others 1.41 percent (CNNIC, 2000).

The above-mentioned phenomenon of Chinese COD payment manner can be explained from the following sides:
1)   *China lacks real credit cards.* According to statistics made by China People's Bank—the central bank of China, the banking cards issued by various banks in

China increased from 140 million in 1999 to over 350 million by June, 2001. But most of the banking cards are debit cards. Only 25 million are real credit cards, and in most cases they virtually work as debit cards. It's very difficult and inconvenient to apply for a real credit card. And some of the Chinese card holders call their credit cards "non-credit cards". Unlike in the U.S., some one billion banking cards had been issued by the end of 2000, and most of them were real credit cards.

2)   *China lacks a centralized settlement system.* Different banks issue their own credit cards and the cards can only be used in certain shops and restaurants and hotels, etc. Each bank has its own territory and they don't talk to each other. Cash, instead of credit cards, is the dominant payment method.

3)   *The inherent value and attitude of Chinese people.* According to a research made by China Women Journal and Mastercard, among the banking card holders, 62 percent of them possess one to three cards, 36.6 percent of them possess three to six cards, and the rest of them even hold more than six cards. However, only 34 percent of them use credit cards occasionally, 15 percent of them never use any card (Shao Hua, 2001). The trouble is that few Chinese people trust the Internet for business. A Chinese saying goes that one should "never let out your hawk until you see the hare." So, frankly speaking, providing a more effective way of paying online will not solve the "attitude" problem of Chinese online purchasers.

Many ways have been suggested on how to resolve the above-mentioned settlement system problems. One successful case is the improvement in China's Postal Savings Banks.

In many countries, the largest consumer banks in terms of branches are in the postal savings systems, and China will likely follow. Chinese consumers need options and branches in local post offices extend throughout the country. Other financial institutions may be hard pressed to compete.

The China Postal Bureau has now announced a new effort to develop electronic commerce. A press release by a leading provider of financial software indicates that the

Exhibit 3: U.S. Online Users, 2000-2006 (Millions).
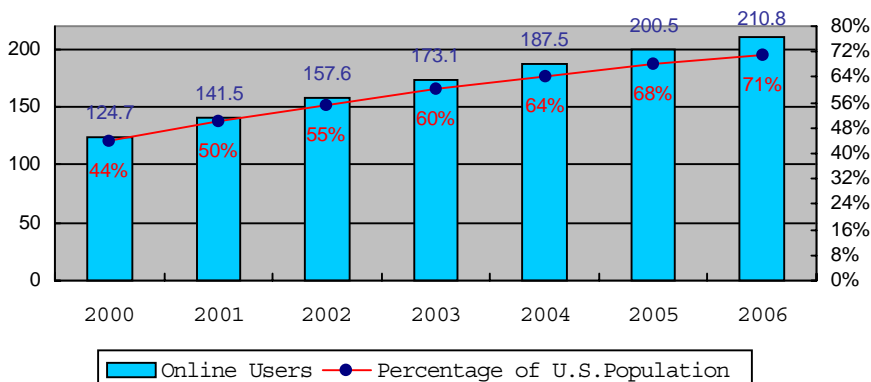
Source: Jupiter Population Model, 10/01(U.S. only)

bank card system will develop 16 gateways with nationwide settlements for automated teller machines (ATMs) used by the post office. The firm, Shanghai Huateng Software Systems Co., Ltd. ("Huateng"), is a veteran provider for China's Golden Card system and likely to assure a workable payments scheme to allow Internet transactions.

Considerable difficulties remain for electronic commerce in China. Consumer banking still lacks extensive services and foreign exchange controls hamper transactions across borders. Still, the announcement of developments in payments schemes and the rapid adoption of e-commerce platforms by banks are impressive. Before China Posts, the Industrial and Commercial Bank of China, China Construction Bank and China Merchant's Bank among others have launched platforms. With new electronic payment arrangements, China is making strides to create nationwide bankcard and "e-commerce" systems.

As to the logistic system, which is another serious problem of e-commerce development in China, the successful online shops in China adopt a pragmatic method—to order online, to pay offline. Such a strategy is based on such a logic of trying to avoid much involvement of delivery and transaction infrastructures. In fact, the development of delivery and transaction infrastructures is out of the reach of internet companies in China. The worst situation is that Internet companies invest a lot of money to develop infrastructures that are supposed to be done by the government and other industries. When the infrastructures are not available, e-commerce companies should focus on building up information platforms to make that part electronic and seek more physical solutions for delivery and transactions, which is called the partial e-commerce models. Unlike in the U.S., the delivery function of online shops is contracted out to major courier firms such as UPS, FedEx, etc., the only viable delivery system to both business and homes is the state-owned Post Office. But the Post Office is notorious for being slow and mishandling goods. Foreign competitors, such as DHL and EMS are starting to have presence in large cities of Shanghai, Beijing and Nanjing, but they are targeting office buildings and the cost they charge is excessively high for an ordinary online shopper. So, a lot of Chinese online shops, together with foreign ones, are taking advantage of cheap labor resource in China to combine with electronic solutions. Physical solutions in delivery and transaction are not necessarily second best solutions in China since labor is still very cheap in China. For example, in current e-commerce models, the most effective one is to order on line, deliver by labor and pay cash when delivered. Thus, the above-mentioned way of hiring hourly workers to deliver goods and collect money for those goods is very popular and effective in China.

How to Remove Language Barriers for Net Growth

Today, half the people on the Internet are American. By 2004 it will only be a third, according to Barry Parr, a senior analyst at the San Francisco-based International Data Corporation, and two-thirds of all Internet spending will then be outside the United States. Because nearly 80 percent of Americans will be online, there is simply more opportunity for growth outside the United States.

Cisco, the largest supplier of communication equipment that runs the Net and its television advertisements, knows what's going on. Their television advertisement shows a flock of children from all over the world asking: "Are you ready?"

They aren't. In fact, IDC's research shows that more than half the U.S. sites surveyed are doing nothing to internationalize their sites and this could threaten their future. Another U.S. company, Forrester Research, says leading U.S. websites now turn away almost half of the orders that originate outside the U.S., and that three-quarters of the sites are not designed to handle non-U.S. addresses or work out shipping costs. This is partially due to these companies' not having their international strategy—maybe lacking the translation strategy in the first place.

In fact, there are two kinds of translations—linguistic translation and cultural translation. Relatively speaking, linguistic translation is fundamental and easy to fulfil, while cultural translation is more difficult to carry out. Thus, using linguistic translation to design a web site in the target market is only the first step to internationalize. For example, mainland Chinese use a kind of simplified Chinese characters compared to the ancient Chinese characters that people use in Taiwan and Hong Kong. Therefore, if a company in the U.S. wants to expand its business in the Greater China area, the company has to know the above fact.

Here, two kinds of strategies might be adopted concerning who will be invited to do the translation job. One strategy is to hire professional website translation companies like Alis Technologies, Berlitz, Geonexus or Worldpoint Interactive. Such a strategy is only used in the beginning of the internationalization of a website. When an American firm seeks to sell online to China and make this avenue as a large percentage of its total profits, they might want to use another strategy—to set up a dedicated web site that is only for the Chinese market, have the Chinese technical team manage this site in China and provide after sale service, etc. Moreover, if a firm wishes to test the water first, they might want to contract a third party to handle part of the e-commerce activities.

Many people think that businesses that don't begin preparing today could find themselves outflanked by their more internationally oriented competitors.

Of course, some are already well advanced. Yahoo!, the Microsoft Network (MSN), and a few others have been globalizing their businesses for three or four years. As a result, they are among the top five sites visited by home users in many different countries including China, judging by the number of unique visitors per month, according to Media Metrix, an audience measurement company based in New York.

Both Yahoo! and MSN are competing by making their local offerings as local as possible. Yahoo! now has operations in 20 countries including China. Jerry Yang, a co-founder of Yahoo!, says: "Our goal is get local when the growth starts to happen." If you ever have a chance to surf Yahoo!'s Chinese website in mainland China, Taiwan and Hong Kong, you will see that the formats of these three websites are quite similar to each other. By localizing with similar style and format in the Greater China area, Yahoo! can save a lot of money.

CONCLUSION

Cultural differences in e-commerce do exist in the process of expanding online business across borders. The main cultural differences lie in language, values and infrastructures in payment and delivery and so on.

Good examples tailoring the global web sites to suit differences in local cultures are Yahoo! and Bol.com. Language translation is only one of the factors that led to the

success of Yahoo!. Creating a locally accepted payment scheme and translating the web site to local language are only the first step of localization for company's globalization effort.

A logistics and distribution system is another barrier that has hindered the growth of B2C business in China. After more than 50 years of development, a state-owned comprehensive logistic and distribution system has been set up with the participation of department stores, grocery stores, book stores and post offices. The American dotcoms that want to enter into China could utilize the delivery capability of traditional businesses instead of setting up a new system by themselves.

China's infrastructure including payment system is poor but improving. For example, China's big four commercial banks— the Industrial and Commercial Bank of China, the China Construction Bank, the Agricultural Bank of China and the Bank of China—have yet to reach every corner of the country, once they realize that online payment systems can bring huge profits to them, they are bound to take part in the improvement of online payment systems proactively.

A pragmatic strategy of "Order Online, Pay Offline" has been proved to be an effective way of doing e-commerce in China at present.

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Chapter III

Initial E-Commerce Efforts in Nine Least Developed Countries:
Review of National Infrastructure, Business Approaches, and Product Selection

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ABSTRACT

While e-commerce would seem to be a unique opportunity for poor countries with limited local markets to sell goods to richer nations, limited research is available on the current status of e-commerce efforts in Least Developed Countries (LDCs). This study reviewed the efforts of the nine countries identified by the UNDP as having the least technological capacity. Statistics provided by the UNDP demonstrate serious national infrastructure problems in each of the countries. Yet a survey of business web sites finds that all but one (Sudan) has some minimal e-commerce efforts underway. A survey sent to companies in three of these countries showed that many companies were being creative in where they were hosting their web sites and were able to keep their web costs low. Yet the vast majority also reported slow sales and a variety of local barriers to success. A review of the products they are offering on their sites found that the product mix might be particularly problematic. The author hopes the results of this study will suggest improved strategies for companies in LDCs seeking to use e-commerce to expand their markets.

INTRODUCTION

For small businesses in developing countries, e-commerce would seem to be a unique opportunity to expand beyond limited local markets. Yet we know from the massive failures of e-commerce companies in the US that B2C is particularly demanding. Beyond the obvious requirements of a web site, companies must have the internal systems to handle orders via the web, the manufacturing capacity to respond to orders, financial systems to take funds online, and the logistics capabilities to ship goods at the speed that e-commerce customers expect. In short, e-commerce requires a level of business acumen and support structures that are as yet rare in the world.

Yet for all the demands of this business method, the opportunities are significant. E-commerce may represent an opportunity for even the Least Developed Countries of the world to export their products and improve their balance of payments. This opportunity has led the United Nations Conference on Trade and Development (UNCTAD) to host a number of conferences on the topic of LDCs and e-commerce (Lake, 2000), and the United Nations Development Programme to focus its 2001 annual report on the topic of Information Technology and development. There is great hope that e-commerce can ease the burdens of the world's poor.

But is that hope realistic? The purpose of this research was to determine, first, if least developed countries (LDCs) were participating in e-commerce efforts. Second, if LDCs are engaged in e-commerce, what strategies are they applying to overcome well-known impediments? Third, what businesses or products are more commonly engaged in successful e-commerce efforts in these countries? It is my hope that by identifying successful technical and business strategies used by companies in these countries, other companies can model their own efforts after their successful peers.

METHODS

To review the current e-commerce efforts of Least Developed Countries, I conducted a detailed analysis of nine countries. The countries are Nicaragua, Pakistan, Senegal, Ghana, Kenya, Nepal, Tanzania, Sudan, and Mozambique. These countries were selected because they were the nine countries identified as "marginal" — the lowest of four levels of technological sophistication — by the United Nations Development Programme in 2001. They would seem to have the least capacity to participate in e-commerce.

My research focused on three questions.
1.   What technical resources are available in these countries to support e-commerce?
2.   What business model are companies following?
3.   For those companies attempting to sell goods over the Internet, what kind of goods are they selling?

I used three primary data sources:
1.   Published statistics from the United Nations Development Programme.
2.   An inspection of all the e-commerce web sites in all nine countries. Business web sites in these countries were identified by using search engines and business directories. Each site was checked to ensure that the business being presented on the web had a significant export-orientation. Businesses that were mainly local

(e.g., restaurants, health services, banks, automotive) were excluded. Given the shortcomings of search engines, and given the costs of business directory listings, clearly many more export-oriented business web sites exist than were found in this study.   But the sites located do represent a substantial portion of the web sites extant in each country in 2002 and correspond roughly to the Internet Software Consortium Internet host count for July 2002.

3.   A short email survey sent to many of the businesses identified in three countries — Nepal, Nicaragua, and Tanzania. These countries were selected because of their geographical balance (one country per continent). More than 200 companies were contacted by email — 116 companies in Nepal, 44 in Nicaragua, and 57 in Tanzania. Since Nepal and Tanzania have a huge number of hotel/resorts on line, it was not felt necessary to query more than a reasonable sample of these businesses. Returned emails indicated that several businesses were no longer using their web sites for business, or had ceased functioning entirely (five in Nepal, one in Nicaragua, and two in Tanzania). That left a total of 209 businesses in the three countries which received the email survey (see Appendix A for the survey questions).

RESULTS: NATIONAL INFRASTRUCTURE

Infrastructure can be defined in many ways. A simple technical approach is to count web sites. That can be summarized in a sentence: A July 2002 domain name count shows that there are 43 million .com sites in the US, and no sites at all in seven nations, including Haiti and Sudan (Internet Software Consortium, 2002). In short, there are massive technical differences between leading nations and LDCs.

Others would urge us to consider social infrastructure. The classic work of Rogers points to social systems as crucial in the diffusion of innovations (Rogers, 2001). Herbig's "Innovation Funnel" posits the need for a series of innovation supports including a technology base, sociocultural supports, institutional infrastructure (government), industrial competitiveness, firm size, and appropriate managerial attitudes (Herbig, 1994). Vadim Levitin, of the e-commerce Institute in San Diego, California asserts, "The first thing we have to do is convince governments — persuade them, train them, scare them perhaps — that it is in their best interest to do something to catch up with this world… I truly believe that anyone can participate in the new digital economy… it is not about technology tools" (Domeisen, 2001). Stephen Corea argues along a similar vein when he says, "low-income countries should place greater priority on developing innovative behavior in their societies than on achieving pervasive ICT adoption" (Corea, 2000, p. 10).

Another perspective promotes organizational structures. Helpman (1998) asserts that general purpose technologies like the internet require complementary investments including organizational and institutional changes. Radosevic argues that technology transfer has become more difficult. In his view the shift from the electromechanical to electronics-based technologies will make transfer more difficult based on the rising complexity of technical change, the changing transferability of new technologies, the increasing knowledge intensity of new technologies, and the increasing significance of organizational change (Radosevic, 1999).

While more mundane, those who have worked in developing countries are quick to point out that logistics are also an aspect of infrastructure. They note that government ownership and management of ports and airports often results in inefficient, costly, and unreliable services, and bureaucratic export and import procedures add costs to goods and slow processing down below the speeds expected of e-commerce consumers (Lake, 2000). Transparency International would also add that customs procedures are often a place where corruption both slows processes and adds costs.

 Finding ways of measuring these many aspects of infrastructure is no easy task. While not overtly subscribing to any theory of innovation diffusion, the United Nations Development Program (Human Development Report, 2001) seems to recognize the role of multiple factors in IT development success. In evaluating the current level of technical development of countries around the world, it looked beyond a simple count of Internet hosts to the importance of patents and royalties, the nature of exports, the telephone and electrical infrastructures, and educational opportunities available to citizens. Its Tech-nology Achievement Index aims to highlight the ability of nations to create innovations (as measured by patents and royalty income), integrate old and new technologies and develop human capacity. The index shows the substantial divide between the leading nations and followers. Table 1 presents the UNDP's summary numbers for the most advanced nation (Finland), and for the nine least technologically developed nations.

The eight measures of technological innovation created by UNDP show stark contrasts between the world's leader and these marginalized countries. Where Finland files many patents and receives licensing income from unique products and processes, the nine marginalized countries patent nothing and receive no royalty income. While Finland has 200 Internet hosts per one thousand people, the marginalized countries may have just one or two hosts for the entire country. Whereas more than half of Finland's exports are high and medium technology exports, marginalized countries continue to struggle with low-tech (and low profit) commodity exports. Because so many people in Finland have both traditional telephones and cell phones, Finland has more phones than people. Marginalized countries struggle with five to 39 phones per one thousand people. And then there are huge differences in electricity consumption (availability), educational

Table 1

Country	Patents per one million people	Royalties per one thousand people	Internet Hosts per one thousand people	% high and medium tech exports	Phones per one thousand people	Electricity consump-tion per capita	Mean years of school-ing	% tertiary science enroll-ment
Finland	187	$125.6	200.2	50.7%	1203	14,129	10.0	27.4%
Nicaragua	0	0	0.4	3.6%	39	281	4.6	3.8%
Pakistan	0	0	0.1	7.9%	24	337	3.9	1.4%
Senegal	0	0	0.2	28.5%	27	111	2.6	0.5%
Ghana	0	0	0	4.1%	12	289	3.9	0.4%
Kenya	0	0	0.2	7.2%	11	129	4.2	0.3%
Nepal	0	0	0.1	1.9%	12	47	2.4	0.7%
Tanzania	0	0	0	6.7%	6	54	2.7	0.2%
Sudan	0	0	0	0.4%	9	47	2.1	0.7%
Mozambique	0	0	0	12.2%	5	54	1.1	0.2%

(Human Development Report, pp. 48-49).

attainment, and number of college students who select math and science as a major. In every category, the differences between world leaders and world followers are daunting.

The point all of these numbers make is that individual firms in these nine nations can expect to be at a significant disadvantage in any e-commerce effort. Their national infrastructure presents them with fewer phone lines, fewer educated workers, and less scientific innovation.

E-COMMERCE PARTICIPATION

Business web sites in these countries were identified by using search engines and business directories. Each site was checked to ensure that the business had a significant export-orientation. Businesses that were mainly local (e.g., restaurants, health services, banks, automotive) were excluded. Table 2 reviews the totals found.

Table 2

Ghana	7
Kenya	60
Mozambique	11
Nepal	229
Nicaragua	44
Pakistan	152
Senegal	5
Sudan	0
Tanzania	86

Only one country — Sudan — has no commercial web sites (and no hosts listed by ISC). The other eight countries identified by the UN as the most "marginalized" have at least fledgling efforts in the world of international e-commerce. These numbers have to be kept in context — remember the US has 43 million .com sites — but at least some businesses are making the effort.

To learn more about the experiences of companies attempting e-commerce in these countries, a short email survey was sent to many of the businesses identified in three countries (one per continent) — 116 companies in Nepal, 44 in Nicaragua, and 57 in Tanzania. Thirty-three surveys were returned (15 from Nepal, 11 from Tanzania, and seven from Nicaragua) from the 214 businesses that received the email survey. Results are tabulated below.

	Nepal	**Tanzania**	**Nicaragua**
Location of Web host	U.S. – 7 Nepal – 8	U.S. – 5 Tanzania – 3 UK – 3	U.S. – 4 Nicaragua – 2 Elsewhere - 1

As can be seen, the US was home to nearly half the web sites found. This significant use of hosting services in other countries was also found in the other countries reviewed. For example, of 98 web sites displaying Pakistani goods for export, 69 sites were hosted in the US. All seven Kenyan exporters are using US-based web sites. So it appears that one of the responses to weak local infrastructure is to use hosting services elsewhere. Lake (2000) points out that an international host also raises the credibility of the enterprise and reduces fears some consumers may have about purchasing from a distant land. On the other hand, at least some hosting is being done at the local level, so we can see that some facility is available. The good news for these countries is that since sites are being created and hosted locally, the talent that created and maintains those sites is also available locally and can be used by other businesses that wish to begin e-commerce efforts (Nepal's business directory lists nine Internet service providers or web development companies).

The second local issue surveyed was site costs. Those results are as follows:

	Nepal	Tanzania	Nicaragua
Monthly cost	<$20/month – 13 $20-$30/month – 2	<$20/month – 6 $20-$50/month – 3 over $50/month - 2	<$20/month – 4 $20-$50/month – 2 over $50/month - 1

These costs are significantly lower than one would expect given the normal higher costs of telecommunications in developing nations. By UNDP calculations, monthly internet charges amount to 1.2% of the monthly income of a US user, 614% for a user in Madagascar, 278% in Nepal, and 191% in Bangladesh. While the costs shown are still high given national income levels, they are less than would otherwise be expected.

The survey also asked for an estimate of traffic to the e-commerce site. Those results were unfortunately low:

	Nepal	Tanzania	Nicaragua
Business Inquiries per month	< 20 – 7 20-50 – 5 over 100 - 1	< 20 – 3 20-50 – 3 50-100 - 4 over 100 – 1	< 20 – 5 20-50 – 1 over 100 - 1

While each country had one site that was generating significant traffic, most sites were struggling.

The last question on the survey asked respondents to identify the nation that provided the most customers for their products. The US was the largest customer in all cases:

	Nepal	Tanzania	Nicaragua
Major foreign customer	U.S. – 9 Europe – 6 Asia - 2	U.S. – 8 Europe - 8	U.S. – 5 Latin America - 2

Respondents also made a number of comments on the obstacles they faced. One described trouble in getting banks to credit international payments. Several mentioned the high shipping costs they faced. One mentioned language problems — he could create a web site in English, but wanted to sell to other European countries and did not know their languages. And others mentioned the general difficulty of having web sites noticed among the millions that exist. These difficulties are all similar to those identified in other studies of e-commerce in developing countries (Lake, 2000; Mukti, 2000; Pradhan, 2002; Mujahid, 2002). The surprise is the number of companies that are using remote hosting to address some of the cost and infrastructure problems.

BUSINESS APPROACHES

Having established that these countries were indeed participating in international e-commerce, the next phase of the web survey was an effort to characterize the kinds of businesses and products that were being presented via the web. Recent discussions of e-commerce have indicated that the label is so large it fits many disparate businesses and products.

Classifications of products and services being sold on the Internet have been attempted by a number of researchers. Kiang and Chi (2001) establish three categories of on-line commercial activities: exchanging information between the buyer and seller, generating sales of tangible products, and exchanging digital products and services. In their subsequent review of failed e-tailers, they found that companies using e-commerce to sell tangible products failed twice as commonly as e-tailers selling digital products.

A recent profitability summary of publicly traded American companies puts products into two large categories — digital products/services and tangible products — and finds the digital products (online travel, software, financial services) are generating significant profits (after very significant start-up costs), while retailers trying to sell tangible goods are having a much more difficult time. According to this report the Expedia travel site was enjoying 70% gross profit margins, while book retailer Amazon.com was barely making 26% on its sales (Mullaney, 2002).

It was determined to use this digital/tangible split as a way of characterizing the products and services being presented on the web sites of the companies being reviewed. The product distribution found is shown on the following page.

The industry that appears to have taken the lead in these countries is tourism. Included in this category are hotels, travel agents, guide services, and outfitters. Nepal has the Himalayas and Tanzania the Serengeti and Kilimanjaro, so it should not be too surprising that they have many tourism businesses connected to these world-renowned sites. But Nicaragua, Ghana, Mozambique, Senegal, and Kenya also had a substantial majority of their web sites connected to the tourism industry, so this trend appears to extend beyond countries with unique destinations.

	Digital Products/Services	Tangible Products
Ghana	6	1
Kenya	53	7
Mozambique	11	0
Nepal	167	62
Nicaragua	35	9
Pakistan	54	98
Senegal	5	0
Sudan	0	0
Tanzania	85	1

The limited amount of business theory developed about e-commerce would support the level of activity we find in seven countries' tourism industries. Kiang and Chi (2001) point out that one of the unique features of Internet marketing can be its use as both a transaction medium and a distribution medium for digital products and services. Online ticketing and reservations are a classic example of this feature in that customers can learn about products, make a purchase, and receive a digital plane ticket or hotel/resort reservation. The Internet seems ideal for this kind of business and the fact that the majority of business being performed in these developing countries was of this type confirms that real business experience seems to be matching business theory.

On the other hand, current theory would predict problems for the many businesses in these countries that are trying to use the Internet as a means of selling tangible products. Already mentioned is the problem remote countries face when trying to ship products — they are a very long distance from any substantial market and so huge delivery obstacles and costs occur. But electronic commerce adds additional problems. Lack of trust in Internet security is frequently named as a problem in the literature (Farhoomand, 2000; Bingi, 2000). Small companies operating in distant countries would seem to be even more a risk to consumers — can they trust companies they have never heard of in countries they can barely find on a map?

But the products being selected for export seem even more problematic. Rangan and Adler (2001) placed tangible products into four categories — undifferentiated commodities (steel bars or a barrel of oil are the same anywhere you buy them), quasi-commodities (branded books or toys available from many sources), "look and feel" goods (houses, clothing, furniture), and "look and feel" goods of varying quality (artwork, wine). In the first two categories price is paramount and foreign companies with significant price advantages could see success. The two "look and feel" categories are much more difficult to sell over the Internet since buyers want to sit in the chair, try on the sweater, or taste a sample of the wine. None of these are possible online, so e-tailers attempting to sell such products have real problems finding customers.

Unfortunately for the businesses in the nine countries tracked, most are attempting to sell the classic "look and feel" products online. In Nepal it is Pashmina sweaters. In Nicaragua it is cigars and rum. Pakistan exports clothing and rugs. Kenya advertises African art work. All these products vary considerably in quality, in size, and in color.... Each would be difficult for experienced vendors with well-establish reputations and

simple return policies to sell. They are going to be extraordinarily difficult sales for distant companies with unknown names. Growing experience with online sales is beginning to suggest strategies companies can take to successfully sell "look and feel" products, but these strategies take significant business sophistication (for example, "relationship marketing" (Shin, 2001)) and still leave the companies of Nepal facing the basic task of shipping a Pashmina sweater to Oregon and accepting a return if the size or color are wrong, and doing so at an attractive price while earning a profit. Such a task is daunting in any country and with any level of technological infrastructure.

The other problem with the product category chosen most often by these exporters is the low profits such products generate. In their study of twelve emerging multinational companies, Bartlett and Ghoshal (2000) identified each company's products by market segment and placement on what they termed the "value curve." They noted, "the problem for most aspiring multinationals from peripheral countries is that they typically enter the global marketplace at the bottom of the value curve – and they stay there." By this they mean companies export low profit commodity — like products rather than more profitable branded products. Persaud (2001) refers to this as the "commodities trap," and points out that the Internet puts additional pressure on commodities sellers since buyers can go to a host of cybermarkets and post a bid for a graded commodity, thus putting pressure on seller's profit margins. If the sweaters, cigars, clothing and rugs being sold are not differentiated from endless competitors, they can be treated as commodities — and priced accordingly. Yet asking a small company in a developing country to develop an international brand for its product so it can move up the value curve seems impossible.

DISCUSSION

Researchers on technology diffusion make a credible case for the need to look beyond the current technology to support systems — educational, governmental, and cultural — that can make the innovation succeed. The figures gathered by the United Nations Development Programme show just how marginal these support systems are in the nine countries they have identified. Clearly any business in these countries will have significant hurdles to cross to participate in global e-commerce. Yet a specific count of web sites in the nine selected nations shows that individual businesses have not given up. They are looking actively for ways to grow their business and gain foreign markets. They have found ways of keeping costs down and ways of circumventing local infrastructure shortcomings. Yet this survey shows they are finding only limited success.

A review of the product choice these companies are selecting for sale over the web finds that digital goods and services greatly outnumber tangible goods. Additionally, the tangible products being advertised seem to be particularly difficult to sell over this medium. It would appear that exporting companies and their government supporters should give some thought to the product mix they are presenting for sale. Just as the dot com bubble in the US represented serious misunderstandings about what products could be successfully sold over the web, businesses in the marginal countries of the world appear to be following down the same failed path.

Given the obvious effort companies in these nations are willing to make to improve their sales, it would appear that they should consider two strategies for successful e-

commerce. The first strategy is the one already being employed by companies that are using the web to sell digital products. Hotels, resorts, vacation sites and travel agents are already using the web to support tourism in these countries. This strategy seems to be in concert with what we know works over this medium.

A second strategy is one that none of these countries appear to be employing at this time — the sale of digital services. The research of Davis, McMaster and Nowak (2002) provides a checklist for support needed to successfully enter the IT-enabled business services industry. Jobs such as keyboarding, text entry, transcription, data processing and contact centers all can be performed with minimal skills and at significant competitive advantage to those countries — or portions of countries — that can provide the necessary social, legal, and technical infrastructure. As noted earlier in this paper, none of these countries has all of the national infrastructure needed to fully compete, but as we also saw, individual companies can do very creative things to leverage the small amount of talent and capital they can accumulate.

Additional research is crucial. One place to start would be with infrastructure. As this study found, many businesses have bypassed local web service weaknesses by hosting overseas. While that is a short-term solution to one infrastructure problem, it does not address problems with shipping. For governments that are not corrupt, are there models available that would suggest the optimal approach these governments could use to speed shipping through local ports and airports? In countries that will not change their practices, are there avenues available to businesses to at least reduce the competitive disadvantages they face?

Another aspect of infrastructure that is frequently mentioned as important is education, but there is little literature on university departments in LDCs that are having an impact in this area. As a former professor of Computer Science at the University of Namibia, I found that local companies were very open to working with university faculty, but there seemed to be much less applied research engagement than is often the case in the US and elsewhere. Research identifying models for such interaction would be useful.

The fact that businesses were often getting very low numbers of "hits" on their web sites reminds us that companies in LDCs share the same problem as all companies — visibility. In a study of e-commerce activity in Ethiopia, Lake (2000) noted that much of the success some companies there were having was based on the fact that some Ethiopian artists have international reputations, and so getting their work noticed was less difficult. Companies just developing an international awareness and international-quality goods, could be greatly helped by research that provided models of companies that were able to successfully make the move to the international stage.

Lastly, we still need much more work identifying the products or product categories that can be sold successfully around the world. This research may have to be done by national bodies as they identify niche products that can be promoted globally. In the meantime, it is a serious waste of effort for fifty Pashmina vendors in Nepal to all find out independently that selling such sweaters over the Internet may not be a possibility.

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APPENDIX A

The email survey consisted of these six questions:

Is your web site hosted in:
____ Nicaragua [or Tanzania or Nepal]
____ US
____ elsewhere

How many years have you had a web site for your business? ____

What is the approximate monthly cost for hosting the web site?
____ Less than $20 per month US
____ $20-$50 per month US
____ More than $50 per month US

How many business inquiries per month do you receive through your web site?
____ Less than 20 per month
____ 20-50 per month
____ 50-100 per month
____ More than 100 per month

What percentage of your total business is generated by your web site?
____ Less than 5%
____ 5-15%
____ 15-30%
____ 30-50%
____ More than 50%

Which area of the world gives you the most business through the Internet/World Wide Web?
____ US
____ Europe
____ Asia
____ Latin America

Chapter IV

A Contigency Theory for Online Consumer Retention:
The Role of
Online Shopping Habit

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ABSTRACT

Customer retention, or repurchase, is one of the main factors that help to create and maintain the competitiveness and sustainability of an organization. With the proliferation of B2C electronic commerce, retention has become even more important to Internet merchants who sell online, where customers are provided with a wide variety of choices and competition is globally severe. As opposed to pageviews and click through ratios, repurchase provides a more revealing metric of the effectiveness of websites. It is therefore important to explain and identify the determinants of online customer retention. Previous IS research on online shopping mainly focused on adoption and usage issues. Very few studies, however, examined whether customers made repurchases after they were attracted to and satisfied with the buying experience and product. In this study, we develop, operationalize and empirically test a model that explains online consumer retention as measured by repurchase. Our findings

demonstrated that the direct effect of satisfaction on repurchase is positively moderated by online shopping habit. This research also highlights and identifies specific factors affecting customer retention that should help practitioners in formulating the appropriate marketing strategies.

INTRODUCTION

Customer retention, or repurchase, is an intangible ability to keep visitors coming back over a long period of time (Maciag, 2000). It is one of the main factors that help to create and maintain the competitiveness and sustainability of an organization. IWon.com, for example, strives hard to retain customers by offering the chance to win $1 million US dollars to its visitors every month (Crockett, 2000). From an economic perspective, it is a marketing strategy to increase the opportunity costs to prevent customers from switching to other counterparts. Customer retention is therefore one of the key strategic imperatives of customer relationship management (CRM) (Soderlund et al., 2001). Short-term retention can be achieved through a number of factors like brand equity which can be easily imitated by competitors. Long-term retention needs to grow continuously over time to create a financial hurdle that deters consumers from switching (Nemzow, 1999). With high customer retention, marketing costs can be substantially reduced, as it is always cheaper to retain a customer than to acquire a new one. It is reported that attracting new customers takes up 75% of the budgets of e-tailers while retention takes up only 25% (Crockett, 2000). With the proliferation of B2C electronic commerce, retention has become even more important to Internet merchants who sell online, where customers are provided with a wide variety of choices and competition is globally severe. Selling in cyberspace is very different from selling in physical markets, and requires a critical understanding of consumer behavior and how new technologies challenge the traditional assumptions underlying conventional theories and models. A critical under-standing of repurchase behavior in cyberspace, as in the physical world, cannot be achieved without a good appreciation of the factors that drive consumers to return. If cybermarketers understand online consumer behavior, they can adjust their marketing strategies to fit this new way of selling in order to convert their potential customers to real ones and retain them. Similarly, website designers, who are faced with the difficult question of how to design pages to make them not only popular but also effective in increasing sales, can benefit from such an understanding. It is not, however, clear what keeps customers returning. Customer retention is one of the key factors affecting the competitiveness of organizations that has become a primary concern for B2C businesses. As opposed to pageviews and click through ratios, repurchase provides a more revealing metric of the effectiveness of websites. It is therefore important to explain and identify the determinants of online customer retention.

Previous IS research on online shopping mainly focused on adoption and usage issues. Very few studies, however, examined whether customers made repurchases after they were attracted to and satisfied with the buying experience and product. Most prior research studied the cognitive aspects of behavior with emphasis on the relationship between intention and behavior. These studies focused on the application of behavioral theories, e.g., the Theory of Planned Behavior (Ajzen, 1991), to examine the determinants

of the intention and behavior of online shopping. However, to our knowledge, no study examined online repeated behavior, i.e., repurchase.

The purpose of this study is to propose a theoretical model to address this void. More specifically, we develop and empirically test a conceptual model that identifies important determinants of online consumer retention, as measured by repurchase. Our research presents important theoretical and practical contributions. On the theoretical side, we operationalize and empirically test a consumer retention model that explains online consumer retention as measured by repurchase. On the practical side, this research highlights and identifies specific factors that influence repurchase. Such specific drivers can help practitioners in formulating the appropriate marketing strategies.

This chapter is organized as follows. The next section presents the theoretical foundations of our research model. We then outline the research methodology and describe the data analysis, and present and discuss the empirical results. Finally, we conclude this paper by discussing the implications of the results and providing suggestions for future research in this area.

RESEARCH MODEL

As illustrated in Figure 1, our model postulates that repurchase is mainly determined by overall satisfaction and that this relationship is moderated by online shopping habit. In other words, online consumers who are satisfied with all the aspects of their shopping experience from a particular retailer are more likely to repurchase from that retailer if they have already acquired the habit of shopping online. Although satisfied, consumers may not shop again from an online retailer if online shopping is not yet part of their shopping habit. Consistent with Homburg and Giering (2001), our model also postulates that overall satisfaction is a function of product satisfaction, sales process satisfaction and after-sale service satisfaction. Each of the constructs and their interrelationships are discussed in more detail next.

Figure 1: The Research Model.
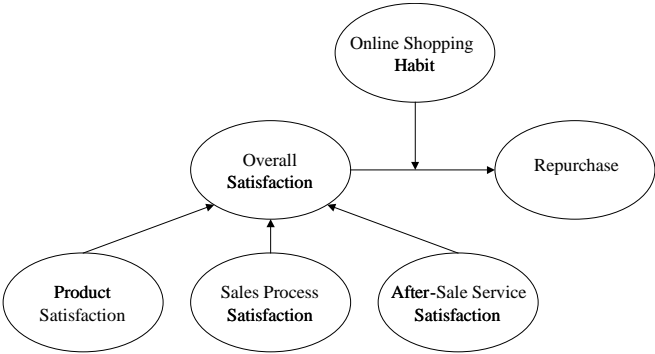
Repurchase

Customer retention has long been in the research agenda of the marketing discipline. It is typically defined as "an intangible ability to keep visitors returning again and again and for longer and longer periods" (Maciag, 2000) and as "a form of repeat purchasing of a particular product or service over time" (see Copeland, 1923). Retention reveals and is one facet of loyalty (Soderlund et al., 2001; Jacoby & Chestnut, 1978). In the current study, retention is measured as the number of repurchases. Unlike other measures, repurchase can better represent the "process of retaining prior customers with repeat business" (Nemzow, 1999). Other metrics like average length of time spent on browsing or click through ratios reflect site retention rather than customer retention, as they merely measure whether the site is being visited instead of whether orders are being placed (Nemzow, 1999). From an organizational perspective, repurchase is also an important measure for evaluating operational performance, given its direct impact on organizational profitability and competitiveness.

Satisfaction

Satisfaction has been widely defined as a post-evaluative judgment over a particular purchase (Bearden & Teel, 1983; Churchill & Suprenant, 1982; Oliver, 1979, 1980; Oliver & DeSarbo, 1988). Yi (1990) further specified that overall satisfaction is affected by three categories of satisfaction; namely, product satisfaction, sales process satisfaction and after-sale service satisfaction. Satisfaction can occur with the product/service itself, the sales process and during the post-sales stage. Product satisfaction is the most popular one adopted by researchers. It relates to the evaluation of product performance with regard to attributes such as value-for-money, ease of use and design sophistication (LaBarbera & Mazursky, 1983; Marr & Crosby, 1992). Sales process satisfaction occurs through the personal interaction with the sales personnel and the capability of the selling parties in meeting the individual needs of customers (Homburg & Giering, 2001). In the context of online shopping, however, it is rather the interaction with the website that largely determines the process satisfaction. During the post-sale stage, satisfaction with after-sale service is based on the quality of the service itself and the interpersonal experience with the after-sale service personnel (Crosby, Evans, & Cowles, 1990).

Satisfaction and Retention

We hypothesize that satisfaction has a direct effect on customer retention. A customer is more likely to come back if he/she is satisfied with the purchase. A number of firms are relying on managing the satisfaction of customers to avoid their defection (Capraro et al., 2003). Unpleasant buying experience or poor product performance easily leads to customer dissatisfaction and discourages him/her from coming back. There is ample empirical evidence from the marketing discipline that customer satisfaction is positively linked to repurchase (e.g., see Newman & Werbel, 1973; La Barbera & Mazursky, 1983; Rust & Zahorik, 1993; Rust, Zahorik, & Keiningham, 1995; Sambandam & Lord, 1995; Hallowell, 1996; Bolton, 1998) or repurchase intention (e.g., Fornell, 1992; Selnes, 1998), which is strongly related to actual purchase behavior (Innis & La Londe, 1994). For example, Mittal and Wagner (2001) argued that the relationship between

satisfaction and repeated purchase behavior is nonlinear, drawing upon empirical evidence collected from more than 100,000 customers.

Online Shopping Habit

Habit is conceptualized as "situation-behavior sequences that are or have become automatic…the individual is usually not conscious of these sequences" (Triandis, 1980, p. 204). It is a behavior tendency developed from historical situations that an individual experienced in the past. Such tendency will then elicit behavioral response from the individual automatically upon a stimulus, which most likely is a situation similar to that in the past. The individual may act accordingly without being aware of it or having instructed him/herself to do it. Habit is distinguished from reflexes as it is developed based on the learning ability of an individual. Reflexes occur both naturally and automatically without having to go through historical experience in the first place. On the other hand, habit is developed partly based on the learning ability of an individual to convert/absorb the behavior into a cognitive schemata (Limayem, Hirt, & Chin, 2001).

Given its nature, habit is directly associated with behavior. A strong habit is more likely to induce a similar behavior. In addition, habit also has an interactive effect on behavior (Triandis, 1980, p. 228). As a certain behavior turns more routinized, habit also becomes more supreme. Similarly, Charng et al. (1988) suggested that when an action becomes routinized, the performance of it may also require less conscious decision-making. In the context of customer behavior, online shopping habit may lead to Internet purchasing behavior, while if such behavior occurs frequently and regularly, online shopping habit may in turn further be strengthened.

Moderating Effect of Online Shopping Habit Over the Relationship Between Satisfaction and Repurchase

Despite that a number of studies report satisfaction to be positively related to repurchase, many of them explain a relatively small portion of the variance in such behavior (e.g., Newman & Werbel, 1973; La Barbera & Mazursky, 1983; Bolton, 1998). A review of literature indicated that 65%-85% of satisfied customers did not return (Reichheld, 1996), implying that satisfaction alone does not necessarily lead to repurchase (Capraro et al., 2003). It is therefore important to consider moderating variables in gaining a better understanding of the relationship between satisfaction and customer retention (Oliver, 1999; Capraro et al., 2003; Nijssen et al., 2003).

Habit has been investigated by some researchers for its impact on the intention to adopt and the subsequent usage of information systems (e.g., see Bergeron et al., 1995; Limayem, Khalifa, & Chin, 1999). Very few studies, however, examined the moderating role of habit in the context of online customer behavior. Furthermore, to our knowledge, no study investigated the combined effects of habit and satisfaction on repeated behavior (repurchase). The effect of satisfaction on repurchase may be further strengthened if the customer habitually buys online. The effect of satisfaction on repurchase may, on the other hand, be weakened if the online shopping habit level is low. A customer who rarely purchases on the Internet may not repurchase from an online retailer despite that he/she is satisfied with that retailer. Therefore we hypothesize that online shopping habit moderates the relationship between satisfaction and repurchase.

Table 1: Weights and Loadings for Formative and Reflective Measures.

Factors	Variables	Weights	Loadings	Std. Error	T - statistics
Overall satisfaction	Satisfaction 1		0.94	0.01	90.49
	Satisfaction 2		0.93	0.02	60.10
	Satisfaction 3		0.96	0.00	199.19
Online shopping habit	Online shopping habit 1		0.81	0.02	32.57
	Online shopping habit 2		0.85	0.03	30.96
	Online shopping habit 3		0.81	0.03	28.80
Repurchase	No. of repurchase in the last month		1.00	0.00	0.00
Product satisfaction	Quality of products	0.32		0.15	2.09
	Prices of products	0.60		0.15	4.07
	Packaging of products	0.06		0.14	0.45**ns**
	Product choices	0.29		0.14	2.10
	Product description	0.21		0.11	1.90
Process satisfaction	Transaction efficiency	0.40		0.09	4.51
	Privacy measures	0.13		0.08	1.60 **ns**
	Navigation efficiency	0.20		0.09	2.19
	Comparative shopping	0.36		0.08	4.52
	Convenience of shopping	0.08		0.10	0.75 **ns**
	Site accessibility	0.28		0.09	3.18
	Web page loading speed	0.27		0.14	1.98
	Security measures	0.19		0.11	1.72
	User-friendliness	0.19		0.07	2.58
After-sale service satisfaction	Delivery time	0.79		0.06	13.05
	Handling returns	0.29		0.09	3.08
	Customer service	0.02		0.08	0.21 **ns**
	Delivery care	0.05		0.06	0.71 **ns**

METHODOLOGY

The methodology consisted of three phases: (1) belief elicitation, (2) survey of online shopping habit and satisfaction, and (3) repurchase tracking.

To identify specific satisfaction factors, we relied on belief elicitation to develop a formative measurement model for each of the satisfaction dimensions; i.e., product satisfaction, sales process satisfaction and after-sale service satisfaction. For the remaining constructs, i.e., overall satisfaction and online shopping habit, we developed reflective measurement models. The dependent variable, repurchase, was operationalized as the number of repurchases made within a specific period of time (one month) since the first purchase.

Belief Elicitation

To develop formative items for the constructs, "product satisfaction", "sales process satisfaction" and "after-sale service satisfaction", we examined the literature and conducted a belief elicitation procedure. Sixty online shoppers were selected randomly from the customer base of a North American supermarket. The selected online consumers were invited to participate in focused group discussion. They were divided into six groups of 10 individuals each. In the focused group discussion, the participants were asked to identify important satisfaction factors and to categorize them under product satisfaction, sales process satisfaction and after-sale service satisfaction. Based on the literature review and the results of the belief elicitation process, we ended up with a list of formative satisfaction items represented in Table 1.

Survey of Online Shopping Habit and Satisfaction

A survey instrument was constructed based on reflective items for the "overall satisfaction" and "online shopping habit" constructs and the formative items developed in the belief elicitation stage for the constructs "product satisfaction", "sales process satisfaction" and "after-sale service satisfaction". The reflective items were validated using the card sorting procedure (Moore & Benbasat, 1991). The resulting survey was then administered to first-time online buyers of a major grocery retailer in North America that also operates an Internet store. For a period of six months, every new online shopper was invited to answer an online survey after the delivery of the grocery (within 24 hours from the online order). Once the respondent has completed the questionnaire, the responses were automatically sent to a database. Pitkow and Recker (1995) present all the advantages of this surveying method. A total of 391 new online shoppers completed the survey. The demographics of these respondents are shown in Table 2.

Repurchase Tracking

The number of repurchases that every respondent of the survey made over a period of 30 days was automatically recorded. We assumed that one month would be sufficient for customers to repurchase from the store given the perishable nature of grocery

Table 2: Demographics of Respondents.

Demographics		%
Age	Less than 20	18
	20-30	37
	30-40	28
	40-50	16
	Greater than 50	1
Gender	Male	28
	Female	72
Household family income	Less than US$ 20,000	16
	US$20,000-35,000	28
	US$35,000-50,000	31
	Greater than US$50,000	25

products. This assumption is supported by the findings of the 10th survey conducted by the Graphics, Visualization and Usability (GVU) Center at Georgia Tech in October 1998. It showed that the frequency of online shopping ranges from once a month to few times a week (GVU, 1998). The entire data collection process lasted for six months.

Data Analysis

The analysis of the data was done in a holistic manner using Partial Least Squares (PLS). The PLS procedure (Wold, 1989) has been gaining interest and use among researchers in recent years because of its ability to model latent constructs under conditions of non-normality and small to medium sample sizes (Chin, 1998; Compeau & Higgins, 1995; Chin & Gopal, 1995). It allows the researcher to both specify the relationships among the conceptual factors of interest and the measures underlying each construct. The result of such a procedure is a simultaneous analysis of (1), how well the measures relate to each construct and (2), whether the hypothesized relationships at the theoretical level are empirically confirmed. This ability to include multiple measures for each construct also provides more accurate estimates of the paths among constructs which are typically biased downward by measurement error when using techniques such as multiple regression. Furthermore, due to the formative nature of some of the measures and non-normality of the data, LISREL analysis was not appropriate (Chin & Gopal, 1995). Thus, PLS-Graph version 2.91.02 (Chin, 1994) was used to perform the analysis. Tests of significance for all paths were conducted using the bootstrap resampling procedure (Cotterman & Senn, 1992). For reflective measures, all items are viewed as parallel measures capturing the same construct of interests. Thus, the standard approach for evaluation, where all path loadings from construct to measures are expected to be strong (i.e., 0.70 or higher), is used. In the case of formative measures, all item measures can be independent of one another since they are viewed as items that create the "emergent factor". Under this situation, Chin (1998) suggested that the weights of each item to be used to assess how much it contributes to the overall factor. For the reflective measures, rather than using Cronbach's alpha, which represents a lower bound estimate of internal consistency due to its assumption of equal weightings of items, a better estimate can be gained using the composite reliability formula (Chin, 1998).

In formulating and testing the moderating effect of "online shopping habit" on the relationship between "overall satisfaction" and "repurchase" with PLS, we followed a hierarchical process similar to multiple regression, where we compared the results of two models (i.e., one with and one without the interaction construct: online shopping habit x satisfaction). We applied the procedure described by Chin et al. (1996). The standard-ized path estimate from the product construct (online shopping habit x overall satisfac-tion) to repurchase indicates how a change in the level of the moderator construct (online shopping habit) would change the influence of satisfaction on the dependent construct (repurchase). Thus, if satisfaction has an estimated beta effect of B on repurchase, a beta of M for the interaction path can be interpreted as a beta change of B+M for the estimated path from satisfaction to repurchase when habit increases by one standard deviation from the baseline of zero.

By comparing the R-square for the interaction model with the R-square for the main effects model (which excludes the interaction construct), we can assess the strength of the moderating effect. The difference in R-squares was used to estimate the overall effect size (f^2) for the interaction where .02, 0.15, and 0.35 suggest small, moderate, and large

effects, respectively (Cohen, 1988)[1]. It is important to understand that a small f^2 does not necessarily imply an unimportant effect. If there is a likelihood of occurrence for the extreme moderating conditions and the resulting beta changes are meaningful, then it is important to take these situations into account.

RESULTS AND DISCUSSION

Figures 2 and 3 provide the results of testing the structural links of the proposed research model using PLS analysis for the main effect model and the interaction model, respectively. The estimated path effects (standardized) are given along with the associated t-values. All path coefficients are significant at the 99% significance level, providing strong support for all the hypothesized relationships.

The main effects model explains 29% for the variance of repurchase. The inclusion of the interaction construct (see Figure 3) increases the R-square for repurchase to 33%. The path coefficient between the interaction construct and repurchase is 0.215 and is also significant at the 1% level. Thus, these results imply that one standard deviation increase in online shopping habit will not only impact repurchase directly by 0.192, but would also increase the impact of satisfaction from 0.416 to 0.521. The interaction effect, therefore, has an effect size f^2 of 0.047, which represents a solid small effect, confirming our hypothesis that online shopping habit moderates the relationship between overall satisfaction and repurchase[2]. In other words, as online shopping becomes more habitual, the effect of satisfaction with an online store on repurchase also becomes stronger. Although small, the moderating effect of online shopping habit is significant at the 1% level. These findings imply that companies should focus on consumers who have acquired the habit of shopping online in allocating their marketing efforts, as these consumers are more likely to repurchase when satisfied. That is, the effects of satisfaction on repurchase could be strengthened or weakened by the online shopping habits of the consumers.

Figure 2: Main Effects Model.
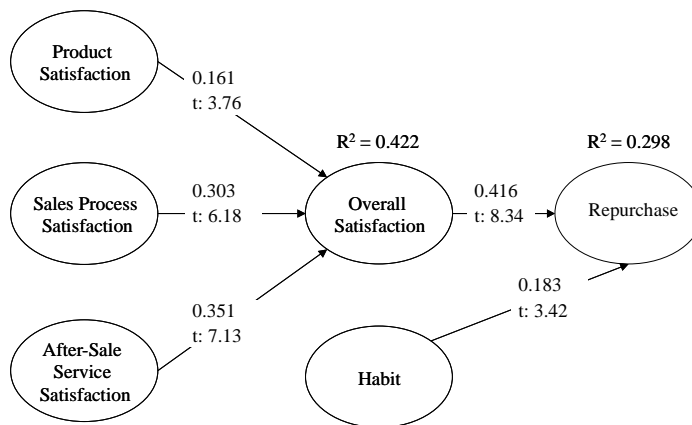
Figure 3: Interaction Model.
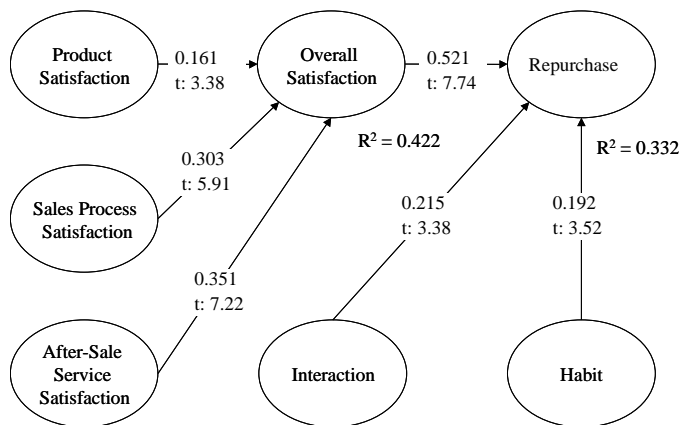
Our findings prove that overall satisfaction is an important factor leading to repurchase. Moreover, sales process satisfaction (.303) and after-sale service satisfaction (.351), as indicated by the strength of their path coefficients, seem to be more important than product satisfaction (.161). A possible explanation is that grocery retailers usually carry products with similar attributes but differ in their support for the online shopping processes and their after-sale services. This result is consistent with the common belief that with e-commerce the competition is mainly on the digital value (i.e., information content, online services), rather than on the physical attributes of the product.

Table 1 highlights the important items constituting each of the three types of satisfaction variables. For product satisfaction, all variables including quality of products, prices of products, product choices and product description were found to be significant, except for packaging of product. This is probably because packaging is no longer a concern for grocery products. Prices, as indicated by the relatively higher weight, are the key drivers of product satisfaction as most customers shop online for cheaper products.

For process satisfaction, only privacy measures and convenience of shopping were found to be insignificant, while the rest (transaction efficiency, navigation efficiency, comparative shopping, site accessibility, web page loading speed, security measures and user-friendliness) were all proven to be important. Privacy may not be a major concern for online consumers since buying grocery products is not really revealing. Convenience of shopping may be taken for granted by online customers, as this attribute is offered by all Internet retailers. On the other hand, transaction efficiency and comparative shopping are regarded by customers as the most important factors that led to online repurchase, as indicated by the relatively higher weights. Transaction efficiency refers to the ability of the customers to complete the shopping cycle in a short period of time. Customers want to be able to compare a wide variety of products easily and efficiently on the Internet in order to make more informed decisions in product selection.

For after-sale service satisfaction, customer service and delivery care (unlike delivery time and handling returns) were found to be insignificant. This could be explained by the fact that customer service and delivery care are not important issues for grocery products. On the other hand, delivery time is the key driver of after-sale service satisfaction given the perishable nature of grocery products.

CONCLUSION AND IMPLICATIONS

In this study, we develop, operationalize and empirically test a model that explains online consumer retention as measured by repurchase. The use of a longitudinal approach provided a better understanding of the causal relationship between satisfaction and repurchase. While previous research on online shopping behavior mainly focused on adoption issues, this study goes beyond adoption to explain the continuation of the behavior; i.e., repurchase. Most earlier studies in the marketing literature on repurchase modeled repurchase as a direct effect of satisfaction. Our findings demonstrated that this was not applicable for online purchase and that a contingency theory was needed; i.e., moderating factors of the link between satisfaction and repurchase should be included. The results of the study presented significant theoretical contribution by showing the importance of considering online shopping habit as moderator of the relationship between satisfaction and repurchase. That is, the link between satisfaction and repurchase can be weakened or strengthened depending on the extent to which a consumer has acquired the habit of online shopping.

Our findings also offered practical contributions. We demonstrated that it is important for cybermarketers to focus their attention and efforts on online shoppers who have already acquired the online shopping habit, as these customers are the ones who are most likely to come back and make repurchases. Furthermore, coupling belief elicitation with prior research allowed us to obtain a salient set of formative measures that resulted in interesting practical implications for managers and cybermarketers about the critical drivers of online customer retention. We identified 13 factors as the main determinants of customer satisfaction, and hence, repurchase. We classified these factors into the dimensions of product satisfaction, process satisfaction and after-sale service satisfaction.

To achieve product satisfaction, "prices of products" was found to be the most significant driver, indicating the importance of pricing strategies in online customer retention. Discounts, coupons and other incentives can be offered to online consumers by making use of the savings in the operational costs resulting from electronic commerce (Gehrke & Turban, 1999).

"Quality of products" came second as the critical factor in determining product satisfaction. As consumers also attach high importance to product quality in evaluating their satisfaction with products, it will be recommendable for managers to seek continuous improvement in the attributes and performance of the products sold on the Internet.

The third significant factor for product satisfaction was found to be "product choices". Cybermarketers should therefore ensure that a wide variety of selections are made available in their Internet storefronts to enhance customer satisfaction. Moreover, consistent with the previous studies, "product description" was found to be another significant driver of product satisfaction. Lohse and Spiller (1998b) found that better product descriptions improved sales significantly. Such impact will even be stronger if

product images are added to supplement the descriptions. Similarly, Ho and Wu (1999) found a positive relationship between valuable/accurate product description and online customer satisfaction. Web designers and cybermarketers can therefore enhance the clarity of product descriptions by using pictures when appropriate.

For process satisfaction, several factors were also identified as key drivers. Among these factors, "transaction efficiency" was found to be the most important. Its role is particularly important in improving customer satisfaction with online shopping processes. Similar results were also reported by Ho and Wu (1999), who found that consumers were more satisfied when the quality of the logical support during online transactions was higher. Therefore web designers should make the transactions as efficient as possible by, for example, enhancing the speed of information retrieval and ease of completing online payments.

"Comparative shopping" emerged as the second significant driver of process satisfaction. Most customers expect to be able to compare the prices and availability of products from diverse Internet stores (Rowley, 1996). Web designers should therefore include features that support information search such as a search engine to enable the online shoppers to perform comparison of company products with those of competing brands easily using multiple attributes. Dholakia and Rego (1998) further added that the quality of the information content of web pages could be enhanced by showing the unique advantages of the company products.

The third important driver of process satisfaction was found to be "site accessibility". There will be more website visitors and higher sales if the storefront is accessible from a greater number of "entrances" (Lohse & Spiller, 1998a). Hence, marketers should promote their websites by including their links in other cybermalls, by negotiating reciprocal links with other commercial websites, and by registering their URLs with popular search engines.

"Web page loading speed" was found to be another important determinant of process satisfaction. According to the findings of the multiple surveys conducted by the Graphics, Visualization & Usability (GVU) Center at Georgia Tech, slow loading speed is consistently shown to be one of the key complaints of Internet shoppers. Web designers should hence maximize page loading speed in order to improve customer satisfaction during the shopping process. This can be accomplished by keeping graphics simple and meaningful, limiting the use of unnecessary animation and multimedia plug-in requirements, using thumbnails, providing a "text-only" option, continuously monitoring the server and the Internet routes, and finally, by allowing text to load first, followed by graphics (Gehrke & Turban, 1999).

Our results also indicated that "navigation efficiency" significantly affects satisfaction with Internet shopping processes. Lohse and Spiller (1998a) found that this factor alone explained as much as 61% of sales and 7% of the traffic. With poor navigation, customers may become frustrated, leading to complaints such as, "this is not for computer illiterate people" and, "I had places I wanted to go but couldn't understand how". Web designers should carefully design the online store layout in order to facilitate navigation. Features such as hyperlinks can enable customers to access the relevant information and drill down to more details, when necessary, easily and efficiently. These links should also be well-labeled, consistent and reliable. A map site and an effective search engine would greatly enhance navigation efficiency if there are many underlying links within a website (Gehrke & Turban, 1999).

The last two significant drivers of process satisfaction were "security measures" and "user-friendliness". These two factors had equal importance as indicated by the weights of their formative measures. Security has been acknowledged as a critical factor that affects online shopping behavior in many studies (Gehrke & Turban, 1999; Ho & Wu, 1999). It is therefore important to provide assurance to online shoppers that the transactions are protected. Web designers and marketers should implement security measures such as encryptions, *Secure Sockets Layer (SSL)*, and secure payment systems. Since Internet security is also a matter of perception, security policies should also be clearly communicated to prospective online shoppers by means like adding the statement "Secure Server" to enhance their confidence (Gehrke & Turban, 1999). User-friendliness was also perceived to be of great importance, consistent with all previous studies that stressed the importance of interface design.

For after-sale service satisfaction, we identified two important drivers from the data analysis of the formative measures. "Delivery time" constitutes the most significant factor. Managers of online storefronts should therefore pay attention to the promptness of delivery and ensure offline logistics issues are well handled.

Another driver of customer satisfaction associated with after-sale service was found to be "handling returns". Offering guarantees and a well-defined return policy can effectively enhance the popularity of a website. The implications to web designers are that terms and procedures of returns handling should be clearly stated in the website. Customers should also be provided with feedback channels to make inquiries about the details of these policies.

Approximately 67% of the variance in repurchase remains unexplained. Future research should use more elaborate models incorporating additional antecedent factors beyond satisfaction and online shopping habit. Attempts should also be made in the future to investigate other types of products and industries and incorporate other possible factors such as personal characteristics in models that explain online customer retention.

ACKNOWLEDGMENTS

ENDNOTES

[1] $f^2 = [\text{R-square(interaction model)} - \text{R-square(main effects model)}]/[1 - \text{R-square(main effects model)}]$

[2] $f^2 = (.332-.298)/(1-.298)=0.05$

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Chapter V

Software and Culture:
Beyond the Internationalization
of the Interface

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ABSTRACT

Software applications are designed around user interaction. One interaction component is the user interface; the other deeper components represent the applications' logic and core functionality. Internationalization architectures recognize the need for localizing user interfaces to particular cultures. We continue the discussion on culture and software focusing on the software core rather than the user interface. This core corresponds to deep culture as opposed to the surface cultural manifestations embedded in the user interface. We argue here that deep culture can be embedded into application software in a modular way.

INTRODUCTION

The participants of the 1999 E-Conomy conference called for a pluralistic perspective on e-commerce and its technologies (Cioffi, 1999). Technologies developed for e-commerce have a number of popular applications, including communication and discussions, decision-making and negotiation, voting and other forms of facilitating citizens' to participate in federal and local governments. A pluralistic perspective on e-commerce and other computing technologies requires the consideration of social and organiza-

tional cultures, including value systems, beliefs and norms. The state of application software today seems to indicate that U.S. technologists and so-called, software evangelists still determine the user experience based on their own cultural biases.

To date, the development of software for a culture different from the culture of its authors has been focused on adapting the user interface. This method is referred to as *software internationalization*. The underlying assumption behind software internationalization is that all of the culturally and linguistically sensitive software components can be separated from the locale-independent core of the application (Hall, 1999, p. 298), (Nakakoji, 1996; Hall and Hudson, 1997).

The assumption of the culture-dependent interface and the culture-independent core has helped software companies to develop programs for international markets without re-writing the very same application for every new national market. The perspective that *all cultural aspects are encapsulated in the external layer of the software* has been fundamental in porting application to international markets. We will argue with this traditional engineering approach (Sommerville, 1992), which (1) separates the human interface from the mechanics of the apparatus, and (2) assumes that changing the interface is all that is necessary to change the usability of that apparatus (Laurel, 1991).

At the early stage of the innovation curve simplification and reductionism are often necessary to understand complex situations, construct models and build machines. The ability to match a problem's complexity with its representation and machinal embodiment increases with the discovery of methods and techniques that are specialized for a particular type of innovation. The discussion presented here is based on the assumption that the current state of the software development processes allows for a richer perspective on the culture-software relationship than that being employed today.

In this chapter we present arguments behind the claim that cultural concerns penetrate beyond the user interface. Contrary to what the current methods of engineering of international software would suggest, we consider *the software core being culture-dependent*. There are two interconnected motivations behind this statement: (1) the software core is a technology which, according to some theories of technology, is rooted in, and shaped by, culture (Heidegger, 1977; Feenberg, 1991; Ferre, 1995); and (2) and unlike many other technologies software describes and automates complex activities and whole processes that previously were undertaken by people and organizations. The core of a software artefact embeds decision-making, rules of behaviour and patterns of actions that depend on culture (Juustila, 1995; Kaplan, 1995; Hofstede, 1997). Consequently, embedding the attributes of the users' culture requires changes to the design of software architectures that go beyond the current international standards for software architecture and localization.

This chapter continues the discussion on culture and software and the dominant role of Western cultures, the U.S. in particular, in software development (Taylor, 1992; Juustila, 1995; Kaplan, 1995; Nakakoji, 1996; Carmel, 1997; Kersten, Matwin et al., 2000). Two perspectives on culture are presented, followed by three theories of technology. Then perspectives on culture are coupled with theories of technology. This theory-based assessment is illustrated with three examples of culture being embodied in the software core. A proposal for software "culturalization" is then formulated. It is based on the recognition that deep cultures can be embedded in software. This should happen, as we conclude, even if one assumes that the impact of national cultures diminishes.

CULTURE

Culture provides subjective insights and relative laws; it allows for the interpretation of actions and events. In explaining culture Hofstede uses the analogy of computers and programming and says that "Culture is … the collective programming of the mind that distinguishes the members of one group or category of people from another" (Hofstede, 1997, p. 5). As such, it is a set of shared and enduring meanings, values, and beliefs that characterize national, ethnic, or other groups, and orient their behaviour (Faure and Rubin, 1993).

Culture is a world of symbols constructed by people; it is a structure of meanings, beliefs and values that condition human behaviour allowing for its interpretation and purposefulness. The key issue for our discussion is whether there is an underlying universal basis in which different cultures are rooted, and whether there are general cross-cultural laws and archetypes of culture. There have been two opposite perspectives on culture and its laws.

1. Holistic perspective posits that there is neither a universal culture nor universal laws. The set of symbols unique for a given culture cannot be detached and interpreted as an instance of a culture-free biological and economic basis.
2. Reductionist perspective views culture as a symbolic discourse. Culture is a language and other symbols that can be interpreted as language; there are universal laws on the creation of the sets, schemas and networks for symbol manipulation.

The holistic and particular perspective distinguishes between *deep culture* and *surface culture*. Deep culture includes beliefs, ideas, language, rules, knowledge, procedures and norms. It manifests itself in symbols, artefacts and objects ranging from art to organizational structures to products and services, all of which are elements of the surface culture. The meaning of the symbols and artefacts is defined by the deep culture and so any separation of the surface causes a loss of the intended meaning. As a result the understanding of the values that underlie any particular cultural manifestation is necessary for the interpretation of this manifestation within the culture that it was created by. Similarly, if we want to create manifestation for a "foreign" culture we need to understand its underlying values.

The reductionist and generalizing perspective is rooted in the empiricist and utilitarian American sociology and anthropology (Kuper 1999). Initially, it was oriented towards discovering general laws of language and structures. Limited progress turned the proponents' attention towards lower level constructs, including brain models, knowledge schemata and neural networks. There is no need to differentiate between deep and surface culture because there is an assumed meta-set of symbols and universal laws which can be used to construct a culture.

TECHNOLOGY

Technology is knowledge embedded in products and processes, and it is also the products and processes themselves. Hart-Davidson (1997) defines technology as the set of artefacts and the sets of cultural beliefs, practices, and texts that surround the production, use, distribution, and conceptualizations of those artefacts, designed to produce some cultural condition. The relationship between culture, society and technol-

ogy has been studied within the philosophy of technology. The following three perspectives on technology have been proposed:

1. Instrumental perspective argues that technology is neutral and indifferent to the variety of ends towards which it can be employed.
2. Substantive perspective argues that technology constitutes a new type of cultural system that restructures the entire social world as an object of control.
3. Critical perspective suggests that technology is a rational process of development that is neutral *per se* but becomes value- and ideology-laden in the design, implementation and use of technical systems.

The instrumental position on technology assumes its universally rational character, employment of a common standard of measurement (e.g., efficiency), which is independent of producers, users and situations. Pacey argues that technology proceeds separately from cultures, values and societies (Pacey 1992). This perspective has been characterized as uncritically positive and self-limiting. It has been contrasted with a substantive theory according to which technology constitutes a new type of cultural system that restructures the entire social world.

In the view of substantive theory, computer technology is seen as the culmination of a variety of cultural and ideological forces which, depending on the context in which the technology is used can be either positive or negative. The substantive position is interesting because it attempts to integrate both negative and positive viewpoints on technology. It suggests that technology has become the defining characteristic of all modern societies regardless of political ideology. It is autonomous and—as Heidegger argues—it is relentlessly overtaking us (Heidegger, 1977, p. 17).

Feenberg advocates a critical theory in which technology is a process of development suspended between different possibilities—a process in which social values and ideas are attributed in the design and development, and not merely the use of technical systems (Feenberg, 1991, p. 14). The two tenets of the critical theory are that (1) technology may be used to advance and enrich social objectives, and (2) technology cannot be seen as separate from people.

We can now observe that each of the three theories of technology leads to different perspectives on the design and development of software technology.

1. Instrumental perspective posits that system design and development can be done in isolation of the users and their situation.
2. Substantive perspective posits that system design and development can be for the betterment of the users leading to new social and cultural values and systems.
3. Critical perspective posits that system design and development is never neutral and can be used to propagate and infirm social and cultural values and systems.

SOFTWARE TECHNOLOGY
Reductionist Culture and Instrumental Technology Perspectives

There are several possibilities in studying the relationship between culture and software that can be based on different perspectives on culture and technology. The

viewpoint of most software designers and engineers can be tracked to both (1) the reductionist understanding of culture as language and other symbols, and (2) the instrumental theory of technology. In this context software is culturally neutral and can be adapted to every culture through the modification of its user interface. The modification, known as a locale, is then defined solely in terms of the requirements regarding the interface.

Consequently, the collection of symbols and conventions that characterize a particular culture or user community (e.g., transliteration, hyphenation, spelling, numbers, currency, time and date, colour) is perceived as being sufficient to adapt software to the given cultural context (Taylor, 1992; Sauter, 1997). This perception has resulted in the existing internationalization methods used for translating software from its source market to the target markets. Current internationalization methods enable the localization of user interface elements. These methods, while based on three presuppositions, namely, (1) the choice of character codes, (2) the use of locales, and (3) the use of resource files, led to the software internationalization architectures (Hall and Hudson, 1997).

The software internationalization architecture that is rooted in the reductionist perspective on culture and the instrumental theory of technology is equivalent to the user interface localization architecture. An example of user interface localization is given in Figure 1. Comparative studies help determine the set of primitives that are common to all cultures in which localization is considered. Primitives which are specific to a given culture (e.g., characters), interpretations of common primitives (e.g., of different colours and icons) and other constructs comprise this culture's locale. These primitives are used to define a common graphical user interface (GUI) toolkit.

The abstract concept of the interface, indicated in Figure 1 as Text Window <>, is a generalization of all possible user interfaces. To avoid extensive studies of different cultures, a reductionist approach is used whereby the text window is developed in Culture A, and the abstract text window is generalized by ensuring that it can support other cultures' locale. In particular, Culture B Text Window is obtained through the replacement of components of the Culture A Locale with components of the Culture B Locale.

Figure 1: User Interface Localization.
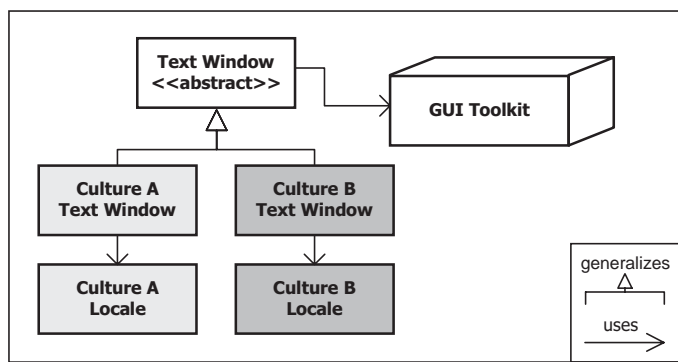
Holistic Culture, and Substantive or Critical Technology Perspectives

In contrast to the above perspective on software internationalization, we propose to consider (1) the holistic understanding of culture, and (2) the substantive and/or critical theory of technology. From the holistic perspective of culture and one of the two theories of technology it clearly follows that software technologies are not culturally neutral. Software internationalization produces applications whose user interface is internationalized and whose core is not.

In Figure 2 we illustrate the results of software internationalization. Software X developed in Culture A is an artefact of Culture A. Cultural elements such as language, graphical symbols and conventions are used in the design of the software's user interface. Because of the internationalization requirements the interface is loosely coupled with the core. Loose coupling (indicated in Figure 2 with the uses arrow between software interface and core) allows for the replacement of an interface localized for Culture A with the interface localized for Culture B. This is an important distinction in the relationship between the *user interface and the application core,* paralleled by the relationship between *surface and deep culture*. The latter conjunction is tightly coupled.

The core of Application X embodies deeper elements of Culture A; those are models and procedures which are used to form messages, construct symbols, and create information and knowledge from data. Their specification and implementation is based on deep culture. Some of the models and procedures may be common to several cultures, their configuration, however, may reflect values and beliefs that are unique to a given culture.

One difference between the substantive and critical perspectives is in the impact of technology on society and its organizations. Observe that even in Culture A the production culture will be somewhat different from the deployment culture. (For example, the UNIX operating system was made by programmers for programmers—its learning curve is steep as a result of numerous conventions that are particular to computer programming culture.) Taking this into account we note that the substantive theory

Figure 2: Internationalization of Software Produced in Culture A.
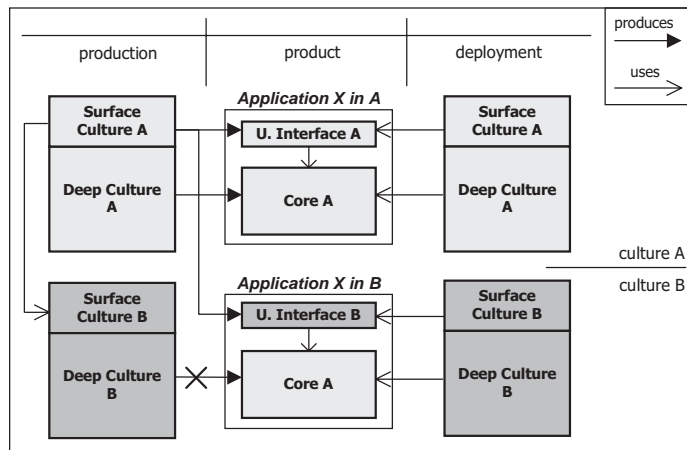
states that a new culture emerges through the implementation and use of technologies. This new culture is neither the production culture nor the deployment culture. In contrast, the critical theory states that the production culture modifies the deployment culture. In particular, the use of Application X in B implants values and norms of A in Culture B.

The goal of the internationalization architecture is, in general, to decouple culture-dependent elements from the culture-independent elements. As Hall states, "all the culturally and linguistically sensitive software components need to be separated from the core of the application" (Hall 1999, p. 298). This indeed may be the case but our short review of this architecture and software localization clearly assumes that—as the result of the reductionist understanding of culture—the only culture-dependent component is the user interface. In the following section we briefly discuss examples of applications that were developed for the same purpose. The applications were developed in different cultures, and as a result the user experience that they offer is fundamentally different.

Three Applications

There are many applications which implement the principles of problem understanding, decision-making, and communication. These principles are heavily culture-dependent (Steward, 1992; Lootsma, 1996). As an example, let us consider three well-known schools for problem solving and decision support: American, English and French, and, respectively, three examples of Decision Support Systems (DSSs): Expert Choice, Decision Explorer and Electre. These systems have been used at any organizational level and for every type of decisions, ranging from strategic to operational.

Electre

French culture, according to Hofstede (1997, p. 87), has high power distance and feminine orientation, while British and American have low power distance and masculine orientation. In France this leads to equal concern for quality of life, relationships and authority. High power distance leads to process standardization, bureaucracy and technocracy (Crozier, 1964; Hofstede, 1997). This would suggest support in which the consultant and the system provide technostructure and supply ideas leaving significant degrees of freedom to the decision makers accepting their authority (Mintzberg, 1979).

French Electre is based on the concept of reduction of incomparability between actions through the use of outranking relations that represent decision-makers' preferences. Effort is made to exploit the relations between actions gaining information allowing for the determination of their partial comparability. In this way the software provides support to define a partial ordering of alternatives. While it aims at providing structure and support similar to Expert Choice, it gives the decision-maker control over the results without the necessity of providing a justification. The recognition of incomparability which allows the decision maker to incorporate aspects cannot be measured, explained or even voiced. As a result this method provides greater distance between the consultant, system, and the decision-maker, than the other two methods described below.

Decision Explorer

Organizations in Britain use adhocracy and mutual adjustment in decision-making. The process is often informal and involves people from different areas who communicate

in order to define and solve problems (Mintzberg 1979). The informal approach to solve problems through communication allows equal involvement of both decision makers and consultants, who have equal responsibility.

The English Decision Explorer is based on the assumption that the search for the solution of a complex problem is equivalent to finding its appropriate representation. The roots of this software are in the development of cognitive mapping used to map thought processes. Users of the Decision Explorer are often consultants who help decision makers to construct the map of the decision problem. The underlying assumption is that if the problem and its potential implications are well understood, and can be assessed from different perspectives and in varying levels of complexity, then the solution becomes obvious. Decision Explorer concentrates on the manipulation of symbols and logical analysis of the relationships. It facilitates informal communication and requires the involvement of all those who have information about the problem at hand.

Expert Choice

In the U.S. the divisional form and standardization of outputs play predominant in organizations. Consultants have a significant and active role in decision making; it is expected that decision makers can provide all information required to solve a problem and determine an optimal decision. Efforts are made to specify the desired results and use well defined coordination mechanisms in decision-making (Mintzberg, 1979; Hofstede, 1997, p. 152).

The Expert Choice application implements a "measurement philosophy" in which every complex problem can be represented with a structure, which in turn can be compared with another structure. This implies that decision makers can—possibly with the help of a consultant—determine their own subjective measures of goodness (utility) allowing them to compare and order decision alternatives. This seems to coincide with the key characteristics of American organizational culture and the principle of technology dominating the policy and social choices (Zysman 1999).

Expert Choice and many other similar utility theory-based systems assume, by the very notion of utility, a full comparability of alternatives. Decision Explorer alleviates the problem of comparability by supporting insight and narrowing the space of alternatives. The French Electre family of systems attempts to bridge the two approaches in acknowledging incomparability and seeking for comparable elements.

GIS and Other Systems

Claims have been made that formalized approaches to decision-making, many of which form a core of DSSs, do not differ and are not a function of culture (Neganshi, 1979; Al-Jafaray and Hollingsworth, 1983). Similar claims are made regarding geographic information systems (GIS), which—according to Brodnig and Mayer-Schomeberger— are culturally appropriate and provide a fair representation of local cultures (2000, p. 11). They state that, "certain purists consider GIS technology as a tool for epistemological assimilation and as such, as the newest link in a long chain of attempts by Western societies to subsume or destroy indigenous cultures. Spatial information technologies cannot capture… the cultural patterns imbedded in landscape and natural resources." (op cit., p. 11). In doing this Brodnig and Mayer-Schomeberger and several other authors seem to forget that mapping requires decisions about representations in which strong

cultural bias has been shown (Harley 1990; Cogswell and Schiotz, 1996). Moreover, GIS and related technologies now incorporate models and procedures for symbol manipulation based on fuzzy logic, multiple criteria decision analysis, utility and optimization. For example, the DSSs reviewed above suggest that the use of utility has been accepted by the American culture but not by the French and English.

Some of the underlying reasons behind these surprising claims may lay in the American culture, which is highly individualistic, low-context, entrepreneurial and oriented towards tangible results rather than relationship, process and deliberation (Hall, 1976; Carmel, 1997; Hofstede, 1997). These attributes are particularly visible in the software industry as a whole, including the culture of designers and developers. The latter may be seen as being "hyper-American" (Keniston, 1997). The above three examples, other studies (Heaton 1998), as well as general studies of the philosophy of technology (Ferre, 1995) indicate that there are significant differences in the software developed in different national and organizational cultures.

SOFTWARE CULTURALIZATION

Cultural Characteristics

The three systems discussed in this chapter are examples of culture-dependent applications. They capture mechanisms that depend on culture and evolve together with other social systems: management, coordination, cooperation, decision-making and problem solving.

We are concerned here with applications which are based on organizational and intra-organizational models, individual problem solving approaches and procedures, group and meeting systems, and systems for knowledge extraction and manipulation. We are also concerned with software agents representing and acting on behalf of individuals and organizations, and systems used for games and simulations. These systems solve problems and make decisions using rules, models and procedures that are rooted in a culture and incorporate its values and symbols. Procedures and algorithms to construct and solve problems are implemented in the software core. If they are culture-dependent, the core is also culture-dependent.

The depth of culture-dependence varies across application domains. A desktop productivity application, a web-based banking facility, and an e-commerce framework all capture different degrees of the culture within which they were created. The culturally dependent functionality in a productivity application, such as a drawing program, may be low because the core goal of the application is independent of culture. Internationalization makes this application more usable and deeper localization may be unnecessary if the core tasks are independent of cultural concerns. In contrast, an e-business framework, web-based customer relationship management and a web-based banking interface are forms of real-world social interaction. In order to be intuitively understandable, these applications must capture a cultural model that describes how they will use motifs, metaphors, information architecture and navigation in order to mimic cultural interaction. The applications for which cultural-dependence must be considered during design are those whose core requirements involve culture-dependent tasks.

The applications for which cultural-dependence must be considered during the design process are those whose core requirements involve culture-dependent tasks and

processes. To determine these tasks and processes, we need to study how they are undertaken in the target cultures and compare with their equivalents in the production culture. This is challenging from both research and engineering perspectives; IS researchers and IT developers need to take into account many different perspectives from philosophy, sociology and anthropology. The difficulty in determining what can be generalized across cultures and what needs to be customized to a given culture is one of the reasons why there has been little formal research on the software-culture relationship. The few exceptions include accounting and taxation software whose core functionality depends on localized rules and conventions. In contrast, cultural differences have not been addressed in software that addresses the relationship between people and organizations, for example, customer-relationship management (CRM) and enterprise resource planning (ERP) systems, in which the cultural dependencies are perhaps less direct but just as fundamental.

Culture-Dependent and Culture-Independent Components

The application model partitions a system into *presentation, business logic,* and *data repository* tiers (Netscape, 1999; Ben-Natan and Sasson, 2000). The purpose of the presentation tier is to deliver a user interface to the end user of the application. This tier controls the look-and-feel of an application and responds to user events. The business logic tier maintains the application-specific processing and business rules, which define the application processing logic and process flow. It typically makes use of a component technology allowing for the scalability of applications and use of the same components in different applications.

We propose *software cultural-ization*, which extends the concept of software internationalization to the business logic of applications. Figure 3 illustrates the localization of an application's business logic in a similar manner as the interface localization presented in Figure 1.

Software culturalization distinguishes, similarly as software internationalization, culture-dependent components from other components of the core. This is not to say that

Figure 3: Business Logic Localization.
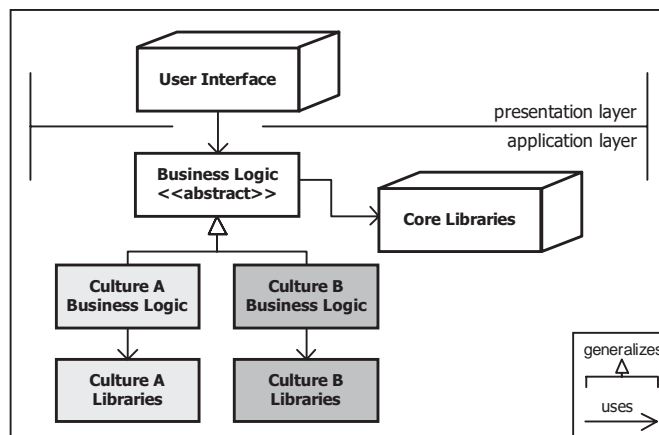
there are components that are completely independent of any culture; this would contradict the critical theory of technology on which we based the proposed architecture. We note, however, that different cultures share certain values and beliefs, and that there are certain mechanisms used to represent economic processes across many cultures. There are significant differences between, for example, Canadian, French and Polish cultures, and yet the functions used to calculate employees' salaries or the procedures used to manage inventories are the same.

To illustrate the proposed architecture let's consider a shopping cart application used in e-business. The abstract business logic module may contain concepts of a shopping cart, customer and products. Let us assume that shopping decisions in culture A are made by groups of shoppers (e.g., families) but in Culture B by individual customers. Furthermore, products may be either purchased or bartered in A while they can only be purchased in B. This behaviour related to these culture-specific shopping habits and patterns is captured in the libraries.

The construction of an application's business logic, for example, Culture A Business Logic, requires the instantiation of relevant classes from Core Libraries using entities from Culture A Libraries as culture-specific parameters according to the Business Logic design. The Core Libraries provide culture-independent components, for example, member-functions that handle addition/removal of products to/from a shopping cart. The Culture A Libraries contain culture-dependent components, for example, the attributes characterizing shopping groups and attributes of products that shoppers may barter.

Implementation of the cultural aspects in both interface and business logic allows for a significantly deeper software localization. In Figure 4 we illustrate software X developed in culture A and localized in culture B. The resulting software X in B includes— in contrast to the localization depicted in Figure 2—these components of the deep culture of B, which are directly relevant to the business logic.

The business logic is adapted to the particular culture in which the application will be deployed, and as such the mismatch evident in Figure 2 is removed. This removal requires, however, knowledge of the deployment culture and the ability to determine culture dependent models and procedures. It also requires that the modular culture-dependent and culture-independent components be integrated in the application core. The "Core Libraries" are reused in the products, and the individual "Business Logic" strategies are adapted according to the architecture shown in Figure 3. The only part of the software entirely culture-dependent and not reused from culture to culture is the culture-specific libraries (A Libs and B Libs in Figure 4).

Culture and Software Characteristics

Determining which software characteristics are culturally dependent is key. In this chapter, we mentioned that this requires a multidisciplinary perspective. It also requires a reorientation form the focus on the problem in its isolation to the focus on the context in which the problem exists. For example, the problem of purchasing needs to be studied as it occurs in different cultures rather than solely in the production culture. The difficult but critical aspect of the study involves the underlying mechanisms and processes that people and organizations undertake in purchasing. These may involve the issues that

Figure 4: Culturalization of Software Produced in Culture A.
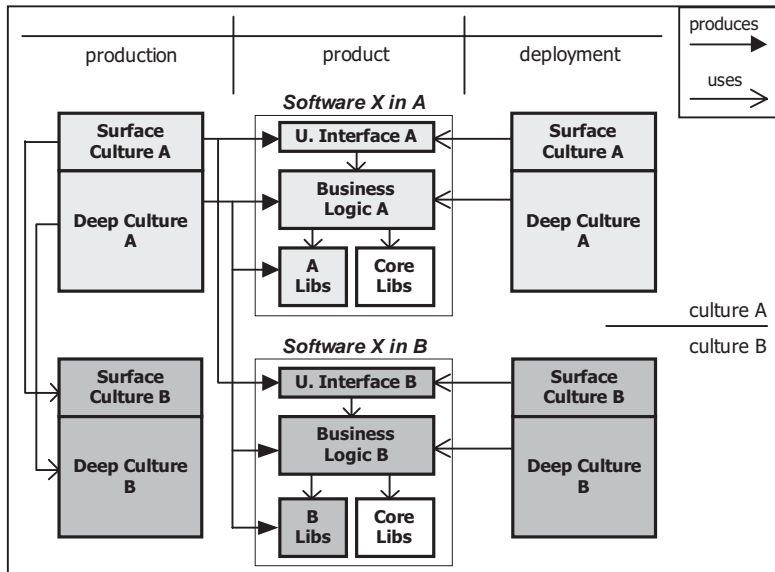
are relatively easy to describe such as payment alternatives, but also such hidden issues as trust and independence.

In a typical organization of employees in an enterprise, the structure of an enterprise and the relationship among enterprises differ. Often an organization's use of software for managing and organizing, communicating and collaborating continuously increases in scope and depth. These two phenomena have been widely researched. Study of their juxtaposition is necessary to determine those underlying structures and processes that have to be embedded in software but which differ in different cultures (national as well as organizational).

It has been long recognized that management, communication and collaboration depend on culture and evolve together with other social systems. The current perspective rooted in modern engineering is to ignore the "cultural nuances and differences" as much as possible. The engineering design process isolates the problem from the environment (cultural and other) and concentrates on its modelling, prototyping, testing, debugging, etc. Moriarty (2000) notes that this form of engineering integrates theory and practice outside of the context in which the product is developed and in which it is to function. Following Borgmann (1984), he proposes focal engineering that is concerned with the role of products in supporting "the good, in the sense of human life of harmonious connections and continuities."

The recognition of context in the engineering design process goes beyond the user-product relationship that is of the user interface concern. The consideration includes the user-product-world relationship and the recognition that the product plays many different roles in this relationship including changing the world (Moriarty, 2000). This

broader and deeper perspective recognizes that software impacts the way people and organizations function, and requires that the designers take this into account. One obstacle in implementing this perspective may be in the role context plays in different cultures. In low context cultures communications have precise meaning and require little relationship to the broader context in which they occur; words are simply the context or the content of the communication. In high-context cultures communications have often ambiguous meaning open to different interpretations; words and media are part of larger context and need to be valued in accordance to several variables, including the previous relationship, the purpose of the conversation and the non-verbal activity.

Software development in low-context cultures may be seen more in purely utilitarian terms than in the high-context cultures where it may be seen as an element which affects, and is affected, by a larger context. In the low-context societies the user interface may not need to be related to the users' background, culture and values, but to their abilities which are considered in abstract from their roots (e.g., ability to recognize and interpret meaning of a colour or an icon). The mainstream U.S. culture is, according to Harry (1992, pp. 111-112), "in comparison to that of many other countries, markedly 'low-context' in its reliance on positivistic criteria for truth and in its tendency to exclude and treat as irrelevant the complexities of human perception and personal interaction." (See also, Hall, 1976 and Hofstede, 1997, among others.) If the key market for application is low-context then the main concern of software developers may be software usability and its effectiveness rather than roles it may have in shaping the users culture and modifying their behaviour. This may especially be the case if software is seen purely as a product or a tool which should have well define use and capability. Ambiguity in its use and multiple interpretations are not desired. Development of software for context-rich societies is more difficult but, as we suggest in the next section, may now be feasible.

CONCLUSION

Software has a unique place in the world of technology because its extreme malleability and complexity makes it embodies numerous aspects of a particular culture's methods, knowledge and philosophy. The importance of computational methods and of information and knowledge has pushed forward the development of information technology (IT). IT in turn has provided resources that change the individual, organizational and national environments. By creating and manipulating information and meanings people and organizations can frame the world to reach goals with IT mediating an interpretation of the world (Poole and DeSanctis, 1990). In this context culture and technology affect the information interpretation and framing.

The emergence of active decision support systems, software agents, meeting systems and brainstorming tools, knowledge management systems and other programs that contribute to the behavioral patterns of individuals and organizations affect the individual and collective "software of the mind". Information systems in any organization embed behaviours that constitute organizational and national cultures.

In the 1990s the necessity for adapting software to international markets was recognised and resulted in software internationalization architectures. Object oriented technology made it possible for the separation of GUI objects from the culture-specific locale. Current software development paradigms such as procedural and object-oriented

programming fail at capturing units of software modularity that crosscut modules. However, the component-based architectures and those derived from "meta-level" development methodologies appear to be better suited for deeper localization. For example, a promising technology called aspect-oriented programming is arising from Xerox PARC, and has been demonstrated to capture crosscutting concerns in new units of software modularity called aspects (Kersten and Murphy, 1999). Since cultural concerns crosscut the system architectures, aspect-oriented programming may prove to be a valuable method of capturing these concerns.

In contrast to the implied universality of the user interface-based internationalization, the proposed application internationalization architecture is not culture independent or universal. We do not posit that separation of the Core Libraries from the culture-dependent libraries (see Figure 3) is possible for all cultures. We recognize the inherent cultural bias in every software product yet suggest that there are values, business processes and mechanisms shared by different cultures. Market-oriented economies and organizations employ many mechanisms across different cultures, the same goes for democracies and so on.

The recognition of the cultural bias embedded in software and the acceptance of the need for application internationalization presented earlier, require both a broader and a deeper perspective to recognizing the role of culture in software design and development–broader because interdisciplinary approaches are required to determine national and organizational requirements. Deeper approaches are necessary because software internationalization has to move beyond the surface manifestations of culture. The recognition of culture as a primary concern in the design of the application core is a key factor in the successful deployment of applications targeted at the international market.

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Chapter VI

Culture, Information Technology Choice and Empowerment:
Revisiting the Interplay

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ABSTRACT

Empowerment is an important and desirable state for employees within business enterprises around the world. Yet, the pursuit of empowerment across national boundaries may vary due to innate differences within cultures. This may be particularly true with respect to choice of technologies for achieving empowerment. Using an interpretive field study of Fellows within the Japanese MITI and US Dept. of Commerce Manufacturing Technology Fellowship (MTF) Program, this study suggests that the achievement of empowerment through choice of information technology is matched to cultural context. Specifically, employees of Japanese companies prefer, need, and use media-rich information technologies in their efforts to achieve empowerment. In contrast, employees of American companies prefer, need, and use collaborative information technologies in their pursuit of empowerment. These findings suggest that information technology is used synergistically with cultural attributes in the enhancement of employee empowerment.

INTRODUCTION

Geographically, the borders that have separated countries for years still exist. However, from the perspective of industrial and financial activity, these borders are rapidly disappearing. The emergence of global supply chains, electronic commerce, and common currencies have heightened both expectations and anxieties among top corporations seeking to enter, sustain, or expand firm presence in international markets. The potential rewards of successful global competition include market expansion, economies of scale, and consequently, competitive advantage (Porter, 1990). However, to reap these benefits, corporate planners must develop organizational structures and supporting technology that facilitate both internal and external coordination. While advanced communications and computing technologies (IT) have, in some instances, moderated the numerous complexities of global competition, many organizations have yet to master the interaction and complexities that geographical, language, organizational, regulatory, and cultural differences have imposed on their transnational IS functions (Tillquist, 1997). As noted by Karimi and Konsynski (1991), "...while many global firms have an explicit business strategy, few have a corresponding strategy for managing information technology internationally... ."

Keen (1987) notes two sets of barriers that inhibit development of effective global IT strategies. The first set, regulatory and standards differences across countries, is in many cases beyond the control of business entities. These external issues pertain to: (1) government regulation of telecommunications channels, and (2) communication protocols that have evolved over time and frequently vary between nationalities. The second set of internal barriers concerns management knowledge and appreciation for the subtle differences in culture, economics, education, and business practice that influence the way professionals think about and interact with information technology across national boundaries. As noted by Keen, too many telecommunications and information systems managers see the world through domestic-tinted glasses. Often they overlook important differences in IT organization and practice between US, European, and Asian firms. Thus, domestic assumptions regarding IT management are projected onto a very different international context. In many instances both organizational and IT structures that have evolved in other countries are "written off" as irrelevant when in fact these structures may be optimal within the regulatory and cultural environment in which they were created.

In sum, the complexities of international competition and its dependence on IT have created numerous managerial concerns of both technical and sociological dimensions. In addition, it has necessitated an important area of theory building and empirical research that, until recently, has been under-represented in IS. While much has been written about largely uncontrollable regulatory and technical issues associated with international computing (King & Sethi, 1992; Sethi & Olson, 1991), little is known about the sociological complexities or patterns in IT management across nationalities (with the notable exception of Guimaraes et al., 1999). Of particular interest is how members of various cultures use IT to achieve goals important in successful organizational life. Among the most important of these goals is empowerment. Clearly, much can be learned about using IT to achieve empowerment by casting the relationship in the research context of cross-cultural comparison.

In this spirit, the primary goal of this research is to examine differences across cultures in the use of IT. Specifically, this study examines the relationship between national culture and choice of IT in the pursuit of employee empowerment. Understanding how various cultural contexts may influence choice of IT and empowerment is an important step in more fully developing effective global IT deployment policies. In addition, such a study opens a potentially interesting avenue of theory building for researchers interested in cultural perceptions of IT and its usefulness in building empowerment. The overall model for the study is illustrated in Figure 1. The following sections define its key concepts.

EMPOWERMENT, NATIONAL CULTURE, AND IT CHOICE

As illustrated in Figure 1, the central issue of this study is the interplay between national culture, empowerment, and technology choice. In essence, we seek to determine if choice of information technology in the pursuit of empowerment is influenced by cultural differences. In this section, we draw on relevant literature streams to develop a definitional domain for the factors of interest.

Empowerment

Empowerment is often cited as the common thread among the "best managed companies" (Alpander, 1991; Robert et al., 2000). Numerous studies recount positive changes and benefits achieved when empowerment initiatives are implemented in organizations (Gilhooly, 1996; Miller, 1995; Ripley & Ripley, 1992; Shrednick, Shutt, & Weiss, 1992; Starr, 1993). A useful definition of empowerment can be derived from the

Figure 1: Cultural Context, IT Choice and Empowerment.
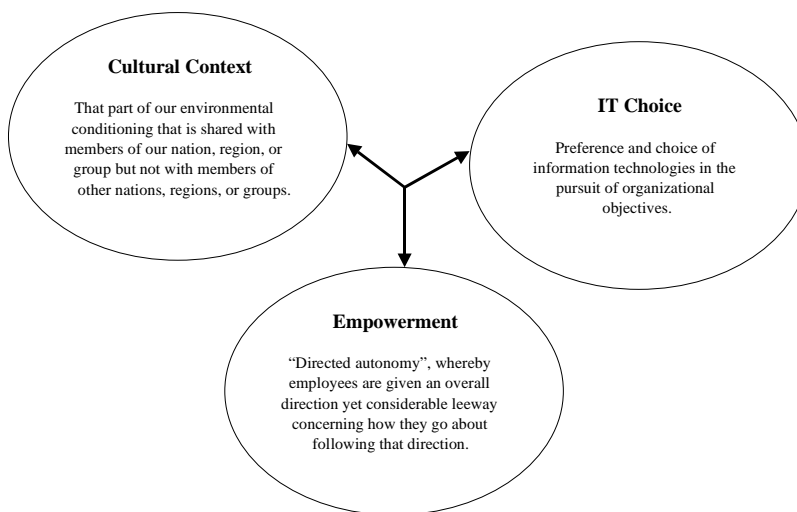
work of Waterman (1987), Ford and Fottler (1995), Bowen and Lawler (1992, 1995), as well as Hayes (1994). Waterman (1987) states that the process of empowerment is one of "directed autonomy", in which employees are given an overall direction, yet considerable leeway regarding how they go about following that direction. Ford and Fottler state: "In our view, empowerment assigns the manager or front-line employee decision responsibility for the entire job and for knowing how the performance of that job fits within the organizational purpose and mission" (1995, p. 22). Bowen and Lawler (1992) reason that employees are empowered if they (1) get information about organizational performance, (2) are rewarded for contributing to organizational performance, (3) have the knowledge and skills to understand and contribute to organizational performance, and (4) have the power to make decisions that influence organizational direction and performance.

From a more operational perspective, Hayes (1994) developed the Employee Empowerment Questionnaire (EEQ) as a means to measure empowerment. The item measures of the EEQ are:

1.   I am allowed to do almost anything to do a high-quality job.
2.   I have the authority to correct problems when they occur.
3.   I am allowed to be creative when I deal with problems at work.
4.   I do not have to go through a lot of red tape to change things.
5.   I have a lot of control over how I do my job.
6.   I do not need to get management's approval before I handle problems.
7.   I am encouraged to handle job-related problems by myself.
8.   I can make changes on my job whenever I want.

Consistent with the other perspectives outlined, this list implies that empowerment consists of the related notions of responsibility, authority, control, and autonomy. In sum, empowerment is the belief by employees that they work within an environment that encourages them to react and respond, as they deem necessary, to a variety of environmental, organizational, and individual contingencies.

A logical question that flows from the definition of empowerment is: "What creates empowerment?" or "What empowers?" Bowen and Lawler (1992) provide an interesting response to this question in the form of a "contingency approach to empowerment". Specifically, they list five contingencies that impact empowerment. These contingencies are basic business strategy, tie to customer, technology, business environment, and types of people. Among these, technology (in particular, Information Technology) and culture (a proxy for the combination of "business environment" and "types of people") have received significant attention in the literature as empowering forces (Alpander, 1991; Bowen & Lawler, 1992; Bowen & Lawler, 1995; Carlson et al., 1999; Couger, 1986; Elgin, 1995; Evans, Hau, & Sculli, 1989; Gilhooly, 1996; Knotts & Tomlin, 1994; Malone, 1997; Miller, 1995; Ripley & Ripley, 1992; Robert et al., 2000). Alpander (1991) as well as Knotts and Tomlin (1994) finds that similar empowerment strategies employed in different cultural contexts produce different results, thereby suggesting that culture plays a role in empowerment. Malone (1997) concludes that empowerment is "a response to fundamental changes in the economics of decision making enabled by new information technologies" (1997, p. 34). Evans et al. (1989) demonstrate that management style will strongly affect empowerment and that management style is a *function* of the level of technology. Further, they note that management style is tempered by cultural charac-

teristics. In sum, it seems that both technology and culture play central roles in the achievement of empowerment. We now develop a definitional context for these important factors. Importantly, the Managers who are the informants and subjects of this study are reflective of Japanese and American cultural context. Therefore, the following discussion is cast within the context of differences between Japanese and American culture.

National Culture

Until recently, the existence of a relationship between management and national culture was far from obvious to many. A widely accepted belief was that sound management principles were somehow "universal"; that is, if national or local practice deviated from these established principles then it was time to change local practice. The logical outcome of what Hofstede (1983, 1983a) terms the "convergence hypothesis" is a set of universally accepted management practices which would in turn lead to societies becoming more and more alike. Obviously, observed reality has been far different from this prescribed theory. Supra-national organizations such as the European Common Market, European Community, and even the coalition of former Soviet States, which are very much founded on the convergence belief, have had to recognize and address the complexities of national differences (Hurwitz & Lequesne, 1991; Nugent, 1991). In addition, a great deal of psychological and international business literature has been devoted to, and successful in, uncovering organizational and managerial differences attributable to national character (Ajiferuke & Boddewyn, 1970; Kelley et al., 1987; Robert et al., 2000). As noted by Hofstede (1983): "The national and regional differences are not disappearing, they are here to stay. In fact, these differences may become one of the most crucial problems for management — in particular for the management of multinational, multicultural organizations both public and private." Culture can best be defined as collective mental programming. It is that part of our environmental conditioning that is shared with members of our nation, region, or group but not with members of other nations, regions, or groups (Hofstede, 1983, 1983a; Adler, Doktor, & Redding, 1986; Pettigrew, 1979).

Perhaps the first and best-known research in the area of objectively characterizing national culture is presented by Hofstede (1983, 1983a). Utilizing over 116,000 survey questionnaires from 40 countries, this author, through factor analysis, identified four distinct dimensions of national culture. These dimensions, in addition to their organizational influence and potential influence on IT use are summarized in Table 1. As shown, cultures can be differentiated based on degrees of: (1) collectivism (collectivist vs. individualist), (2) power distance (small or large), (3) disposition towards uncertainty (strong vs. weak), and (4) masculinity/femininity. In turn, these dimensions directly impact organizational culture through the experiences and beliefs of policy-making managers.

Collectivism and Power Distance

As noted by Hofstede (1983), collectivism and power distance tend to be closely related. Within cultures characterized by high levels of power distance and low individualism, inequalities in power and wealth are more readily accepted and have become a part of the cultural fabric. Hence, the members of these societies are willing

to follow those in charge with little desire to control or direct. In essence, it is part of their expectations that leaders lead autocratically. In the organizational profile of such cultures, these tendencies have been related to increased centralization of authority and autocratic leadership styles (Hofstede, 1983). These cultural characteristics and related organizational profiles are typical of Asian countries such as Korea, Hong Kong, and Japan. At the other end of the cultural spectrum, nations such as the United States, Great Britain, and Canada are characterized by levels of small power distance and low collectivism. Organizations within these countries are typically characterized by decentralized authority and participative decision making processes. Though few in number, some European countries such as France, Italy, and Spain exhibit levels of large power distance and high individualism, implying moderately-centralized decision making structure.

Uncertainty Avoidance and Masculinity/Femininity

Dimensions of uncertainty avoidance and masculinity refer to the risk-taking disposition and aggressiveness of cultural members. Countries with weak uncertainty avoidance and high levels of masculinity are characterized by firms more aggressive in their approach to competition and innovation. Performance within such organizations would typically be emphasized and measured in tangible terms. Countries characteristic of this profile include the US, Canada, and Great Britain. Conversely, countries with high levels of femininity and strong uncertainty avoidance are often characterized by firms with less aggressive competitive postures and more conservative dispositions toward innovation. Performance, in terms of tangible results, is not so heavily emphasized in these cultures. Such countries include Norway, Korea, and France.

Information Technology Choice

Tan et al. (1995) demonstrate how GSS technologies can affect power distance, and, if chosen carefully, can have positive synergies with the national culture. Tan et al. (1998) show that computer-mediated communication (CMC) can reduce status effects and interact with both individualist and collectivist cultures to enhance the quality of decisions in some situations. Further, as noted by Straub (1994), cultural factors seem to affect IT diffusion. Specifically, Straub's study finds that the strong discomfort with uncertainty present in Japanese culture tends to cause members of that culture to prefer communications media that are "information rich". Straub develops his theory by drawing on the work of Daft and Lengel (1984). These authors theorize that individuals choose information technology with a "richness" that corresponds to the ambiguity or uncertainty of the task they need to accomplish. These choices are also based on whether a culture is "high context" or "low context" (Kim et al., 1998). Richness is defined as "the interactive nature of the feedback, channel type (e.g., body language, facial expression, and tone of voice), the personal quality of the source, and the ability of the interface to express linguistic innuendos" (Straub, 1994, p. 26). While some authors have differing opinions on information richness theory (Ngwenyama & Lee, 1997; Suh, 1999), in general, the more ambiguous the task, the more rich the media that is required. Tan et al.'s and Straub's studies seem to demonstrate that IT can interact with certain cultural factors, and will be chosen accordingly.

In their contingency approach to empowerment, Bowen and Lawler (1992) reason that a business environment that is "predictable" with "few surprises" does not favor empowerment, whereas one that is "unpredictable" with "many surprises" does favor empowerment. Using Straub's line of reasoning, it follows that members of Japanese culture, who are uncomfortable with uncertainty, may choose rich information technologies (another contingency) to help achieve empowerment. In contrast, members of American (or US) culture, who are less uncomfortable with uncertainty, may not choose the same amount of richness in technologies to achieve empowerment. Bowen and Lawler also explain that people with low social needs inhibit empowerment, whereas people with high social needs enhance empowerment. Given that US culture is individualistic with low social needs, similar to the logic above, it follows that members of US culture may desire to use information technologies that are high in "collaborative capacity" to help achieve empowerment. In contrast, members of the Japanese culture may not choose highly collaborative information technologies to achieve empowerment due to their relatively collectivist culture with high social needs. Here, "collaborative capacity" of an information technology is simply the degree to which the technology aids end users

Table 1: Hofstede's (1983) Dimensions of National Culture and Their Potential Influence on Managerial and IT Practice.

Dimension	Organizational Influence	Potential Influence on Use of IT for Empowerment
Individualism vs. Collectivism	Leadership. In individualistic societies leadership theories are based on presumed needs of individuals who seek their ultimate self-interest. Collectivist societies rely on group motivation. The employer returns protection in the same manner as natural in-group.	Individualistic cultures may choose more collaborative technologies to facilitate information sharing and decision making. Technology augments lack of collectivist structure and empowers employees. Collectivist cultures may require less collaborative technologies due to existing tendencies to share information through social structures.
Large or Small Power Distance	Centralization of authority and autocratic leadership. Large power distance implies little participative leadership and greater centralization of authority. Conversely, smaller power distance is associated with more decentralized, participative, management practices.	Centralization of decision making may imply less need for collaborative technologies among cultures with large power distance. In contrast, collaborative technologies may be chosen in cultures of small power distance to facilitate shared decision making.
Strong vs. Weak Uncertainty Avoidance	Organizational structure and managerial risk disposition. Organizational forms and managerial policies are created in an effort to avoid uncertainty in "strong" societies. Managerial decision making may also exhibit centralized tendencies. Creation of formalized policies and operating procedures.	Cultures with strong uncertainty avoidance may choose rich communications medium to reduce the chance of miscommunication and poor decision making. Cultures low in uncertainty avoidance may choose less rich communication mediums.
Masculinity vs. Femininity	Motivation and Management Style. Performance, desire to achieve is motivation in masculine societies. Employees are challenged or jobs enriched in order to motivate. Individual versus group accomplishments are more emphasized.	Performance and reward systems may facilitate strong social structures in less masculine cultures. Therefore, collaborative technologies may not be chosen to enhance empowerment. Masculine cultures may choose more collaborative technologies to achieve better sources of communication and information.

in sharing resources, communicating ideas, and coordinating efforts as members of the many formal and informal work groups that make up organizations (O'Brien, 1996). Whether the technology is primarily used for (moving from least to most collaborative) one-to-one communication, one-to-many communication, or many-to-many communication affects its collaborative ability. It follows that such technologies would be quite useful for cultures that are high in individualism. Thus, within Japanese culture one would expect empowerment to be high if information technologies that are high in richness are employed interactively with the discomfort with uncertainty in the culture. However, given the collectivist nature of the Japanese culture, it is not necessarily important that collaborative information technologies are chosen if empowerment is to be achieved. We now develop the methodological approach for considering these relationships.

METHODOLOGY

Interpretive field study methodology is used for this research. The interpretive methods employed draw on the model first proposed by Miles and Huberman (1984) and demonstrated in a cross-cultural setting by Hasan and Ditsa (1999), and explicitly follow the guidelines set forth by Klein and Myers (1999). As explained by Hasan and Ditsa (1999), the Miles and Huberman (1984) model incorporates the four phases of data collection, data reduction, data display, and the verification and drawing of conclusions. Analogous to these four phases are the seven principles presented by Klein and Myers (1999): The Fundamental Principle of the Hermeneutic Circle, Contextualization, Interaction between the Researchers and the Subjects, Abstraction and Generalization, Dialogical Reasoning, Multiple Interpretations, and Suspicion. An abbreviated version of Klein and Myers' (1999) summary explanation of each of these principles is presented in Table 2. The remainder of this paper is organized around these seven principles.

The Fundamental Principle of the Hermeneutic Circle

To allow for an iterative exploration of the association between micro and macro issues surrounding culture, IT, and empowerment, researchers were needed who were available for a long period of time, who were available for repeated interviewing and reflection sessions, and who had ample time to observe and participate in both cultures of interest. This unique opportunity is afforded by the Manufacturing Technology Fellowship ("MTF") Program. The US-Japan Manufacturing Technology Fellowship is a program that gives US engineering managers the opportunity to spend a year in Japan learning Japanese work techniques, culture and language. The US-Japan Manufacturing Fellowship is a joint project of the US Department of Commerce (USDOC) and the Japanese Ministry of International Trade and Industry (MITI). The duration of each fellowship is a minimum of 15 months. Approximately the first three months are spent in language and cultural training in the United States. This is followed by further training and orientation in Japan. The Fellows are then dispersed to their respective Japanese host companies. Twelve Fellows participated in the initial portion of this research. Six of the Fellows participated in the study for a full two-year period and helped the research reach its conclusion. The length of the time the Fellows were available for questioning and reflection was ideal for the iterative nature of interpretive research.

Table 2: Klein and Myers' (1999, p. 72) Summary of Principles for Interpretive Field Research.

Principle	Explanation (Klein & Myers, 1999, p. 72)
The Fundamental Principle of the Hermeneutic Circle	"This principle suggests that all human understanding is achieved by iterating between considering the interdependent meaning of parts and the whole that they form. This principle of human understanding is fundamental to all the other principles."
Contextualization	"Requires critical refection of the social and historical background of the research setting, so that the intended audience can see how the current situation under investigation emerged."
Interaction between the Researchers and the Subjects	"Requires critical reflection on how the research materials (or "data") were socially constructed through the interaction between the researchers and participants."
Abstraction and Generalization	"Requires relating the idiographic details revealed by the data interpretation through the application of principles one and two to theoretical, general concepts that describe the nature of human understanding and social action."
Dialogical Reasoning	"Requires sensitivity to possible contractions between the theoretical preconceptions guiding the research design and actual findings ("the story which the data tell") with subsequent cycles of revision."
Multiple Interpretations	"Requires sensitivity to possible difference in interpretations among the participants as are typically expressed in multiple narratives or stories of the same sequence of events under study."
Suspicion	"Requires sensitivity to possible "biases" and systematic "distortions" in the narratives collected from participants."

Contextualization

The Fellows come from American companies such as Delco Electronics, Ford Motor Company, General Motors Corporation, Northern Telecom, Texas Instruments and Xerox. These individuals were assigned to various Japanese companies for the fellowship. Participating Japanese companies include Hitachi, Okuma Corporation, Ricoh, Sony, Suzuki, Toyota and Yamaha. All companies in the study had mature manufacturing operations, with most processes in existence for at least five years.

As noted earlier, the cultural settings within the present study are Japanese and American. To effectively study the effect culture has on Information Technology choice in the pursuit of empowerment, it is desirable to select radically different cultural contexts (Watson, Ho, & Raman, 1994; Yin, 1989). Hofstede's index for each of the four cultural attributes is shown in Figure 2. Japan and the United States differ by at least 45 points out of a possible 100 on the attributes Individualism/Collectivism and Uncertainty

Avoidance. Thus, comparing Japanese and American cultures seems useful. Note that a higher number in the Individualism/ Collectivism category implies a culture that is Individualistic, and a higher number in the Uncertainty Avoidance category implies a culture that is highly averse to uncertainty. In sum, it seems that Japanese and American culture vary widely across important dimensions of Hofstede's typology and are therefore suitable for examining potential differences in technology choice for the pursuit of empowerment. To educate Fellows in these cultural contexts, each American Fellow was given several months (averaging about three) of company-provided training in Japanese history and culture.

Interaction Between the Researchers and the Subjects

The authors acted as coordinating investigators of the study. Each of the six participating MTF Fellows acted as individual case informants. Data was gathered from the case informants through surveys, written questionnaires and formal interviews. The case investigators used lengthy and detailed Participant Observer status (i.e., the investigators were working side-by-side with those they were studying, thus simultaneously participating and observing), and both formal and informal interviews to collect their data. Participant Observer status was maintained during the entire duration of each individual's fellowship. Electronic mail correspondence between the Fellows and the coordinating investigators took place during this time.

A pilot questionnaire was sent to Fellows immediately after they returned from their Japanese companies. This questionnaire was exploratory in nature, seeking to determine which technologies and cultural elements were affecting empowerment, thereby allowing the research to be refined. Based on the results of this questionnaire and comments made by the investigators during the entire process, a lengthy interview plan was constructed. Interviews were exhaustive and detailed, in some cases lasting more than one day.

While case informants (Fellows) were often requested to assign numerical values to Likert-style questions, for this interpretive study only responses consistently on an extreme side of the scale were considered meaningful. It was assumed that the cultural attributes of Comfort w/ Uncertainty and Collectivism were known, based on Hofstede's index: Japanese companies being low on Comfort w/ Uncertainty and high on Collectivism, and United States companies being high and low, respectively, on these two cultural attributes (see Figure 2). Nonetheless, questions concerning these attributes were posed to investigators for additional verification.

Case informants were asked which technologies were most helpful and most often used in gaining empowerment in the cultures they were participating in and observing. Observations about the state of empowerment at an organization were guided using The Employee Empowerment Questionnaire (EEQ) (Hayes, 1994). Additionally, informants were requested to react to scenarios based on the Bowen and Lawler (1992) definition of empowerment presented previously. In particular, the following scenarios were presented:

- You want to obtain information about your organization's performance. Can you? Are there any aspects of the culture that allow or inhibit this? Which communication technologies would you use to accomplish this?
- You need to perform a job or task that you have never done before. Will you be able to obtain the knowledge and/or skills necessary? Any aspects of the culture

Figure 2: Index for each of Hofstede's (1980) Cultural Dimensions.

• **Individualism/Collectivism**		• Power distance	
– United States	91	– United States	40
– Japan	46	– Japan	54
– France	71	– France	68
– Germany	67	– Germany	35
– India	48	– India	77
• **Uncertainty avoidance**		• Masculinity	
– United States	46	– United States	62
– Japan	92	– Japan	95
– France	86	– France	43
– Germany	65	– Germany	66
– India	40	– India	56

that allow or inhibit this? Which communication technologies would you use to accomplish this?

• You want to organize a small group of employees to suggest and implement changes to your job tasks and general organizational direction. Is this realistic? Any aspects of the culture that allow or inhibit this? Which communication technologies would you use to accomplish this? What other factors besides culture and technology might influence the three scenarios?

• Are you rewarded for contributing to organizational performance (e.g., formal ways are profit sharing or stock ownership)?

Informants were asked if cultural aspects aided or inhibited the level of empowerment, and also which information technologies were typically chosen as a remedy for these aspects. Responses to all questions were detailed and investigated in-depth.

Abstraction and Generalization

The first pilot survey and corresponding interviews yielded interesting results. The survey asked if various technologies were "valuable/used extensively in helping employees to perform their jobs." Several notable observations were gained from this survey:

• Information-based technologies seem to be the class of technologies that facilitate empowerment. Several manufacturing technologies (e.g., CAD/CAM, Machine Control, etc.) were included in the pilot survey. Qualitative comments indicated that these technologies are viewed as invaluable tools and necessities in completing a job, but do not contribute to empowerment. As such, these technologies were not included in subsequent questions. Further, responses indicated that Japanese employees are using rich technologies (telephones in particular showed significant differences) to achieve empowerment at a much higher level than their American

counterparts. Thus, additional rich "technologies" (e.g., face-to-face) are added for subsequent questions.

- There seems to be "cultural convergence" with respect to empowerment strategies and directives. Not surprisingly, both American and Japanese companies felt that empowering employees is a "positive endeavor", and both cultures demonstrate strikingly similar plans in place to achieve empowerment.

- Japan exhibits significantly inferior communications technologies (from the standpoint of "level of technical advancement"), and equal or better communication and empowerment. In some cases even an individual's exclusive use of a standard telephone, something taken for granted in American companies, is not a luxury enjoyed by Japanese employees. However, the state of communication and empowerment at the Japanese companies is at a comparable level to the American companies.

- Fellows noted on the comments section of the survey that Japanese companies that used information technologies high in richness (for example, face-to-face communication, fax, etc.) were high in empowerment. Additionally, Fellows noted that Japanese companies that heavily used information technologies that were low in richness (for example, e-mail) were low in empowerment. Fellows also noted that richness and collaborative capacity were attributes of information technology choice that seemed to synergistically combine with cultural attributes in the pursuit of empowerment.

These initial findings suggest that information technologies are in fact chosen and used to influence the state of empowerment. Therefore, the study was continued and expanded to further explore this idea. Twelve Fellows participated extensively in the survey process, and of those, six took part in the refined interview process throughout the subsequent year.

In the more detailed iterative subsequent phases of the study, two major findings emerged: Information technology that is high in information richness was more often chosen and used in Japanese versus American cultural contexts in support of empowerment, and information technology that is high in collaborative capacity was more often chosen and used in American versus Japanese cultural contexts in support of empowerment.

Selection of Information Rich Technologies in Japan

In five out of six of the Japanese companies studied, empowerment was high. Additionally, based on the observations of the Fellows, the Hofstede cultural indices were accurate; five out of the six Japanese companies were rated high on Uncertainty Avoidance and six out of six were rated high on Collectivism (low on Individualism). Yet the path to achievement of empowerment in this cultural setting was markedly different than that in the cultural setting of the United States companies. In particular, Fellows noted the use of information rich technologies in pursuing empowerment.

On the eight EEQ questions/scenarios, Fellows overwhelmingly reported that their Japanese counterparts utilized face-to-face, facsimile, and the telephone to complete the empowerment scenario. For example, for EEQ question number 8, "I can make changes

on my job whenever I want," when asked how Japanese employees would inquire about, communicate, or suggest such changes, five out of six Fellows noted that face-to-face communication or the telephone would be chosen, helpful and accepted in that culture. Only *one* Fellow noted that e-mail would even be considered in this scenario. It was observed that the uncertainty avoidance in the Japanese culture necessitated that such a change be discussed in a very rich context; something as impersonal as e-mail would almost be considered inappropriate. In contrast, all six Fellows claimed that e-mail would be a technology chosen, helpful and accepted for this scenario in the culture of their United States companies.

Such findings were consistent for all eight EEQ scenarios as well as the four Bowen and Lawler scenarios. Empowerment often involved actions that were sensitive or involved risk and uncertainty, and as such the Japanese employees appeared to ground the circumstances with the assistance of information rich technologies. Tasks such as "obtaining information about your organization's performance," "obtaining the knowledge to perform a job or task which has never been done before," or "organizing a small group of employees to suggest and implement changes to your job tasks and general organizational direction" are all seen as uncertain and risky in the Japanese culture. Using information rich technologies which reduce uncertainty and add comfort, as reported by the Fellows, allowed the Japanese employees to still pursue these tasks and be empowered.

It was quite interesting that one Fellow reported a state of empowerment at his Japanese company which was low. The uncertainty avoidance in that Japanese culture, as expected, was reported as high. However, information rich technologies were not utilized nearly as often in assisting in the empowerment scenarios, an observation that suggests that this lack of usage could be a contributing factor to the low state of empowerment.

Selection of Collaborative Technologies in the United States

In the cultures of the United States companies, accomplishing tasks such as those outlined in the Bowen and Lawler scenarios was viewed as less intimidating. In these cultures which are relatively comfortable with uncertainty and risk, suggesting a change in a job task or organizing a group to change job tasks or organizational direction was not viewed with fear, and as such the technologies used to assist in accomplishing these tasks were chosen more with regard to efficiency than information richness. As such, e-mail, groupware, and intranets were used with great regularity in helping with these tasks. In fact, the Fellows observed that such technologies were essential in carrying out the empowerment scenarios, because of their collaborative capacity. The cultures in the United States companies, high on individualism, needed and desired the assistance of collaborative technologies. In fact, one Fellow commented that his American colleagues might never have the ability to make changes in job tasks or organizational direction, or otherwise be empowered, were it not for groupware-type technologies which facilitated group connectivity, communication and decision making. It seemed that the collaborative nature of these technologies synergistically combined with the individualistic nature of the culture to allow for empowerment.

Similar to the Japanese companies studied, empowerment was high in most of the United States companies observed (four out of six). Additionally, based on the

observations of the Fellows, the Hofstede cultural indices were again accurate, with four out of the six United States companies being rated low on Uncertainty Avoidance and six out of six being rated high on Individualism (low on Collectivism). Again, however, the path to achievement of empowerment in this cultural setting was quite different than that in the cultural setting of the Japanese companies. For the United States companies, Fellows noted the use of collaborative technologies, in particular in the pursuit of empowerment.

In considering the EEQ questions/scenarios as well as the Bowen and Lawler scenarios for empowerment, the Fellows reported a *one hundred percent* usage of either e-mail, groupware, or an intranet in the United States companies. In stark contrast to their Japanese counterparts, the United States employees could hardly imagine "organizing a small group of employees to suggest and implement changes to your job tasks and general organizational direction" *without* the use of such technologies. Organizing groups, encouraging discussion and participation in decision making, and other empowerment activities seemed to require electronic assistance in the cultures of the United States companies studied. The Japanese companies in general saw these technologies as less necessary for the allowance of empowerment activities, and as such were much slower to adopt and/or use them. The one United States company studied which did not make extensive use of collaborative technologies was the only company which was low in empowerment. These findings are summarized in Table 3.

Table 3: Summary of Technology Usage and Empowerment State within Cultural Dimensions.

	HIGH UNCERTAINTY AVOIDANCE	LOW UNCERTAINTY AVOIDANCE	COLLECTIVIST	INDIVIDUALIST
INFORMATION RICH TECHNOLOGIES	**Information Rich Technologies chosen to assist with uncertain and ambiguous tasks in achieving empowerment.**	Information Rich Technologies seen as less necessary in achieving empowerment.	Information rich technologies chosen or not chosen due to other factors.	Information rich technologies often avoided and are subsequently chosen less often.
COLLABORATIVE TECHNOLOGIES	Collaborative technologies can add to uncertainty and are subsequently chosen less often.	Collaborative technologies chosen or not chosen due to other factors.	Collaborative Technologies seen as less necessary in achieving empowerment.	**Collaborative Technologies chosen to assist with communication and organization tasks in achieving empowerment.**

Dialogical Reasoning and Multiple Interpretations

It is important to be sensitive to the possibility of contradiction to the observations and findings in the previous section. In particular, in two of the United States companies studied, collaborative technologies were used extensively and yet the state of empowerment did not reveal itself to be high or low… the two Fellows had ambiguous observations and experiences concerning the various empowerment scenarios presented. Thus, it is of course possible that an individualistic culture which uses collaborative technologies will still not have members who feel empowered. There are many factors which can or do contribute to an empowered cultural setting, and this research has suggested that certain cultural dimensions, combined with certain technology choices, are in this set of factors. However, in the counter example case mentioned, the likelihood is that some other unknown factor(s) had enough strength to negate the relationships examined in this study.

Suspicion

While both the authors and the Fellows were careful to view the research setting objectively, there are several possibilities for bias which must be discussed. First, the Fellows were participant-observers in Japanese companies. Thus, their observations on how information technology empowered the workforce are subject to their own biases of what might be happening or should be happening. The Fellows discussed and questioned the Japanese employees about their IT usage at great length, yet a potential for bias certainly exists. The reports presented by the Fellows cannot be assumed to directly represent the perceptions and behaviors of their Japanese counterparts. Ideally, Japanese employees and United States employees would have been studied separately, but from a practical standpoint of longitudinal and lengthy access, the Fellows were chosen for this study. Thus, the Fellows were used as observers in Japan as a reliable measure of Japanese IT usage, empowerment, and culture, and then again to study their own American companies. Our hope is that the length and depth of the study can help to overcome this limitation.

Second, biases could exist in the sample itself. The Fellows could have had their perceptions skewed by their companies' or the researchers' preconceptions, and the companies themselves may not be exemplary of traditional Japanese and American corporate culture. And finally, global communications media such as television and the Internet, as well as increasingly affordable travel, may be mediating or lessening the cultural differences that Hofstede documented. In fact, if true, cultural differences might be stratified more along the lines of certain groups than national boundaries.

For all of these reasons, the results of this study must be considered cautiously. A larger sample size would be useful. Increasing the sample size would more than likely require separate sets of respondents based exclusively in each culture, yet any replication of results with a larger sample would be valuable. Additionally, parametric statistical testing could be employed on such a sample, adding further credibility to the findings.

DISCUSSION

Supporting the reasoning of Tan et al. (1995, 1998) and Straub (1994), this study suggests that cultural factors affect information technology choice. Additionally, the

results strengthen Bowen and Lawler's (1992) proposition that information technology choice is one important contingency in the pursuit of empowerment. Japanese companies which had a high state of empowerment all used information rich technologies extensively. Given the cultural dimensions and characteristics as explained by Hofstede (1980), combined with the reasoning of Straub (1994) and Bowen and Lawler (1992), this high state of empowerment could stem from a synergistic interaction between the inherent Japanese resistance to uncertainty with their overwhelming choice and use of information rich technologies. In contrast, United States companies which had a high state of empowerment all used collaborative technologies extensively. Again, given the Hofstede (1980) dimensions and Straub (1994) and Bowen and Lawler (1992) reasoning, this high state of empowerment could stem from a synergistic interaction between the inherent US individualist nature with their overwhelming choice and use of collaborative technologies.

As observed by the Fellows, only two of the twelve companies studied had low empowerment, possibly because the technologies chosen and used were not appropriate for the cultural settings. In the Japanese company which had a low state of empowerment, the employees of the company did not extensively employ rich technologies to assist with the culture's discomfort with uncertainty, and so this is expected. In the United States company which had a low state of empowerment, the employees of the company did not extensively employ collaborative technologies to assist with the culture's individualistic nature, and so this is also expected.

Given that the study results give strong support to the suggestions and findings of the literature to date, it would follow that an expansion of Table 3 in this chapter, "Summary of Technology Usage and Empowerment State within Cultural Dimensions", would be possible. In particular, what effects do other cultural dimensions have on empowerment when interacting with other categories of technologies? Only two of Hofstede's dimensions were studied for this research, and only two types of technologies. There are numerous possibilities to consider when contemplating this sort of expansion, and the more that are explored, the more guidelines will be available to persons desiring to make intelligent information technology choices in differing cultural settings.

Subsequent to the literature review originally performed for this study, Jasperson et al. (2002, p. 456) note, "From one perspective, IT may be seen as a driver of change in power structures and processes. Alternatively, the creation and introduction of IT can be seen as a process that involves interested parties intentionally using their power to affect the nature of the systems that are put in place. At a more complex level, expectations regarding changes to power structures and power can serve as an important factor in decisions to adopt, promote, or develop IT even if the actions that result are not themselves particularly power-laden or political." Further, Ryan et al. (2002) demonstrate the importance of culture ("social subsystems") in Information Technology investment decisions. These observations lend additional credence to the findings enumerated herein.

CONCLUSION

In all six company pairs studied, technology was a critical element in the empowerment process (especially to the extent that it seemed to react synergistically with cultural characteristics), and the following results are noted:

- Empowerment in Japanese and US settings was seen as equal, despite the fact that US firms employed superior communication technologies.
- Information rich communication methods employed in Japan were used in conjunction with the cultural trait of uncertainty avoidance and furthered the pursuit of empowerment.
- Collaborative technologies employed in the United States were used in conjunction with the individualist cultural trait and furthered the pursuit of empowerment.

These results have important implications for both researchers and practitioners. Evidence has been presented that cultural factors can be synergistic with the correct technology choice in the pursuit of empowerment. Therefore, management should consider technology infrastructure strategies that are geared towards the organizational culture. For example, a culture predisposed toward collectivism, such as most of the Japanese companies studied, should have less need for high-end, collaborative technologies such as Groupware and Intranets if empowerment is the goal. In fact, if the culture is uncomfortable with uncertainty, employees might even prefer *not* to have these technologies. On the other hand, a culture comfortable with uncertainty and predisposed toward individualism may desire and in fact need these technologies.

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Chapter VII

Using a GSS to Support Virtual Team-Building:

A Theoretical Framework

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ABSTRACT

This chapter deals with the use of a group support system (GSS) to support virtual team-building. Literature review on Group Support Systems (GSS) indicates that most prior GSS research focuses on supporting face-to-face teamwork, and few studies were conducted in supporting virtual teamwork and team-building. When virtual teamwork becomes more common in modern organizations, how GSS can be used to enhance virtual team-building is becoming an important research issue. This chapter proposes a conceptual team-building framework. By embedding this conceptual framework into a GSS, the GSS may have the potential to support virtual team-building. Based on the framework, a set of testable research propositions is formulated, and some suggestions for future GSS research are discussed.

INTRODUCTION

Team-building is important and also necessary when a team faces problems of low production or output, increasing numbers of complaints from team members, more conflicts or hostilities among team members, ineffective team meetings, and decisions that are misunderstood or not carried out properly (Dyer, 1987; Huang et al., 2002; Phillips

& Elledge, 1989; Salas et al., 1999; Svyantek et al., 1999). Surveys show that the vast majority of U.S. companies have realized that "team development is important to the success of their organizations...but a significant number of companies tend to neglect team-building, failing to include it as part of the corporate philosophy, objectives, or reward system" (Dyer, 1995, p.9). Teamwork has frequently not been as productive as expected (Dennis, Haley & Vandenberg, 2001; Huang, Wei, & Tan, 1999; Jessup & Valacich, 1993), and one of the main reasons would be that teams are not well developed before performing various specific tasks (Chidabaram & Bostrom, 1996; Larson & LaFasto, 1989; Straus, 1986; Zawacki & Lackow, 1998).

In modern organizations, global virtual teams such as global software development teams or Computer Aided Design/Computer Aided Manufacture (CAD/CAM) teams are becoming widespread (Meadows, 1996; Rayport & Sviokla, 1994). Virtual teamwork functions as a central mechanism for emerging virtual organizations (e.g., Davidow & Malone, 1992; Lucas, 1996; Jarvenpaa & Ives, 1994). Although there exists a rich GSS research literature for supporting teamwork, most previous GSS studies have been conducted in face-to-face (FtF) decision room settings (e.g., Briggs, Nunamaker, & Sprague, 1998; Dennis, Haley, & Vandenberg, 2001; Fjermestad and Hiltz ,1999; Huang & Wei, 2000; Huang, Raman, & Wei, 1997; Nunamaker et al., 1997). Virtual teamwork has been inadequately studied in GSS research literature, although some notable exceptions include the studies conducted by Chidambaram (1996), Chidambaram and Jones (1993), and Turoff et al. (1993). Further, even less research on supporting virtual team-building is available in GSS literature.

Virtual team-building would be the precursor of effective teamwork for many virtual teams. In virtual team settings, certain types of social interactions in face-to-face settings, such as informal talks over coffee breaks or in cocktail parties, which can often help enhance interpersonal relationships among team members, hardly exist. As a result, a specific session of team-building, aiming at supporting a team's interpersonal relationship and shared basis, may become even more important for a virtual team. If a virtual team is not well built up, for example, if a team's values and goals are not genuinely shared, team members can hardly collaborate with each other to accomplish a task effectively. Because teamwork largely involves collaborative activities (Huang et al., 2002; Larson & LaFasto, 1989; Turoff et al., 1993), working performance of a virtual team would be consequently dampened. In summary, virtual team-building should be an important research issue that has been largely neglected.

In general, there are two types of research approaches (Ackoff, Gupta, & Minas, 1962; Nunamaker et al., 1991): developmental and empirical research. The former attempts to develop improved work methods whereas the latter evaluates and understands them. A review on GSS literature indicates that much previous GSS research is empirical in nature. More effort is thus needed in developing new group work methods and/or theories in GSS research (Huang, Raman, & Wei, 1997; Nunamaker et al., 1991; Olson et al., 1993). This study adopts a developmental research approach and proposes a theoretical framework that can be embedded into a GSS system and aims to specifically support virtual team-building.

According to the Encyclopedia of Sociology (Borgatta & Borgatta, 1992), a team consists of four basic elements: (1) **team common identity or basis**– grounded in shared values, experiences, and goals; (2) **team structure**–interaction patterned in terms of

statuses and roles; (3) **team interdependence**–some degree of members' mutual reliance on each other for needed or valued material and non-material resources; and (4) **team history**–some regularity or frequency of interaction over time.

The common basis is the fundamental element of these four basic team elements. Without the common basis (of shared goals and values), team members could hardly really understand, and thus trust each other. As a result, team interdependency would be difficult to develop, and the team structure (e.g., team roles and statuses) would be difficult to be genuinely accepted by all team members. Consequently, more frequent team interactions over time (i.e., the team history) might connote with a waste of time. In summary, the team common basis is the most important element of the four, and it is therefore targeted for our proposed theoretical framework in order to support virtual team-building.

The remaining parts of this chapter are organized as follows. The next section briefly reviews the relevant research literature. Following that, a conceptual team-building framework is derived. Subsequently, the chapter develops a set of research propositions based on the derived framework. Further discussion of the framework is also included.

LITERATURE REVIEW

Background

Research on group development in the social psychological literature seems relevant to team-building. Two group development models, sequential and non-sequential models, can be used to categorize group development (Chidambaram & Bostrom, 1996). Sequential group development models posit unitary development sequences or patterns which groups pass through during the course of their life cycles. Non-sequential models focus on underlying factors that cause shifts in group development.

However, prefixed sequences or patterns of group development in the sequential models are not supported by some studies and theories, such as the Adaptive Structuration Theory (AST) (e.g., DeSanctis & Poole, 1994), and Time, Interaction, and Performance (TIP) Theory (McGrath, 1990, 1991). Hence, the prefixed group development patterns are still a matter of debate (Hare, 1992). As a result, the proposed theoretical framework cannot be based on the research literature of group development.

Some field studies in social psychology and some consultation work in team diagnosis may provide useful insights for team-building. Dyer (1987) finds out that an effective and well built up team has clear overall goals, appropriate materials and member qualifications, and appropriate leadership for implementation. Most prior research in social psychology studies teams as closed systems (cf. Hackman, Brousseau & Weiss, 1976; McGrath, 1984; Sundstrom & Altman, 1989), but many current teams are open systems with members and their interactions beyond teams' borders. After a three-year study of real-world teams, Larson and LaFasto (1989) identify eight properties of effectively functioning teams: a clear and elevating goal, a results-driven structure, competent team members, unified commitment, a collaborative climate, standards of excellence, external support and recognition, and principled leadership.

In summary, the review on field studies in social psychology and on consultation work in team diagnosis indicates that team-building exercises should be conducted to

help team members keep in touch with their thoughts and feelings, which is the key to team-building (e.g., Lau, 1988a, 1988b; Orpen, 1986).

Further, relevant theoretical perspectives of GSS are reviewed. Some theories, such as AST theory, TIP theory, communication theories (e.g., Bormann, 1980; Daft & Lengel, 1986), and institutional theories (e.g., Markus & Robey, 1988; Perrow, 1986; Salancik & Pfeffer, 1978), have inadequacies because of missing elements (DeSanctis, 1993). For example, they fail to specifically address issues of diversity of group membership or the common basis of a team.

In addition, the above theories are largely influenced by organization theories (DeSanctis, 1993), which are in turn based on an "I" or "We" paradigm (Etzioni, 1988). These two paradigms represent different theoretical views and result in tensions between the role of the individual versus social good, the role of rationality versus emotion and values, and the role of authority versus cooperation (Etzioni, 1988; Miller & O'Leary, 1989; Perrow, 1986). The "I" paradigm has been dominant in GSS research for the last decade (e.g., Easton, Vogel, & Nunamaker, 1989; Watson, DeSanctis, & Poole, 1988) while there is a growing interest in the "We" paradigm. However, neither "I" nor "We" paradigm alone is an ideal theoretical foundation; a combination of the two, i.e., the "I & We" paradigm (Etzioni, 1988) that recognizes mutually dependent forces of personal freedom and collective action, may be a better choice (DeSanctis, 1993). Therefore, the "I & We" paradigm is targeted as a theoretical guideline for deriving our team-building framework in this chapter.

Dialogue: A Theoretical Team-Building Perspective

Dialogue perspective (e.g., Bohm, 1990; Isaacs, 1993, 1994; Schein, 1993) provides a theoretical foundation for deriving the team-building framework. It helps build up a team that can generate shared team meanings (Bohm, 1990) and whose members can think together (Schein, 1993). Conceptually, shared team meanings include shared team values, goals, and experiences, which actually overlap with the concept of the common basis of a team (Borgatta & Borgatta, 1992). Thinking together as a team should have a shared common basis as the precursor. Hence, dialogue theoretical perspective can help a team to build up a common basis for thinking together.

Dialogue theoretical perspective largely originates from the work of three twentieth-century thinkers: Buber (1988), DeMaré (1991), and Bohm (1985). The word "dialogue" comes from the Greek dialogos: logos means "the word" and dia means "through." Dialogue is a stream of meaning of word(s) flowing among us and through us and between us (Bohm, 1985), out of which form meanings that are genuinely shared by all team members. It is such a shared meaning that is the "cement" holding team members together (Bohm, 1990).

An important goal of dialogue is to reveal incoherence within people's thoughts. Dialogue can enable a team to achieve a higher level of consciousness and creativity not at the expense of personal freedom and interest (Schein, 1993). Dialogue can help team members to keep in touch with their thoughts and feelings, which is the key to team-building (e.g., Lau 1988a, 1988b; Orpen, 1986) as discussed in the literature review.

Three main attributes of dialogue are "container," "suspension," and "laser." A **container** can be understood as the sum of assumptions, shared intentions, and beliefs

in a team (Isaacs 1993). "To **suspend** something is, ..., to keep it 'hanging in front of you,' constantly accessible for questioning and observation" (Bohm, 1990). The power of a team (after going through a dialogue) could metaphorically be described as laser. **Laser** produces a very intense beam which is coherent, and the light waves build up strength because they are all going toward the same direction, and the beam can do all sorts of things that ordinary light cannot (Bohm, 1990).

A big container is necessary for creating a climate and a set of explicit or implicit norms that permit people to handle "hot issues" without getting burned (Schein, 1993). A big container that can include all kinds of ideas, beliefs, and comments can avoid or at least reduce human being's "defensive behavior" (Argyris, 1985). Defensive behaviors prevent team members from keeping in touch with their thoughts and feelings, and thus dampen team cohesion and trust. Further, suspension is important for resolving problems of the very nature of human being's thought, because thought often deludes us into a view that "this is the way it is" (Bohm, 1990), which prevents us from a deeper questioning and observation of an event. To minimize defensive behavior and encourage the deeper questioning and observation, "psychological safety," provided by the container and suspension of dialogue, is very important (Schein, 1993).

The Dialogue Project conducted at MIT has adopted and developed this dialogue theoretical perspective, and conducted a series of field studies to explore its impacts. The research done at MIT, reporting some positive research findings, has also provided an operational procedure, consisting of eight steps, for conducting a face-to-face dialogue (e.g., Schein, 1993), on which this research is mainly based. This dialogue procedure will be adopted and elaborated in the next section.

Research has shown that dialogue procedure eventually leads a team to a high level of team consciousness, out of which forms team meanings that are genuinely shared (Bohm, 1990). Further, all dynamics of team-building (e.g., the four basic elements of a team discussed in the introduction) occur in parallel with the process of conducting a dialogue, and therefore, dialogue is the root for any effective team (Schein, 1993). Correspondingly, the dialogue theoretical perspective with its procedure may form a good basis for supporting team-building.

PROPOSING A CONCEPTUAL TEAM-BUILDING FRAMEWORK

Based on the above theoretical discussion, a conceptual team-building framework, consisting of five steps, is derived as shown in Figure 1. After embedding this framework into a GSS system, the GSS may be able to support virtual team-building.

1)   Team members have an electronic (GSS) dialogue which aims to enhance team-building by generating shared team meanings (i.e., the common basis of a team). Before a formal dialogue begins, team members have a small talk where they introduce themselves in terms of name, sex, individual background information, and even sharing jokes (Goerge, 1987; Jarvenpaa & Knoll, 1996) (this can be achieved through using e-mail or web home page for a virtual team). The purpose of this informal and relaxing small talk is to make it easier for team members to put aside their formal roles and mentalities (Dyer, 1987), so that they can better interact with each other in a formal dialogue.

Figure 1: A Conceptual Team-Building Framework.
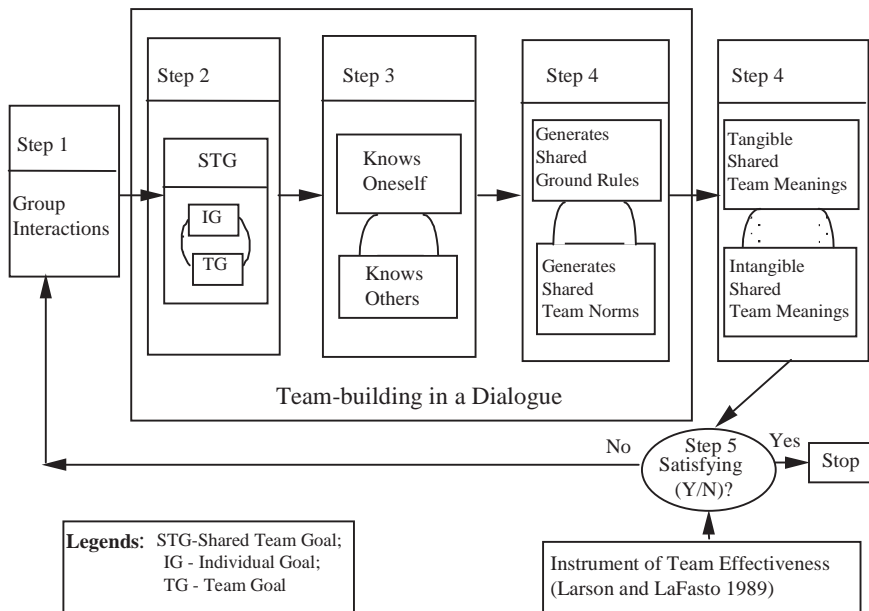
2)   At this step, team members have a GSS dialogue on defining and generating shared team goals. A team goal is an objective or end result that a team seeks to achieve, and toward which a team works (Johnson & Johnson, 1987).

Generating shared team goals is very important to a successful team (Dyer, 1987; Larson & LaFasto, 1989; Locke & Latham, 1990), especially to a new team (Adams, 1988; Hare, 1992). Team members generally possess multiple individual and team goals because they normally belong to multiple teams simultaneously (McGrath, 1990). These individual and team goals may not be originally compatible (Galegher & Kraut, 1990). As a result, various goal conflicts exist due to differences between what some team members want and need, and what others want and need (Schultz, 1992). Hence, a specific and explicit step of generating shared team goals that can minimize these goal conflicts is necessary and important to team-building.

The shared vision discipline provides a guideline for generating shared team goals (Senge, 1990). First, team members start to disclose their own purposes or goals for joining the team (Jarvenpaa & Knoll, 1996). Second, because shared team goals should emerge from individual goals (Banks, 1996; Senge, 1990), team members propose clear and challenging team goals based on their disclosed individual goals. In this way, team members can better align and reconcile possible incompatible individual and team goals (Culbert & McDonough, 1980). Third, after exchanging and discussing proposed team goals, team members rank these team goals. Then, they choose the top ranked goals as shared team goals. This way of ranking and choosing proposed team goals is a pooled coordination exercise for team members (Turoff et al., 1993).

Shared team goals can guide coordinating behaviors for team members, since all coordinating activities in a team are for the purpose of attaining shared team goals (Larson & LaFasto, 1989). Further, shared team goals is one element of a team's common basis (Borgatta & Borgatta, 1992), and provides a basis for developing shared team norms and standards (Mechener et al., 1990). Moreover, shared team goals can motivate a team (Locke & Latham, 1990) to effectively attend a dialogue, and such a motivating element is missing in dialogue (Schein, 1993). Hence, this step of generating shared team goals may form a good basis for an effective dialogue.

3)   This step, the core of this theoretical framework, is a dialogue session guided by the MIT dialogue procedure. MIT dialogue sessions were all conducted manually without the support of information technology (Schein, 1993). The current study, however, intends to embed the dialogue procedure into a GSS system for supporting virtual team-building. Thus, the dialogue here is actually an electronic (GSS) dialogue. The MIT dialogue procedure is adapted and modified below:

- First, team members are asked to think of their past team working experiences in terms of good team communications. Because the GSS simultaneity (Bostrom & Anson, 1992) provides an open, equal, and parallel electronic communication channel to every member, there would be a better sense of equality in a GSS dialogue than in a manual dialogue.

- Second, members simultaneously disclose and share their past team working experiences and identify related characteristics of their experiences in terms of good team communication protocols, team roles (Nath & Lederer, 1996; Turoff et al., 1993), and the four basic elements of a team (Borgatta & Borgatta, 1992). Because this sub-step allows members to disclose their own experiences and thinking about good team communications (i.e., turning a mirror inward, as suggested by the mental models discipline), team members could start to know themselves and others (see Step 3 of Figure 1).

- Third, given the shared team goals, members simultaneously exchange and clarify their reactions to the above-identified characteristics of good team communications. More specifically, members make enquiries about the characteristics identified by others, and clarify with justifications of the characteristics identified by them. This sub-step with the inquiring structure may help surface and understand each other's mental models (Senge, 1990), so that members could know themselves and others better.

- Fourth, in this step, members are not allowed to criticize others' ideas and justifications to meet the requirement of the container and suspension of a dialogue. When necessary, a dialogue facilitator/administrator could be arranged to intervene (e.g., through e-mail in such a GSS dialogue) to clarify or elucidate, using concepts and data that illustrate problems of communication.

- Fifth, the dialogue will be closed when no further exchange and clarification from team members are required.

4)   At this step, outcomes of a dialogue, described as laser by Bohm (1990), can be generated. More specifically, given the shared team goals, team members rank the characteristics discussed at Step (3), another round of pooled coordination activity (Turoff et al., 1993). In other words, team members are asked to determine (by

ranking) what characteristics of team communications are most important to the attainment of the shared team goals. This can result in specific team interaction rules shared by all members, which will guide the team's future communications, interactions, and activities.

In general, two types of dialogue outcomes can be generated. The first type can be termed as shared ground rules of a team (or tangible shared team meanings), which may include the four basic team elements discussed in the introduction–the team structure (e.g., leadership and role differentiation), team identity (e.g., team goals), team interdependence (e.g., team coordination), and team history (e.g., the frequency of team meeting). The second type is a kind of shared team conventions and norms (or intangible shared team meanings), which may guide team interactions consciously (e.g., respecting differences in team interactions), and most of the time, maybe unconsciously (e.g., a team norm may exist in some cultures where ideas given by senior people will be automatically and unconsciously considered with higher weights in team interactions).

The generated outcome of both tangible and intangible shared team meanings indicates that team members reach a level of team consciousness, so that the team can think together in the future (Schein, 1993).

5)   The above two types of dialogue outcomes can be *measured* using the instrument proposed by Larson and LaFasto (1989) to check whether or not a team achieves a satisfied level of team-building. If not, the team can repeat the dialogue procedure until a satisfied level is achieved.

In summary, because this conceptual team-building framework can support the generation of shared team meanings (i.e., the common basis of a team), a GSS embedded with this framework may have a potential to enhance virtual team-building. Further, at the dialogue Steps (2) and (3), shared team goals are generated based on individual goals; shared team meanings are generated from disclosing each individual's past experiences, preferences, and values, and from surfacing and understanding each individual's mental models. In this way, individual values and actions could be aligned with a team's collective values and actions. As a result, the proposed framework is generally in line with the "I & We" paradigm as discussed in the literature review, since it recognizes and emphasizes the mutual dependency between individual and collective action (Etzioni, 1988). This "I & We" paradigm is considered to be superior to the "I" or "We" paradigm (e.g., DeSanctis, 1993), which is a target for our proposed theoretical framework as discussed in the literature review.

DISCUSSION AND IMPLICATIONS
Characteristics of a GSS Dialogue

Positive research results reported by the MIT Dialogue Project (e.g., Isaacs, 1993; Schein, 1993) support the effort of embedding the conceptual team-building framework into a GSS for supporting virtual team-building. MIT research has been conducted in a manual face-to-face (FtF) setting. When embedded with a GSS, a dialogue session may be more effective in some aspects.

First, with GSS structures of anonymity, simultaneity, electronic recording, and expandable electronic storage space, the container of dialogue can virtually contain any number of controversial ideas in a GSS dialogue. Hence, the container in a GSS dialogue can be larger than in a manual face-to-face dialogue.

Second, the *suspension* of dialogue may be better controlled in a GSS dialogue. Transmission of a message via a GSS is often separated from its composition and editing (McGrath & Hollinshead, 1993) whereas the message composition, editing, and transmission cannot be separated in face-to-face communication. Consequently, the communication channel of a GSS typically promotes more carefully and precisely worded communication (Daft & Lengel, 1986), which can enhance the suspension. Further, GSS can separate individual work space from team work space in communication (Bostrom & Anson, 1992), which can also make the control of suspension easier. For example, to ensure a satisfied level of suspension, a dialogue facilitator can vet the messages generated in a GSS dialogue from team members before they are sent through the electronic communication channel.

Third, with GSS structures of electronic recording and evaluation (ranking or voting), messages of preferences and values generated at Step (4) can be easier and better to be captured, edited, organized, and evaluated. As a result, shared team meanings can be more effectively and efficiently generated. In addition, GSS structures of anonymity may provide a better sense of psychological safety (Schein, 1993) and further reduce defensive behavior (Argyris, 1985) in a GSS dialogue.

In summary, a dialogue may be more effectively conducted in a GSS setting than in a face-to-face setting in terms of its three main attributes of container, suspension, and laser. Hence, a GSS embedded with the conceptual team-building framework may effectively support virtual team-building, which leads to the research propositions to be presented next. To smooth the flow of the remaining parts of this chapter, a TB-GSS is used to denote a *GSS* embedded with the conceptual team-building framework; and a GSS without embedding such a framework is denoted as a traditional GSS.

Research Propositions

Laboratory experiments can be conducted to test the framework proposed above. Effectiveness of team-building can be measured in terms of team trust (Larson & LaFasto, 1989; Schein, 1993), cohesion (Seashore, 1954), and conflict (Chidambaram, Bostrom, & Wynne, 1991). In general, a well-built team should perform better in task activities. Dependent variables of decision quality and satisfaction are commonly used to measure outcomes of teamwork (e.g., Benbasat & Lim, 1993; Dennis, Haley, & Vandenberg, 2001). The above five variables are used to examine whether or not a TB-GSS could enhance virtual team-building as well as the performance of virtual teamwork.

A TB-GSS can enhance team trust in two aspects. First, with the conceptual framework presented above, shared team goals could be aligned with individual goals. Shared team goals can clearly show to team members that their individual interests and needs depend on the attainment of team goals (Culbert & McDonough, 1980; Mackie & Goethals, 1987). Team members are thus motivated to understand each other, trust each other, and collaborate with each other, in order to attain shared team goals as well as individual goals.

Second, two specific guidelines for building up team trust—that a team must be fairly consistent and mature in its approach to deal with problems, and that every member must be valued and treated with respect (Larson & LaFasto, 1989)—can actually be proposed and included in the shared team ground rules at Step 4). Because shared team ground rules are generated and commonly accepted by team members themselves in a GSS dialogue, team members are more likely to follow these two guidelines. Hence, shared team ground rules in a GSS dialogue can enhance team trust and hold people together (Bohm, 1990).

Proposition #1: A TB-GSS will enhance team trust for a virtual team, relative to a traditional GSS.

Team cohesion refers to the attraction of a team and the closeness that team members feel toward each other (Seashore, 1954). Team goals consist of achievement and maintenance goals. Team maintenance goals generally involve relationships among team members. Shared team maintenance goals can help bind a team together and give the team a basic level of cohesiveness (Barker et al., 1991; Johnson & Johnson, 1987; Schultz, 1992).

Further, shared team goals generated in a GSS dialogue can enhance the sense of "we-ness" among team members (Lewin, 1951; Owen, 1985; Schultz, 1992). As a result, team members would feel closer and more attractive to each other.

Proposition #2: A TB-GSS will enhance team cohesion for a virtual team, relative to a traditional GSS.

Team conflict here refers to the personally oriented conflict that militates against team consensus and leads to a general dissatisfaction among team members (Gouran, 1992). Shared team goals can enhance the sense of "we-ness" (e.g., Schultz, 1992) and thus minimize chances of negative conflicts (Poole, Seibold, & McPhee, 1985). Further, literature review shows that team cohesion and conflict have a reciprocal causal relationship (e.g., Chidambaram, Bostrom, & Wynne, 1991; Shaw, 1981; Watson, 1987). Since a TB-GSS may enhance team cohesion (the proposition #1), it could reduce team conflict.

Proposition #3: A TB-GSS will reduce team conflict for a virtual team, relative to a traditional GSS.

GSS research literature indicates that although GSS can generally increase team decision quality, it fails to increase or sometimes even decreases decision satisfaction and decision process satisfaction (e.g., Benbasat & Lim, 1993; Dennis, Haley, & Vandenberg, 2001). This issue has become one of major concern in GSS research (e.g., McGrath & Hollingshead, 1994). A TB-GSS might be able to rectify this issue by enhancing both decision satisfaction and decision process satisfaction.

In a team's decision making process, A TB-GSS may increase team cohesion (the proposition #2) and decrease team conflict (the proposition #3). Hence, team members in such a cohesive environment with fewer negative conflicts should feel more comfort-

able to work together on decision-makings. As a result, team members may be more satisfied with such a cohesive decision-making process.

Proposition #4: A TB-GSS will increase decision process satisfaction for a virtual team, relative to a traditional GSS.

From a goal perspective, final decision of a team is generally for the purpose of attaining team goals. In a GSS dialogue, shared team goals are generated based on individual goals (see Step (2) of the proposed framework), and consequently, the isomorphism between individual and team goals can be fostered. Thus, the final decision for attaining shared team goals may be perceived by team members as simultaneously attaining their own individual goals (Mackie & Goethals, 1987). Therefore, team members are likely to be more satisfied with the final team decision.

Proposition #5: A TB-GSS will increase decision satisfaction for a virtual team, relative to a traditional GSS.

Review of research literature indicates that team cohesion and team performance are often co-related (Littlepage, Cowart, & Kerr, 1989; Shaw, 1981), which is further confirmed by a meta-analysis (Evans & Dion, 1991). A highly cohesive team can be productive while team value is placed on accomplishing team task (e.g., Goodman, Ravlin, & Schminke, 1987; Schultz, 1992; Shaw, 1983). The team value of accomplishing team task can be reflected in the form of team achievement goals in a GSS dialogue. As a result, a more cohesive team supported by a TB-GSS (Proposition #2) may lead to a better team performance such as team decision quality.

Proposition #6: A TB-GSS will increase decision quality for a virtual team, relative to a traditional GSS.

A controlled laboratory experiment may be used to empirically test the above-mentioned research propositions in future studies. A Web-based GSS, TCBWorks (Dennis, Pootheri, & Natarajan, 1997), can be adopted to embed the team-building framework to support virtual team-building. Teams with and without the embedded team-building framework can be used to test whether the team-building framework could help a team develop more effectively and efficiently.

Further Discussion

The proposed framework can be used for different purposes in different ways. For example, it can be used to address *one general team issue* such as enhancing virtual team-building; and it can also be used to address one specific team issue such as role clarification, interpersonal relationship, or team socio-emotional interaction issues.

For a new virtual team, the framework could be even more important. Initial meetings of a new team are so unique and important that they set the tone for the team's future actions (Chidambaram & Bostrom, 1996; Gersick, 1989). A new team at this early stage can be most vulnerable. Team members are eager to know and familiarize with each other, but due to lack of shared meanings and values, they may not know how to start and how to co-orient further from the start. Team members may have various high expectations

towards others and the team, but due to the least available structures as a necessary guidance for interactions at this stage, they may not know how to adjust themselves to fit practical situations. These, if not resolved properly, can result in low member participation, high anxieties, and much dependence on team leaders (Bales & Strodbeck, 1951; Chidambaram & Bostrom, 1996; Mann, Gibbard, & Hartman, 1967). Consequently, team-building may be hindered.

However, a TB-GSS can help generate the necessary *shared meanings, values, and provide team structures* (the framework itself can be such a structure) to guide processes of initial team co-orientations and interactions. Further, with the container and suspension of dialogue, team members can interact with each other with less fear of social offenses or negative feedback from others. As a result, a new team may be better built up and more likely to function as a cohesive and effective team in the future (Gersick, 1989).

Further, team needs/goals (as well as individual goals) often change over time, and thus, communication protocols, rules, and structures already existing in a team may need to be changed to match these changed goals (Johnson-Lenz & Johnson-Lenz, 1981; Turoff et al., 1993). As a result, a TB-GSS could be periodically used to support dynamically changing needs/goals of teams.

The conceptual framework also suggests some research questions for future studies. First, empirical studies can be conducted to directly test the conceptual team-building framework. For example, laboratory research can be used to study impacts of each component of the framework on virtual team-building.

Second, review of GSS literature indicates that most prior GSS research focuses on supporting task-oriented teamwork and largely neglects socio-emotional activities of a team. However, research reports that even in task-oriented computer system design meetings, only 40% of meeting time are spent in task-focused discussion (Olson et al., 1992). Task and socio-emotional activities coexist in and are equally important to a team (e.g., Bales & Strodbeck, 1951; Blake & Mouton, 1978; Cartwright & Zander, 1968; Huang & Wei, 2000). More research is therefore needed to study how to support a team's socio-emotional activities using a GSS.

A TB-GSS provides a virtual gathering place as well as structures for team members to interact socially, where team members can disclose and exchange personal experiences, preferences, values, likes/dislikes, and internal needs/goals. Further, a TB-GSS with dialogue structures of container and suspension can result in team members having a good sense of psychological safety (Schein, 1993). In this way, team members might feel more comfortable to share and be open to personal and controversial information (Olive & Langford, 1987). This kind of socialization of sharing personal information is important to the trust building of a team, since it can bring team spirit with it (Conlin, 1989; Hare, 1992). Therefore, future research can specifically study how a TB-GSS can be used to support socio-emotional activities of a team, a largely neglected aspect in GSS research.

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Chapter VIII

An Exploratory Study and Design of Cross-Cultural Impact of Information Systems Managers' Performance, Job Satisfaction and Managerial Value

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ABSTRACT

This research is an exploratory study and design to find cross-cultural impact on information systems (IS) managers' performance, job satisfaction and managerial value, particularly on American IS and Korean IS expatriate managers in the U.S. in the banking industry. Through the literature review, first, this study attempts to find frequently used variables to measure the magnitude of the cross-cultural impact on the two national IS managers. Second, a literature-derived research instrument was developed and pretested for content validity. Third, to examine the goals and objectives of the study, 14 hypotheses were developed through the literature research. And then the hypotheses were matched to the specific items in the research instrument in order to test them. Fourth, this chapter presents a research design, which used the cultural variables to separate the influences of the cross-cultural impact on the IS managers from

the other variables, followed by the research methodology in which the questionnaire's reliability and validity were tested using Pearson's correlation analysis, Cronbach's α test and factor analysis. Fifth, based on the data analysis, the test results of the hypotheses were examined, and compared with the existing literature. Finally, the research conclusion is presented.

LITERATURE REVIEW

One of the fundamental issues in cross-cultural management in IS research is to determine the extent to which culture impacts on IS manager's behaviors, beliefs, attitudes, values, motivation, job satisfaction, and performances in the workplace (Adler, 1983a). The variables were being identified as frequently used ones in the cross-cultural studies research variables in the literature. However, "behaviors," "value," and "performance" variables were identified as the ones that were vital to measure and explain the cross-cultural impact on the managers (Hofstede, 1980, 1983, 1984). Thus, the three variables were utilized for this research to measure and explain the cultural influences on Korean IS expatriate and American IS managers in the banking industry.

Convergence Versus Divergence

Convergence (or universalist) hypothesis contends that managers are subject to follow industrial norms, attitudes and behaviors in order to comply with the trend of industrialization of the world (Kerr, Dunlop, Harbison, & Myers, 1954). On the other hand, divergence (or culturogist) hypothesis argues that managerial differences will remain continually around the world as long as differences in culture exist. Convergence perspective by Black and Porter (1991), Kerr, Dunlop, Harbison, and Myers (1954), Mendenhall and Oddou (1985), Miller and Doyle (1987), Negandhi and Prasad (1971) and Tung (1981) dominated international management thought during the 1950s in the U.S. These researchers believed that international differences in management practices would disappear as countries "converge" and become equally industrialized. On the other hand, culturogists (Bass & Berger, 1979; Emory, 1985; England & Lee, 1974; Griffeth, Hom, DeNiSi, & Kirchner, 1980; Haire, Ghiselli, & Poter, 1966; Hofstede, 1980, 1984; Hofstede, 1983; McClellnad, 1961; Munson & McIntyre, 1979; Redding & Casey, 1976; Ruben & Kealey, 1979; Whitley & England, 1977) were opposite to the universalists. They believed that managerial differences would be a permanent characteristic for different culture.

Cultural Variables

Cultural variables uniquely influence Korean IS expatriate and American IS managers. The commonly used cultural variables in the literature as follows: history (Haire, Ghiselli, & Poter, 1966; Malinowski, 1960), language (Hoebel, Frost, & Spencer, 1976; Worf, 1956), religion (Triandis, 1972; Webber, 1969), political system (Huntington, 1973), ethnicity (Katona, Strumpel, & Zahn, 1971), general economic level (Harbison & Myers, 1960), and geographical propinquity (Haire, Ghiselli, & Poter, 1966). Dymsza and Negandhi (1983) explained that the managerial behaviors of American managers in the U.S. compared to those in a foreign country and compared the relationship between

managerial behaviors. Mendenhall and Oddou (1985) explained that even though managerial behavior is not the only determining factor of performance, it is an important variable. Lincoln and Gerald (1978) have researched cultural differences in the Asian nations' organizations. They found that Confucianism ethics in Korean managers favor vertical social structures, and the vertical differentiation of the organization's structure had positive effects on the personal ties and work satisfaction of the Korean managers. On the other hand, horizontal differentiation had negative effects on personal ties and work satisfaction for Korean managers.

Motivation and Job Satisfaction

Successful IS managers are depending on their performance. Performance of managers, then, is influenced by the rewards, which managers desire to have in their work situation and by their perceptions of the degree to which their job expectations are being satisfied. Thus IS managers' performances are influenced by the levels of their work attitude, motivation and job satisfaction (Kanungo & Wright, 1983). As shown in Figure 1, Korean IS expatriate—and American IS managers' motivation and job satisfaction are determined by the interaction between the attitude and value which the IS managers have toward their jobs, and values which they have in relation to job outcomes. The values of IS managers of two nations to job outcomes are culturally determined mainly with the relative importance of intrinsic versus extrinsic job outcomes. Kelley, Whatley, and Worthley (1987) developed the research design model that separates cultural effects from other variables. As shown in Figure 2, a research model was designed according to Kelley, Whatley, and Worthley's (1987) concept and modified to measure only cultural variables influencing both American and Korean IS managers in the organizations. American economic, political and legal environments were separated in measuring the managers' performances, value and job satisfaction. Non-cultural variables of American economic, political, and legal environment with dotted lines represent that they do not affect IS managers' performance, value and behaviors, but Korean and American cultural influences with solid arrow lines, each nation's IS managers will be affected and measured.

Figure 1: Performance of IS Managers.
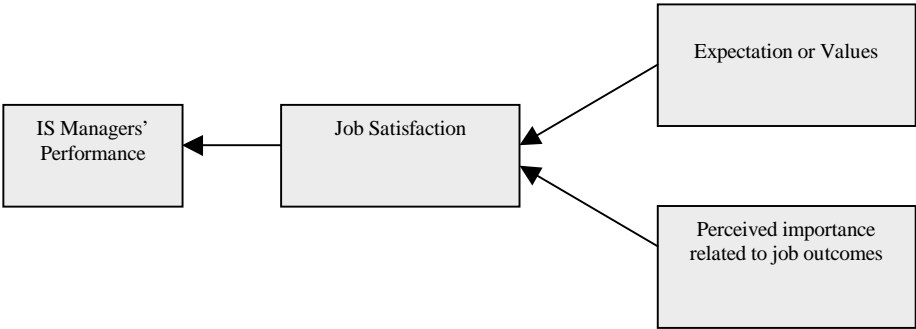
Explanation for Differences of Managerial Behaviors

Researchers in the area of cross-cultural studies explained why managers show different behaviors in the different environment. Ajifuruku and Boddewyn (1970) explained similarities and differences by using cultural, economic, psychological and sociological variables. These researchers claimed that out of the four variables, cultural variables have substantial influences in managerial behaviors. Harbison and Myers (1960) divided managerial similarities and differences into three categories: economical, psychological, and sociological. Gudykunst, Yoon, and Nishida (1987) found that Korean managers have a collectivistic culture, and American managers have a very individualistic culture based on Hofstede's study (1983). Hofstede (1980, 1984) classi-fied national culture into four dimensions: power distance, uncertainty avoidance, collectivism versus individualism and masculinity versus femininity (1983). Noburn, Birley, and Dunn (1990) classified it into four different perspectives: contextual (Negandhi, 1983, 1973, 1971), behavioral (Davis, 1971; Hofstede, 1980, 1984, 1983; Nath, 1986), environmental (Farmer & Richman, 1964, 1965), and situational (Boddewyn, 1966; Haire, Ghiselli, & Poter, 1966; Peterson, 1972). In contextual environment, Negandhi (1983; 1973) argued not the cultural specificity, but considered factors such as corporate size, location and market complexity to be at least equally important to a nation's culture. In environmental, Farmer and Richman (1964, 1965) suggested that there are constraints on managerial influence by socioeconomic, political, legal and technical factors. Nath (1986) also explained that the behavioral approach explains managerial behavioral patterns. Thus, in behavioral approach, attitudes, beliefs, value systems and need hierarchies are functions of a given culture of a society. On the contrary, some cross-cultural management researchers claim that there is increasing evidence to support the conten-tion that managerial practices, behavior and effectiveness are as much, if not more, functions of such contextual and environmental variables as they are of socio-cultural variables (Boyd, Ralph, & Stanley, 1977; Negandhi, 1983, 1973).

Figure 2: Research Design for the Isolation of Cultural Influences from Other Variables.
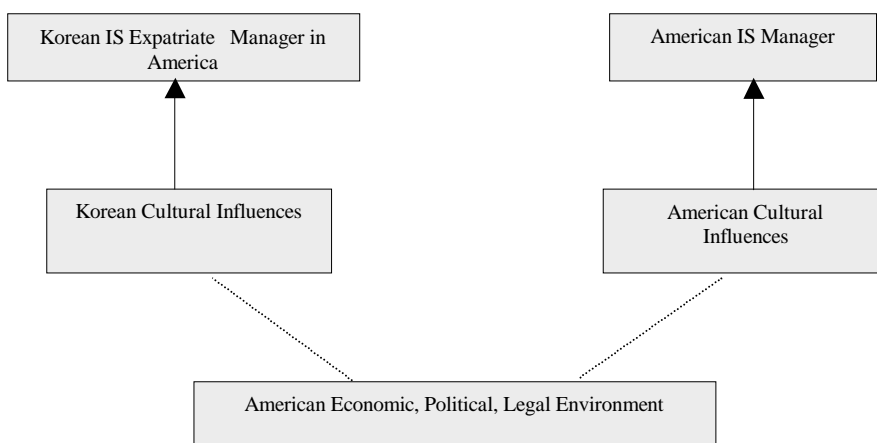
Measurement of Values and Culture

In this research, values and culture are important variables in measuring performance and job satisfaction of the groups of two national IS managers. Individuals have their values and the values can be used to compare individuals. On the other hand, culture compares ethnic groups such as between American and Korean IS managers. Culture includes systems of values and values are among the building blocks of culture. Some cultural variables are closely related to specific behavior of managers (Fishbein & Ajzen, 1972, 1975). On the other hand, other cultural variables such as attitudes and values are not closely related to specific behaviors. Thus values are an attribute of individuals and collective people of a nation. On the other hand, culture assumes collective people of a nation or a country. Therefore, culture would be one of the main variables used in measuring the behaviors of IS managers.

RESEARCH GOALS AND OBJECTIVES

As Bonini and Adams (1991) and Dickson and DeSanctis (1986) suggested , cross-cultural factors with an empirical methodology pertaining to IS managers' satisfaction and motivation in comparative management studies are very important subjects in the area of IS literature. However, a cross-culturally related topic such as cross-cultural influence on IS managers and IS expatriate managers has been receiving little attention in the IS literature. Therefore, this research may have significance in the following three ways for cross-cultural studies for the behaviors of IS managers. First, comparative studies of Korean IS expatriate and American IS managers' behaviors and values pertaining to their job satisfaction and performance would provide a contribution to the existing IS literature because there were not many studies in this area. Previous researches have emphasized cross-cultural behaviors only with IS managerial thoughts developed in America. Furthermore, there were few cross-cultural studies based on Korean IS expatriate and America IS managers. This research has attempted to measure the influence of both national IS managers' cultural impact on their behaviors, attitudes and values. Second, this research may explain the adaptation of Korean IS expatriate managers' attitudes and value systems toward their organizations, which are different from those inherited and developed by their traditional culture. In other words, this study attempted to analyze how values and behaviors of Korean IS managers are sustained or changed to meet different cultural factors in which IS managers are operating. These factors are important because those values and behaviors are closely related to the job satisfaction and performance of IS managers in their organizations. In addition, IS literature usually has not paid much attention to expatriate managers' cultural factors in explaining the adapting behaviors of Korean IS expatriate managers to new cultural situations. The final contribution may be the examinations of Hofstede's (1980, 1984) four cultural dimensions: individualism versus collectivism, femininity versus masculinity, uncertainty avoidance and power distance. As a result, this research was designed to examine cross-cultural managerial performances, values and job satisfaction on both Korean IS expatriate managers and American IS managers in the banking industry. This research was conducted to examine the following goals and objectives:

1.   To examine the differences and similarities of the cultural influences on American IS and on Korean IS expatriate managers. Five job descriptive variables such as

Table 1: Relationships between Research Goals and Objectives and Hypotheses.

Research Goals and Objectives	Hypotheses
Goals and Objectives 1	H_1, H_2, H_3, H_4, H_5, and H_7
Goals and Objectives 2	H_6, H_{10}, H_{13} and H_{14}
Goals and Objectives 3	H_8, H_9, H_{11}, and H_{12}

work, supervision, promotion, pay and coworkers–were used to test the first objective. Self-rated performance and values were also used to examine the uniqueness and similarity of the groups of two national IS managers.

2.   To examine the dimensions of the culture between the two groups of national IS managers. Using 35 questions in the questionnaire, the dimensions of individualism versus collectivist, uncertainty avoidance, power distance, work role of femininity and masculinity environment were tested.

3.   To examine Korean IS expatriate managers to determine if they have adapted American managerial practices or if they have enforced their own culturally oriented policies at the personal level and at the organizational level of the organizations.

RESEARCH HYPOTHESES

Not many studies have attempted to examine American IS - and Korean IS expatriate managers (Black & Porter, 1991) who deal with different environments, internal and external rewards, physical working conditions, and relationship with coworkers, and job performance in the banks located in the U.S. As shown in Table 1, the hypotheses examined the goals and objectives of the research aimed at measuring the cross-cultural influences on IS managers' behaviors and attitudes. With different cultural backgrounds, IS managers would want to have different organizational policies, and regulations to meet their culturally specific values, performance and behaviors (Hofstede, 1980, 1984).

H_1:   The effects of organizational forms on IS managers' values, behaviors, and relations are culture-specific. Culturogists such as England and Lee (1974), and Hofstede (1983) explained that managerial differences in values, behaviors, and relations will remain permanent around the world as long as there are differences in cultures of nations. Hofstede (1980, 1984) also found that American IS managers were weak uncertainty avoidance, while Korean IS expatriate managers are strong uncertainty avoidance. In addition, the job expectations of IS managers would be determined by the values that the managers have in relation to the various job outcomes. These values would be culturally determined.

H_2:   Cross-cultural influences between the groups of two national IS managers studied lead to measurable differences in their cognitive value systems pertaining to job satisfaction and performances. Hofstede (1980, 1984) explained that expatriate

managers from Korean and American managers would display measurable differences in the values systems about job satisfaction and performances in their organization. Thus, the two groups may have different levels of satisfaction on their job and as a result, they may perform differently on the job.

H_3:   American IS managers would place greater emphasis on intrinsic job factors than Korean counterparts, whereas Korean IS managers place relatively more importance on extrinsic job factors such as working conditions and fringe benefits. Kanungo and Wright (1983) explained that American managers are likely to emphasize the protestant ethic, which places high value on work for its own sake. Thus, intrinsic job outcomes such as autonomy, independence and achievement are likely to be valued highly. Korean expatriate managers come largely from a more authoritarian family and educational system with emphasis on a Confucianism ethic. Such background de-emphasizes work ethic and places more emphasis on family (Hofstede, 1980, 1984, 1983; McClelland, 1961). Thus, Korean IS expatriate managers are likely to put more emphasis on the importance of extrinsic job outcomes.

H_4:   Korean IS expatriate managers have job value and behavior profiles that are different from those of the Americans IS managers. Korean IS expatriate managers are influenced by Confucianism work ethic. Thus, they are expected to keep obedience to authority and to the group, to achieve the obligation (England & Lee, 1974).

H_5:   American IS managers working for companies viewed as prestigious by others have greater job satisfaction than those working for less prestigious companies. England and Lee (1974) indicated that American managers place higher importance on the organizationally and interpersonally mediated intrinsic job outcomes. Therefore, American IS managers would expect greater job satisfaction when the company has the high prestige.

H_6:   Korean IS expatriate managers have greater job satisfaction than American IS managers when a bonus is paid for extraordinary performance. As mentioned in Hypothesis 3, Kanungo and Wright (1983) explained that one ethnic group may place value more on extrinsic job outcomes, and the other group may attach relatively more importance to intrinsic job outcomes.

H_7:   Korean IS expatriate managers use a greater percentage of their free time for job-related activities than American IS managers. Kanungo and Wright (1983) explained that intrinsically oriented management would work for achievement at work and are more likely to work in job-related activities in their free time. Therefore, Korean IS expatriate managers would make use of their free time for job-related activities because of their integrity and loyalty to their organization in comparison to the counterpart of American IS managers (Hofstede, 1980, 1984).

H_8:   Korean IS expatriate managers are more likely than American IS managers to exhibit a paternalistic value orientation toward the organization for which they work. Cole (1979) stressed that paternalistic values would more likely be present in Korean managers than in American managers. In other words, Korean IS expatriate managers would show personal caring relationships between co-workers (Edwards, 1979).

H_9:   Korean IS expatriate managers are more integrated in a network of personal affective relationships with co-managers than American IS managers. Edwards

(1979) explained that Korean and American workers differ in relation to their personal ties with co-workers. Thus for Korean IS expatriate managers the work relationships between superiors and subordinates have a personal and family relationships which one would hardly find in American IS co-workers.

H_{10}:   American IS managers experience a generally higher level of job satisfaction than Korean IS expatriate managers. The protestant work ethic would place emphasis on striving for more than what is currently possessed, while Confucianism would emphasize contentment with what they have now (England & Lee, 1974). Therefore, Korean IS expatriate managers would likely be less satisfied with their jobs than that of American IS managers. Strong work values raise expectations and thereby American IS managers are more satisfied with the existing level of reward. The gap between expectation and achievement accounts for relative dissatisfaction.

H_{11}:   Korean IS expatriate managers are less satisfied with their organizational involvement than American IS managers. American IS expatriate managers would likely be more satisfied with their organizational involvement than that of Korean IS managers. Strong job involvement raises expectations and thereby managers are more satisfied with the existing level of reward (Cole, 1979). The gap between expectation and achievement accounts for relative dissatisfaction in their organizational involvement.

H_{12}:   IS managers in different societies and with different cultural backgrounds acquire different expectations regarding work organizations. Marsh and Manari (1977) suggested that paternalistic values such as company housing and life-time employment and close relationships between subordinates and superiors raise higher expectations. Thus, Korean IS expatriate managers would expect higher or different expectations from those of American IS managers in the organization.

H_{13}:   Masculine cultures are more effective than feminine cultures in absorbing and diffusing imported IS technology in organizational contexts. Masculine culture's value in more traditional societies sets a limit to the technology transfer possibilities compared to that of feminine societies. Crowley (1973), Herzberg (1957, 1959) and Hofstede (1980, 1984) explained that masculine cultures emphasize advancement, training, up-to-datedness, adopting new IS technology and working on problems to the organization. On the other hand, feminine cultures emphasize friendly atmosphere, position security, physical conditions, cooperation, and co-worker relations in an organization.

H_{14}:   Organizations located in individualistic cultures are more successful than organizations located in collectivistic cultures in their propensity to absorb and diffuse imported IS technology. The collectivist value in more traditional societies sets a limit to the technology transfer possibilities compared to that of individualistic societies. There is an obvious relationship between the organization's technology and position of its members on the individualism and collectivism continuum. Technologies developed in individualist settings presuppose an individualist mentality in managers and workers (Hofstede, 1980, 1984, 1983; Triandis, 1971, 1989). On the other hand, the collectivist value pattern in more traditional societies sets a limit to the technology transfer possibilities.

RESEARCH METHODOLOGY

Sample Subjects

This research was conducted by using IS managers, including data processing managers, operation managers and check processing managers in American and Korean banks and their branches located in the United States. Those banks are using computer-based information systems in order to process and to perform their daily transaction processing function such as automated teller machines (ATMs), loan decision making systems and check processing systems and other information resources processing. Numerous researchers (Miller & Doyle, 1987; Scott, 1988; Singleton, McLean, & Altman, 1988) have used the banking industry as an information systems research institution in the literature. The banking industry can uniquely represent American IS managers and Korean IS expatriate managers in which this research attempts to study their goals and objectives. Sampled banks and IS managers were chosen from *Thomson Bank Directory* and *The Rand McNally Bankers Directory*. The sampled banks were selected from seven states: California, Washington, Florida, Pennsylvania, Illinois, Texas, and New York. These states are the ones that have Korean banks and American banks as well. Based on the number of banks available in the United States, the numbers of sampled banks were determined. In particular, every fifth American bank in the *Thomson Bank Directory* and *The Rand McNally Bankers Directory* were selected. On the other hand, for Korean banks, all the banks in the directory were selected. Number of IS managers selected from each bank was different since all the IS managers including operations, check processing and data processing managers were chosen. As a result, 567 American IS managers, and 126 Korean IS expatriate managers were selected respectively from those seven states.

Research Instrument

The research instrument includes a cover letter and a questionnaire. The research instrument consists of a questionnaire of 35 questions. As suggested by Kerlinger (1973), more than 10 times the number of items in the questionnaire, 945 questionnaires were sent to the selected subjects. As shown in Table 2, 19 predictors used in this study were as follows:
1.   Organizationally mediated (eight questions) variables such as communications, job-related stress and participation in decision-making.
2.   Interpersonally mediated (five questions) variables are job variety, and interpersonal relations.
3.   Internally or personality mediated (six questions) attributes are independence and achievement.

On the other hand, the criterion variables of value, job satisfaction and performance were measured by five, five and three questions, respectively. The questionnaire has two parts. In Part I, each question was answered using a 5 point-scale ranging from 1 (Of Very Little Importance: VLI) to 5 (Of Utmost Importance: UI). This questionnaire also contains three questions to evaluate self-productivity, self-performance, and self-effort of IS managers. The purpose of three self-reported-ratings in the questionnaire was to examine the predictive validity. In Part II, there were seven demographic questions such as number

Table 2: Measures Used in the Study.

Variables	Item Numbers in the Questionnaire	Sources
Predictor Variables:		
Organizationally Mediated:		Sekaran & Martin (1982)
Participating in decision-making	10, 11	White & Ruh (1973)
Communication	12	Price (1972)
Sound company policies	25, 27, 28	Kanungo & Wright (1983); Hofstede (1983)
Self-esteem from job setting	1	Quinn & Shepard (1974)
Job-related stress	15	Lyon (1971)
Interpersonally Mediated:		Sekaran and Martin (1982)
Job variety	26	Sims, Szilagyi, & Keller (1976)
Interpersonal relations	9, 13	Kanungo & Wright (1983)
Respect and independence	4, 22	Kanungo & Wright (1983)
Internally Mediated:		Sekaran & Martin (1982)
Responsibility and independence	2, 3, 5	Steers & Braunstein (1976)
Achievement	3, 7, 8	Steers & Braunstein (1976)
Criterion Variables:		Sekaran (1983)
Values	6, 13, 14, 17, 28	Hofstede (1980, 1984)
Job satisfaction (Pay, promotion, coworkers, supervisor, work)	13, 16, 21, 23, 24	Smith, Kendall, & Hulin (1969)
Performances (Self-rated performance)	18, 19, 20	Porter & Lawler (1968)

of years working in the organization and in the current position, sex, education, age, nationality, and total assets of bank. The seven demographic variables were used to measure the devotion of IS managers and loyalty toward their organization. In addition, Table 2 shows the relationships between the variables and their item numbers in the questionnaire with their sources in the literature.

Methodology of Data Analysis

The data analysis has purposes as follows: to evaluate the objectives in conjunction with the values, job satisfaction and performances of the groups of two national IS managers' activities; to evaluate and analyze the psychometric properties of the instrument; and to examine the adequacy for cross-cultural studies from those IS managers. Thus, this research followed three phases. In Phase 1 of descriptive statistics, Korean IS expatriate and American IS managers' values, job satisfaction and performances are measured by the 28 questions with a 5-point Likert scale, ranging from 1 (Of Very Little Importance: VLI) to 5 (Of Utmost Importance: UI). Since Montazemi (1988) argued that unweighted scores were validated as reliable results and highly correlated to weighted scores, the unweighted scores were used in this study. The IS managers' values were measured by eight questions of "organizationally mediated" variables. In addition, IS managers' values were measured using five questions of "interpersonally mediated" variables and six questions of "internally mediated" variables. Job satisfaction also used the same three groups of mediated variables. Finally, performance was measured based on effort, productivity, and performance. Those three criterion variables were measured by their own self-evaluated variables. This research then compares the results with those of the independent variables which support them for the two groups of national IS

managers. In Phase 2, the reliability and construct validity of the instrument were tested by utilizing Cronbach's α tests, Pearson's product-moment correlation coefficient analysis and factor analysis (Churchhill, 1979; Cohen, 1977; Cronbach, 1951). Content validity was tested through an exhaustive literature research to include representative questions for this research design. After developing the research instrument, it was pretested by 20 faculty and staff members to follow the suggestions made by Hunt, Sparkman, and Wilcox (1982). In addition to that, the instrument was corrected and edited according to the suggestions from the respondents of the pretest. The coefficient of reliability tells whether the instrument is consistent in what it does. The cut-off point of Cronbach's α ranges from 0.60 to 0.80 for this research analysis (Churchhill, 1979; Cohen, 1977; Cronbach, 1951; Ives & Olson, 1984; Nunnally, 1978). When the alpha is below the range of 0.60 to 0.80 out of 1.00, the corresponding item(s) was deleted from the instrument. After the Cronbach's α test, a factor analysis was tested with those items which are reliable variables. Coefficient of validity tells whether the instrument is doing what a researcher believed it was doing (Montazemi, 1988). In doing the construct validity, this research used the cut-off point at 0.45. For the content validity, internal consistency of the instrument would be tested by examining the inter-item correlations coefficient at 0.05 level (Doll & Torkzadeh, 1988; Doyle & Becker, 1983). In order to keep the variables in the questionnaire the instrument should have passed the basis based on the results of the validity and reliability tests. Montazemi (1988) also suggested that to measure the homogeneity of the questionnaire, calculate the correlation coefficients for each pair of scales for each factor. If the coefficients are significant at p-value > 0.0001 level, these coefficients indicate that the questionnaire is internally consistent. In addition, to measure the predictive validity or criterion-related validity of the questionnaire, three self-rated performance criterion variables were utilized.

In Phase 3 of regression analysis and ANOVA Test, this study also examined correlation of values, satisfaction and performance between the two national IS managers. The correlation coefficient of the variables that measure the values with the dependent variables was measured and the suggested cut-off point (Dunn, Norburn, & Birley, 1985) of each coefficient is equal to or greater than 0.3. For regression analysis, separate regression equations were used between each dependent variable (value, job satisfaction and performance) with the independent variables. All predictor variables were regressed without a predetermined order, thereby variables were included sequentially into the equation based on the respective contribution of each predictor to explained variance in the dependent variables. This regression procedure does not assume a definite causal ordering among the variables, and therefore would identify the most powerful independent variables of value, job satisfaction and performance. As a result, a stepwise regression was calculated and used to show the unique marginal contribution of criterion variables in terms of change in R^2. Besides, to measure criterion-related validity, cross-validated regression analysis procedures were employed. This technique was used to provide an average measure of the degree of association (R^2) between a set of predictor variables and the criterion measures within each culture. In addition, ANOVA analysis was conducted. Through the multivariate analysis of variance, dependent variables, job satisfaction and performances of the two national IS managers were analyzed. The differences and similarities based on the convergence hypothesis and divergence hypothesis were examined.

DATA ANALYSIS
Phase 1: Descriptive Statistics

Through the research survey, a total of 296 valid responses (usable response rate of 31.3%) were received from the sampled subjects, and were used for the data analysis. Twenty-eight variables with their abbreviations used in the research are in Tables 3 and 4. The 14 hypotheses used to test the objectives of the research aimed at measuring the cross-cultural influences on the IS managers' performances, job satisfaction and managerial values. Since the usable answers, 296, were larger than 30, according to the central limit theorem, the response distribution would be normal. Out of 236 American respondents, 63.6% were male, while out of 60 Korean IS expatriate managers, male response rate was 60%. In the education category, 28.3% respondents had a bachelor's degree in the U.S., while 20 out of 60 subjects had a bachelor's degree from Korea. In the age category, the majority of American IS managers were between 39 and 49 years old. On the other hand, the majority of Korean IS expatriate managers were between 29 and 39 years old. In the category of the total assets in the banks, 80.9% of American banks had over $50,000,000, whereas, 88.3% of Korean Banks were in that category. As shown in Tables 3 and 4, mean values of combined descriptive statistics for 28 variables of IS managers' value, job satisfaction and performance ranged from 2.97 to 4.52. Standard deviations (Std. Dev.) ranged from 0.56 to 1.05. Out of the mean value, "The feeling of achievement of your job performance (PERF)" for American IS managers was the variable that has the highest mean value with the next to the lowest standard deviation of 0.57, while the question item "The opportunity to develop close friendship (FRID)" has the lowest mean value. On the other hand, for the Korean IS expatriate managers, "The opportunity for personal growth and development (GROW)" was the variable that has the highest mean value, while the question item "The frequency of your expressing disagreement with supervisors (DISA)" has the lowest mean value with the lowest standard deviation of 0.72. These descriptive statistics are representing some differences between the two

Table 3: 28 Variables Used in the Research and Their Descriptive Statistics (Questions 1 - 14).

Question Item (Abbreviation)	America Data (n = 236)		Korea Data (n = 60)	
	Mean	Std.Dev.	Mean	Std.Dev.
1. The feeling of self-esteem (ESTM)	4.23	0.60	3.60	0.90
2. The authority connected with your job (AUTO)	3.82	0.78	3.74	0.87
3. The opportunity for personal growth and development (GROW)	4.18	0.71	3.93	0.92
4. The prestige of your job inside the firm (PRES)	3.77	0.74	3.59	0.77
5. The opportunity for independent thought and action (INDE)	4.32	0.64	3.84	0.94
6. The feeling of security (SECU)	4.01	0.77	3.47	0.82
7. The feeling of self-fulfillment (FULF)	4.21	0.63	3.57	0.84
8. The feeling of worthwhile accomplishment (ACCO)	4.35	0.58	3.64	0.89
9. The opportunity to give help to other people (HELP)	4.08	0.64	3.35	0.83
10. The opportunity for participating in the setting of goals (PART)	3.95	0.74	3.36	0.89
11. The opportunity for participation in the determination of method (METH)	3.92	0.65	3.31	0.90
12. The feeling of being informed (INFO)	4.27	0.68	3.28	0.93
13. The opportunity to develop close friendship (FRID)	3.03	0.88	3.17	0.88
14. The amount of time available for personal and family life (PERS)	3.98	0.86	3.21	0.93

Table 4: 28 Variables Used in the Research and Their Descriptive Statistics (Questions 15 - 28).

Question Item (Abbreviation)	America Data (n = 236)		Korea Data (n = 60)	
	Mean	Std.Dev.	Mean	Std.Dev.
15. The amount of tension or stress on the job (STRE)	3.59	0.88	3.17	0.92
16. The physical working conditions on the job (WORK)	3.43	0.80	3.09	0.73
17. The good working relationship with your supervisor (SUPE)	4.18	0.69	3.47	0.92
18. The feeling of quality of your job performance (PERF)	4.52	0.57	3.69	0.82
19. The feeling of achievement regarding your productivity on the job (PROD)	4.34	0.56	3.36	0.81
20. The amount of your effort you extend on the job (EFFO)	4.01	0.79	3.38	0.86
21. The frequency of your expressing disagreement with your supervisors (DISA)	3.14	0.83	2.97	0.72
22. The prestige of your job outside the company (OUTS)	3.23	0.87	3.35	0.78
23. The opportunity for higher earnings (EARN)	3.97	0.76	3.31	1.05
24. The opportunity for advancement to higher level jobs (ADVA)	3.78	0.86	3.57	1.04
25. The job definition (DEFI)	3.68	0.85	3.17	0.95
26. The amount of variety and adventure on the job (VARI)	3.74	0.79	3.09	0.80
27. The organization's rules (RULE)	3.55	0.76	3.19	9.76
28. The adaptation and diffusion of new information systems technology (TECH)	3.74	0.81	3.06	0.91

groups' characteristics. For the American IS managers, the mode for age is between 39 and 49 years and the average working years in the present position was about 7.5 years. On the other hand, the average age of Korean IS managers was 34 and the average work experience in that position was 3.5 years. That implies American IS managers' turn-over rate is smaller than that of Korean IS expatriate managers.

Phase 2: Reliability and Validity Test

As Kerlinger (1978) and Montazemi (1988) suggested, the reliability for each individual item in the questionnaire was calculated and the reliability coefficient for each item was above 0.80. Thus, this research instrument has proven to be reliable for further analysis without deleting any items from the questionnaire. Hair, Ghiselli, and Poter (1966) described that factor analysis can help to reveal the underlying dimensions which tend to be associated with the variables and to identify the grouping of variables which are most closely associated or aligned with those dimensions. Even though the two tables were not included, the correlations between pairs of 28 items showed that all the items were related statistically significant at a p-value < .05 level at almost all pairs of the variables in the instrument. Thus, the results have proven that this research instrument has internal consistency. Hair, Ghiselli, and Poter (1966) also explained that factor analysis based on multi-item scales is more reliable than measures based on the original individual items. As a result of that test, four factors were extracted for the American IS managers as significant factors as shown in Table 5. As a cut-off point of eigen value, only those factors with one or larger than one were extracted. For the America data, the underlying constructs of the factors are meaningfully labeled as Performance, Self-Actualization, Accomplishment, and Company-Policy; 43.84% of the total variance for America data was attributed to the four factors. On the other hand, Korea data showed

Table 5: Factor Statistics.

Factors*	America Data		Korea Data	
	Eigen Value	% of Variance	Eigen Value	% of Variance
Factor 1	6.612	23.61	10.816	38.63
Factor 2	2.344	8.37	2.468	8.81
Factor 3	1.762	6.29	2.213	7.90
Factor 4	1.558	5.56	1.629	5.82
Total		43.84		61.17

Factors*   Factor 1: Performance   Factor 3: Accomplishment
            Factor 2: Self-Actualization   Factor 4: Company-Policy

that with the four factors, 61.17% of the total variances was explained. Each eigen value is a summary index of how much of the variance in the initial correlation matrix is accounted for by the associated factor. Thus, in conclusion, these four underlying constructs represent those underlying factors very well. Hair, Ghiselli, and Poter (1966) and Kerlinger (1978) explained that an absolute value of 0.30 or above for the loading factor of the factor analysis is regarded as significant for this kind of the research. Even though those two tables were not included, all the loading of the items was greater than the level of the minimum standard of 0.30 at least on one factor. The calculated reliability measures both internal reliability and consistency when using the same instrument to measure similar constructs. Since all items were reliable, elimination of items was not a necessary step in the study. Construct validity means that a measure is a valid measure of a construct if it relates to other measures of this construct and to measures of different constructs in the expected manner. Kerlinger (1978) explained that factor analysis is the most important of construct validity tools. In the Item-Factor Correlations analysis, using Varimax Rotated Factor Loading, for America data, Factor 1 was loaded significantly in the variables such as ESTM, SUPE, PERF, PROD, EFFO, ACCO, PART and INFO. For the Factor 2, these variables such as RULE, HELP, FRID, PERS, STRE, WORK, DISA, and TECH were significantly loaded. For Factor 3, distinctly loaded variables were PRES, SECU, ADVA, DEFI, METH, OUTS, and EARN. For the Factor 4, the significantly loaded variables were included FULF, AUTO, GROW, INDE, and VARI. For Korea data, Factor 1 was loaded significantly by variables such as AUTO, PERS, STRE, WORK, PERF, DISA, EARN, and ADVA. Factor 2 was loaded significantly in the variables such as HELP, PART, METH, INFO, FRID, SUPE, PROD, EFFO, and VARI. Factor 3 was loaded significantly in the variables such as ESTM, GROW, PRES, INDE, SECU, FULF, and ACCO. Finally, for Factor 4, OUTS, DEFI, RULE, and TECH are the ones that were loaded significantly. Thus, the findings are validating the 28 variables as measures of four

distinct constructs for Korean IS and American IS managers. To measure the predictive validity or criterion-related validity of the questionnaire, the three self-rated performance criterion variables were utilized; the test result showed that correlation of each item was highly correlated to the self-rated items.

Phase 3: Regression Analysis and ANOVA Test

In this phase, a multiple regression procedure was utilized. This method generates an average measure of the degree of association (R^2) among the criterion variables, IS managers' managerial values, job satisfaction and performances, and predictor variables within and across the two cultures. It is assumed that there is no interaction and correlation among the predictor variables. In this analysis, three mediated variables (organizationally, interpersonally, and internally) were used to predict the three criterion variables shown in Table 2. The coefficients resulting from standardized data of the regression analysis are called beta coefficients. The beta coefficient reflects the impact on the criterion variable of a change of a standard deviation in 10 independent variables from the three mediated variables. Then, beta coefficients were used as the relative importance of 10 individual independent items of the three mediated variables in this study. Separate regression equations were used to analyze the relationship between each dependent variable of the three criterions (value, job satisfaction and performance) with independent variables. All predictor variables were included sequentially into the equation based on the respective contribution of each predictor to explained variance in the dependent variables. For this purpose, as shown in Tables 6 and 7, the stepwise regression analysis was tested, and then predictor variables that significantly contributed were identified. For America data, PRES, VARI, EARN, HELP, and ADVA variables in IS managers' managerial value criterion showed significant F-value at the level of 0.003 or above. For job satisfaction criterion, HELP, ACCO, RULE, AUTO, SUPE, and FRID showed significant F-value at the 0.004 level or above. For performance, related variables also showed a significant level of F-value at the 0.040 level or above. On the other hand, in the value criterion, VARI and EARN showed negative signs which means that those two variables of the value criterion are the opposite of what was expected from American IS managers. In the job satisfaction criterion, HELP, ACCO, and AUTO showed a strong positive impact on job satisfaction, which was an expected result in this study. In the performance criterion variables, PART, VARI and DEFI variables also indicated that

Table 6: Independent Variables that Entered and Stayed in the Stepwise Regression Analysis of Values, Job Satisfaction and Performance.

America Data (n = 236)											
Value				Job Satisfaction				Performance			
Variable	β Value	R^2 After Entry	Prob. > F	Variable	β Value	R^2 After Entry	Prob. > F	Variable	β Value	R^2 After Entry	Prob. > F
PRES	.1251	.0578	.0012	HELP	.2496	.1020	.0001	PART	-.1346	.0443	.1033
VARI	-.1453	.1251	.0031	ACCO	.1809	.1759	.0044	INFO	.2027	.1027	.0432
HELP	.2681	.2539	.0019	RULE	-.1247	.2157	.0037	VARI	-.1516	.1505	.0247
EARN	-.1087	.2984	.0006	AUTO	.1435	.2638	.0021	HELP	.2099	.2060	.0106
ADVA	.1134	.3286	.0006	SUPE	-.1442	.3002	.0016	DEFI	-.1578	.2556	.0052
				FRID	-.1552	.3349	.0012				

Table 7: Independent Variables that Entered and Stayed in the Stepwise Regression Analysis of Values, Job Satisfaction and Performance.

Korea Data (n = 60)											
Value				Job Satisfaction				Performance			
Variable	β Value	R^2 After Entry	Prob. > F	Variable	β Value	R^2 After Entry	Prob. > F	Variable	β Value	R^2 After Entry	Prob. > F
PRES	.1251	.0578	.0012	ADVA	-.1593	.0793	.0307	HELP	-.2296	.1160	.0089
VARI	.2143	.1481	.0122	PART	.1766	.1433	.0131	PRID	.1763	.1840	.0039
PRES	-.1773	.1907	.0092	HELP	-.1566	.1783	.0123				
DEFI	.1483	.2308	.0068	SUPE	.1525	.2113	.0110				
ADVA	-.1644	.0813	.0300	PROD	-.2176	.2463	.0088				
				DISA	.2233	.2908	.0050				
				PRES	-.1759	.3284	.0034				

American IS managers in the banks do not desire or value too detailed a description of job definition. On the other hand, the results showed that they strongly desire to have INFO, and HELP. In other words, American IS managers would value helping and having a close relationship among IS managers and IS workers in the organization. For Korean IS expatriate managers in the surveyed banks, variables such as VARI and DEFI showed strong impacts on the criterion variable, managerial value. Thus, IS managers would value more defined rules and policies in the organization and more variation in their job environment. For the job satisfaction, PART, SUPE, and DISA were the variables, which have positive indication on the dependent variable. These predictor variables are significant at the 0.01 level of significance. On the other hand, ADVA, HELP, PROD, and PRES variables showed negative impact on the job satisfaction of Korean IS expatriate managers. Interestingly enough, literature supported the same result (Cole, 1979) too. For the performance criterion, PRID and HELP showed a mixed result, which was not expected in this study. One explanation may be that Korean IS managers who work in a western country like the U.S. have been changing their values so that they are becoming more individualized compared with those IS managers in Korea. FRID has a strong positive indication on performance, which is not expected in Korean IS managers because this factor usually has shown in the femininity society rather than that of Korea. In comparison of the two countries for the value criterion, predictor variables entered into the regression analysis have shown very similar results. Through the multivariate analysis of variance (ANOVA) shown in Table 8, dependent variables, value, job satisfaction and performances of the groups of two national IS managers were analyzed. This analysis can identify statistically significant differences by comparing variances due to the treatment effect and the measure of chance errors of the two national IS managers' cultural influences on the value, job satisfaction and performances. This analysis attempted to show what are the differences and similarities based on the convergence hypothesis and divergence hypothesis in cross-cultural studies. Three independent variables describing the criterion variable of value for Korea data have very

Table 8: Variables Contributing to ANOVA on Value, Job Satisfaction, and Performance Criterion.

Korea Data (n = 60)			America Data (n = 236)		
Variables	R^2	Prob. > F	Variables	R^2	Prob. > F
Value:			Value:		
SECU	0.1498	0.0858	SECU	0.1878	0.0003
FRID	0.2356	0.0005	FRID	0.1398	0.0001
PERS	0.1503	0.0846	PERS	0.2812	0.0001
SUPE	0.3780	0.0001	SUPE	0.3128	0.0001
TECH	0.3249	0.0001	TECH	0.1190	0.0001
Job Satisfaction:			Job Satisfaction:		
WORK	0.2611	0.0030	WORK	0.0433	0.0168
DISA	0.3595	0.0001	DISA	0.0428	0.0178
EARN	0.2337	0.0074	EARN	0.1197	0.0001
ADVA	0.3808	0.0001	ADVA	0.2826	0.0001
Performance:			Performance:		
PERF	0.5616	0.0038	PERF	0.2866	0.0001
PROD	0.7614	0.0001	PROD	0.3278	0.0001
EFFO	0.5711	0.0028	EFFO	0.2948	0.0001

significant F-values at the level of 0.0005 or 0.0001. For America data, all independent variables of value criterion were very significant at the 0.0003 or 0.0001 level. In addition, for job satisfaction criterion, all five variables were very significant at the 0.0005 or above level for Korea data. On the other hand, for America data, three of five variables for job satisfaction for both the Korea and America data were very significant statistically. Table 9 presents the ANOVA test of three different levels of independent variables belonging to organizationally mediated, interpersonally mediated and internally mediated variables. As expected and supported in the literature (Boyd, Ralph, & Stanley, 1977), Korea data in the organizationally mediated variable were not significant statistically. On the other hand, America data showed that all the variables were very significant at the 0.001 of significance. For the internally mediated variables, those variables for both countries' IS managers were equally significant, except one variable INDE for Korean IS managers, which indicates that Korean IS managers were not concerned with, nor considered INDE to be an important factor in their organization.

FINDINGS AND DISCUSSIONS

As shown in Tables 10 and 11, the 14 hypotheses were tested in relation to the objectives of the research aimed at measuring the cross-cultural influences on the IS managers' performances, job satisfaction and values. One of the underlying constructs used in this study is the IS managers' managerial values related to a culture, since this study attempts to determine to what extent culture impacts on IS managers' attitude, value and behavior in their organizations (Alder, 1983b).

Table 9: Test of ANOVA on Variables of Organizationally, Interpersonally, and Internally Mediated.

Variables (Korea Data)	Prob. > F	Variables (America Data)	Prob. > F
Organizationally Mediated		**Organizationally Mediated**	
Participating in Decision-Making:		Participating in Decision-Making:	
PART	.0127	PART	.0001
METH	.0001	METH	.0001
Communication (INFO)	.0001	Communication (INFO)	.0001
Sound Company Policies:		Sound Company Policies:	
DEFI	.0117	DEFI	.0117
RULE	.0015	RULE	.0015
TECH	.0003	TECH	.0001
Self-Esteem from Job Setting	.0012	Self-Esteem from Job Setting	.0003
Job-Related Stress (STRE)	.0001	Job-Related Stress (STRE)	.0001
Interpersonally or Job Mediated		**Interpersonally or Job Mediated**	
Job Variety (VARI)	.0008	Job Variety (VARI)	.0001
Interpersonal Relation:		Interpersonal Relation:	
HELP	.0390	HELP	.0001
FRID	.6365	FRID	.0001
Respect and Recognition:		Respect and Recognition:	
PRES	.0001	PRES	.0001
OUTS	.0212	OUTS	.0001
Internally or Personally Mediated		**Internally or Personally Mediated**	
Responsibility and Independence:		Responsibility and Independence:	
AUTO		AUTO	
GROW	.0004	GROW	.0001
INDE	.0001	INDE	.0001
Achievement:	.1832	Achievement:	.0001
GROW		GROW	
FULF	.1832	FULF	.0001
ACCO	.0001	ACCO	.0001
	.0141		.0141

H$_1$:   The effects of organizational forms on IS managers' values, behaviors, and relations are culture-specific. One argument is that individuals are forced to adapt industrial attitudes and behaviors in order to follow with the imperative of industrialization. This is commonly known as convergence hypothesis and its validity has been debated against divergence hypothesis in the literature (England, 1967; England & Lee, 1974; Hofstede, 1980, 1984, 1983; Kelley, Whatley, & Worhley, 1987; Webber, 1969). In this research, the organizationally versus internally mediated variables were tested to support H$_1$. Child (1981) found there was convergence at the organizational related variables and divergence at the personal related variables. Whitley and England (1977) said that managers' managerial differences would be permanent as long as differences in culture exist. From Table 3, RULE, SECU, STRE, and TECH are good variables to examine this hypothesis (Hofstede, 1980, 1984, 1983). Thus, IS expatriate managers from Korea and American IS managers would display measurable differences in the values, relations, and behaviors in their organization. These behaviors and attitudes would be determined

Table 10: Relationships Between Hypotheses 1-7 and Variables in the Research Instrument.

Hypothesis	Variables	Researchers
H_1	Organizationally versus internally mediate	England & Lee (1974); Hofstede (1980, 1984); Kelly & Worthley (1987)
H_2	Testing value criterion variable	Kanungo & Wright (1983)
H_3	Organizationally versus internally mediated	McClelland (1961); Hofstede (1980, 1984)
H_4		England & Lee (1974)
H_5	Testing value variable	Lincoln & Gerald (1978)
H_6	Job satisfaction variable	Hair, Ghiselli, & Poter (1966); Hofstede (1980, 1984); Lincoln & Gerald (1978)
	Higher earning variable	
H_7	In addition to H1, interpersonally mediate	England & Lee (1974); Kanungo & Wright (1983); Lincoln & Gerald (1978)

culturally. As shown in Table 9, critical F-values between American IS managers and Korean IS expatriate managers' value systems is significant at 0.0001 levels. For American IS managers, organizationally, interpersonally and internally mediated variables were significant at 0.0001 levels. It was also the case for Korean IS managers at 0.0001 and 0.0004 levels. From Table 12, T-test for organizationally mediated variables was significant at that level too, but internally mediated variables were at the level of 0.0034. Thus, this hypothesis was supported by the data analysis. That is, the effects of organizational forms (types) on the two national IS managers' values, behaviors are culture specific.

Table 11: Relationships Between Hypotheses 8-14 and Variables in the Research Instrument.

H_8	Testing demographic variables such as age and tenure	Lincoln & Gerald (1978)
H_9	Testing friendship and tenure variables	Lincoln & Gerald (1978); Edwards (1979)
H_{10}	Testing friendship, higher earning, advancement and disagreement with supervisors	England & Lee (1974); Lincoln & Gerald (1978)
H_{11}	Participation, job satisfaction, and determining methods	Hofstede (1980, 1984); Lincoln & Gerald (1978)
H_{12}	Testing value variables	Hofstede (1980, 1984)
H_{13}	Testing technology variables	Crowley, Levitin, & Quinn (1973); Herzberg, Mausner, Peterson, & Capwell (1957, 1959); Hofstede (1980, 1984)
H_{14}	Disagreement with supervisors, variety and adventure on the job and adaptation of new technology	Hofstede (1980, 1984); Triandis (1971, 1989)

Table 12: T-Test for Predictor and Criterion Variables.

Variable	Sheff's Test	Prob>T**	Prob>F
Organizationally Mediated	7.436*	0.0000	0.0623
Interpersonally Mediated	4.627*	0.0000	0.0007
Internally Mediated	6.194*	0.0034	0.8166
Values	n.a.	0.0000	0.0310
Job Satisfaction	n.a.	0.0660	0.0742
Performance	n.a.	0.0000	0.0173

Note: * Significance level at .05
      ** Cochran's T-test

H₂: Cross-cultural influences between the groups of two national IS managers studied lead to measurable differences in their cognitive value systems pertaining to job satisfaction and performances. The job satisfaction and performances of IS managers refer to the orientations and values the two national managers hold with respect to the various job outcomes.   The orientations and values are culturally determined. Thus, American IS managers and Korean IS expatriate managers may have different levels of cognitive value expectation on what the job offers to them and may, as a result, be motivated differently on the job. From Table 8, job satisfaction variables, WORK, DISA, EARN, and ADVA were tested against the values of the two national IS managers. The value variable was very significant at the level of 0.0001. Therefore, the job satisfaction factors are not considered very closely related with the value systems of the two societies. For Korean managers, there were 16 managers who did not regard those values as that important in their organization. From Table 8, in ANOVA test, F-value was not significant at all and there were non-linear relationships between the two criterion variables, job satisfaction and performance. On the other hand are those IS managers who responded that the values are important in their organization, as indicated by F-value which was very significant at 0.0001. In value systems pertaining to performances for the American IS managers, the statistics was very significant at 0.0001 levels. On the contrary, for those IS managers whether they valued value system is important or not, the test results showed that the value pertaining to performance was not significant at all. From Table 12, Scheffe's test also showed that the two national IS managers are quite different in their performance. As literature supported (Haire, Ghiselli, & Poter, 1966; Kanungo & Wright, 1983), American IS managers regarded value system pertaining to job satisfaction and performance as very important as opposed to that of Korean IS managers. Using the correlations from the test results of value variables and self-rated performance variables, the hypothesis was supported.

H₃: American IS managers place greater emphasis on intrinsic job factors than Korean counterparts, whereas Korean IS managers place relatively more importance on extrinsic job factors such as working conditions and fringe benefits.

American IS managers have the protestant ethic which places high value on work for its own sake. American IS managers viewed work as a central part of their life and as a major vehicle for realizing their self-actualization. Thus, intrinsic job outcomes such as autonomy, independence and achievement were valued highly. Korean IS expatriate managers are traditionally motivated by a more authoritarian family and educational system with emphasis on a Confucianism ethic (Lincoln & Gerald, 1978). Such a background traditionally de-emphasizes work ethic (Hofstede, 1980, 1984, 1983) and places more emphasis on family. Korean IS expatriate managers are expected to put more emphasis on the importance of extrinsic job outcomes. As shown in Table 3, for Korean IS expatriate managers', mean value of internally mediated variables was lower than that of Americans. For interpersonally mediated variables, the mean value between American and Korean IS managers was not significant. However, for organizationally mediated variables in Table 12, T-test between the two groups was significant at the 0.0000 level. Using those predictor variables for testing H_3 resulted in the positive. Therefore, the groups of two IS managers place greater emphasis on either intrinsic or extrinsic job factors.

H_4:   Korean IS expatriate managers have job value profiles that are different from those of the American IS managers. Job profiles of IS managers would be determined by the orientations and values the groups of two national managers hold with respect to the various job outcomes. As mentioned in H2, Korean IS expatriate managers are traditionally influenced by Confucianism. Thus, they are expected to keep obedience to authority and to group to achieve the obligation (England & Lee, 1974). They also explained that Korean managers place higher importance on the organizationally and interpersonally mediated extrinsic job outcomes rather than those of intrinsic values. Using the ANOVA test shown in Table 8, with value variables, SECU, PERS, SUPE, FRID, TECH, the significance level was 0.0001 or 0.005 levels except for SECU, and PERS for America data. Two different empirical articles supported that the hypothesized value profiles that are different between the two national IS managers in the literature (Hofstede, 1980, 1984, 1983). From Table 9, value system of American IS managers by using organizationally mediated variables, ESTM, PART, METH, INFO, STRE, DEFI, RULE, and TECH, was very significant (0.0001) in its ANOVA test. The statistics also showed that value and the organizationally mediated variables have positive linear relationship between them. The finding implies that IS managers increase their values toward the organization when they have sound company policy, self-esteem from job setting and less job stress or relief from it. For American IS managers, value and interpersonally mediated variables showed the same result as that of the organizationally mediated variables. The interpersonal variables are statistically significant at the 0.0001 level of significance. Thus, this hypothesis was also supported.

H_5:   American IS managers working for companies viewed as prestigious have greater job satisfaction than those working for less prestigious companies. The prestige of the company was measured with OUTS and PRES. The two variables were significant at the level of 0.0001 for both Korean and American IS managers. However, American IS managers showed higher scores on the prestige expressed inside the company. On the other hand, Korean IS expatriate managers showed

higher scores on the prestige of the company outside. When testing the correlation between the prestige variables, and the satisfaction variables, the correlation was significant at the 0.0001 level except with FRID with PRES at the 0.0100 level and ADVA with OUTS at 0.0600 level. On the other hand, for Korean IS managers, only ADVA and DISA with PRES, OUTS at 0.05 and 0.0002 respectively were significant. Thus, the results support the hypothesis. So does the literature (Lincoln & Gerald, 1978).

H_6:   Korean IS managers have greater satisfaction when a bonus is paid for extraordinary performance. Kanungo and Wright (1983) explained that this hypothesis examined variables related to extrinsic versus intrinsic job outcomes. In Table 3, for American IS managers, mean value of EARN (3.97) was correlated with satisfaction variables, and the results were significant at the level of 0.0001. On the other hand, for Korean IS expatriate mangers, the mean (3.36) of EARN variable showed the correlation with satisfaction variables, and the statistics are: FRID (0.07), WORK (0.0004), DISA (0.0005), and ADVA (0.0001). When EARN was examined with the performance variables, the results were: PERF (0.003), EFFO (0.002), and PROD (0.14). On the other hand, for Korea data, when EARN was examined with the performance variables, the results were: PERF (0.003), EFFO (0.002), and PROD (0.14).   Thus the results do not support the hypothesis.

H_7:   Korean IS expatriate managers use a greater percentage of their free time for job-related activities than American IS managers. Korean IS expatriate managers would make use of their free time for job-related activities because of their integrity and loyalty to their organization in comparison to American IS managers (Hofstede, 1980, 1984). Kanungo and Wright (1983) explained that intrinsically oriented managers would work for achievement at work and are more likely to work in job-related activities in their free time. Thus, it is expected that Korean IS expatriate managers would regard this hypothesis as more important than American IS managers. There was a substantial mean value difference and F-value was very significant at .0001 levels. H_7 tested the use of Korean IS expatriate managers' free time for job-related activities for integrity and loyalty to their organizations. As a result, the data analysis supported this hypothesis.

H_8:   Korean IS managers are more likely than American IS managers to exhibit a paternalistic value orientation toward the organization for which they work. Hofstede (1980, 1984) also found that American IS managers have a high individualistic and small power distance. On the other hand, Korean IS expatriate managers have larger power distance and lower individualistic. Power distance variable, DISA, was positively related with the formal education, EDUC. As shown in Tables 13 and 14, for Korean IS expatriate managers, number of years in service with organizationally mediated variables and value criterion was very significant. On the other hand, for American IS managers, education with interpersonally mediated and job satisfaction criterion was very significant. Thus, testing greater paternalistic values of Korean IS managers toward their organization using individualistic variables supported the hypothesis.

H_9:   Korean IS expatriate managers are more integrated in a network of personal affective relationships with co-managers than American IS managers. Edwards (1979) explained that Korean and American managers differ in relation to their personal ties

Table 13: F-Value and Significance of Effects: Korea Data.

	Question	Age	Gender	Position	Education	Year
Organizationally Mediated Variables:	ESTM	25.83***	2.58*	0.97	0.77	6.61***
	METH	15.11***	1.35	2.05	0.71	16.27***
	INFO	15.49***	0.18	0.92	0.76	12.29***
	STRE	14.77***	0.55	0.25	0.69	6.40***
	DEFI	21.10***	1.64	0.16	1.16	6.15***
	RULE	10.79***	0.53	1.37	1.22	7.93***
Interpersonally Mediated Variables:	AUTO	1.90	1.04	0.31	0.70	0.41
	HELP	1.58	2.84*	1.43	1.34	2.10
	FRID	.061	2.36	1.02	0.60	0.53
	PRES	1.56	2.23	0.93	2.33	2.40
	OUTS	1.74	0.89	0.73	0.74	0.75
	VARI	1.43	0.88	0.30	0.47	2.10
Personally Mediated Variables:	GROW	3.26**	2.09	0.88	0.47	1.05
	INDE	0.97	0.86	0.91	1.01	1.02
	FULF	1.14	1.73	0.90	1.49	0.86
	ACCO	0.76	0.46	1.03	1.11	1.97
Criterion Variables: Value	SECU	1.72	1.34	0.98	1.42	4.11***
	FRID	0.64	2.50	1.10	0.50	0.90
	PERS	1.06	0.62	0.27	0.50	3.97***
	SUPE		4.15**	0.99	1.13	8.91***
	TECH	1.24	0.90	0.69	0.79	4.30***
Criterion Variables: Job Satisfaction	WORK	0.03	0.12	0.97	0.27	1.53
	DISA	1.72	1.36	1.51	0.28	1.97
	EARN	0.79	1.26	0.10	0.15	0.84
	ADVA	0.36	1.38	0.13	1.29	1.05
Criterion Variables: Performance	PERF	.2.14	1.57	0.52	1.34	1.82
	PROD	4.21**	1.06	0.51	0.73	4.39***
	EFFO	0.86	0.40	0.53	0.10	2.27

Significance level: *** $p < .001$ level   ** $p < .01$ level   * $p < .05$ level

with co-workers. For Korean IS managers the work relationships between superiors and subordinates would carry over into personal and family relationships which one would hardly find in American co-workers. For Korean IS managers the work relationships between supervisors and subordinates enable them to have personal and family relationships, which one would hardly find in American coworkers. The variables SUPE (0.0001) and FRID (0.29) were examined. The mean values also were different: Korean IS managers have 3.15 while that of American IS managers was 3.01. As a result, one can conclude that the hypothesis was supported by the finding.

H_{10}: American IS managers experience a generally higher level of job satisfaction than Korean expatriate IS managers. The protestant ethic would place more emphasis on striving for more than is currently possessed. On the other hand, Confucianism

Table 14: F-Value and Significance of Effects: America Data.

	Question	Age	Gender	Position	Education	Year
Organizationally Mediated Variables:	ESTM	1.60	0.65	2.53*	1.48	0.13
	METH	1.41	1.62	0.24	0.26	1.06
	INFO	0.44	2.50	1.06	1.46	2.10
	STRE	0.35	2.65*	2.10	3.09*	0.63
	DEFI	1.17	1.05	1.28	2.26	0.39
	RULE	0.65	2.59*	0.88	0.80	2.07
Interpersonally Mediated Variables:	AUTO	2.25	0.53		1.27	1.78
	HELP	0.64	1.15	1.82	3.70**	0.64
	FRID	2.35	1.40	2.72*	4.96***	0.97
	PRES	1.25	0.62	2.72*	0.22	1.59
	OUTS	2.29	0.56	1.93	1.11	0.78
	VARI	0.33	0.90	0.40	0.56	0.68
Personally Mediated Variables:	GROW	1.31	0.99	0.60	1.99	0.60
	INDE	1.89	0.61	0.59	2.32	1.42
	FULF	4.92**	2.24	0.34	1.08	3.66**
	ACCO	0.74	2.04	1.30	1.88	1.63
Criterion Variables: Value	SECU	3.28**	4.48**	0.92	2.33	0.15
	FRID	2.36	1.18	2.42*	4.80**	0.90
	PERS	0.24	1.23	0.83	0.62	1.28
	SUPE	0.86	2.58*	1.40	1.90	0.81
	TECH	1.25	2.63*	1.87	2.13	1.01
Criterion Variables: Job Satisfaction	WORK	0.09	4.05*	2.51	6.92***	0.51
	DISA	0.67	0.94	0.25	2.82*	1.35
	EARN	1.17	1.71	0.27	1.38	1.50
	ADVA	3.36**	1.92	0.85	0.16	1.40
Criterion Variables: Performance	PERF	0.84	1.53	0.04	2.47	0.11
	PROD	1.77	0.85	2.31	0.71	0.07
	EFFO	2.72*	1.92	0.42	2.51*	0.9

Significance level: *** p < .001 level   ** p < .01 level   * p < .05 level

would emphasize contentment with what one has now. This would likely provide a higher level of job satisfaction (Kerlinger, 1978). Level of overall satisfaction of IS managers is positively related to the uncertainty avoidance. Their correlation was very strong at a significance level of 0.0001. Motivation for Korean IS managers traditionally comes by personal and individual security. This can be found in wealth and especially in hard work. On the other hand, American IS managers are motivated by individual success, in the form of wealth, recognition and self-actualization. Mean values were significantly different as shown in Table 3. Thus testing of the hypothesis was supported by the data analysis.

H_{11}:   Korean IS expatriate managers are less satisfied with their organizational involve-ment than American IS managers. Korean IS managers would likely be less satisfied

with their jobs than American IS managers. Strong work values raise expectations and thereby the worker is less satisfied with the existing level of reward (Cole, 1979; Lincoln & Gerald, 1978). The gap between expectation and achievement accounts for relative dissatisfaction. Using a T-test and the ANOVA test, testing organizational involvement in relations to job satisfaction was positive. Thus, the hypothesis was supported by the result.

H_{12}: IS managers with different cultural backgrounds acquire different expectations regarding work organizations. For American IS managers, for ANOVA test, criterion variables were tested against the organizationally mediated variables. All the variables were significant at the 0.0001 level. For Korean IS managers, for ANOVA test, criterion variables tested against the organizationally mediated variables were tested against the organizationally mediated variables. All the variables were significant at 0.0001 level too. Therefore, this hypothesis was supported. In addition, this hypothesis was supported in the literature (Haire, Ghiselli, & Poter, 1966; Hofstede, 1980, 1984).

H_{13}: Masculine cultures are more effective than feminine cultures in absorbing and diffusing imported IS technology in organizational contexts. Masculine societies' cultural values in more traditional societies sets a limit to the technology transfer possibilities compared to that of feminine societies. Crowley (1973), Herzberg (1957; 1959) and Hofstede (1980, 1984) explained that there are sex differences in work goals. Masculine cultures emphasize advancement, training, up-to-datedness and working on problems central to the organization. On the other hand, feminine cultures emphasize friendly atmosphere, position security, physical conditions, cooperation and co-worker relations. Korean society is more feminine, and American society is masculine (Manhardt, 1972). Herzberg (1957; 1959), Crowley, Levitin, and Quinn (1973), and Manhardt (1972) argued that more important for masculine culture were advancement and earnings. On the other hand, for feminine culture, freedom, coworkers, clearly defined responsibilities, working hours and working conditions, and ample leisure time were important variables. Testing the effectiveness of diffusing and absorbing IS technology in masculine and feminine culture was supportive. Thus, the test from ANOVA and T-test supported the hypothesis.

H_{14}: Organizations located in individualistic cultures are more successful than organizations located in collectivistic cultures in their propensity to absorb and diffuse imported IS technology. Technologies developed in American individualist settings assume an individualist mentality in IS managers and workers (Hofstede, 1980, 1984, 1983; Triandis, 1971, 1989). On the other hand, the collectivist value pattern in more traditional societies sets a limit on the technology transfer possibilities. To test this hypothesis, the mean value of variable TECH was used: 3.73 and 3.09 for Korean and American IS managers respectively. The variable TECH was significant at 0.0001 levels. Also the variables deciding masculinity such as VARI (0.0001), DEFI (0.0001) except for DISA were significant statistically. The result implies that Korean society or Korean IS managers are low in individualistic settings. On the other hand, American IS managers were high in their individualism as expected through the literature (Hofstede, 1980, 1984; Hofstede, 1983). As a result, the data analysis supported the hypothesis.

CONCLUSION

This study was supported in the addressed hypotheses except for hypothesis six by the findings of the data analysis and by previous researchers in the cross-cultural studies. Few topics have received special attention from IS professionals and practicing managers in the people management, especially for cross-cultural related areas. Thus, this research as indicated by Bonini and Adams (1991) and Desanctis and McBride (1986) has attempted to examine and interpret information systems managers' behaviors and attitudes pertaining to the values, job satisfaction and performances between American IS managers and Korean IS expatriate managers who work in the banking industry located in the American territory. For a pretest, the questionnaires were sent to those selected IS managers including data processing managers, and check processing managers in the banking organizations. The valid response rate was 32.3%. For examining those goals and objectives of the study, fourteen hypotheses were developed through the literature research and the hypotheses were tested using the questionnaire of 35 question items. As a research methodology, this research used production moment correlation analysis, factor analysis, regression and ANOVA. For the purpose of examining the reliability and validity of the test instrument, those validity and reliability tests were conducted. Special attention was paid to the point of whether or not Korean IS expatriate managers would change their value system so that they could affect the job satisfaction and their performances in their organization.

Generally speaking, Korean IS expatriate managers still hold their inherited value systems during their overseas assignment. However, there were not many differences from the previous studies done by Child (1981) and other researchers (Hofstede, 1980, 1984; Hofstede, 1983; England, 1967; Haire, Ghiselli, & Poter, 1966). It implies that a further study would be good by adding American IS managers who work in Korea and Korean IS managers who currently work in Korea to the current data. Thus, for the next test, the sample subjects may be drawn from American and Korean computer manufacturing industries located in America and Korea. This study implies that divergence hypothesis in an organization is identified through the research. In addition to this, since some former communist countries in Europe are experiencing difficulties in their economies, it seems an opportune time that the findings of the study of the cross-cultural influences on IS managers be applied to those IS managers in eastern European countries. From a practical standpoint, an organization should organize and design its structure specifically depending on the cultures of IS managers so that it can improve IS managers' performance, values and job satisfaction through a proper channel of communications, relationships between subordinates and superiors, working conditions, and adequate intrinsic and extrinsic rewards and benefits. As findings have suggested, IS managers' behaviors and attitudes in an organization are determined by their specific cultures. IS managers' involvement in their organizations was identified as one of the important factors for improving their job satisfaction which may improve their performances. An international management of an organization should consider an IS manager's cultural background when the organization provides benefits whether it should be an intrinsic or extrinsic one.

Even though, Korean IS expatriate managers were raised and educated in more collectivistic and traditional settings; they indicated that they are very eager to diffuse and absorb the new IS technology. The result may explain the rapid development of

Korean economic structures during the last three or four decades and explain the relatively affluent living conditions they currently have.

As a group of Korean IS expatriate managers, they are adapting their indispensable factors for their organization, but they still keep values inherited from their own cultures and educations. Therefore, this value systems should be applied into an organizational policy in order to maximize IS expatriate managers' job satisfaction and performances as well.

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Chapter IX

STP Technology and Global Financial Market:
An Assessment Framework and a Case Study

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ABSTRACT

Straight Through Processing (STP) is the end-to-end automation of security trading process from order to settlement. It is to be used for cross-border trades to speed up settlement, reduce risk, and build the foundation for a more effective and efficient settlement process. To remain competitive, financial firms need to take actions promptly to address the opportunities and challenges brought about by STP from a global perspective of electronic business. Global STP capability may not be achieved by simply initiating a series of projects to address the challenges. It needs to be approached by a well-orchestrated re-engineering activity and enterprise-wide technology solutions. This paper presents a general model of security trading processes under the umbrella of STP, and proposes a framework of STP readiness assessment from a global perspective of electronic business, which can be used to guide the STP implementation in organizations.

INTRODUCTION

With rising trading volumes in domestic and cross-border security transactions, risks faced by global financial firms and markets are increasing. To manage settlement risks and remain competitive in global financial markets, US Security and Exchange Commission (SEC) has decided to shorten the settlement cycle of security transactions from the current T+3 to T+1 by June 2005. As a result, key players in financial markets will need to develop capabilities to cope with challenges arising from this impending change. One initiative for addressing the issue is referred to in the securities industry as Straight Through Processing (STP). Little research has been conducted on STP so far. STP provides a nonstop flow of information from trade execution to settlement. It is to be used for cross-border trades to speed up settlement, reduce risk, and facilitate the move toward T+1. To remain competitive, financial firms need to take actions promptly to address the opportunities and challenges brought about by STP from a global perspective of electronic business (Guerra, 2003). However, global STP capability may not be achieved by simply initiating a series of projects to address the challenges. It needs to be approached by a well-orchestrated re-engineering activity and enterprise-wide technology solutions (McKenzie, 2003). This paper presents a general model of security trading processes under the umbrella of STP, and proposes a framework of STP readiness assessment from a global perspective of electronic business, which can be used to guide the STP implementation in organizations.

CHALLENGES TO
GLOBAL FINANCIAL MARKETS

The financial services sector is undergoing rapid changes on a global basis. The NYSE reported an increase from US $382 billion (13,015,000 trades) in 1980 to US $11.2 trillion (221,040,000 trades) in 2000. Global equity markets are also growing at a fast speed, with the number of global security trades doubling every three years. Whereas in the US the volume of equity transactions has increased 17 times since 1980, 20% of these transactions were related to cross-border trades (Baker, 2001). Financial markets in other countries are, by no means, isolated from the developments in the major global markets. For example, reported in its 2001 fact book, the Australian stock market has achieved an average daily trade volume of 58,718 trades valued at US $1.55 billion and is expected to show continued growth from local as well as global institutional and retail players.

Percentage-wise, current estimates of online cross-border security trading volume are only in the 5-7% range and predominantly by sell-side users; yet online systems will continue to increase in importance as additional buy-side institutions overcome their hesitation and recognize the benefits of Straight Through Processing (STP) and order execution (Platt, 2001). Platt predicts that 10-15% of buy-side clients will be using online systems within the next 12 to 18 months and the growth trend will continue with no ceiling. "The ability to process cross-border security trades efficiently, with minimum manual intervention and fewer mistakes, not only supports larger foreign exchange institutions, but also allows smaller volume institutions to compete in a lower spread environment," (Platt, 2001, p. 18). Though they present tremendous opportunities and potential, cross-

border security trades also bring about problems and challenges to financial institutions (Adams, 2003).

In the United States

As far as end investors such as pension funds, mutual funds, and corporations are concerned, today's cross-border, post-trade securities processing environment increasingly represents poor value and dead weight on performance. Intermediary firms, such as investment managers, brokers, custodians, and clearers suffer from high fixed costs in the form of incompatible databases and manual procedures (Kirby, 1999). With every prospect of cross-border security flows doubling every two or three years, there is a significant and growing level of risk exposure that needs to be managed. There are also significant inefficiencies in cross-border transactions across firms, as 70% of such transactions are currently performed using manually intensive methods. This has led to a failure rate as high as 15-20%, and caused delays in 60% of such trades. These failures are caused by data re-entry, lack of standards, delays, handovers, frequent manual intervention, and other breaks in the security transaction workflow. As a consequence, 40% of fund managers' back office cost may be attributed to reconciling these transactions. While cross-border transactions are more exposed to settlement risks and inefficiency, domestic transactions are not exempt from them. According to the securities industry association, under the current T+3 settlement cycle, approximately US $1.8 trillion worth of trades remain outstanding everyday. There is a growing consensus on the need to increase productivity and efficiency by reducing operational costs, mitigating risks to participants, and eliminating volume sensitivity to enable the business to grow (Kirby, 1999).

As an effort to reduce transaction failure and operational cost, the US security industry plans to move from T+3 to T+1 settlement cycle in mid-2005, followed by one year of processing and testing period. The T+1 effort, however, presents the security industry with one of the biggest challenges, the challenge of having to create a global network that processes millions of transaction instantly, that must interface with thousands of companies, and that cannot afford to crash (Hoffman, 1999). The T+1 effort will require security industry players to completely re-engineer a significant portion of their trading processes as well as their underlying infrastructures. Trade groups such as the Securities Industry Association have already begun forming working groups of different firms to brainstorm how to attack these issues.

One initiative that would help support T+1 is referred to in the industry as Straight Through Processing (STP), which is proposed to be used for cross-border trades to speed up settlement, reduce risk, facilitate the US' move toward T+1 (Massaro, 1999) and improve transaction efficiency. A group called the Global Straight Through Processing Association (GSTPA), which is made up of 40 firms, plans to build a global network to promote the more efficient flow of information to brokerages, custodians, and other firms involved in cross-border trade processing. Streamlining the information flows will reduce the number of failed cross-border trades by opening up connectivity among participants involved in post-trade, pre-settlement securities processing. According to GSTPA, a reduction in processing time would reduce US $280 billion daily from being exposed to operational risks in the US Achieving the goals of the more specific STP initiatives will be one of the top trends in investment-management technology for a few years to come.

Figure 1: Trading Processes and Participation Parties Under STP Umbrella.
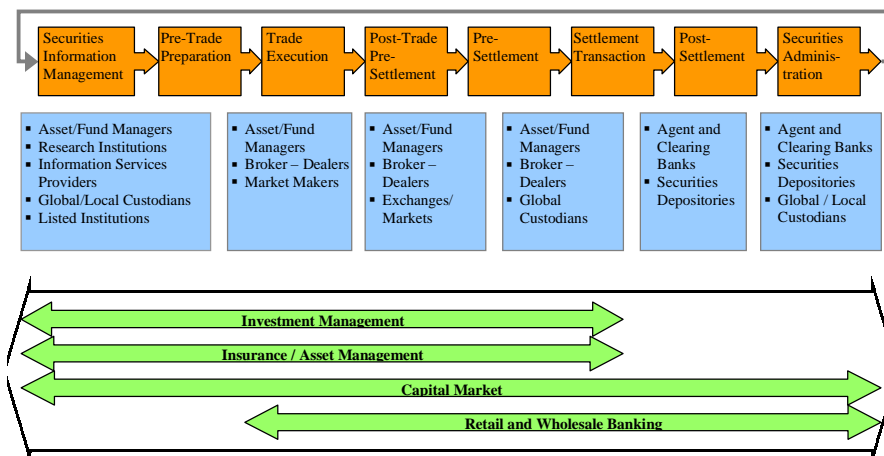
In Other Countries

In other countries outside the US, such as in Australia, the pressure is mounting in the same magnitude. With rising trade volumes and cross-border security transactions, key players in the Australian financial markets will need to develop capabilities to cope with challenges. Based on a case study by KPMG Consulting, in Australian financial institutions, about a third of the total failures[1] in the business process across banking, insurance, capital markets, and investment management sectors may be related to the lack of STP. While a significant number of breaks in business processes have been solved through various initiatives such as process re-engineering and cost reduction, a broader assessment of STP readiness needs to be carried out to precisely identify potential STP "hotspots" in the processes. These failures (hotspots) arise because of the complexity of the interactions among brokers, manufacturers, banks, custodians, financial consultants, and other third parties. These "end-to-end" business processes are highly fragmented and frequently require manual intervention, handling and dealing with system incompatibilities. According to Elliot and Briers (2001), in the financial industry, the "state of integration between a bank's internal systems is a real issue. Banks lacking the capacity for STP recognize the need to build that capability."

Likewise, many Southeast Asian countries are currently at T+3 and undergoing movements toward STP. In the case of Malaysia, after the consolidation of the banking industry, new banks launch to automate and to re-engineer their processes to achieve STP. Financial institutions are in the process of adopting new systems to enhance data management, to integrate data and business processes, and to manage transactions across their entire life cycle (Alok, 2002).

STP AS ONE POSSIBLE SOLUTION

STP is defined as the end-to-end automation of security trading process from order to settlement (Hee & Huang, 2002; Anonymous, 2001). It involves the seamless, automated electronic transfer of trade information to all parties in as close to real-time as possible. It also involves moving electronically through a trading process from initiation through post-execution and final settlement without manual intervention. It aims to achieve:

- No re-keying of information once the transaction has entered the workflow;
- Automatic linkages and paperless processing from front-end to back-end, regardless of the parties involved or their geographic location;
- Workflow automation to facilitate transaction monitoring and exception alerts;
- Manual intervention or data processing only on an exceptional basis.

Properly implemented, STP can increase efficiencies, improve customer services, and reduce operational costs and risks. Figure 1 depicts the security trading processes as well as the participating parties that are under the umbrella of STP.

A Theoretical Framework for STP

STP may be implemented in different levels. *Intra-STP* refers to STP implementation inside an organization and all of its branches. *Extra-STP* refers to STP between firms that allows direct access into other companies' internal processes and facilitates an industry-wide integrated straight through process. *Global-STP* refers to a set of interconnected extra-STPs that cover worldwide boundaries. It represents the level of integration of core processes, systems, and information interchange within firms, between firms, and between industries. As the implementation of STP expands, cost reduction effect escalates.

Financial firms are moving to integrated connections for direct interactions/transactions with customers, partners and suppliers. All concerned parties need to work with the same data and information. Recent usage has defined different stages of interconnection between firms, such as intranet, extranet or Internet. The term "intranet" refers to a Web-based private network. An intranet facilitates dissemination of company information within the boundaries of the company and its sub-organizations. An "extranet" is a group of intranets that connects companies with suppliers or other business partners. An extranet facilitates information sharing across the companies. The Internet is an open system which allows interconnectivity across all sectors of industry. Taking into consideration the distinction between internal processes (within a firm and its subsidiaries) and external processes (with other trading partners or customers' processes), and the integration level as well as connectivity between the two types of processes, we can propose a theoretical framework for STP (illustrated in Figure 2).

The proposed theoretical framework includes "intra-STP", "extra-STP", and "full-STP". Intra-STP refers to STP implementation inside the organization and all of its branches. Extra-STP refers to STP between firms, which allows direct access into other companies' internal processes, and facilitates an industry-wide integrated straight

Figure 2: A Theoretical Framework for STP.
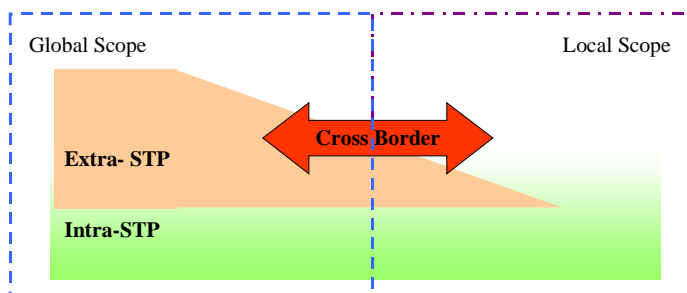
through process. Full-STP (a special and highest level of Global Extra-STP) refers to a set of interconnected extra-STPs that covers worldwide boundaries. It represents the level of integration of core processes, systems and information interchange within firms, between firms, and between industries. It is the largest and most complicated integration of STP.

There needs to be a distinction made between local and global boundaries for extra-STP and/or full-STP capabilities. To some extent, local boundaries can place limitations on the capabilities of STP. For example, in Australia, the SEATS system (an Australia security settling system) allows only nationally originated access into the system. An overseas transaction has to relay to a local processing centre to be able to initiate the transaction.

In an ideal or full-STP-enabled global environment, such restrictions should be reviewed to facilitate worldwide transaction at any time. According to GSTPA, a globalized (full)-STP solution will be a multilateral interconnectivity to establish an environment for Investment Managers, Brokers/Dealers, and Global Custodians to inter-operate in the process of trade enrichment and matching. It is obvious that STP in a global scope requires international standard protocols, substantial network backbone and comprehensive cooperation among all participants in the global system.

A Brief History

The Industry Standardization for Institutional Trade Communications (ISITC) was set up in 1992, focusing on standardizing the links and the format of trade settlement instructions and other messages among fund managers and custodians. The Financial Information Exchange (FIX) was also formed in 1992 to deal with pre-trade and trade communications among counterparties. FIX's objective is *"to improve the global trading process by defining, managing, and promoting an open protocol for real-time, electronic communication between industry participants, while complementing indus-try standards"* (Greensted, 2001). In 1999, a key new standard to facilitate STP implementation became available. The ISO 15022 standard permits migration of the securities industry to a standardized use of XML, guaranteeing interoperability across the industry and others. Each country or region will adapt its message formats to suit

its own particular requirements. One of the first initiatives taken by Fidelity Investment in establishing the Electronic Trade Confirmation (ETC) facility was to provide electronic post-trade communications among fund managers and brokers. The availability of quasi-industry message standards such as ISITC, FIX, and ISO 15022 has enabled this seamless automated trade processing.

Emerging Standards

Intra-STP, extra-STP and full-STP do not imply simple interconnectivity among different parties in the market. STP, like any electronic communication arrangement, comprises multiple layers that need to be standardized and agreed upon to facilitate true STP in a global environment. Currently, the two major central matching approaches to STP are the GSTPA and OMGEO models. Both entities have significant market presence and are important in the move toward T+1, and both also support the emerging standards. A brief outline of these two entities is presented.

There are some major differences between the OMGEO and GSTPA models. The GSTPA approach is not intended to support existing domestic market infrastructures and

Table 1

	OMGEO	GSTPA
History	Joint venture between TradeSuite of the Depository Trust & Clearing Corporation (DTCC) with Thomson Financial ESG, a division of Thomson Financial in 2000	Founded in August 1998, the GSTPA is an industry association open to all Investment Managers, Brokers/Dealers and Global Custodians involved in the processing of cross-border trades.
Objective	To create the leading global trade processing platform and bring the securities industry closer to shortened settlement cycles	To accelerate the flow of cross-border trades information, to reduce the number of failed cross-border trades and to reduce the risks and the costs of cross-border trade settlements
STP Solution	- ITM is a total workflow solution that enriches trades and tracks the state of transactions in real-time, and also facilitates operational performance analysis to improve the process. - Enable firms to build on existing services and infrastructures and migrate towards STP in pace with internal timelines - Use single platform for processing all cross-border and domestic trades: e.g., using client/server structure with Microsoft NT on the client side and Sun's Solaris operating system and Sybase's relational database on the backend.	- Clear focus in post-trade/pre-settlement activities of the industry participants engaged in cross-border institutional securities trading and guarantee full operability among participants - Tracks, numbers, timestamps and routes trade information - Multi-layered trade matching, enrichment and other value-added functions - Unique feature: design of the solution around the notion of multilateral interconnectivity among participants involved in the post-trade, pre-settlement securities processing

practices, while OMGEO utilizes the existing infrastructure. OMGEO has made significant progress in getting to market, as it continues to leverage from existing systems to drive the workflow. On the other hand, the GSTPA solution is taking a longer time to be developed, implemented and fully functional (two years to get to its current state and is expected to take another one or two to be fully functional). So, in terms of the fast changing nature of technology and market requirements, the current level of responsiveness might be an issue for GSTPA. The GSTPA solution is being built from scratch, thus its compatibility with, and ability to re-use, the huge legacy infrastructure of most participants is likely to affect its adoption. Some of the larger dominant players in the processing area cover multiple functions (investment managers, global custodian, broker dealers).

According to research by DST International (Frolich, 2001), both STP models have received equal levels of support, with 5% of respondents indicating support for each. This research also indicated that the most important factor determining the choice of the STP model is which one will most easily enable new product flexibility. So, there are two solutions from different vendors which are basically aimed at providing broadly similar services. This, plus the prospect of antitrust restrictions, raises the prospect that these two competitive models will have to eventually become interoperable. Not to do so will risk significant investment funding for two separate initiatives and significant negative market reaction. Notwithstanding the differences and uncertainty about which model may eventually emerge as superior, the imperative of T+1 implementation in the US remains. Firms need to begin assessing their STP readiness, while any issues between the two models are resolved in the background.

STP READINESS ASSESSMENT

More than half (51%) of the IT and business managers representing 113 financial services firms who attended a Wall Street conference on straight through trade processing in January 2002 said they have not begun upgrading their organizations' IT infrastructure and business rules for the purpose of reaching STP goals (Mearian, 2002). Among them, 41% are still evaluating how to move to STP and T+1 and the remaining 10% have not even started to evaluate their systems.

Nine challenges of implementing STP are identified and discussed below. Financial institutions can use them to self-evaluate their status. The degree to which the current operating state of a firm is different from the likely future scenario demonstrates the level of readiness the firm has for STP. The specific items in the nine challenges can be easily converted to a Likert scale checkbox form to measure the readiness of a firm's STP implementation. Firms with operations that are predominantly described by the current state situation in the nine challenges are at risk of falling too far behind in the STP "race". They may experience greater difficulty in reaping the full benefits of STP compared with their competitors who have already begun the process. Firms that begin the transformation of their organizations earlier will be able to leverage from their learning process and be ready to join the network of other STP-ready counterparts.

Challenge 1: Attain Single Point Data Capture Process
Current State
• Redundant re-entry of data in process
• Paper-based processing/execution requiring manual input
• Multiple independent front-end and back-end systems
• Entry of security master information into multiple systems in value chain and manual scrubbing of security master files
• Exception report or paper-based document to manually adjust/correct entries across multiple systems
• Multiple work streams/systems for different sub-processes
• Manual workaround for low volume specialized products
Likely Future Scenario
• Single point for all data capture — non-disparate data
• Entry of instructions occur once only in the continuous interaction cycle

Challenge 2: Fully Automated Internal Workflows
Current State
• Manual initiation of pulling executions from front to back office
• Frequent need to re-enter or re-initiate data transfer across system
• Batch files frequently used to transfer data across workflows/systems
• Specialized and unique requirements need to be manually monitored in the front, middle or back-end
• Transactions completed in batches before being relayed to next stage processing
• Frequent manual and exception processing throughout the internal process
Likely Future Scenario
• Automated and fully integrated/seamless workflow
• Limited exception-based processing and control processes
• Alerts automatically and near immediate relay for further instructions

Challenge 3: Fully Automated External Workflows
Current State
• Batch processing of transaction data across to third party systems for information interchange
• Front-end distribution channels not fully interfaced with third party systems on near real-time basis
• Back-end interface with third parties occurs at predefined intervals
• Certified records of holdings require manual intervention and frequent adjustments
• Selected domestic and international contracts requires manual fax confirmation to custodian or settlement parties
Likely Future Scenario
• Automated and fully integrated/seamless workflow across third parties systems
• Fully electronic holdings
• Alerts automatically and instantaneously relayed for further instructions
• Full and continuous electronic linkages between third party systems

Challenge 4: Practical Real-Time Processing
Current State
- Systems run on manually initiated batch process, resulting in accumulated transactions
- Notification or confirmation of transaction occurs only after batch files up-loaded, resulting in blocks of idle processing capacity
- Adoption of "end-of-day" processing practices
- Designated system will go off-line for batch transaction processing
- Momentary gaps or delays in confirmation feed between transaction event and actual processing, creating risk exposure
- Computation of asset market value based on closing prices (static) rather than actual prices (dynamic)

Likely Future Scenario
- Infrequent batch cycle needs to be replaced with practical real-time processing
- Online processing rather than off-line processing

Challenge 5: Front, Middle, and Back-Office Total Connectivity
Current State
- Cross-border transaction requires manual re-entry of instructions and re-entry of confirmation — current practice constraint by regulatory requirements
- Limited connectivity between front, middle, or back office systems
- Incompatible systems across front, middle, and back office system
- Single purpose and ridged applications built for system interfaces
- Segregation of transactions in offices to manage and control risks across departments
- Product-centric type processing in system

Likely Future Scenario
- Seamless integration within and across office systems (intranet and extranet), domestically and internationally
- Real-time risk monitoring and management systems
- Single office space concept, removal of front vs. back office separation of processing

Challenge 6: Adopt Industry Standards and Protocols

Current State
- Adoption of selected domestic industry standards in some cases, and limited application of international standards
- Messaging standards not utilizing the full capability of XML-enhanced features
- Institutions develop proprietary codes for use, often based on unsystematic code assignments or firm specific codes
- Cost of maintaining links across system without standards increases cost of links

Likely Future Scenario
- Concerted development and adoption of industry standards and protocols
- Implementation and utilization of existing and emerging industry standards to enable efficient exchange of data
- Widely adopted or emerging industry standards (Security Identifiers: ISIN, Counter-parties Identifiers: BIC, Currencies: ISO, Messaging: XML, SWIFT, FIX, ISITC, Data Standards: ISO 15022)

Challenge 7: Multilateral Interfaces with Third Parties

Current State
- Frequent use of email, fax, and phone for execution and transference of instructions between third parties
- Significant levels of manual information exchange across multi-parties in international transactions
- Manual matching/reconciliation of instructions with transactions or funds in cross-border trades
- Transaction details frequently not relayed on real-time basis (e.g., domestic trades processed overnight in batch files, international trades by ISITC files frequently during the day)
- Funds processing and clearing performed in batch modes across third parties

Likely Future Scenario
- Global adoption of emerging standards for messaging to achieve efficiency and improve cost for maintenance of linkages
- Internal systems to maintain state and share with Virtual Matching

Challenge 8: Just-in-time data enrichment

Current State
- Movement of data across networks and workflows not enriched in a timely manner; they remain in "suspension" while waiting for additional/new data to be built onto it
- Transactions process frequently remains in "suspension" during transition from a few minutes to days of elapsed time, although actual applied processing time only requires a fraction of a second

Likely Future Scenario
- Data enrichment should be made with appropriate data whilst flowing through the network
- Participants in the process will actively facilitate the virtual enrichment of data to push the transaction to completion
- Move toward a "zero latency" data transmission and fulfillment

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Challenge 9: Global STP Implementation Process Capabilities
Current State
•   Lack of theoretical framework to understand implications of Global STP workflows
•   Evolving concepts/models across industries
•   Limited exposure to STP project management capabilities
Likely Future Scenario
•   Practical knowledge of robust and proven STP rollout methodology
•   Ability to re-design, manage, and continuously upgrade STP infrastructure

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STP IMPLEMENTATION

The success of a firm's STP initiative goes beyond technology and systems integration. It redefines the way of running a firm's operations and needs to be done systematically. It is dependent on a firm's ability to merge process, technology, structure, and culture into a single cohesive force to address the challenges posed by STP. As Borelli and Auxier (2002) stated, achieving STP will require that "many diverse transactions, system functions, and operations must occur simultaneously. This highly parallel-processing environment will need to be supported by a complementary-technical architecture and organization design."

Operating financial services in this increasingly globalized world will yield long-term benefits for the firm with a global-centric view of doing business. The most successful firms will adopt new and innovative *intra-STP, extra-STP* and *global-STP* propositions that cut across the firm, third parties, and national boundaries. STP is built on a customer-centric approach that will give a better understanding of customer needs and motivations and lead to a better opportunity to realize the full potential of STP. Implementing STP requires organizational learning, which often requires lead-time for firms to absorb and become part of their culture. As a firm progresses from an *intra-STP* to *extra-STP* and *global-STP* operating environment, it will build on its capabilities and increase its competitive and strategic advantage.

Currently, only a handful of institutions in the financial industry have taken on the global STP challenges. The case study below summarizes a STP project conducted by the KPMK Consulting in Australia, following the STP readiness assessment framework presented above. It highlights some of the benefits of embarking on STP readiness assessment and implementation.

Case Study: Global Asset Management Company

A leading asset management company with operations dispersed globally is responding to changes in the securities industry with respect to compressed trade settlements. The project objective was to analyse the transaction-processing environment and make specific recommendations for changes needed to support compressed settlements, T+1, connectivity to GSTPA and a domestic trade match utility. The project

also developed tactical recommendations to facilitate short-term improvements to their current environment and long-term strategic recommendations to support future business initiatives and industry trends.

KPMG Consulting worked with the client's technical and operations staff to build a current state transaction flow model. This was the basic building block driving a gap analysis, leading the organization to a future state model. Utilizing subject matter experts in the areas of technology, GSTPA, and securities processing, KPMG Consulting delivered an analysis showing the organization where the future lies for participants in the Investment Management arena. Benefits of the project are summarized below.

- Detailed current state review of business processes and global technical architecture
- Strategic assessment for conformity to STP best practice and readiness for T+1
- Development of high-level future state framework
- Future state roadmap highlighting requires technical and operational changes
- Internal and external communications strategy

The above business case for the implementation of STP demonstrates the tactical and strategic benefits that STP will bring to organizations. The tactical benefits include reduction in transaction costs, error rates, and risk exposure, increased capacity and operational efficiency in transaction processing, and improvement in customer service through knowledge management. The strategic benefits include the opportunities to develop new products, the ability to extend businesses into new markets globally, and the flexibility via open-systems enterprise architecture.

CONCLUSION

The rapid growth and recent T+1 development of cross-border security trading have an impact not only on investment firms and the capital markets in which they operate, but also on surrounding banking and insurance institutions. Firms that do not have the capability to complete the transaction cycle effectively will be forced out of the industry. To remain competitive, firms need to address the challenges brought about by STP immediately. Global STP capability may not be achieved by simply initiating a series of projects to address the challenges. It needs to be approached by a well-orchestrated re-engineering activity, and enterprise-wide technology solutions. Firms should take a holistic view of change — the use of process re-engineering with technology integration. It should be performed in an integrated approach rather than distinctive process re-engineering projects or technology initiatives. The change must also embrace the concept of the "continuous interaction cycle" approach, as STP transactions must satisfy the requirements of all the parties concerned in order to achieve their intrinsic value. Considering the proposed T+1 implementation timeframe of July 2005, financial firms need to assess their readiness for STP, and begin the process right now.

STP is an emerging technology that has a potential to substantially enhance the effectiveness of cross-border security trading and the development of global financial markets. However, research on STP has been laggard and limited. Opportunities as well

as challenges lie ahead when STP is being implemented in financial firms and institutions in the US and other countries around the world. This study proposes a STP readiness assessment framework that can help manage STP implementation risks and increase STP implementation success rates from a global perspective of electronic business. Future research may further study STP implementation strategies based on the STP readiness assessment framework proposed by the current study.

ENDNOTES

[1]   Failures include value and non-value based transactions.

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Chapter X

Evolutionary Stages of
e-Tailers and Retailers:
Firm Value Determinants Model

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ABSTRACT

We have studied the evolutionary stages of pure e-tailers, click & mortar (C&M) and brick & mortar (B&M) retailers for three points of time: June 1999, June 2000, and June 2001. To evaluate the dynamic stages of e-tailing business as an innovative venture, we propose four stages: exploration, breakeven, growth, and maturity. The stages are measured by the impact of revenue and income on the firm value, and a regression model is adopted to formulate the model. To empirically examine the stages of e-tailers and retailers, we have collected 14 e-tailers, 112 C&M, and 75 B&M from the U.S. stock markets. According to this study, the proposed stage model explains the evolution of pure e-tailers very meaningfully. E-tailers were in the late exploration stage in 1999, breakeven stage in 2000, and growth stage in 2001. Unlike our hypothetical expectation, the stage model could not adequately explain the effect of online business to C&M. In this regard, the impact of online channel to traditional

retailers was not revolutionary. In 1999 and 2000, the primary contributing factor to firm value of C&M was income, but in 2001, it was revenue. According to this result, investors were very conservative to the risky investment on the click business of traditional retailers. However, it turned out that C&M has performed better than B&M in terms of revenue, income, income/revenue, stock price, and market capitalization. It is noteworthy that the revenue effect of C&M in 2001 was significantly higher than that of B&M.

INTRODUCTION

Electronic retailing (e-tailing) has been around for years, fundamentally impacting the structure of traditional retailing business (Rao, 1999, Turban et al., 2002). The stock price and market capitalization of pure e-tailers has skyrocketed till 1999 owing to its extraordinary market growth (Schultz and Zaman, 2001). So traditional retailers are obliged to jump into the opportunity of e-tailing business by opening an online retailing site as an additional channel. Although the hybrid of online and offline channels within a company supplement each other, there also exist conflicts between the two. When the channel conflict is severe, some companies like Egghead.com gave up the traditional channels, exclusively depending on the online channel, which turned out a failure. Barnes & Noble has spinned off the e-tailing business as BarnesandNoble.com. In this manner, there was a minor migration to pure e-tailing (Sandoval, 1999). However, the major trend is the traditional retailers's shift to hybrid channels, because the growth opportunity of e-tailing is too big to neglect and also because the cash-cow of traditional business should not be given up too hastily (Kane, 1999; Maruca, 1999; Scheppler, 2001). Nevertheless, 75 out of 187 listed retailers in the U.S. stock market, which we have studied in this research, still have not opened the online channel.

Let us formally define the three business models in retail business:

- *Pure Click or Pure e-Tailer* is a pure online retailer without physical stores. Some pure e-tailers may have some promotional physical stores, but let us categorize this kind of company to pure e-tailers in this study.
- *Click and Mortar (C&M)* is a traditional retailer(s) with an additional online channel.
- *Brick and Mortar (B&M)* is a traditional retailer(s) without an online channel.

Our concern is a comparative analysis on the dynamic performance of these business models with a view of stage theory (Lee, 2000; Lee et al., 2000). We would like to know where the status of pure e-tailers is, and what the impacts of adding online stores to traditional physical stores are. For this study, we evaluate the performance of three business models at three points of time: June 1999 (denoted *T1999*), June 2000 (*T2000*), and June 2001(*T2001*).

As a reference stage theory model, we propose the Firm Value Determinants Model which uses regression models to measure the impact of revenue and income on firm value. Assumption of the model is that in the early stage of innovation, by adopting e-tail channels, the e-tailers can grow their revenue very fast at the cost of negative income. After the shakeout, the failed companies will disappear, be acquired or merged, and the average income of survivors will be improved reaching zero. The revenue of surviving

companies will grow while gaining income. However, as the stage gets matured, the income will become the primary concern more than the revenue growth. Based on this assumption, we propose four stages of e-tailing business: *exploration, breakeven, growth*, and *maturity*. To identify the stages, we adopt a regression model that selects the primary factors–revenue and/or income–which determine the firm values.

With this stage model, we evaluate the stages of three business models for T1999-T2001. However, the fluctuation of traditional business in annual revenue growth and income is a fact of business life. So evaluating stages of traditional business purely based on revenue and income fluctuation is not adequate. Since we need to know the stock prices of the companies, we have selected the e-tailers and retailers listed in the U.S. stock markets (NYSE, NASDAQ, and AMEX). The U.S. stock markets are selected because the U.S. market has the largest number of companies than any other country.

In the second section, we review the stage theories in the literature and propose the stage theory for e-tailers and the regression model that can compute the stage. We then explain the implications of stages in the e-tailing and retailing business, and describe the measurement of factors and data collection. The next section explores the behaviors of revenue, income, and market capitalization during the study period. We then propose the regression models that can estimate the impact of revenue and income on firm value. The next section derives the stages of e-tailers, B&M, and C&M for T1999-T2001. The paper concludes with the discussion about limitations.

STAGE THEORIES ABOUT THE E-TAILING VENTURE

Before we explain the proposed model in detail, let us review the literature about stage theories in marketing and venture.

Literature on the Stage Theories

There are many stage theories in the marketing and venture arena. In marketing, the Product Life Cycle Theory (Kotler and Armstrong, 2000; Day, 1981; Ryan and Riggs, 1996; Hedden, 1996) proposed the product life cycle from inception to demise, in terms of sales and profits respectively, identifying five stages: *product development, introduction, growth, maturity, and decline* (see Figure 1). However, in practice, it is very difficult to forecast the length of each stage and the shape of the product life cycle curve. Since this theory attempts to interpret the stages of product life cycle rather than those of business life cycle, this model is not suitable for explaining the stages of e-tailing business. However, the two factors–sales and profits–are the same as what we adopt.

The e-tailing business can be regarded as a venture business (Meeker and Pearson, 1997). So the stage models in venture can be applied to the development of e-tailers' stage model. In the venture's stage model, the stages are categorized into four: *startup, high growth, maturity*, and *stability* (see Figure 2). Timmons (1999) studied the time span, sales, and number of employees in each stage. He noted that the shape of the S curve is never smooth, and actually jagged with many ups and downs, and explicit definition about the quantitative measure of each stage is not described in this model.

*Figure 1: Sales and Profits Over the Product Life Cycle.*
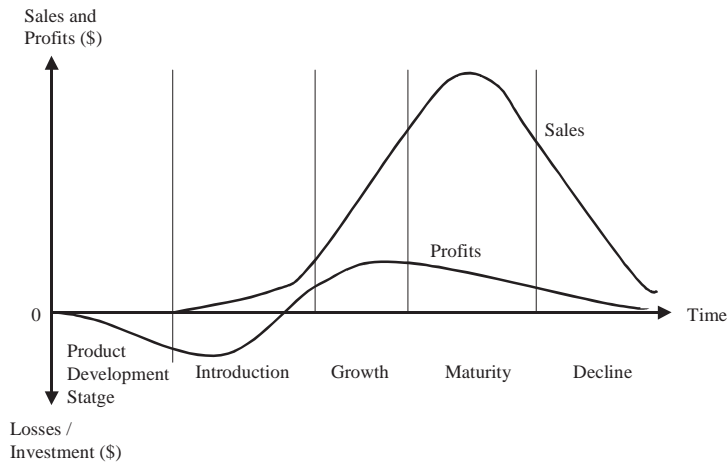
For the stage model of e-tailing business, we adopt the sales (revenue) and profit (net income) as the determining factors of stages from the product life cycle model. The concept of stages are adopted from the venture model. However, we need to modify the definition of stages to be compatible with the regression model which can identify the stages numerically.

Stages of e-Tailing Business

In this study, we regard e-tailing as an innovation and a venture, and we could collect *revenue* and *net income* (simply called *income*) to measure the sales and profit respectively. Based on the levels of revenue and income, we can explain the characteristics of the four stages as follows:

1)   **Exploration Stage**: This stage is a combination of the two stages (startup and high growth) in the venture model. This stage expects an ***extraordinary high revenue growth, possibly with negative income due to the heavy investment.*** Stock price may be very high at this stage.

2)   **Breakeven Stage**: After the start-up, failed companies will shakout as the stage progresses. Surviving companies will sustain the ***high revenue growth but*** at decelerated rate. Some are profitable and some are not, resulting in the ***industrial average income near-zero***. Let us call this stage the Breakeven Stage.

3)   **Growth Stage**: The surviving companies become more profitable, but the growth rate will decrease. Therefore this stage expects both ***positive and moderate revenue growth and income.***

4)   **Maturity Stage**: The market is saturated at this stage, so there is little chance of high revenue growth. So the business model has no other choice but to pursue ***high income without significant revenue growth***.

Figure 2: Stages of Venture Growth.
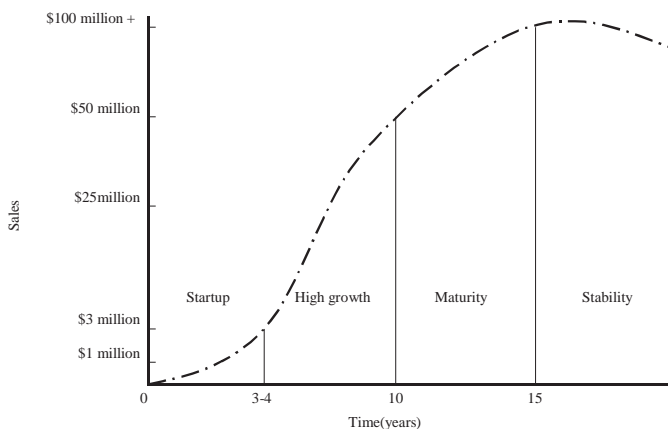
(Source: Timmons 1999)

This stage theory is easy to comprehend, but it is not easy to distinguish the boundaries between stages. It is not easy to numerically distinguish the definitions of *very high, high*, and *moderate*. So we propose the Firm Value Determinant Model to complement such a weakness.

Firm Value Determinants Model

This model observes the determining factors of firm value. The firm value can be measured by the market capitalization, which means the value of total stocks outstanding (Lee et al., 2002). Since we adopted the revenue and net income as the factors, we need

Figure 3: Stages by the Firm Value Determinant Model.
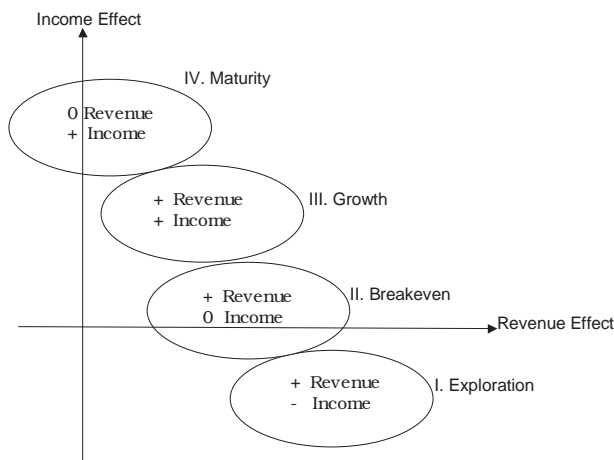
to study their impacts on market capitalization. This model can be expressed as the regression model (1).

$$\text{MarCap} = \beta_0 + \beta_R \text{ Revenue} + \beta_I \text{ Income} + \text{Error} \tag{1}$$

where

MarCap: Market capitalization;
Revenue: Annual revenue; and
Income: Annual net income.

This model studies the impact on market capitalization instead of the magnitude of revenue and net income per se. In this model, we can estimate the impact of revenue and net income on market capitalization by β_R and β_I. An advantage of this model is that the stages can be defined based on the sign of βs as follows.

1) **Exploration Stage:** The high revenue growth implies ***positive b_R***, and the negative income implies ***negative b_I***.
2) **Breakeven Stage:** The high revenue growth implies ***positive b_R***, and the near-zero income implies ***insignificant b_I***. Note that the insignificant b_I does not necessarily mean the magnitude of income is near zero.
3) **Growth Stage:** The positive revenue growth and positive income imply both ***positive b_R and b_I***.
4) **Maturity Stage:** The low revenue growth implies ***insignificant b_R***, and positive income implies ***positive b_I***.

The hypothetical stage theory is graphically depicted in Figure 3.

STAGES OF E-TAILING BUSINESS

Let us elaborate the implication of stages in the e-tailing and retailing business.

Exploration Stage

E-tailing firms in this stage build strong teams, develop platform, and build up their market share by aggressively investing in partnerships and promotions (Rayport and Jaworski, 2000). Most e-tailers have started their business after 1995. In this stage, it is very difficult for the investors to distinguish who will become winners, although the overall expectation for the market potential is very high. Thus *MarCap* is very sensitive to the revenue growth. On the other hand, investors tolerate the negative net income due to the larger scale investment in advertisement, system development, and logistic infrastructure for the promising future (Kotler and Armstrong, 2000).

A good example of this stage is Amazon.com in 1998 which had grown rapidly (313% in 1998) and lost tens of millions of dollars a year (-20% of sales in 1998). An exceptional company is eBay which has been profitable from the beginning. However, the income on the average is negative in this stage.

Breakeven Stage

The shakeout occurs inevitably when a new innovative industry emerges such as e-tailing (Vigoroso, 2002). Similar phenomenon could be found in the history of the automobile industry in the early 20th century. There were more than 100 automobile makers in the exploration stage. Now it ended up with three in the U.S.A. The time span of this stage can vary from a few years to tens of years. In this stage, the successful performers begin to gain profit, but the poor performers are still losing money and investors cannot tolerate such a loss any longer. The winners continue to grow stably, but the losers close their sites, or are acquired or merged. At the breakeven stage, the average net income of these companies becomes the mixture of negative and positive values. According to the definition by the Firm Value Determinants Model, the average impact of net income on the firm value is near zero. So the state with near-zero net income impact on the average can be a distinction point from the exploration stage.

For example, Amazon showed decreasing revenue growth rate from 313% in 1998, to 169% in 1999, 68% in 2000 and 13% in 2001, while the negative 'net income'/revenue increased from -20% in 1998, to -44% in 1999, and -51% in 2000, until it bounced to net income of $5million in the fourth quarter 2001 (Cox, 2002). For the recent happenings at Amazon, refer to Schaff (2001). On the contrary, eBay has shown positive net income for five consecutive years. For the fiscal year ending Dec. 2000, its revenue increased 92% to $431 million while net income increased 343% to $48 million. Like these examples, positive and negative income companies coexist and are balanced in the breakeven stage. According to Timmons (1999, p. 32), the average failure rate of a new business is 23.7% within two years, 51.7% within four years, and 62.7% within six years. Note that 15 out of 22 listed e-tailers in this study have disappeared during this study period.

Typical e-tailers shaken out are CDNow (acquired by Bertelsmann), Cybershop.com (closed in April 2000), FatBrain.com (acquired by Barnesandnoble.com in November 2000), Go2Net (acquired by InfoSpace in October 2000), i-Mall (merged with Excite@home in July 1999), OnSale (merged with Egghead.com in Nov 1999, but Egghead is also delisted from NASDAQ as of April 10, 2001), PCOrder.com (merged with Trilogy Software in October 2000), Preview Travel (merged with Travelocity.com in March 2000), VitaminShoppe.com (delisted from NASDAQ), and e-Toys (closed in April 2001). Peapod was acquired by the world's largest food retailer Royal Ahold in April 2000 (Regan and Macaluso, 2001) although the Peapod site remained.

Growth Stage

In the growth stage, the surviving companies continue to grow the revenue, gaining positive net income as well. In this stage, both revenue and net income have positive relationships with the market capitalization. The firms in this stage have the option of trading-off between high revenue growth and high net income. The investor's ultimate concern is high net income, but they may postpone a portion of high income in compensation for the high growth that may contribute to high future income.

The C&M retailers at starting stages of online business may belong to this stage. C&M retailers invest to cultivate its online channel, sacrificing some of its current income. We need to investigate whether the introduction of online channel contributed to revenue or income. The pattern may vary depending upon the time point. We hypothesized that the online channel contributed to revenue growth in the early stage,

but gradually contributed more to income. But it turned out this hypothesis was not supported by the data in reality as we will see later.

Maturity Stage

In the maturity stage, the market is quite saturated and there is little room left for growth. In this stage, investors do not seriously care about the revenue growth since investors' main concern is the income. This implies that the income has a positive impact on market capitalization, while the revenue growth is nearly insensitive. We hypothesized that B&M belongs to this stage and continued to stay in this stage, but it was not true as described later.

The traditional retailing business turned out that they were not in the maturity stage. So it seems more appropriate to evaluate the traditional business as a fluctuation between revenue and income, instead of the view of stage theory. However, it deserves to contrast with the e-tailing business with the same measure.

MEASUREMENT AND DATA COLLECTION

The data on revenue, net income, and market capitalization of e-tailers and retailers from U.S. Stock Markets–NYSE (New York Stock Exchange), NASDAQ (National Association of Securities Dealers Automated Quotation System), and AMEX (American Stock Exchange)–are collected from Datastream (www.datastream.com) and Media General Financial Services (MGFS; www.mgfs.com).

The definitions of factors are the followings:

1) *Revenue:* Annual sales and net of allowance for the fiscal year before June (US$million)
2) *Income:* Annual net income for the fiscal year before June (US$million)
3) *Stock Price:* Monthly average stock price in June (US$)
4) *Market Capitalization:* Stock price multiplied by shares outstanding in June (US$million)

According to the classification of MGFS, there were 251 retailers (coded in #73 retail group and #74 special retail group) and 14 e-tailers (picked from the code in #852 Internet Software & Services Group) in the U.S. stock markets as of June 2001. We have used all of the 14 e-tailers, but classified the retailers to C&M and B&M by confirming the existence of online stores. In this manner, we could collect the reliable data of 112 C&Ms and 75 B&Ms. The data are collected for three time points: June 1999 (T1999), June 2000 (T2000), and June 2001 (T2001). Due to the nature of factors, the time for revenue and income implies a period of a fiscal year closest to June, whereas the time for stock prices and market capitalization implies the time point of June.

1) **Pure e-Tailer Group:** There were 14 pure e-tailers listed at NASDAQ in June 2001, but eight of them went public since June 2000. So in June 1999, there were only six listed companies in the stock market, thus there are only six data points for stock prices although there are 14 data points for revenue and income for T1999. The revenue and market capitalization of 14 companies are listed in Table 1.
2) **C&M Retailer Group:** We collected 112 data points in total: 55 from NYSE, 55 from NASDAQ; and two from AMEX.

Table 1: Market Capitalization and Revenue of Pure e-Tailers.

Ticker	Company	T1999			T2000			T2001		
		Market Cap	Revenue	MarCap/Rev	Market Cap	Revenue	MarCap/Rev	Market Cap	Revenue	MarCap/Rev
ABTL	Autobytel Inc .	351,422.50	40,300	8.720	141,672.10	66,500	2.130	29,120.52	71,100	0.410
AMZN	Amazon.Com Inc.	18,028,997.33	1,639,800	10.995	15,892,537.99	2,762,000	5.754	5,086,144.56	3,122,400	1.629
ASFD	Ashford.Com Inc.	N/A	5,900	N/A	133,431.74	39,900	3.344	13,958.25	67,200	0.208
BNBN	Barnesandnoble.ComInc.	426,500.00	193,700	2.202	248,394.60	320,100	0.776	76,713.60	404,600	0.190
DMAX	Drugmax Inc .	2,007.72	100	20.077	62,410.79	21,100	2.958	43,368.00	177,700	0.244
DSCM	Drugstore.Com Inc.	N/A	34,800	N/A	389,717.37	110,000	3.543	77,618.97	145,300	0.534
EBAY	Ebay Inc.	19,549,023.78	224,700	87.001	16,496,789.76	431,400	38.240	17,739,033.90	748,800	23.690
EFTD	FTD.Com Inc	N/A	49,400	N/A	15,567.20	94,800	0.164	48,692.00	126,500	0.385
FLWS	1-800-Flowers.Com Inc.	N/A	292,900	N/A	146,014.95	379,500	0.385	297,303.02	442,200	0.672
FMKT	Freemarkets Inc.	N/A	N/A	20.900	1,795,940.51	83,300	21.560	578,459.16	147,600	3.919
ONVI	Onvia.Com Inc.	N/A	27,200	N/A	610,387.08	147,600	4.135	76,473.65	68,100	1.123
PCLN	Priceline.Com Inc.	13,937,397.60	482,400	28.892	7,330,298.44	1,235,400	5.934	1,489,417.55	1,170,000	1.273
QXLC	Qxl Ricardo Plc Ads	N/A	4,200	N/A	1,983,372.65	9,800	202.385	256,275.38	21,300	12.032
STMP	Stamps.Com Inc	.	N/A	400	N/A	449,438.40	15,200	29.568	157,759.88	20,200
	Mean	8,715,891.49	215,479	26.314	3,263,998	408,329	22.920	1,855,024	480,929	3.866

Unit: Market Capitalization and Revenue ($thousand); N/A: Not Applicable

3)   **B&M Retailer Group:** We collected 75 data points in total: 28 from NYSE, 44 from NASDAQ, and three from AMEX.

The mean and standard deviation of groups are summarized in Table 2. With these data, we can perform the t-test to compare the difference between groups for the same point of time, and also the paired t-test to check the change between two consecutive times.

A limitation of this data is that it cannot represent all e-tailers and retailers which are not yet listed. In this regard, the data collected represent the currently successful, or at least surviving, listed companies in the U.S. stock markets.

DYNAMIC BEHAVIOR OF REVENUE, INCOME, AND FIRM VALUE

To evaluate the stages of pure e-tailers, C&M retailers, and B&M retailers during T1999-T2001, we propose a series of hypotheses. Our concern is how the behavior of pure e-tailers is different from traditional retailers, and how the introduction of online e-tailing to traditional retailing has influenced their performances in terms of revenue, income, stock price, and market capitalization. To compare the difference of mean values between groups, we performed the t-test. To study if there was dynamic change between two consecutive time points within each group, we performed the paired t-test. Note the test results summarized in Table 3 and 4 respectively.

Revenue

The belief on the potential of e-tailing stemmed from the extraordinary high revenue growth even though it may not have been profitable. We investigated whether the revenue growth of pure e-tailers continued during 1999-2001, and compare it with the growth of C&M and B&M.

H1a) The average revenue of pure e-tailers has significantly increased during T1999–T2001.

The average revenues of pure e-tailers in T1999, T2000, and T2001 were $215 million, $408 million, and $481 million. According to the paired t-test, the revenue growth is significant at 4.7% and 5.2% for T1999-T2000 and T2000-T2001 respectively. However, the growth rates for T1999–T2000 and T2000-T2001 are 89.8% and 17.9% respectively, which implies that the growth rate has significantly declined. Since the revenue growth before 1999 was higher than that of T1999, we can conclude that the revenue growth rate of e-tailers peaked in T2000, and the growth rate declined since then.

H1b) The average revenue of C&M has significantly increased during T1999–T2001.

The average revenues of C&M in T1999, T2000, and T2001 were $5,334 million, $6,332 million, and $7,221 million. According to the paired t-test, growth magnitudes are statistically significant (p-value = 0.4% and 0.5%). The growth rates for T1999-T2000 and T2000-T2001

Table 2: Mean and Standard Deviations of Pure e-Tailers, C&M, and B&M for T1999-T2001.

		Pure e-Tailers (G1)				C&M Retailers (G2)				B&M Retailers (G3)			
		Mean	Std. Dev	Std. Err. Mean	N	Mean	Std. Dev	Std. Err. Mean	N	Mean	Std. Dev	Std. Err. Mean	N
Revenue ($thousand)	T1999	215,478.6	434,292.0	116,069.4	14	5,333,626.4	14,994,251.7	1,416,823.6	112	2,004,070.8	4,191,867.1	484,035.1	75
	T2000	408,328.6	749,861.2	200,408.8	14	6,332,120.2	17,926,834.8	1,701,539.9	111	2,416,346.7	5,884,478.7	679,481.1	75
	T2001	480,928.6	827,678.9	221,206.5	14	7,221,200.5	20,665,032.4	1,970,333.5	110	2,644,386.0	6,337,416.5	736,709.7	74
Net Income ($thousand)	T1999	-149,385.7	321,201.8	85,844.8	14	136,490.9	434,127.4	41,021.2	112	36,083.3	109,783.9	12,676.8	75
	T2000	-189,861.9	364,847.3	97,509.5	14	184,784.3	574,223.8	54,502.9	111	55,652.9	146,277.2	16,890.6	75
	T2001	-145,121.4	170,606.8	45,596.6	14	184,216.9	711,937.5	67,271.8	112	46,941.7	115,777.3	13,458.8	74
Shares	T1999	72,453.3	67,643.4	25,566.8	7	140,673.2	463,459.9	44,391.4	109	48,037.0	85,501.1	10,147.1	71
	T2000	95,775.0	107,667.9	28,775.5	14	159,340.2	493,339.6	46,616.2	112	52,149.2	110,606.0	12,945.4	73
	T2001	97,807.5	106,698.2	28,516.3	14	166,959.2	501,007.5	47,340.8	112	54,251.9	108,449.8	12,693.1	73
Stock P (US$)	T1999	60.4	60.3	22.8	7	25.2	18.9	1.8	109	20.8	15.8	1.9	71
	T2000	19.3	20.8	5.5	14	18.9	15.9	1.5	112	15.4	11.9	1.4	74
	T2001	9.7	16.8	4.5	14	20.5	16.7	1.6	112	16.9	11.6	1.3	74
Market Cap ($thousand)	T1999	8,715,891.5	9,444,204.0	3,855,580.1	6	5,962,290.1	20,662,105.9	1,979,070.8	109	1,350,307.3	3,256,592.5	389,237.3	70
	T2000	3,263,998.1	5,799,928.3	1,550,096.0	14	6,217,249.4	27,059,165.4	2,556,850.8	112	1,015,334.0	2,312,349.1	270,640.0	73
	T2001	1,855,024.2	4,764,625.8	1,273,399.8	14	6,742,740.9	27,549,819.6	2,603,213.3	112	1,264,932.5	2,888,932.5	338,124.0	73

N: Sample Size

are 18.7% and 14.0%. Note that the growth rate 18.7% during T1999-T2000 is drastically smaller than that of e-tailers (89.5%), but the rate (14%) during T2000-T2001 is similar to that of e-tailers (17.9%). It was not possible to collect the precise amount of online sales of C&M, but we can conjecture by comparing the ratio against that of pure e-tailers. The average revenue ratio of e-tailers over C&M was 4.03%, 6.44%, and 6.66% respectively. The ratios were small, although they were increasing. So we can conclude that the revenue growth rate of C&M was significantly smaller than pure e-tailers during T1999-T2000, but the rates converged during T2000-T2001.

H1c) The average revenue of B&M has significantly increased during T1999–T2001.

The average revenues of B&M in T1999, T2000, and T2001 were $2,004 million, $2,416 million, and $2,644 million. The growth rates for T1999-T2000 and T2000-T2001 are 20.55% and 9.4%, with the significance level of 7.6% and 0.0%. The growth rate of B&M (20.6%) in T1999-T2000 is slightly greater than that of C&M (18.7%), but the one (9.4%) in T2000-T2001 is smaller than that of C&M (14%). We can observe that the C&M grew faster than B&M since T2000, although it is premature to conclude whether this trend will continue in the future.

H1d) There was a significant difference of revenue between pure e-tailers and C&M (B&M) during T1999- T2001.

According to the t-test of revenue between pure click and C&M (B&M) for three points of time, the hypothesis that revenue of C&M(B&M) is bigger than that of pure retailers is accepted by 1% level of significance for all time points.

H1e) There was a significant difference of revenue between C&M and B&M during T1999–T2001.

According to the t-test of revenue between C&M and B&M for three time points, the hypothesis that C&M is bigger than B&M is accepted by 5% level of significance for all points of time. This implies that bigger retailers have joined the e-tailing business.

Net Income

The hypothesis is that the pure e-tailers have invested without positive incomes during the early stage of the business (Hand, 2002). We study when the net income turned profitable (if it did), and compare the levels of pure e-tailers, C&M, and B&M.

H2a) The average net income of pure e-tailers has significantly increased during T1999–T2001.

The net losses of pure e-tailers in T1999, T2000, and T2001 were $-149.4 million, $-189.9 million, and $-145.1 million. The average net income of pure e-tailers got worse in T2000, but got better in T2001 although the differences were not statistically significant. This weakly supports the conclusion that the pure e-tailers became healthier since T2001 although they were not profitable yet.

Table 3: Test for Differences Using t-Test for T1999-T2001.

		Mean Values			t-Test for(G2-G1)			t-Test for(G3-G1)			t-Test for(G3-G2)		
		Pure Click (G1)	C&M (G2)	B&M (G3)	Difference	t	p-value	Difference	t	p-value	Difference	t	p-value
Revenue 1999		215,478.6	5,333,626.4	2,004,070.8	5,118,147.8	3.60	0.000	1,788,592.2	3.59	0.001	-3,329,555.6	-2.22	0.028
($thousand) 2000		408,328.6	6,332,120.2	2,416,346.7	5,923,791.7	3.46	0.001	2,008,018.1	2.84	0.006	-3,915,773.5	-2.14	0.034
2001		480,928.6	7,221,200.5	2,644,386.0	6,740,271.9	3.40	0.001	2,163,457.4	2.81	0.006	-4,576,814.5	-2.18	0.031
Net Income 1999		-149,385.7	136,491.0	36,083.3	285,876.6	2.38	0.019	185,469.0	2.14	0.051	-100,407.6	-2.34	0.021
($thousand) 2000		-189,861.9	184,784.3	55,652.9	374,646.2	2.38	0.019	245,514.8	2.48	0.027	-129,131.4	-2.26	0.025
2001		-145,121.4	184,216.9	46,941.7	329,338.3	1.72	0.088	192,063.2	4.04	0.001	-137,275.2	-2.00	0.048
Shares 1999		72,453.3	140,673.2	48,037.0	68,219.9	0.39	0.699	-24,416.3	-0.73	0.467	-92,636.2	-2.03	0.044
2000		95,775.0	159,340.2	52,149.2	63,565.2	0.48	0.633	-43,625.8	-1.36	0.178	-107,191.0	-2.22	0.028
2001		97,807.5	166,959.2	54,251.9	69,151.7	0.51	0.609	-43,555.6	-1.38	0.171	-112,707.3	-2.30	0.023
Stock P 1999		60.4	25.2	20.8	-35.3	-1.54	0.173	-39.6	-1.73	0.133	-4.3	-1.66	0.099
(US$) 2000		19.3	18.9	15.4	-0.5	-0.10	0.923	-3.9	-0.68	0.509	-3.4	-1.67	0.096
2001		9.7	20.5	16.9	10.8	2.27	0.025	7.2	1.98	0.051	-3.6	-1.72	0.087
Market Cap 1999		8,715,891.5	5,962,290.1	1,350,307.3	-2,753,601.4	-0.32	0.747	7,365,584.2	-1.90	0.115	-4,611,982.9	-2.29	0.024
($thousand) 2000		3,263,998.1	6,217,249.4	1,015,334.0	2,953,251.3	0.41	0.686	-2,248,664.1	-1.43	0.175	-5,201,915.4	-2.02	0.045
2001		1,855,024.2	6,742,740.9	1,264,932.5	4,887,716.8	0.66	0.510	-590,091.7	-0.62	0.535	-5,477,808.4	-2.09	0.039

Table 4: Paired t-Tests Between Two Consecutive Time Points.

		T1999 and T2000				T2000 and T2001			
		Difference (T00-T99)	t	df	p-value	Difference (T01-T00)	t	df	p-value
Revenue ($thousand)	Pure Click	192,850.0	2.198	13	0.047	72,600.0	2.136	13	0.052
	C & M	971,824.7	2.972	110	0.004	833,754.6	2.848	109	0.005
	B & M	412,275.9	1.797	74	0.076	247,235.9	3.781	73	0.000
Net Income ($thousand)	Pure Click	-40,476.2	-0.527	13	0.607	44,740.5	0.661	13	0.520
	C & M	47,112.1	2.697	110	0.008	1,121.1	0.046	110	0.963
	B & M	19,569.6	2.417	74	0.018	-9,232.1	-0.687	73	0.494
Shares	Pure Click	48,039.0	1.575	6	0.166	2,032.5	0.300	13	0.769
	C & M	22,436.2	2.384	108	0.019	7,619.0	1.721	111	0.088
	B & M	5,013.0	0.653	70	0.516	2,102.7	1.514	72	0.134
Stock Price (US$)	Pure Click	-33.8	-2.403	6	0.053	-9.6	-2.640	13	0.020
	C & M	-6.2	-5.328	108	0.000	1.6	1.827	111	0.070
	B & M	-5.1	-3.945	70	0.000	1.5	1.641	73	0.105
Market Cap ($thousand)	Pure Click	-2,020,540.9	-1.923	5	0.112	-1,408,973.9	-1.669	13	0.119
	C & M	416,080.7	0.585	108	0.560	525,491.5	2.759	111	0.007
	B & M	-296,193.4	-2.316	69	0.024	249,598.5	3.090	72	0.003

H2b) The average net income of C&M has significantly increased during T1999–T2001.

The average net incomes of C&M in T1999, T2000, and T2001 were $136.5 million, $184.8 million, and $184.2 million. The income has significantly increased during T1999-T2000 (35.88%), but slightly decreased during T2000-T2001 (-0.32%). This trend is opposite to pure e-tailers.

H2c) The average net income of B&M has significantly increased during T1999–T2001.

The average net incomes of B&M in T1999, T2000, and T2001 were $36.1 million, $55.7 million, and $46.9 million. The income significantly increased during T1999 - T2000 (54.72%), but there was a big decrease during T2000-T2001 (-15.72%). This implies that in T2001 the income of B&M dropped bigger than C&M and pure e-tailers.

H2d) There was a significant difference of net income between groups during T1999–T2001.

Obviously, there was a significant difference of net income between pure e-tailer and "C&M and B&M." The average income level of C&M is significantly greater (less than 5% of error) than that of B&M for all time points. This implies that C&M have performed better than B&M not only in revenue but also in income and its ratio. Note that the income/revenue of C&M during T1999-T2001 are 2.56%, 2.92%, and 2.55%, which is greater than those of B&M, 1.80%, 2.30%, and 1.78%.

Stock Price

A firm value can be studied by observing the stock price and market capitalization (Trueman et al., 2002). We study whether the levels of falls between groups were significantly different.

H3a) The average stock price of pure e-tailers has dropped significantly during T1999–T2001.

The average stock price of pure e-tailers at T1999, T2001, and T2001 were $60.4, $19.3, and $9.7. According to the paired t-test between T1999 and T2000, and between T2000 and T2001, the average stock price of pure e-tailers dropped with the significance level of 5.3% and 2.0%. So the hypothesis H3a is accepted at 10% of significance. We can see that this drop is more severe than C&M and B&M.

H3b) The average stock price of C&M has significantly dropped during T1999–T2001.

The average stock prices of C&M at T1999, T2000, and T2001 were $25.2, $18.9, and $20.5. According to the paired t-test, the stock price dropped during T1999 and T2000 with the significance level of 0.0%, but rose during T2000 and T2001 with the significance

level of 7%. The increase during T2000-T2001 is a substantial contrast with the severely fallen stock prices of pure e-tailers.

H3c) The average stock price of B&M has significantly dropped during T1999–T2001.

The stock price of B&M at T1999 ($20.8) dropped significantly (0.0%) to $15.4 at T2000, but rose (10.5% level of significance) to $16.9 at T2001. This pattern is similar to that of C&M. According to H3a, H3b, and H3c, we can conclude that the stock prices of pure click have consecutively dropped, but the stock prices of traditional retailers (both C&M and B&M) have bounced back during the T2000-T2001 periods.

H3d) Stock price levels between groups were significantly different during T1999–T2001.

The stock prices of pure e-tailers at T1999 were higher than those of C&M (B&M) at 17.3% (13.3%) level of significance. However, pure e-tailers became lower than C&M (B&M) at 2.5% (5.1%) level of significance at T2001. On the other hand, the hypothesis that stock prices of C&M were higher than B&M is accepted at 10% of significance for all points of time.

Market Capitalization

We investigate whether the significant fall of stock prices has influenced the firm value of e-tailiers.

H4a) The average market capitalization of pure e-tailers has significantly dropped during T1999–T2001.

The market capitalization of pure e-tailers at T1999, T2000, and T2001 were $8,716 million, $3,264 million, and $1,855 million. According to the paired t-test, the market capitalization dropped with 11.2% (11.9%) level of significance during T1999-T2000 (T2000-T2001). The sample size (6) for the test of T1999-T2000 is too small, but they were all listed companies available at T1999.

H4b) The average market capitalization of C&M has significantly dropped during T1999–T2001.

The market capitalization of C&M at T1999, T2000, and T2001 were $5,962 million, $6,217 million, and $6,742 million. The change between T1999 and T2000 was not significant, but was significant (0.7%) between T2000 and T2001. This implies the firm value of C&M grew significantly since T2000.

H4c) The average market capitalization of B&M has significantly dropped during T1999–T2001.

The market capitalization of B&M at T1999, T2000, and T2001 were $1,350 million, $1,015 million, and $1,265 million. According to the paired t-test, the market capitalization dropped significantly (2.4%) at T2000, but bounced up significantly (0.3%) at T2001.

H4d) There was a significant difference of market capitalization between groups during T1999-T2001.

The market capitalization of pure e-tailer was larger than C&M at T1999, but became much smaller at T2000 and T2001, even though the levels were not statistically significant. However, pure e-tailers had larger market capitalization than B&M for all time points although the differences were are not statistically significant at 5%.

REGRESSION MODEL FOR THE SELECTION OF FIRM VALUE DETERMINANTS

To formally study the changes of patterns in three business models, we build a regression model which explains the impact of revenue and income to firm value. With this model, we attempt to evaluate the dynamic stages of pure e-tailers, C&M, and B&M. For each, we test the hypotheses at T1999-T2001 as follows.

H5a) The revenue has a positive (negative, or no) impact on market capitalization.
H5b) The income has a positive (negative, or no) impact on market capitalization.
H5c) The level of impact has changed during two consecutive time points.
H5d) The level of impact in C&M is significantly different from that in B&M.

We can derive the conclusion of H5a and H5b by testing the significance of coefficients b_R and b_I in model (1). We need to adopt dummy variables to test the hypotheses of H5c and H5d as in model (2) and (3) respectively. With the results derived from this study, we can conclude the dynamic stages of business models.

Impact of Revenue and Income

The estimated results from model (1) are summarized in Table 5. For the pure e-tailers, the revenue effect was positively significant at T2000 (1.8%) and T2001 (4.7%), and income effect became positively significant at T2001 (0.9%). For C&M, the income effect was positively significant for all times with 0.0% level of significance, but the revenue effect become significant (0.0%) only at T2001. However, B&M has both revenue and income effects significantly positive for all times. These results indicate significantly different patterns between the business models. The impacts measured by the coefficients are depicted in Figure 4.

Pure retailers have moved from exploration stage to growth stage even though there was a big fluctuation in T2000. C&M fluctuated along the income effects, but B&M did not have prominent changes.

Figure 4: Dynamic Behaviors of e-Tailers and Retailers.
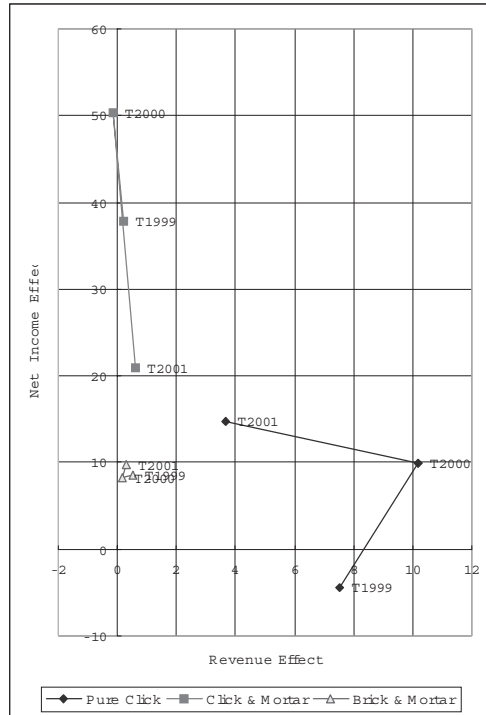
Time Effect

To confirm if β_R and/or β_I significantly changed between two consecutive time points, a dummy variable D is introduced as in model (2).

$$\text{MarCap} = \beta_0 + \beta_R \text{ Revenue}$$
$$+ \beta_I \text{ Income} + \beta_3 D + \beta_4 \text{ DR}$$
$$+ \beta_5 \text{DI} + \text{Error} \qquad\qquad (2)$$

where

$D = 0$ if a datum belongs to the preceding time point, and
$D = 1$ if a datum belongs to the succeeding time point.

The interaction variables, $DR = D \times Revenue$ and $DI = D \times Income,$ are included to test the structural changes between the two consecutive time points. The change in revenue can be examined by testing the null hypothesis of $\beta_4 = 0$, and the change in net income by testing $\beta_5 = 0$.

The results are summarized in the right-hand side column of Table 5. According to this study, both the revenue and income effects in C&M were significantly (10%)

Table 5: Revenue and Net Income Effects on Market Capitalization.

	Variable	T1999	T2000	T2001	Structural Changes	
					T99 → T00	T00 → T01
Pure e-Tailers	Revenue	7.533	10.164	3.666	2.631	-6.497
	(Standardized)	(0.492)	(1.314)	(0.637)		
	t	0.865	2.762	2.230	0.359	-1.574
	p-value	0.451	0.018	0.047	0.725	0.130
	Income	-4.365	9.928	14.792	14.292	4.864
	(Standardized)	(-0.214)	(0.625)	(0.530)		
	t	-0.376	1.313	1.855	1.127	0.442
	p-value	0.732	0.216	0.091	0.279	0.663
C&M	Revenue	0.205	-0.159	0.593	-0.364	0.752
	(Standardized)	(0.151)	(-0.105)	(0.441)		
	t	1.339	-1.198	7.060	-1.779	4.678
	p-value	0.183	0.234	0.000	0.077	0.000
	Income	37.768	50.287	20.990	12.519	-29.297
	(Standardized)	(0.799)	(1.063)	(0.542)		
	t	7.114	12.112	8.688	1.832	-5.951
	p-value	0.000	0.000	0.000	0.068	0.000
B&M	Revenue	0.516	0.172	0.284	-0.344	0.112
	(Standardized)	(0.686)	(0.444)	(0.627)		
	t	8.949	5.641	11.131	-5.469	2.735
	p-value	0.000	0.000	0.000	0.000	0.007
	Income	8.503	8.276	9.707	-0.227	1.431
	(Standardized)	(0.273)	(0.529)	(0.390)		
	t	3.567	6.728	6.924	-0.088	0.765
	p-value	0.001	0.000	0.000	0.930	0.446

increased at T2001, and revenue effect in B&M was significantly (1%) increased both at T2000 and T2001.

Effect of Introducing Click to Retailers

To test the structural difference between C&M and B&M, we use model (3) with dummy variable M.

$$MarCap = \beta_0 + \beta_R \, Revenue + \beta_I \, Income + \beta_3 M + \beta_4 \, MR + \beta_5 MI + Error \tag{3}$$

where
$M = 0$ if a datum belongs to C&M, and
$M = 1$ if a datum belongs to B&M.

The interaction variables, $MR = M \times Revenue$ and $MI = M \times Income$, are included to test the structural difference between C&M and B&M. The difference in revenue can be examined by testing the null hypothesis of $\beta_4 = 0$, and the difference in income by testing $\beta_5 = 0$.

The estimated results are summarized in Table 6. According to this study, the structural differences between C&M and B&M are detected as follows:

1) Income effects of click were significant at T1999 and T2000 (0.5% and 0.0% respectively).

2) Revenue effect of click was significant at T2001 (7.8%).

These results imply that by adding the e-tailing channel to retailers, the income effect was apparent in T1999 and T2000, but the revenue effect apparent in T2001.

STAGES OF PURE E-TAILERS, C&M RETAILERS, AND B&M RETAILERS

Based on the statistical analysis already described, we can derive the stages of e-tailers and retailers. To evaluate the impact of revenue and income, we can use the coefficients, the corresponding t-values and significance levels. To see the normalized weight between factors regardless of the scale, let us use the standarized coefficients noted in the parentheses in Table 5.

Stages of e-Tailers

1) *T1999: Late Exploration Stage*
    In T1999, neither revenue nor income has significant impact even though we have expected the revenue impact significant. This may be caused because of the small sample size of 6. In spite of the low significance level (45.1% and 73.2%), it is noteworthy that revenue has a positive coefficient of 0.492, and income has a negative coefficient of –0.214. So we can conclude that the period T1999 was the late exploration stage.
2) *T2000: Late Breakeven Stage*
    In T2000, revenue has a significant (1.8%) impact with a larger positive coefficient (1.314) than income (0.625 with 21.6% level of significance). Since the impact of income is insignificant, the period T2000 belongs to the late Breakeven Stage.
3) *T2001: Growth Stage*
    In T2001, both revenue (0.637 with 4.7% of significance) and income (0.53 with 9.1% of significance) have positive and significant coefficients. So the period T2001 belongs to the Growth Stage.

According to this analysis, e-tailers have progressed its stages from exploration to breakeven and growth stages during T1999-2001.

Stages of Click and Mortar Retailers

1) *T1999: Income Sensitive Stage*
    The income effect 0.799 is significant (0.0%), while the revenue effect (0.151) is small and insignificant (18.3%). So investors in this stage were more sensitive to income than revenue. According to model (3), we can see that the income effect in C&M is significantly (0.05%) larger than that of B&M (see Table 6). So we can conclude that in T1999 the primary contribution of online channel was the enhancement of income. Although the statistical phenomenon of C&M is the same as the maturity stage, it is not appropriate to explain the status of C&M with the stage theory. So let us call this stage an *Income Sensitive Stage*.

2)   *T2000: Income Sensitive Stage*
     The stage in T1999 continues in T2000. The income effect 1.063 is significant (0.0%),
     while the revenue effect (-0.105) is small and insignificant (23.4%). Note that the
     coefficient of revenue is even negative although it is not significant. According to
     model (3), we can see that the income effect in C&M is significantly (0.00%) greater
     than that of B&M. So we can conclude that the online channel was used to enhance
     income in T2000.
3)   *T2001: Balanced Stage*
     In T2001, the income effect 0.542 is still significant (0.0%), and the revenue effect
     (0.441) has also become positive and significant (0.0%). So investors in this stage
     have balanced concern between income and revenue. According to model (3), we
     can see that the revenue effect in C&M is significantly (7.8%) larger than that of
     B&M, so we can conclude that the online channel has significantly contributed to
     the enhancement of revenue effect in T2001. This phenomenon is a keen contrast
     to T2000.

     In summary, we can conclude that the online business in C&M has contributed more
to income in T1999-T2000, and both income and revenue in T2001.

Stages of Brick and Mortar Retailers

1)   *T1999-T2001: Balanced Stages*
     During the entire period of T1999-T2001, both revenue and income effects have
     been positive at 1% of significance. So we can conclude that all periods belong to

Table 6. C&M vs. B&M: Retailers Click Effect.

		C&M	B&M	Click Effect B&M → C&M
T1999	Revenue	0.205	0.516	-0.311
	t	1.339	8.949	-1.216
	p-value	0.183	0.000	0.226
	Income	37.768	8.503	29.265
	t	7.114	3.567	2.861
	p-value	0.000	0.001	0.005
T2000	Revenue	-0.159	0.172	-0.331
	t	-1.198	5.641	-1.416
	p-value	0.234	0.000	0.159
	Income	50.287	8.276	42.011
	t	12.112	6.728	4.639
	p-value	0.000	0.000	0.000
T2001	Revenue	0.593	0.284	0.309
	t	7.060	11.131	1.773
	p-value	0.000	0.000	0.078
	Income	20.990	9.707	11.283
	t	8.688	6.924	1.246
	p-value	0.000	0.000	0.215

the Balanced Stage, and the changed magnitudes of the coefficients of B&M were smaller than those of C&M and pure e-tailers.

SUMMARY OF IMPLICATIONS AND LIMITATIONS

We have studied the stages of pure e-tailers, C&M, and B&M for three points of time: June 1999, June 2000, and June 2001. To evaluate the dynamic stages of the e-tailing business as an innovative venture, we have proposed four stages: exploration, breakeven, growth, and maturity. The stages are measured by the impacts of revenue and income on the firm value. This stage model explains the evolution of pure e-tailers as follows. The year 1999 was the late exploration stage, which has positive revenue and negative income impacts on the firm value. The year 2000 evolved to the breakeven stage, which has positive revenue and insignificant income impact on the firm value. The year 2001 evolved again to the growth stage, which has both positive revenue and income impacts on the firm value.

Unlike our hypothetical expectation, the stage model could not adequately explain the effect of online business to C&M. In this regard, the impact of online channel to traditional retailers was not revolutionary. In 1999 and 2000, the primary contributing factor to firm value was income. On the other hand, both income and revenue contributed in 2001. According to this result, investors were very conservative to the risky investment on the click business to traditional retailers.

However, we have discovered some interesting conclusions between C&M and B&M. C&M had significantly larger revenue and market capitalization from the beginning. This implies that larger retailers tended to invest on the online channels. Unlike C&M, B&M had pursued balanced revenue and income throughout the entire period of this study. However, C&M has performed better than B&M in terms of revenue, income, income/revenue, stock price, and market capitalization. In addition, the revenue effect of C&M at 2001 was significantly higher than that of B&M. In Korea, the revenue growth of many leading e-tailers is about 100%, and they became profitable as the broadband environment widely propagated. This phenomenon gives hope to a second wave of high growth of e-tailers.

A limitation of this study is in the availability of stock prices. To obtain the market price of stocks, we have picked the listed companies in the U.S. stock market. This population cannot explain the behavior of all e-tailers and retailers. In 1999, we had only six pure e-tailers, which listed till 2001. So the small sample size for that period was unavoidable. Nevertheless, this study provides valuable information about the stages of e-tailers and retailers.

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Section II:

Regional Themes

Chapter XI

Fundamental Risk Factors in Deploying IT/IS Projects in Omani Government Organisations

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ABSTRACT

Deploying IT systems has always presented a combination of challenges and risks to decision-makers. Many IT projects have failed to accomplish their cost, schedule, or technical performance objectives. However, the factors that are encountered in deploying IT/IS projects in developing countries differ from those encountered in developed countries due to cultural and organisational reasons. Oman is one developing country that has started, slowly, exploring the use of computer systems to help in improving their business. The case is made that Oman needs to have a coherent IT strategic vision at the national level. Implementing this vision into detailed strategies depends on the high awareness of the positive role IT can play in the economy, counterbalanced by the ability to manage the associated risks. The factors that are associated with implementing IT/IS in Omani government organisations are: human resource deficiency, organisational inefficiencies, and the immaturity of the IT business culture. The risk factors that arise in the context of the Omani culture are contrasted with those that have been reported in the literature.

INTRODUCTION

The software industry is full of experiences about software projects that miss their deadlines, exceed budget, are low in quality, and are delivered not to customer satisfaction (for example Dutton, 1980, Myers, 1995; Brooks, 1995; Flowers, 1996; Glass, 1997; & McBride, 1997). These problems are usually caused by risks to the project that were not anticipated and identified early enough. However, as each software development project involves at least some degree of uniqueness and our technology changes continuously, uncertainty about the end results will always accompany software development (Kontio & Basili, 1996). It is generally accepted that risks, if not managed properly and successfully, may cause IS projects to fail (Charette, 1989; Boehm, 1991; Fairley, 1997). Therefore, the factors that contribute to IT/IS project failure have to be examined since they are sources of project risks. The success and failure of IS/IT projects have been extensively covered in the IS literature (Dutton, 1980; Pinto & Slevin, 1987; Abdel-Hamid & Stuart, 1990; Poulymenakou & Holmes, 1996; Flowers, 1996). Several authors have examined the issue of IS failure for the purpose of gaining detailed understanding of the nature, issues and factors affecting failure (Ginzberg, 1980; Lyytinen, 1988; Ewusi-Mensah & Przasnyski, 1995). Several frameworks have been proposed (Ginzberg, 1980; Lyytinen, 1988; Flowers, 1996; & Karolak, 1996).

Our current research work is investigating risks at the implementation stage of IS projects in Omani government organizations. It aims to answer the following questions: What are the cultural/organisational risk factors involved in implementing IT projects in Oman? And what strategies are needed to deal with those risks? A review of the IS literature suggests that most research that has concentrated on exploring the factors affecting IT implementation can be characterized by the following.

First, it concentrates on businesses. However, public administration theory and management literatures argue that business organizations face a different environment than government organisations, which in turn leads to observable differences in organizational behaviour and management that surrounds the IS implementation.

Second, most studies in IT implementation have been conducted in developed countries like the U.S. and UK. Much of the technology designed and produced in industrialized countries is culturally biased in favour of their social and cultural systems; consequently, developing countries encounter cultural and social obstacles when transferring technology into practice (Hill et al., 1998). There are significant cultural, and organizational differences between organisations in developed and developing countries (Palvia & Palvia, 1996). The aim of this chapter is to contribute to a broader understanding of the IT implementation process by focusing on government organizations in a developing country (in this case, Oman). The analyses of these factors will enable us to recommend mitigation strategies to deal with them.

In this chapter, the cultural and organisational factors affecting IT/IS deployment in Omani government are examined. To provide a context we outline the IT culture of the country. We then establish the theoretical background for the importance of the cultural and organisational factors in the success and failure of IT/IS. The different characteristics of implementing an IS in commercial companies and government organisations in Oman will also be highlighted. Then we discuss specific factors that are relevant to Omani culture. Our focus will be on the cultural and organisational factors: we then conclude with a list of recommended solutions to minimise the difficulties of IT deployment.

Background of IT in Oman

Oman is located on the east of the Arabian Peninsula and is part of the Gulf Cooperation Council (GCC) along with Saudi Arabia, United Arab Emirates, Qatar, Bahrain, and Kuwait. These countries signed a 'Unified Economic Agreement' in 1981 with the aim of creating an economic block. All the GCC countries are classified as either high or upper-middle income, according to World Bank classification. The GCC's combined GDP reached US$250 billion in 1999 while Oman's GDP reached US$15.5 billion. In 1999 Oman's population was put at 2.3 million and it is considered to be the second largest among GCC countries. The use of IT in Oman is booming, although it is not possible to get accurate figures of IT spending. However, it is accepted in Oman that IT use in the public sector is much less than in the private sector. Several reasons contribute to this situation, including:

* *Language:* The private sector uses English as an official language while the public sector uses Arabic. The availability of IS in Arabic is limited.
* *Workforce composition and management styles:* The private sector is mainly managed by expatriates (especially at decision making levels) who tend to possess higher education and better awareness of the potential of IT than Omani nationals.
* *Competition:* Private enterprises are subject to potential competition and use IT to improve efficiency in decision making, while in government organisations bureaucratic rationale, centralised decision-making, and risk-averse culture still prevails.

Oman has only one university (Sultan Qaboos University) that is state owned, funded, and operated. The chancellor of the university is a cabinet minister, and the education is free. There are also few colleges offering diplomas in administrations, engineering, and sciences. In 1998, 260 IT professionals entered the Omani job market: 24 graduated from the local university with either computer science or information science degrees, nine from abroad, and 227 with local IT diplomas. This number is fairly small compared to high demand for IT in Oman, thus compounding the need for expatriates.

CULTURAL AND ORGANISATIONAL DIMENSIONS

Factors Affecting General IS

The acquisition of IT systems has always presented a combination of challenges and risks to decision-makers. The single most important response to software failures since the 1970s has been to increase the rigour of the development process through the adoption of engineering principles (Poulymenakou and Holmes, 1996). Most of the techniques that are adopted in a software development deal with technical aspects of the problem: people are seen as secondary to technology. However, IS projects continue to fail. Several researchers have argued that it is essential to look at IS as social systems, not purely technical systems, for instance Poulymenakou and Holmes (1996) and McBride (1997). Moreover cultural and organisational dimensions play a major role in IS

failures. When studying IS project abandonment, Ewusi-Mensah and Przasnyski (1995) found that organisational and social factors contributed significantly to project abandonment. In his study of the concept of expectation failure, Lyytinen (1988) divided IS failure reasons into four classes: information system, the environment of the IS, information systems development (ISD), and the environment of the ISD. He then broke down those classes to 13 different failure reasons as follows:

- Technical and operational reasons
- Organisational reasons
- Individual reasons
- Environmental reasons
- Method-based reasons
- Decision-making based reasons
- Work-based reasons
- Contingency reasons
- Implementation reasons
- Assumption-based reasons
- Political reasons
- Analyst based reasons
- User-based reasons

Lyytinen characterised the technical and operational reasons, organisational reasons, and environmental reasons as "mostly uncontrolled". This highlights the difficulties in dealing with risks that are caused by those factors. Furthermore, in a Delphi experiment ten years later Keil et al. (1998) found that out of eleven risk factors that were viewed as important by experienced software project managers from three different countries, only one factor involved technology. However, that factor, "the introduction of new technology", was not rated highly in comparison to the other non-technical factors. Contingency approaches argue that failure is highly situational in nature and consequently dependent upon a number of environmental factors, which manifest themselves differently in different circumstances (Poulymenakou & Holmes, 1996). Ginzberg (1980) summarised several key organisational characteristics that affect the implementation of IS. These factors are technology, formal organisational structure, and informal organisational structure. According to Ginzberg, a correlation exists between the routine level of the technology employed in the organisation and the type of IS being implemented; procedural systems will be less likely to succeed in organisational sub-units employing non-routine technology, and vice versa. The formal organisational structure, the level of bureaucracy, centralisation, and differentiation play an important role in the success or failure of IS. For example, systems that support inter-dependent tasks will be difficult to implement in highly differentiated organisations. Finally, according to Ginzberg (1980), the norms and power distribution which constitute the informal organisation are key to IS success. As information is a key resource in the organisation, power struggle could occur if the system was viewed by some that would take away their information monopoly. This view is also shared by Dutton (1980) in his explanation of how organisational and interpersonal factors influence the implementa-

tion process. Dutton concluded that the greatest determinant was the political environment; he described in detail how the organisational and technical factors were contingent on the political ones. Hence, implementation success or failure in a given situation is seen to be a matter of interpretation, not a unitary phenomenon. Moreover, interpretation may change over time (Myers, 1995).

Taking the contingent approach a step further, Poulymenakou and Holmes (1996) complemented Ginzberg's approach with a framework that divides the variables that affect IS implementation into two major categories. The first category is termed macro contingent variables that are organisational or external in nature. Macro variables are: culture, planning, accountability, irrationality, and evaluation. The second category is termed micro contingent, which are internal or project specific variables. These are: power and politics, resistance to change, and development methods.

McBride (1997) applied the contingent approach to the study of the Communication Company Executive Information System (EIS). In addition to the variables by Poulymenakou and Holmes, McBride added three macro variables based on his analysis of the Communication Company case study: (i) technical awareness, (ii) organisational structure, and (iii) business environment. Moreover, he added two micro variables: (i) strength of organisation needs to the project and (ii) technology shift. He concluded that there is a close and dynamic relationship between the IS and its organisational environment. He also emphasised the importance for IS to be adaptable to the changing needs of the business. In his words: *"IS that fail to adapt to changing environment conditions die and are replaced by new systems."* The macro and micro variables identified in this section are summarised in Figure 1.

The important role the cultural and organisational factors play in the success and failure of IT systems cannot be ignored. Socio-technical theorists argue that if *"systems are regarded in purely technical terms, the result may be sub-optimised, organisationally and socially deficient systems"* (Poulymenakou & Holmes, 1996).

Factors of Importance to Government Organisations

The acquisition of IT systems is increasing rapidly in Oman. Omani government organisations are facing serious challenges in the effective use and deployment of IT systems. Public administration theory highlights the differences between private and government organizations, and this has been a topic of on-going research. For instance, (Heeks, 1998a) identifies public and private sector differences under five broad headings: efficiency, decentralisation, accountability, resource management, and marketisation, with the implication that these are worthy goals achieved in the private sector and frequently lacking in the public sector. Be that as it may, government systems share many of the risks, factors and characteristics with standard commercial systems, but in addition Flowers (1996) has identified that they differ as shown in Table 1.

And, according to the same author, the process of building large and complex government IS is affected by situationally specific constraints (as shown in Table 2).

The cultural and organisational environment of Oman possesses some peculiarities that are not found in the Western cultures where previous research has concentrated. However, these factors do correlate with many of those identified by the Institute for Development Policy and Management (see for instance Heeks, 1999). Other researchers suggest that IT in developing countries is faced with the following issues; IT introduc-

Figure 1: A Summary of Contingent Variables Affecting IS Deployment.
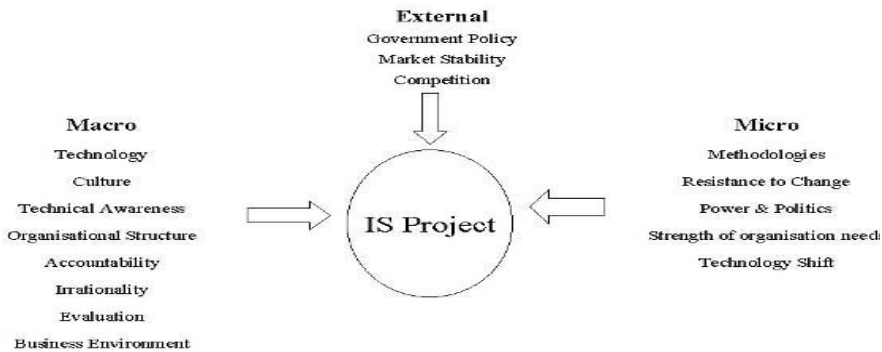
tion is fairly recent (Hassan, 1994), cultural constraints (Goodman & Green, 1992; Ein-Dor et al 1993; Hasan & Ditsa, 1999) under utilization of data resources (Baron, 1976; Ibrahim, 1985; & Attiyah, 1991), poor information culture, IT professional manpower turnover (Khan, 1991), low use of advanced management techniques, low human resources, operational use of IT, and poor IT infrastructure (Harris, 1995). We believe that many of these factors (and additional ones) are associated with the deployment of IT/IS in Omani government organisations, and these need to be explicitly identified. This corresponds with what Moynihan (1997) has argued: that building a single, all-encompassing risk taxonomy for use by all software developers is unrealistic since that does not take the context in which the project is implemented into consideration. In the Omani context we have categorised the prevalent factors under the headings of *human resource deficiency, organisational inefficiencies, and the immaturity of the IT business culture*. This chapter looks at the origins and the manifestation of these factors from the outlook of the Omani culture and offers some solutions for dealing with them. However, it must be borne in mind that although these factors are discussed separately for clarity, in reality they often have strong influence on each other (Pinto & Slevin, 1987).

RESEARCH METHOD

The phase of the research reported here aimed to identify an initial set of risk factors that were believed to be influential in determining the success/failure of systems implementation in Omani government. The approach taken was to determine initial factors using local expert opinion and to compare this against the relevant literature. The next phase of the research is concerned with the validation and weighting of these factors. Several factors were identified from the first author's experiences of working, for many years, in IT projects in Oman and also from the various viewpoints of the delegates that attended a workshop on "*government information systems success and failure*" that took place in Muscat, Oman on the 14th of October, 1999 (Al-Wohaibi, 1999). The objective of the organiser was to gather a discussion group of experts to gain

Table 1: Typical Government IS Characteristics.

Factor	Typical government IS characteristic
Size of data	Intended to serve millions of people and deal with huge volumes
Uniqueness	Unique and bespoke.
Complexity	Complex: reflecting a core complex legislation
Timescale	Very long development
Cost	Very high

different perspectives on the issues surrounding software failures in Oman. Therefore, in the workshop speakers were selected from varied backgrounds in academia, commerce, and government. They represented a good cross-section of the talent that is currently working in the area of information technology in Oman and reflected the international make-up of this expertise. The nationalities represented included: Omani, British, Jordanian, Indian, Syrian, Egyptian, Ukrainian, and American. Around 40 IT professionals attended the workshop, and speakers were as follows: two from the local university, three IT directors, and two IT consultants from large local IT companies. The workshop consisted of two sessions, each followed by a panel discussion. The first session provided a theoretical review of risks, success and failure factors. It consisted of three presentations. The first was from a researcher in the Computer Science Department (Sultan Qaboos University) and highlighted the role of methodology on minimising risks. The second was by the head of the Information Systems department (Sultan Qaboos University) who proposed a database approach to IS development and alignment of IT and business strategies in IS projects success. The third paper was by the first author and covered the contingent view of IS success and failure. In the second session, two IT consultants and two IT directors presented four papers from government organisations. These papers presented experiences of implementing IT projects in the public

Table 2: Typical Government IS Development Constraints.

Factor	Typical Government IS Development Constraints
Politics	Priorities may be refocused: for instance as a result of changes in government policy.Impositions of external deadlines: primarily for political reasons
Decision making	Highly bureaucratic decision-making processes. High level of public interests and oversight
Management	Short-term tenures of managers overseeing projects
Lead from	Technology led
Uniqueness	Custom systems rather than packaged preferred.
Cost	Low-cost solutions not sought

sectors and highlighted the risks involved from the viewpoints of the IT practitioners. A final panel discussion helped in summarising the various risks that were raised in the workshop. A report of the workshop proceeding can be found in Al-Wohaibi (1999). The individual factors raised at the workshop were then categorised by the authors and presented to a panel of experts that consisted of three IT researchers: two from the local university and the third from abroad. The panel deliberated and reached the following three risk categorisations: human resource deficiency, organisational inefficiencies, and the immaturity of the IT business culture.

FINDINGS: THE FUNDAMENTAL RISK FACTORS DETECTED IN OMANI GOVERNMENT ORGANISATIONS

Within each of the three risk categorisations (of human resource deficiency, organisational inefficiencies, and the immaturity of the IT business culture), the expert discussion group identified more specific risk factors. These are discussed below.

Human Resource Deficiency

Limited Expertise

IT expertise in Oman is in the hands of expatriates who mainly come from the Indian subcontinent. In the majority of cases, the professional level of these specialists is below international average level, as they have limited IT background and experience on arrival. The investigation by Heeks (1999), which focused attention on the skills of the Indian subcontinent, refers to its skills base as being focused at the "coding" level rather than at higher levels of analysis, design and organisational requirements (Heeks, 1999, p.9). In Oman it has been observed that these expatriates are contracted to work in the public or private sectors for one to two years: they are trained and gain some expertise, then leave to better paying jobs in western countries (typically in the U.S. or UK). This situation has also been detected in other developing countries (Khan, 1991) and the worldwide shortage of IT professionals is intensifying this problem. The local IT professionals, however, do not change jobs as frequently: therefore any expertise that they develop remains as a resource for country. Unfortunately, the Omani IT professionals are in a minority, therefore, most specialists leave and take their expertise with them. This leaves the government department in a dilemma. It is generally understood that adding new staff as a substitute to departing team members makes matters worse due to the learning and induction time required (Brooks, 1995; Flowers, 1996). While it is true that acquiring IT and IS specialists is very expensive, it is also recognised that in a young IT culture, there is no other way to stimulate development than to use imported talent and then to develop plans and train local people.

A separate consideration that reflects the issue of "limited expertise" is that the expatriate IT professionals, even when they have the technical skills, lack relevant expertise since they are unaware of the Omani environment: its terminology and the problems and needs of the management and users. Coming from different cultures, they usually have difficulty understanding the social and organisational intricacies and

norms and cultures of Omani government organisations. The issue of the developer's knowledge of the country's language and culture has also been observed by Moynihan (1997). However, in his analysis of two popular risk taxonomies (Barki et al., 1993; Carr, 1993) this factor is simply not present.

Currently the local universities and other higher educational institutions in Oman are not producing enough analysts, designers, programmers, etc. Expansion is a function of perceived needs, financial investment, and the availability of skilled teachers. The shortage of skilled and experienced analysts and designers, and their cost of employment is becoming a serious administrative problem. Importing these professionals on a temporary basis means that artificially high salaries must be paid. We believe that while this problem is not unique to Oman it is of particular concern given the rate at which new IT installations are happening.

Most of the government organisations have a small IT department that is under-staffed, and depends heavily on support from local companies. Many, if not all, have relied on local IT vendors for the implementations of IT with minimum intervention from the organisation's own IT personnel. For that reason IT staff have been kept at a minimum with minimum resources in most of the government organisations. Interestingly enough, although government organisations are usually large in size, these findings agree with those of Edwards et al. (1997) in the context of small to medium commercial enterprises in UK. Furthermore, due to the high dependence of local companies on an expatriate IT workforce and the high turnover rate of staff, public sector organisations are in a dilemma about how to build and maintain expertise and effective customer-client relationships.

Non-Technical IT Management

Omani IT managers in the government mainly come from non-technical disciplines. Due to the scarcity of qualified and well-trained professionals, personnel who are largely untrained have obtained key positions. However, it is fair to say that this situation is slowly changing, as the number of Omani graduates that possess higher degrees and professional training in IT is increasing. The scarcity of IT expertise forces government departments to rely on external consultants as outlined above and, in the majority of cases, this means inviting somebody from abroad. As a result, this leaves government organisations open to potential manipulation by external consultants and suppliers. Moreover, as Arunkumar (1999) has explained: this problem can result in a loss of opportunity to both the IT companies (which manifests itself as lost business at the right time), as well as to the government departments (in terms of lack of progress in implementing new and appropriate solutions).

Poor Training

The funding available for training for both the users and the IT staff is low in most government departments. When setting up project requirement, very little attention is paid to the training side: this complicates the technical support process. On the other hand, trainers working in IT training institutes in Oman often lack the practical experience of working in a modern industrial environment. When somebody wants good training the only choice is to go abroad.

The very high cost of the professional training, and very high possibility that the trained staff will leave the government organisation or company with a better offer as

00488 Al-Wohaibi, Masoud and Edwards

Table 3: Internet Growth in the Gulf Region Including Oman[1].

Country	TLD	1995	1996	1997	Growth
Bahrain	.bh	0	142	841	592%
Iran	.ir	18	271	285	105%
Iraq	.iq	0	0	0	na
Kuwait	.kw	220	1,233	2,920	237%
Oman	.om	0	0	5	na
Qatar	.qa	0	0	21	na
Saudi arabia	.sa	2	27	57	211%
Uae	.ae	0	365	1802	494%
Yemen	.ye	0	0	2	na
Gulf Totals		240	2038	5933	291%
World Totals		4,852,000	9,472,000	16,146,000	170%
% In Gulf Region		0.005%	0.022%	0.037%	

[1]From the *Communications of the ACM*, 41(3), 1998, pp.19-25.

soon as the training is complete, put organisations in dilemma. Yet there is no other choice for government organisations but to train their specialists as much as possible if they want to improve the quality of their IT professionals. Putting in place a national strategy to produce IT-competent workers and IT professionals is both a necessity and an investment for the future of the country. As Heeks (1999, p.11) states: *"The best governments also work with providers–including private trainers–to target the analytical and managerial skills that the developing world so crucially lacks"* and in the same paper he cites Ireland's success in metamorphosing from *"...poor rural backwater to Celtic Cyber-Tiger"* with half the population going into tertiary education where considerable emphasis is placed on IT courses.

Organisational Inefficiencies

Lack of IT Technical Awareness

Low awareness exists among higher management of the strengths and weaknesses of IT and the role that it can play. Top management usually has either a naïve view that IT can solve management problems and improve inefficiencies, or is unaware of what IT can accomplish in terms of improving the decision making process. Other authors have also cited the risk of low IT awareness (Carr et al., 1993; Barki et al., 1993; McBride, 1997; Moynihan, 1997). The use of computers in government is much less than at commercial companies as explained earlier. This is accompanied by low IT literacy within the potential user community. For example, the Internet has been accessible in gulf countries (including Oman) for only a few years and the level of Internet penetration is still very low. Whereas in modern industrial countries, computer and Internet connections are as common in many houses as a telephone or TV. Table 3 shows the Internet growth in the Gulf region.

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Bureaucratic Decision-Making Process

The decision-making process within the government is either highly bureaucratic, or depends on a "one-man show". Decisions are made top down with very little planning, consultation, and evaluation of alternatives. In fact some IT projects approval depends on how loyal, or close, the IT directors are to the top management. This lack of collective decision making is highlighted in the absence of the role of IS steering committees in Omani government organisations.

The tendering and procurement process for IT systems is the same as that used for other government projects and contracts. It does not take into account any of the special risks that impact an IT system alone. This has the impact of hindering the complete analyses of the specific issues and risks that surround IT projects, and lead to increased costs, since IT suppliers may well increase cost to protect themselves from the many unforeseen risks ide the projects. Top management see a software development contract as something that is well framed, the objectives are well defined, the deliverables are well defined and so on. Nobody wants to hear about failure. This factor is a common characteristic of government projects (Flowers, 1996) and similarly reported by other researchers (Keil et al., 1998). Senior management demands that they want solutions and they don't want to hear about problems. They don't appreciate that the software is an intangible commodity although it is the most tradable commodity.

Lack of Unified IT Strategy

The Omani government does not have a unified IT strategy at the national level. There is no single government agency that is responsible for setting up guidelines and standards for IT acquisition at the national level. Each Omani government organisation acquires IT differently, and many times the acquisition process will vary within the same organisation from project to project. This leads to redundancies and incompatibilities of information systems among government organisations, and hinders or complicates government systems interconnections and data sharing. Compounding this problem, very few Omani government departments have an IT architecture at the organisational level. Without the proper IT architecture, it is hard to set out plans for IT strategies.

The gap between operational and informational processing is very high. Most of the systems that are operating in the government organisations are operational in nature, and systems that support management decision-making process are almost non-existent. Local IT departments are still working on the level of "application specific view" with multiple isolated databases and application programs (Boreisha, 1999).

Poor IT Infrastructure

The IT infrastructure is still in its initial stages and the country is in need of an information superhighway. However, the government has not developed the vision for the creation of an information highway, let alone an information superhighway. In many countries telecommunications companies (under some government supervision) are leading the way in pushing out plans for information highways. Where as in Oman, the local telecom provider (owned by the government) does not have coherent plans to set up an information highway. This impacts on local companies, banks, and government agencies that are having difficulties obtaining the required leased lines with the

appropriate bandwidths. This factor is a characteristic of other developing countries as reported by Palvia and Palvia (1996) and Heeks (1999). However, in Oman it is further amplified because the country is scarcely populated with pockets of dispersed inhabitants. A powerful IT infrastructure would allow an expansion of computers into shops and households, and provide the environment in which IT literacy and competency can be raised: thus enabling the significant growth of Omani IT professionals. Such strides can be made towards an effective IT infrastructure where a government adopts such a national strategy; example success stories include such disparate countries as Singapore and South Africa (Heeks, 1999).

Immature IT Business Culture

The lack of IT maturity and IT professionals in Oman impacts significantly on practical project planning, implementation and management. The following subsections expand the discussion of these areas.

- Limited Use of Project
- Management Approaches
- Limited Use of Methodologies

The systems analysts and designers working in Oman, in general, do not follow any of the well-known western analysis and design methodologies such as; Jackson systems development, Yourdon, SSADM, and Object Oriented Analysis and Design. They simply utilise various unsound assumptions, beliefs and tricks, developing systems with the help of their personal 'know-how'. Their work is carried out by following a trial-and-error approach. This method continues even after the completion of the project. IS project managers needs to understand that intuition alone may not be sufficient to handle the complex and dynamic interactions characterising a software project environment (Abdel-Hamid & Madnik, 1990).

Poor Project Costing

The estimations for the project cost and time are usually badly judged. No one really knows how to estimate how long a given software project ought to take, how much it should cost and how efficiently it will work. Most managers have low knowledge about project control. This causes frustration and mistrust. Currently project costing does not include the cost of manpower (i.e., the salaries of the IT team) that is involved in the project. Therefore, if the project gets delayed, it is very hard to calculate the cost increase that was a result of this delay. In the West there is a large body of experience in particular application areas which enables managers to make reasonable estimates (Boehm, 1991; Bowers, 1994; Fairley, 1997; Kansala, 1997). Managers in Omani government organisations have either little basis for estimates or they depend totally on whatever is estimated by software companies. These companies in general give more consideration to their own interests than those of the customers.

Unclear User Requirement

Senior management and users in many Omani government organisations can't state what they want the IT system to accomplish. Analysts and designers assume that Omani

government organisations can express their requirements in a complete and comprehensive way. Past experiences reveal that the requirements of most of the Omani organisations were not stated fully at the beginning of IT projects. The lack of knowledge about their actual requirements and the specification of these requirements have resulted in many ill-defined IT systems. This is a common factor that has been extensively reported upon by many authors in the context of systems development (Carr et al., 1993; Jones, 1996; Moynihan, 1997; Keil et al., 1998).

Lack of Project Control

As part of the 'accountability' of government-sector projects, invariably it has been found that there is no external consultancy role or an audit role during the implementation of major IT projects in Oman. Consequently, the objectives of the project and means of measure of the achievement of the same become somewhat clouded and hazy with time.

Risk Indifference

Government and businesses perceive risks differently. In businesses risks almost always equate to money, this makes businesses pay more attention to their IT projects to protect them from failure. Working in a government organisation in Oman is considered to be a lifetime job, and it is rare to encounter a person who has been reprimanded or lost his job for doing poorly in a project, or as response to a failed project: IT or otherwise. Perhaps this has to do with the social role the government plays in the society, being the largest employer. This job security leads to complacency and reduces the need for management to be aware of the importance of risk management, which is still very low in the Omani society.

Lack of Collaboration

The lack of collaboration and cooperation between government, business and the academic community in Oman is too great and has led to two things: *first* the government does not benefit from the IT expertise that is available in the academic community. For instance, when a government organisation needs an assistant in a large IT project, it usually looks to external consultants for help and guidance almost forgetting the local academic expertise. At the same time the Omani academic community concentrates on teaching and publishing papers in international journals, on topics that have little relevance to the Omani IT culture. *Second*, IT graduates from the local universities are sent out to the market without the proper practical experience. The syllabi for teaching various subjects in IT are not well organised or up to date. They do not fulfil the requirement and expectations of the IT industry and do not reflect the ever demanding and fast changing nature of IT in Oman.

Lack of Public Oversights

Unlike the West where government projects enjoy high level of public interest and oversight (Flowers, 1996), this is not the case in Oman where IT projects enjoy little public scrutiny. This is largely a result of the political system in the country where the public has little involvement in the political life and government spending. As a result, government organisations implement their IT projects without worrying about the public. This sometimes leads to complacency.

Also, IT systems face the risk of becoming technology-led (Flowers, 1996) rather than concentrating on the customer requirement, since there is no fear of competition nor that the customer (the public) will take their business elsewhere.

Reliance on Localised Systems Solutions

Omani government departments use custom-made software more than packaged. This is a common factor to many government organisations as reported by Flowers (1996). It is due to three reasons: the *first* reason has to do with the special role that government plays in the society (Flowers, 1996), it is sometimes hard to find packaged software that can fulfill their requirements. Generally, the tendency within government organisations is to always project that their systems are unique and no package will even fit even 60% of their requirements. The *second* reason is the unwillingness to internally take a fresh look at the government's business processes and perhaps try to change them for the better and thereby adopt industry standard practices which are more amenable to be implemented within a package. Therefore, management should appreciate that introducing a new IT system will bring changes to the users' work environment and should prepare the users to accept this change. Top management in government organisations should fully comprehend that deploying of an information system means serious organisational changes. Without these changes even the perfect IT will bring very little improvement. It is an exercise of complex human relationships and teamwork that impact the culture of the organisation (Boreisha, 1999). This means that we are not in the scientific sense dealing with a closed technological system. The fact that IT implementation involves socio-technical issues means that by definition it is an open system. It is not contained, and that itself will generate risks (Sauer, 1993; McBride, 1997).

The *third* reason is that most of the software packages were available in the English language, whereas Arabic is the official language of Oman. Therefore, it is sometimes hard to find applications that are completely *Arabised*; even popular packages such as a human resource or finance packages are not. The user interface and software documentation are mainly in the English language, which is not familiar to many users. To implement the software efficiently, there is an acute need to have efficient translation facilities from English to Arabic. However, it is fair to note that this is changing as most major software vendors are now providing extensive multilingual support. Table 4 summarises the factors affecting IT/IS deployment in Oman and identifies those factors that have been discussed in previous literature.

PROPOSED SOLUTIONS

In this section we consider some possible solutions to help overcome the risks discussed earlier. Several risk factors are intertwined and have a common solution. Overcoming these risks depends heavily on government organisations performing more risk-oriented practices. This in turn depends on the existence of high awareness of risk among the IT community and upper management in Oman. We have grouped the factors that are intertwined and have common solutions below and a summary of which can be found in Table 5. Although these issues have arisen in the Omani situation we believe that they are generally applicable to other developing countries especially GCC countries which share many social, economical, and cultural characteristics with Oman.

Table 4: A Summary of Risk Factors Observed in Oman.

Category	Factor	Discussed elsewhere
Human resource deficiency	Limited expertise	Khan, 1991; Moynihan, 1997; and Heeks, 1999
	Non-technical IT management	✘
	Poor training	Jordan, 2000
Organisational inefficiencies	Lack of IT technical awareness	Carr et al., 1993; Barki et al., 1993; McBride, 1997; and Moynihan, 1997
	Bureaucratic decision making	Flowers, 1996; and Keil et al., 1998
	Lack of unified IT strategy	✘
	Poor IT infrastructure	Palvia & Palvia, 1996; Avgerou, 1996; Heeks, 1999
Immature IT business culture	Limited use of project management approaches	Abdel-Hamid & Madnik, 1990
	Risk indifference	Carr, 1997; Kontio & Basili, 1997; Boehm & deMarco, 1997
	Lack of collaboration	✘
	Lack of public oversights	✘
	Reliance on localised systems solutions	Flowers, 1996, p 128

Limited Expertise, Non-Technical IT Management, and Poor Training

Develop a plan to train the local people. A lot of financial and organisational support is now a must, as far as training is concerned. Separate budgets must be allocated for training. Jordan (2000) argues that top management should treat IT training as a strategic issue, the same way they treat information technology, finance, and marketing. For instance, as a rule of thumb, 25% of every IT project cost and time must be allocated for training (over and above the project cost). Furthermore, promoting high-skilled IT technical management will help IT planning and reduce the risk of IT acquisitions.

Lack of IT Technical Awareness and Risk Indifference

Give more emphasis to IT literacy in Omani government organisations. A strong and wide IT awareness base can be built by introducing computer science as an optional subject at secondary schools and introduce the use of the Internet. The benefit of this approach is that in the future there will be a large body of IT systems-aware people in the community in which advanced training courses can be built.

Create awareness that risks are ever present. It must not only be in the minds of senior management. It must be in the minds of the organisation or even the society at large. We should not underestimate the receptivity of society. People can deal with risks if they're told about it (McBrierty, 1999). The importance of risk awareness and the difficulties encountered when managing risks are widely covered in literature (see Carr, 1997; Kontio & Basili, 1997; Boehm & DeMarco, 1997).

Lack of Unified IT Strategy and Lack of Public Oversights

Oman needs to have a coherent IT strategic vision at the national level, fully informed by the future needs of the country, with clearly defined economic and social agenda. More than eight years ago improving IS strategic planning was found to be at the top of Omani chief executives' concerns (Badri, 1992). This vision still needs to be translated into detailed strategies that could be implemented by the different government organisations.

There should be a single government agency that is responsible for setting guidelines and standards for IT acquisition at the national level. It is important that the Omani government initiate policies that encourage innovation in IT and encourage widespread IT use among government agencies. Several developing countries have used this approach in order to promote the role of IT in economic development. The most successful examples are Taiwan, Singapore, and South Korea where government agencies have coordinated IT policies since the 1980s (Palvia & Palvia, 1996). Furthermore, other developing countries (i.e., Malaysia, Bahrain, Jordan, South Africa, and Egypt) have created IT steering bodies for the same purpose. Unlike developed societies,

Table 5: A Summary of Risk Factors and Corresponding Recommendations

Risk Factors	Recommended Solution
Limited expertise Non-technical IT management Poor training	Develop a plan to train the local people. Promote a high-skilled IT technical management
Lack of IT technical awareness risk indifference	Emphasise IT literacy in omani government organisations Create awareness that risks are ever present
Lack of unified IT strategy Lack of public oversights	Create a coherent IT strategic vision at the national level Create a single government agency that is responsible for setting guidelines and standards for IT acquisition at the national level. Emphasise enterprise computing
Poor IT infrastructure	Create a vision for a powerful and modern IT infrastructure and implement it. Form a task force to network government information systems
Limited use of project Lack of collaboration	Wider collaboration and communication between business, management approaches, academia and government Improve IT curricula at local colleges and universities
Reliance on localised systems solutions Bureaucratic decision making	Promote investments in IT systems Arabisation Take a fresh look at the government business process Promote popular management practices Embrace e-commerce and e-government

organisations in small developing nations look for the government to set the vision and take the lead in setting computerization as a national goal, setting standards, providing the infrastructure, and promoting IT awareness. The need for an integrated policy towards informatics and telecommunications was one of the issues facing IT in developing countries (Palvia & Palvia, 1996).

Government can also look into the possibility of establishing Software Technology Parks with attractive schemes for participants and must encourage software exports. Oman imports numerous software professionals every year, and one way to retain talent here is to build a strong local IT industry. This would also attract investments from leading global IT players in the country's IT economy. Examples of similar international initiatives includes the Multimedia Super Corridor (MSC) project designated as a hub for the development of multimedia products and services in Malaysia, and the Dubai Internet City which is to be launched in November 2000. Government organisations, similar to big enterprises, can't work efficiently without moving to so-called "enterprise computing", integrating and sharing their data through the enterprise data model (Boreisha, 1999).

Poor IT Infrastructure

Create a vision for a powerful and modern IT infrastructure: without it a country can't survive in the modern world. In their model of global information technology environment, Palvia and Palvia (1996) grouped countries into four categories based on the issues that dominate the IT environment. The authors stated that the IT environment in under-developed countries is dominated by infrastructure issues, operational issues in developing countries, management and control issues in newly developed countries, and strategic issues in developed countries. The placement of Oman into the under-developed or developing country category is subject to debate, yet the provision of a strong IT infrastructure is a pre-requisite for the proliferation of IT services in Oman. It is necessary to have strong government commitment on expanding the telecommunications infrastructure and reforming the regulatory environment (Avgerou, 1996).

Form a task force to network government information systems; with participation from leading private sector IT services firms. Networking government databases means data could be accessed across government departments, and analysis can make a difference in the quality of policies that are initiated and implemented for promoting economic development (Bahtnagar & Patel, 1988). Examples may be drawn from other neighbouring countries like United Arab Emirates (where telecom, Internet and IT have been given a tremendous boost recently) and the Indian State of Andhra Pradesh (where the entire administration is automated and networked) (Bahtnagar & Patel, 1988; Arunkumar, 1999).

Limited Use of Project Management Approaches and Lack of Collaboration

Local universities should make it compulsory, as part of the degree curriculum, to have an "Industry Practice School". This program should be planned with close coordination between the academic community, government departments and the local IT industry. Under this scheme, every student of IS/Engineering would undergo a minimum of three months apprenticeship in a local company or government department.

The project output from this must form part of the final examination. Students will benefit by gaining practical experience and would get to know the working environment in the private and public sectors. This should be a part of a larger drive for wider collaboration and communications between the local computer and information science departments and their customers, the government departments and the local IT industry. Oman has only one university and a few private colleges offering diplomas. Thus, with its small population it would be both feasible, in the interest the government, and under its jurisdiction to adjust its policies in favour of supporting wider IT collaboration and networking among government entities. It would make local IT and computer science departments more in tune with the requirements of the new economic environment in the information age and ensure that their curricula would be refocused to reflect the demand for the relevant courses. The field of IT is changing rapidly: concepts such as object-oriented analysis and design, e-business, and Web- based applications development are embraced by academic schools worldwide and transformed into courses within their curricula; Oman needs to incorporate such topics into its local university and colleges. This approach should attract good students who will be the IT decision-makers of the future.

Reliance on Localised Systems Solutions and Bureaucratic Decision Making

Promote investments in IT systems Arabisation. This could be done by the collaboration of the Arab world to push the research in these areas. Avgerou (1996) suggested other research and development areas in IT for developing countries in general. Moreover, institutions world-wide should be encouraged to research these issues. There should be a pool of expertise in the Arab world to guide and direct progress in translation techniques. Emphasis on IT training could be the solution to the Arabisation issues, as today the IT knowledge and Arabic knowledge seem to be mutually exclusive. Local software talent must be groomed to develop software in Arabic. At the same time, we must remember that in the fast-shrinking global economy and a highly networked world, English is the vehicle of information interchange. While Arabic interfaces are required at operational levels of IT systems, English awareness must be fuelled at a more intensive pace among government departments.

Furthermore, the diffusion of IT in the public sector in Oman is dependent on the government investing in management reform. Government organisations must take a fresh look at their business processes to make them more in tune with popular management practices. E-governance and e-commerce are very big and immediate threats to the traditional ways of conducting business and administration, and it is in the interest of the entire economy that the government moves rapidly to embrace these new global practices.

LESSONS FOR OTHER DEVELOPING COUNTRIES

The factors addressed earlier were based mainly on the experiences of professionals working with government organisations in Oman. However, the comparative literature on IT in the developing world that has been reviewed indicates that the findings and suggested solutions would apply in government departments of similar economical and

social cultures. In particular, Palvia and Palvia (1996) have found that organisations in the developing world face similar IT issues, and Heeks (1998b) believes lessons from Brunei, the Middle East and other small mineral-rich countries have resonance from one to another. Therefore, the outcome of this research may be of particular interest to GCC countries that have many political, economical, cultural and social characteristics in common. To summarise, the following strategies would benefit developing countries in minimising the risks of deploying IT:

- **Create a national IT strategy and implement it**: Developing countries need to set up a vision of where the country is heading in the information age and the role IT should play in the country's future economical environment. This vision should be translated into working strategies that can be implemented. One way to expedite implementation of IT strategies is to set up a single government agency responsible for setting guidelines and standards for IT acquisition at the national level. It is important that this agency plays a consultative role and avoids being a bottleneck or hindrance to IT acquisition by government departments. One of its objectives is to oversee a task force to network government Information Systems such as health organisations, educational institutes, libraries, and public service organisations. Networking means sharing information, linking databases, and establishing information channels. This should translate into better planning, less data redundancies, and improved efficiency in the public sector (Bahtnagar & Patel, 1988).

- **Create a powerful and modern IT infrastructure:** The weak IT and telecommunications infrastructure of developing countries within the global economy is too obvious (Avgerou, 1996). Governments in developing countries should influence the creation of a strong information highway in which services are widely available and at the same time cost effective for the local users and industry. This means the creation of a sophisticated deregulated environment in which public inefficiencies are not substituted by private monopolies.

- **Improve IT education and awareness:** Educational policy-making bodies in developing countries may consider improvement in four issues in this regard. *First*, increase in the quantity of IT graduates. *Second* improve the quality of IT education in the country. *Third*, improve in IT literacy and awareness in the society as a whole and in government organisations in particular. Increasing IT awareness among public sectors' management is essential in reducing their IT risk-averseness and understanding the role of IT in improving the decision-making process. *Fourth*, the development of a plan to train the local people; an efficient training program should be developed to improve the technical skills of the local people in order to be able to develop applications, manage computer networks, and maintain systems and networks (Avgerou 1996). This effort would help prepare future high skilled IT technical management, and should be in concert with the actual demands for IT professionals of the private and public sectors.

- **Reform the public sector management:** Developing countries public organisations should take a fresh look at their business process; successful IT applications should be implemented in relation to transformation of organisational structures, ways of working, and decision making. Promote popular management practices;

using formal planning techniques, decisions should be made based on merit and validity, empowerment and initiatives. Emerging techniques such as e-business and e-government are gaining popular support and are a serious threat to the old way of delivering governments services. These initiatives should be seriously evaluated by developing countries in order be able to benefit from the information age.

- **Promote research and development in IT issues:** Avgerou (1996) argues that the objective of research and development for developing countries is to address exploitations of IT to meet their needs rather than discovery of new technology. Development and implementation techniques were created by western industrial societies, and instead of taking them for granted and applying them in developing countries' societies, national and organisational cultural issues should be considered. For example, Arabic-speaking countries should promote investments in IT systems' Arabisation. Research and development is part of a wider collaboration and communication between business, academia and government.

CONCLUSION

This chapter has addressed the cultural and organisational factors that surround the deployment of IT systems in Omani government organisations. A clear understanding of the issues involved is a prerequisite to successful implementation. Some of the risks that have been observed are not unique to Omani government organisations and have been cited in the literature. However, we believe that their impact in Oman is much greater because of the low familiarity with IT systems.

A fundamental solution to the above problems is to create a countrywide IT vision and share it and publicise it within the Omani society. This will create higher awareness of the importance of IT in the economic and social well-being of the country. A remaining obstacle of creating a society-wide awareness of IT and risk management is that of the unavailability of computer literature written in the Arabic language. This is a formidable barrier to the widespread understanding of the benefits and limitations of IT systems in the Arab world.

Directions for Future Research

This article is part of an on-going multi-phase research effort that aims to develop a deeper understanding and evaluation of the above-mentioned factors. A different research method is being used at each stage. In Phase I (reported here), factors were identified from experiences working in IT projects in Oman and from the various viewpoints of the expert delegates that attended the workshop on *"government information systems success and failure"* (Al-Wohaibi, 1999) coupled with review of the literature. This helped us identify risk factors that are of interest. In Phase II, a questionnaire will be mailed to all government organisations in Oman requesting them to rate the impact of the above factors in their organisations. This will enable us to evaluate the relative importance of these and understanding of why certain factors are perceived to be more critical to Omani government than others. Phase III of our research is to undertake detailed case studies of IT projects selected from the Omani government.

In-depth interviews with IT managers, system analysts and selected users will be used to explore and establish relevancy of the factors that were earlier identified by the questionnaire. Data gathered from the case studies along with review of literature will enable us to design an appropriate model to enable IT decision makers in Oman to minimise these risks. The fourth and final phase of the research will be to test this model on a wider range of projects in Oman.

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<div align="center">Chapter XII</div>

Legislation Systems Project:
An Ethnographic Case Study of Computerisation and the Production of Legislation in Tasmania, Australia

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ABSTRACT

The LSP is a project where computerised technology has been used in an innovative manner to assist the creation of and access to legislation in Tasmania, Australia. It has had significant organisational implications and provides an insight into the computerisation of core government processes and the professional area of legal drafting. Particularly, it has induced standardisation and an increasingly technocratic approach with process, role and authority structure changes.

INTRODUCTION

Determining the state of statute law has been a problem in most government jurisdictions based on the Westminster model. Firstly, one must obtain a copy of the original, or *principle* act, plus a copy of all amendments made to it since it was passed. Then the amendments must be manually noted on the principle act. Given that all citizens are expected to have a reasonable understanding of the law, this lack of access to consolidated legislation has been an issue for all Australian jurisdictions and other

governments based on the Westminster model[1]. The Tasmanian Government has resolved this issue by implementing the EnAct system and providing public access to the associated document database via the Internet through the Legislation Systems Project (LSP).

This chapter introduces the LSP and discusses its organisational implications. Although primarily viewed as a technical systems project, the LSP has substantial non-technical implications. As the LSP provides a technical solution of interest to other jurisdictions, the organisational impacts of the project also have wider relevance.

This chapter reports part of a larger research project looking at the social processes surrounding system development as it is practiced in organisations. In focusing on the social reality of what actually occurred during the process, the research highlights some of the adequacies of normative literature in this area and helps fill a noted gap in research on systems development (Lucas, 1981; Franz and Robey, 1987; Myers, 1995). By providing an explanation of the Legislation Systems Project and a description of the resulting changes, this chapter provides an insight into an area of core government activity on which very little has been written, at a time of significant change. In summary, three questions are pursued here:

1.   How does computerisation and an information systems development project, such as the LSP, impact on the creation, amendment and enactment of legislation?
2.   What are the impetuses and influences on such initiatives? and
3.   What organisational changes does a systems development project such as the LSP induce?

The production of legislation is a core government activity, legislation being the "framework in which governments achieve their purposes" (Crabbe, 1993 quoted in Lim, 1993: p 3). Considering the importance of legislative drafting in the workings of government and law courts, there is remarkably little written about the role of drafters, the processes of drafting and the influence of computers. This chapter helps fill this gap by examining the organisational implications of the LSP in relation to related studies of organisational change associated with the implementation of IT.

For purposes of later discussion, it is worth clarifying some terms. *Acts* have been passed by both Houses of Parliament, have received Royal Assent, and define the state's law. *Bills* are acts being debated by the Houses of Parliament, and *drafts* are proposed legislation before it reaches the House of Assembly. The legislative process has two main sub-processes: *drafting* and *enactment* (Mason, 1988). Drafting is the process of articulating policies in a written legal form. Enactment is the process of authenticating and approving documents so they can pass into law.

The chapter will illustrate that, while the LSP has had limited direct impact on the process of enactment, there will probably be substantial indirect implications. It will also describe significant changes to the drafting process associated with the project. In addition to changing the technical infrastructure, the resulting system has affected work processes, roles and authority structures of the office primarily responsible for creating legislation, the OPC. In particular, there has been increased standardisation in relation to computerisation, and a shift towards technocracy.

RESEARCH APPROACH

This research is a real-time, broadly focused, non-quantitative longitudinal study of a single organisation. Data was collected via participant and non-participant observation, interviews and the examination of associated documentation. As this project utilises structuration theory as an ontological sensitising device, it employs longitudinal, historical and contextual research methods (Orlikowski, 1988). Nundakumar and Jones (1997) highly recommended this participant observation research approach but noted it was rarely used.

The case study involved observations covering three-and-a-half years, with concentrated periods of involvement in the first six months and periodically throughout the project. This involved attending meetings, shadowing participants, conducting interviews, observing activities, examining documentation, and sometimes active involvement. Such real-time longitudinal observation is the best way to look at change in its organisational context, but is quite rare (Pettigrew, 1995). Most longitudinal studies tend to examine change retrospectively, so that the reconstructed events tend to ignore the ambiguity and untidiness of real world situations.

A Case Study Using Ethnographic Methods

The use of a single primary study relates to an interpretivist stance. The LSP case study was investigated via ethnographic methods to create a "thick" description of events and issues (Atkinson & Hammersley, 1997). There is no attempt to completely empathise with the subjects in the case study, as the many differing perspectives and world views would have made this impossible and limiting. The subjects of the research primarily included legislative drafters and others in the drafting office, and the separate systems development unit. Separate groups, and individuals within the groups, often had different perspectives on events and issues. The aim was to understand what Geertz (1988, in Harvey and Myers, 1995) termed the "webs of significance". In other words the thick description of the LSP aims to reflect the opinions and world views of those directly involved with the LSP. Participants' responses to early drafts of sections of this chapter suggest that this has been done.

As Applegate and King (1997) point out, the intellectual foundations of case study research are robust. Demonstrable rigour is achieved by making data gathering and analysis techniques explicit and transparent, as is done below. In addition to this, the validity of the descriptions and discussions of this research project are enhanced by:

- aiming to find multiple sources of evidence for each observation (Yetton, Johnston et al., 1994). Each piece of information was checked against other sources to ensure its validity. For example, an observation might be checked against minutes of a meeting (another person's observation) and a question at a later point in time;
- actively looking for negative evidence (Dey, 1993);
- feeding back observations and interpretations to those in the field (Pettigrew, 1995);
- maintaining a log of events and interpretations to aid reflection; and
- ongoing analysis through discussions with research colleagues.

The Role of the Researcher

It is important to reflect on the role of the researcher and how this may have affected the phenomena under investigation (Prasad, 1993). As in any research project, it was impossible not to interact and be part of the observed phenomena even when trying to be a non-participant observer. Giddens (1989) termed the way in which the actions and perceptions of the researcher become part of the social interaction being observed the "double hermeneutic cycle".

On one level, the double hermeneutic cycle describes how "lay members of society routinely reincorporate social science concepts into the world" (Held & Thompson 1989: p 251). When people in the situation under investigation, or similar situations, start using the concepts developed by researchers, it illustrates the utility and plausibility of the concepts developed by social researchers. Hence, towards the end of this longitudinal project, the concepts being developed here were presented to those involved in the study for comment. As well as being appreciated by those in the field, this was a good validity test. The double hermeneutic cycle can also occur within social research projects, so that the actions and perceptions of the research directly influence their observations and results (Dey, 1993). Interpretivists recognise this is unavoidable but that it must be at least partly addressed by actively analysing the role of the researcher as part of the research context.

Initially the research focused on the LSP project as the unit of change. However, later multiple levels of analysis were used, and the relationship between the different levels was an integral component of the research. As Pettigrew (1995) noted, focusing on a project as the unit of change can be problematic, and it can prove insightful to examine change at multiple levels.

Data Analysis

Data analysis involved two primary steps. The first was the distillation of the wealth of information derived from the case studies into a rich description of incidents and issues of the project as it progressed via a process of summarisation. The second step involved the consideration of these incidents and issues against existing and emerging themes. These two steps have been iterative. An iterative approach to theory development is highly recommended (Miles & Huberman, 1994; Walsham, 1995).

Field notes provided an abundance of detail and in order to gain some initial insight into it, it was necessary to try and summarise them. Thick descriptions are an important part of qualitative observations, forming the foundation for further theory building (Dey, 1993; Walsham, 1995). These thick descriptions display the subtleties and some of the multiple perspectives which make up "reality". Many of the recent developments in the social study of technology have produced thick descriptions which have provided a wealth of detailed information, but this needs to be structured if it is to be of use (Bijker, Hughes and Pinch, 1989).

The structure of the thick description was not closely aligned to existing theoretical frameworks and emerged over time. Initially a grounded approach was employed, with observations from the field categorised initially according to incidents and issues which the systems developers and/or users had to contend with as the project progressed.

Over time, some of these incidents and issues seemed to naturally group together around certain themes. Miles and Huberman (1994) refer to this activity as noting patterns and themes, and clustering them.

In the latter stages of the research project, ongoing data from the field and reviews of my notes and other documentation were used to strengthen or discard emerging concepts. During this stage, concepts become better articulated and were sometimes adapted to ongoing observations or further information from other sources. Miles and Huberman (1994) referred to this as building a logical chain of evidence and making conceptual/theoretical coherence.

CONSIDERING THE ORGANISATIONAL CONTEXT OF TECHNOLOGICAL CHANGE

The contextual model described here emerged through the iterative process of observation, analysis of the observations, and a consideration of the literature in the area, particularly Kling's (1982, 1987, 1994) web model. Key elements include: the position of the organisation in the wider context, the technical/process infrastructure, roles, authority relationships, and culture. The supporting literature is consistent with the ontological and epistemological approach adopted.

Orlikowski (1988) predicted that, as organisations adopt information technology as their production technology, it would affect the nature of production tasks, the expertise associated with the production processes, the production strategy underlying the production process, and the organisation of people around the production (Orlikowski, 1988). Orlikowski illustrated the manner in which these predictions unfolded in relation to the implementation of CASE tools in a large accounting/consulting firm. The discussion below will examine the degree to which these predictions seem to be occurring in relation to the LSP, and so builds upon her work.

Relation to Wider Context

A parliamentary system created now would probably be quite different to ones created last century because the technology on which the system could be based would be quite different. Procedures for producing legislation that use computerised information technology could be quite different from ones that do not. Yet, would the implementation of a computerised information system greatly affect existing procedures for producing legislation?

There have been predictions that information technology will greatly change government (e.g., Brussard, 1988). Politicians could sit in front of workstations in parliament with access to electronic versions of principal bills and amendments in either a consolidated or unconsolidated form. Drafters could amend these bills on a real-time basis and the role of the government printer could be eliminated as drafters work directly in the system the members of parliament access.

Despite the opportunities presented by technology, political, legal and structural elements of government are likely to reduce the chance of short-term wider contextual changes. As Kraemer (1991) argues, information systems do not induce reform in organisations, but tend to reinforce existing organisational arrangements and power distributions.

Technical/Process Infrastructure

The technical and process infrastructure is what Kling (1987) termed the "production lattice". Processes are the networks of procedures and activities people complete while pursuing their organisation's goals. The technical infrastructure supports and enables the process structure. Thus, process and technical changes are often interlinked in both theory and practice. Identifying these processes and suggesting improvements utilising new technology is an integral part of systems development and is usually addressed at length in literature in the area (e.g., Hawryszkiewycz, 1994; Shelly, Cashman et al., 1995). With Business Process Reengineering (BPR) (e.g., Davenport and Short, 1990; Hammer and Stanton, 1995) proclaiming the advantages of redesigning business processes and the role of technology as an enabler in this process, the importance of process has become generally recognised. However, often consideration of "organisational" or "non-technical" elements only focuses on process issues, and ignores the many other facets of organisations which impact on and are impacted by systems development.

Roles

Organisations consist of people and their roles in relation to each other. These roles are the "building blocks" of that organisation (Carnall, 1990). Together, a network of inter-related roles form a working organisation. Focusing on how these roles changes in a case study of the implementation of CAT scanners, Barley (1990) concluded that technical change could only be associated with social change if these ongoing relationships were influenced.

Authority Relationships

Within the network of social relationships created as people act out their roles, some individuals have more influence. Patterns of influence are authority relationships that are created and recreated through power. As Giddens terms it, power is the "capacity to achieve outcomes" (1984 in Walsham, 1993: p. 39). It can derive from one's position in the organisational hierarchy or by reference to expert knowledge. Individuals can gain authority due to their position within an organisation, with a supervisor obviously having more authority than her subordinates. This relationship between power and organisational hierarchical relationships is a fundamental aspect of bureaucracy and Weber's (1924) concept of rational legal authority. With the rise of professional groups and the greater degree of specialisation associated with technocracy, however, many roles in organisations are specialised ones for people with perceived expertise in a given area.

Technocracy refers to the legitimisation of actions by reference to scientific knowledge or expertise, or rule by experts, with Centeno (1993) terming it an ideology of methods, as opposed to an ideology of outcomes. Technocracy assumes that value assumptions can be ignored, with other perspectives being dismissed as uninformed, and that "one best way" is possible and achievable by technical experts (Burris, 1993). Technocratic trends had a large impact on the LSP.

Burris noted several characteristics of technocracy, including:

- an increased polarisation between expert and non-expert sectors;
- centralisation is combined with decentralisation in differing configurations. For example, control may be obtained via systemisation rather than personal control;
- skill restructuring;
- expertise as authority; and
- technocratic ideology, which is the assumption that technological imperatives have replaced traditional politics in organisational decision making and there is "one best" approach.

Burris (1993) observed that bureaucratic structures arose in conjunction with industrialisation and termed it a complementary control structure. She suggested that, as production work processes change with computerisation, there are likely to be corresponding changes from bureaucratic to technocratic control structures. These observations are echoed by Orlikowski (1988), who suggests that control need not just exist through social interactions, but can be embedded in the technological infrastructure through policies and so forth. In this way, IT is a medium as well as product of social interaction, and expert authority can become embedded in standard practices.

Culture

Culture greatly influences how an organisation responds to change and is a focus for many researchers (e.g., Cooper, 1994; Robey and Azevedo, 1994; Tibosch and Heng, 1994). The concept of culture is useful because it highlights the importance of social interpretations of cultural artefacts, such as information technology, and recognises that organisations are both enduring and able to change (Robey and Azevedo, 1994). In essence, culture can be viewed as a "negotiated reality" which people experience as an objective reality (Tibosch and Heng, 1994) as it becomes institutionalised and objectified as truths (Prasad, 1993).

Each of these organisational elements provides a lens through which to view certain aspects of change. Together, they assist the creation of a rich description of the research situation.

THE ORGANISATIONAL CONTEXT OF THE LSP

The organisational context of the LSP was the core government processes of enacting and drafting legislation and associated work processes, roles, authority structures, and culture.

Wider Context

Tasmania is the smallest state of Australia, with a population of approximately half a million. The Australian state governments broadly have the same functions as the Canadian provinces and operate according to the principles of the Westminster system.

The production of legislation is a highly complex and iterative process in Tasmania and is similar to other Australian jurisdictions.

For Acts of Parliament, processes of enactment are basic parliamentary processes, where new legislation is presented, debated and passed. Most people are aware of the basic workings of parliament, at least in their own jurisdiction. In a democracy based on the Westminster model, new legislation (called *Principal Bills*) or amendments to existing legislation (termed *Amending Bills*) are presented to one house of Parliament by an elected member of that house. The Bill is then debated and perhaps amended before being either accepted or rejected. In the two-house, bicameral system, both houses must agree to the contents of the legislation before it becomes an Act and can be enforced. Most legislation is signed by the formal head of state (the governor or governor general) before it becomes part of the formal body of statute law. This is the model followed by all the states of Australia and the federal Commonwealth government, the federal and provincial governments of Canada and other governments based on the Westminster model.

The OPC (Office of Parliamentary Counsel) is a centralised body of expertise on legislation, providing services to other government and judicial bodies and the public. The Office aims to produce accurate, readable, and understandable legislation which incorporates agencies' instructions and meets legal requirements and access to consolidated legislation in an affordable and timely manner. It also provides advice to members of the general public, judiciary or other government agency personnel about the statute book. Most of the changes associated with the LSP were in or around the OPC, and so this unit features strongly in the analysis below.

Technical and Process Infrastructure

The background drafting processes and access to legislation once it passes into law are the administrative functions associated with the broader enactment processes. As in other states of Australia, legislation is written by lawyers who specialise in the drafting of legislation, called Parliamentary Counsel or, less formally, drafters. Formally, members of parliament initiate legislation, usually through the Cabinet. It is further developed through consultation between the agency responsible for the area of policy covered by the legislation and the OPC, before it is reviewed by the Legislative Review Committee, printed by the Government Printing Office and debated in Parliament. The division between policy creation and drafting is not always clear, but generally the instructing department is responsible for the policy articulated in a bill while drafters are responsible for its legal effectiveness (Mason, 1988). Amendments made on the floor of either house of Parliament also must be included in the legislation.

Within the OPC, the creation of legislation was, and is, an iterative process between the drafter, the instructing officer and the support staff. The drafters obtain instructions which they attempt to write in a logical and legally binding manner. Before the LSP, drafters generally wrote handwritten drafts, which the administrative assistants typed and returned to the drafters for amendments and corrections. Other support staff tracked cross-references to other legislation and coordinated the administrative side of producing legislation.

Roles

The OPC can be divided into two broad categories of roles: drafters and their support staff. The roles are complementary but quite different in nature. The drafters were all specialised lawyers, most with many years of experience in the field. The work of a drafter involved a great deal of concentration as the requirements of the clients and existing legal requirements were incorporated into the structure of new legislation or amendments. The drafters had a further consultative role as they supported parliamentary amendment, or amendments made on the floor of parliament.

The roles of the support staff were more varied than the drafters' and included an executive officer, a records clerk, three administrative assistants, and generally two part-time proofreaders, though this changed during the course of the project. They all had considerable technical knowledge about the format and structure of legislation and the logistics of producing it.

Authority Structures and Culture

While the OPC could be classed in some ways as bureaucratic, with a strong emphasis on hierarchical relationships, there was also a strong, and sometimes conflicting, emphasis on supporting the individual approaches of the drafters, who saw themselves as experts in their field. As one drafter commented: "We're all one-man bands. Put us together and you get a hell of a cacophony".

Anyone who believed in consensus would not have entered the field of legislative drafting. We're all egomaniacs. We are the type of people who argue over the position of commas in a sentence (transcripts 23/8/1995).

In many ways, the culture of the OPC, and the drafters in particular, can be likened to an academic community, which also comprises individuals who tend to respond critically to issues and work independently. This, combined with the hierarchical legal culture of the unit, meant that managing the OPC was no easy task.

Although on a personal level, many of the drafters and support staff related well to each other, there were perceived divisions between drafters and the administrative staff. Drafters sometimes felt their expertise differentiated them from their support staff, and some of the support staff commented they sometimes felt their contributions were undervalued.

IMPETUS FOR THE LSP

The importance of statute law has increased both generally and in Tasmania, with an associated increase in its volume and complexity. Governments are creating policy in areas previously only covered by common (case) law. While a reprint of Australian Commonwealth Legislation in 1950 involved about 5,000 pages, a similar exercise in 1982 was estimated to include 150,000 pages (Ward, 1981). The trend towards more statute law has not slowed since that time.

These trends, prevalent in most other Australian jurisdictions, were intensified in Tasmania from 1992 to 1996 due to a majority government in parliament, and a general lack of funding. Compared with other Australian Offices of Parliamentary Counsel, the

Tasmanian OPC was under-resourced and the standard of the statute book consequentially suffered. It was the poor state of the statute book, plus the perceived need for a greater throughput of legislation, that prompted the push for automatic consolidation which is central to the LSP.

Access to consolidated legislation was an ongoing problem in Tasmania. Amendment acts were not consolidated into the principal acts and anyone wishing to use acts which had since been amended had to manually include these updates. That is, they would physically cut out sections of the amendment act and stick them into the principle act or correct the principle act by pen. There were three major periodic consolidations of Tasmanian legislation, in 1902, 1936 and 1959. In 1978 a rolling reprint scheme was introduced but fell into disuse due to lack of resources.

The result was a cumbersome statute book that was difficult to understand and apply. For example, the *Racing and Gaming Act* was last reprinted in 1974 and by 1994 had been the subject of 39 amendment acts resulting in over 300 separate amendments which had to be manually incorporated into the principal act. Incorporating these amendments into the principal act was time consuming, prone to error, and directly increased the costs of obtaining legal advice or using legislation. The manually consolidated versions of the legislation, termed 'paste-ups', were cumbersome, even when correct. Significant effort was required to interpret the law, and resulting mistakes impinged on the effectiveness of the judicial courts. Law based on unconsolidated statutes is complex, requiring legal expertise to interpret and so imposing financial burdens on the community. It also impinged on the effectiveness of parliament, and parliamentarians complained about the difficulty of interpreting amendment legislation they were to debate.

The Legislation System Project

Very little computerised technology was used to aid the production of legislation in Tasmania prior to 1993, and advances in information technologies suggested solutions to the identified problems. The project's Business Case Document stated:

The OPC has not benefited from improvements in information systems which have increased productivity in other areas of Government activity. Although at its core, drafting is essentially an intellectual and creative task, the process of producing legislation involves many stages which could be significantly improved by automation and access to better information systems (p. 2).

The LSP formally aimed to provide:
* A legislation drafting and consolidation system within the OPC;
* A legislation database controlled and maintained by the OPC; and
* A communications network that provides access to the Bill drafting and consolidation system, and the legislation database.

Most other state jurisdictions now use document management systems but, while all State and the Federal governments in Australia have the problem of consolidating legislation, this is the first time automatic consolidation has been attempted. Initiated

in 1993, the project was planned to be completed by 1995, but was not implemented until late 1997/early 1998 due primarily to unforeseen technical difficulties.

ORGANISATIONAL CHANGES ASSOCIATED WITH THE LSP

Although the LSP was largely viewed as a technical project, there were significant organisational implications. In the longer term, the project could impact on the way in which legislation is enacted, though these implications have been minimised in the shorter term. Particularly, the development of the system has affected the technical/process infrastructure, roles, authority structures and culture of the OPC.

Changes in the Process of Enacting Legislation and Broad Organisational Changes

On one level, the LSP produced minimal wider changes, but in specific areas, it has, and probably will induce significant changes.

Technological developments in public administration tend to be complex as a result of inevitable inter-weaving of political, judicial and technical aspects (Snellen and Schokker, 1992). The developers of the LSP coped with this increased complexity by avoiding it. In other words, they avoided having to deal with the broad contextual issues and cope with the corresponding risks by carefully embedding the project in the outer organisational context. Thus, changes directly resulting from the system on the broader parliamentary procedures are minimal.

However, the project was predicted to greatly impact on the legislation drafters and their support staff, and the bulk of the description here focuses on this level of analysis. Broadly speaking, the purpose of the OPC and its place in its wider organisational context have not changed. However, there have been some significant specific changes, including:

- *Changes to the evidentiary status of electronic documents*. When the EnAct system was implemented, legislation was stored in a consolidated, electronic format and there were concerns that the legality of this legislation could be questioned. Originally, the Solicitor General believed the source document, which would be the definitive source of law, would still be the original hard copy Act filed in the Supreme Court. Thus, initially the Solicitor General tried to fit the changes to the established norms of keeping official versions of documents on chapter. Later it was decided that electronic copies of legislation should be given at least equivalent status to printed copies, and prima facie be evidence of the written law as of a given date.

- *Changes in the process of forwarding legislation to the Printing Office and the process of printing legislation.* The LSP has significantly reduced the role of the Printing Office. Whereas previously they created the final version of legislation, which was proofread by the OPC, the OPC now provide them with a camera-ready

version. With the launch of a web site to access the EnAct system (see www.thelaw.tas.gov.au), there is also far less need for printed legislation.

- *Changes in how government agencies and the public access legislation.* Publicly accessible consolidated legislation allows lawyers and other users of legislation to reduce costs by eliminating the need to maintain manual paste-ups of legislation and enabling electronic text searching. This is impacting on the roles of those who have been responsible for such paste-ups.

    These changes, although significant in their own right to those involved, are minor compared with the potential changes which could emerge. These include changes to:

- *The methods by which Parliament and instructing agencies receive legislation for review*. Currently, Parliament receives amendments in an insert/omit format, as illustrated in Figure 1. An alternative strikethrough/underline presentation, also illustrated in Figure 1, would allow parliamentarians to view proposed amendments in context and so could improve the effectiveness of Parliament.
- *Tasmania's legislation* Consolidation of Acts within EnAct highlighted a number of errors, many of which were simply grammatical, but some which were significant (one Act was found to refer to a "minister of faeces"). Consolidation may stimulate changes to the statute book.
- *Improved access to legislation by lay people*, as specific legal expertise and considerable time is not required to consolidate legislation.
- *Greater efficiency by government agencies and legal organisations, who are no longer required to maintain their own pasted up versions of legislation.* Units such as the Audit Office and Police spent considerable effort in maintaining their own copies of legislation.

Figure 1: Insert/Omit and Strikethrough/Underline Styles.

Amendment Act- insert/omit style
31   Section 137 (5) of the Principal Act is amended by omitting "subdivision" and "subdivisions" (each twice occurring) and subsituting "division" and "divisions" respectively.

Amendment Act- strikethrough/underline style
Where polling for an election at one or more polling-booths in any Assembly division subdivision or Assembly divisions subdivisions, or polling for an election at one or more polling-booths in a Council division, has been adjourned, only those electors who are enrolled for that Assembly division subdivision or those Assembly divisions subdivisions or, as the case may be, that Council division, and who have not already voted at that election, are entitled to vote at the adjourned poll.

Nature of Work Processes (Technical and Process Infrastructure)

The LSP has not greatly changed the process of enacting legislation. This would have involved substantial re-engineering of parliamentary processes, and this probably would not have been successful. Parliamentary processes aim not so much for efficiency, as is the focus of BPR activities, but the amalgamation of different opinions and interests into policies. Any alteration to workings of parliament could be interpreted as a threat to the existing balance of power between the different political groups in parliament and the resulting debate would probably be significant and lengthy. Any BPR exercise is likely to challenge existing power bases but, in this case, the issues would have been magnified in that the status quo is the formal system of government.

However, there were significant changes to drafting processes. For example:

- Amendments are created using EnAct to "mark up" the relevant principal legislation.
- Drafters can electronically search consolidated legislation.
- Some drafting tasks, such as repealing legislation, will only be able to be completed using EnAct.
- Indexes of Bill and Statutory Rule numbers, Acts, cross references contained in Acts, and so forth, previously maintained by the OPC's records clerk, are not necessary with the new system.

One of the most significant changes was standardisation, especially in the wording of amendment legislation and the processes surrounding the creation of legislation. Standard wordings were required if the new system was to automatically produce amendment legislation from the consolidated legislation in which the drafters marked desired changes. Many discussions were held during the design stage to determine what the standard wordings would be. Through the analysis of LSP business rules, on which the new system was based, OPC standard practices were defined. In other areas, the project promoted standardisation but did not enforce it. Further examples of standardisation in relation to the LSP are provided in Table 1.

Role Changes

Importantly, many of the OPC's administrative tasks were to be eliminated, significantly reduced or substantially changed by the new system. Everyone was assured their jobs would not disappear, but that their nature may well change.

Burris (1993) suggested that computerisation is associated with greater distinction between expert and non-expert sectors, and so reinforces technocratic tendencies. With the implementation of EnAct, the systems developers predicted that people in the office would become more multi-skilled, and divisions between the two groups could be reduced. There has been little evidence of this, except in the role of the new systems administrator. This may be because previously, while there was a strict division between the drafters and the administrative staff, most of the administrative staff were considered experts in particular areas. The administrative staff generally had knowledge about the structure and format of legislation. When discussing keyboarding, drafters recognised

the skills of the administrative assistants, and regarded them as experts. The EnAct system seems to be broadening the role of the administrative assistants at the same time as removing this area of specialisation by providing keyboard training to the drafters. Thus, observations of the LSP do not back up Burris' conclusions in this respect.

Barley (1990) suggested organisa-tional change cannot be seen to have occurred if there are no role changes. The roles of some of the support staff are changing or will probably change. The Executive Officer is taking on the role of system administrator. The roles of the administrative assistants and records clerks remain unclear, and will depend on how the drafters utilise EnAct in the longer term. However, it is apparent their skills will still be required. Far from being threatened with job loss, the administrative assistants have been required to both input previous legislation and support the drafters as they create current legislation. They have done this while learning to use what is widely agreed to be a very complex and sophisticated system.

The most fundamental change will be written legislation in a form that allows easier access to both consolidated and unconsolidated versions of acts, as acts and amend-ments are linked electronically. On the surface, this would suggest that the way the

Table 1: Evidence of Standardisation Associated with the LSP.

Date occurred	Examples of standardisation associated with LSP
6/9/94	Standard interim formats for drafts discussed, and standard amendment wordings.
4/11/94	Agree on standard letters and forms, glossaries, macros, templates.
	LSP processes described based on business rules.
14/11/94	Development of standard forms for OPC.
9/12/94	Process charts for camera ready processes- though deputy chief drafter says these do not define "thou shalt do this".
	OPC now only accept maps and charts in particular formats.
27/1/95	Project manager says drafting will become more standardised with the new system (though later recognise need to override system 23/8/95).
1/9/95	Standardisation of statutory rules structures.
22/11/95	Standard wordings for amendments discussed; CPC comments that "The name of all this game is we are
20/12/95	trying to build some consistency into the way we do things".
5/9/97	Impact analysis report: "EnAct provides a series of steps which represent the logical work flow for the preparation and processing of legislation…" "The entering of the legislative text can be performed in a creative "free form" manner, or by adding each piece of legislation in its final format… Regardless of the method used to draft the legislation, it needs to be modified into the correct structure before it can be converted into SGML" (pp 24-5). "Legislation is loaded on the consolidated database by a commencement utility… As the integrity of the legislation database is based on the commencement dates, the process needs to be completed accurately" (p 31).

drafters create legislation could substantially change and that the roles of the administrative assistants would become redundant. Yet this is not necessarily so. It is possible for a drafter to not change the way they work greatly, so that the role of the administrative assistants expands to include the "marking up" of drafts into the required SGML formats (i.e., including structural tags in the writing). Some of the systems developers have anticipated some drafters may not change their work-practices with the implementation of the new system. Several drafters commented that they will still rely on the administrative assistants to complete large quantities of typing or to mark up and convert the drafters' work into required EnAct structures. Such role changes are still emerging and this remains an area for future research. Essentially, role changes are being negotiated on an ongoing basis as staff learn how to use the system and it becomes embedded into organisational processes.

Changes in the Formal Authority Structures

Those involved in the project claimed the LSP would empower OPC staff to have more control over their work, and would give the management of the OPC more control over the work of the staff. Paradoxically, both predictions seem to have occurred.

The systems developers believed EnAct could help break down the division between drafters and their support staff, as the support staff gained specialist skills and became more multiskilled. With the implementation of the system, the executive officer took on the role of systems administrator, a position that was to give him greater authority. Several other staff members gained authority by having knowledge about particular aspects of the system. In some ways, therefore, the LSP has helped break down the strict separation between the "specialist" drafters and their "support" staff.

At the same time, the drafters were concerned that administrative staff would be able to tell the drafters to conform to standards. They felt this impinged on their area of responsibility and would devalue their experience and hard-earned expertise.

With standardisation embedded in the EnAct system, the management of the OPC could impose standards on the staff of the OPC and so broadly control their work practices and outputs. Of course, most staff had input into the creation and interpretation of these standards. That is, control occurred not only from the top of the office downwards, but over time, as people helped develop standards they would later apply themselves. The new system also provided reporting facilities for the chief drafter to obtain information about drafting files within the office and workflow tools to monitor the progress of each legislative drafting task. Orlikowski (1988) suggested the introduction of computerised technology signals a commitment to systems thinking, and that control can be embedded in such systems. Her conclusions are echoed here.

Cultural Changes

Perhaps the biggest change was change itself. The OPC was a stable organisation whose work processes had not changed for some time. At the beginning of the LSP, staff members generally had little experience with computers and were not overly enrapt in the ideas of the systems developers. One of the systems developers politely referred to the "traditional nature of the OPC". A drafter likened himself and his colleagues to dinosaurs and the systems developers to mammals, thus humorously suggesting he felt threatened.

Other drafters and support staff also often suggested they were uncomfortable with the technological changes being promoted. This impacted on how the systems developers approached the systems development process:

> *The OPC are not taking an active role (responsibility) for specifying their system requirements. The OPC will be required to "sign-off" the Functional Specifications as being an accurate representation of their system requirements. However, this stage is a little late for an effective contribution. The attitude seems to indicate a denial of change. The availability of the drafters' time is a constant issue. A phased implementation (of both technology and procedures) is emerging as the only plausible option (LSP Update, 15/3/94).*

At times the systems developers extended their own cultural norms into the OPC. For example, the systems developers heavily emphasised the importance of documentation and systematic processes. At this stage, it is difficult to see if these imported norms will continue and if changes in the OPC's authority structures will result in cultural changes. Certainly, some OPC staff members felt the systems developers were promoting their own approach and viewed it as "cultural imperialism". On the other hand, others suggested that, as the office's heavy workload precluded OPC management's ability to focus on the quality and efficiency of office procedures and practices, it was beneficial to have some external input.

DISCUSSION

In summary, while many of the implications of the LSP are still to be felt, EnAct has already promoted significant changes, particularly within the OPC. Outside the OPC, there have not been, and are unlikely to be, substantial direct impacts on enactment processes, though it is having a huge impact on people's access to legislation and could have significant longer-term indirect effects. Within the OPC, the EnAct system seems to be changing the way that drafters create legislation, has induced standardisation, and has promoted technocratic authority structures and processes. Other role, authority and cultural changes are still unfolding, but could be significant in the longer term. The project seemed to stimulate change before the system was implemented, and many of these changes were not envisaged or planned. While systems development project management tends to emphasise control and prediction, this research suggests this is difficult, and that emergent issues should be acknowledged and managed. As such, this research backs up recent work by Orlikowski and Hofman (1997).

While some of Orlikowski's (1988) predictions also apply to the changes in the OPC, others do not. Table 2 summarises these observations. Some of the differences between these observations and those of Orlikowski's could be attributed to the differing organisational contexts under examination, the 10 years' difference between the two studies, and the slightly different foci of the research. While Orlikowski's study focused power and control, these issues were relevant, but not central to this study. This study supports Orlikowski's conclusions that computerisation can be associated with moves towards technical rationality, increased formalisation, abstraction and reification of task processes and greater standardisation.

Table 2: Orlikowski's (1988) Predictions on Computerisation and Control and the LSP.

The nature of production tasks	Evidence in LSP Case Study
A shift towards technical rationality	Yes- through greater standardisation, but not completely, as the expertise of individuals is acknowledged.
Increased technical and cultural control standardisation;	More technical control through no evidence of major cultural changes noted.
Deskilling of production tasks overall	Administrative assistants loose specialist as keyboard experts but remain important in workings of office.
Increase of formalisation, abstraction and reification of task content	Yes- through use of standard wordings and SGML structures.
Integration of the division of labour	None observed, but nature of relationship between drafters and administrative assistants still fluid.
The expertise associated with the production processes	
A synthesis of technical expert and managerial roles, achieved through joint project teams or technical managers	Already existing.
A conflict between hierarchical and expert authority (functional & technical territorialism)	Within the OPC, conflict between these two sources of power reduced slightly as individual areas of authority are defined.
The production strategy underlying the production process	
A shift towards generalised problem-solving approaches drafting	Possibly but not necessarily; the system does not prescribe a method for drafting, and the structures required by the system can be enforced towards the end of the process.
Increased programmed customisation; that is, the production of services by standardised problem-solving logic.	Not observed.
Organisation of people around the production processes	
Increased debureaucratisation, with more client participation, multi-disciplinary project teams and loosely coupled semi-autonomous production units	Potentially - not observed at time of system implementation
Decentralisation supported with elements of centralisation, as control is centralised	Yes- through standardisation.

One possible limitation of this study is that it is difficult to firmly claim direct correspondence between changes and their results in a real world situation where there are so many other factors that could have influenced the situation. Other parallel changes, such as the implementation of enterprise bargaining and plain English drafting, changes in the executive government after an election in early 1996, and broad social changes may have contributed to the changes observed. For example, during the time EnAct was being developed and implemented, OPC staff members became more technically literate. This is probably largely due to the LSP training program, but may also have been affected by a growing awareness of technology by the general public. Nevertheless, the changes noted above were broadly linked to the LSP by the project's participants, and this is supported by multiple sources of evidence.

Given that the LSP provides a novel and promising way for managing access to legislation, this research has implications for other jurisdictions. In developing such technical systems, others are also interested in possible associated organisational changes, and this chapter fulfills this need. It also provides an in-depth insight into core government processes at a time of significant change. The LSP is significant due to the technology employed but, more particularly, because of the application of this technology.

Areas for possible future research include:

- Similar studies in other organisational settings focusing on similar issues to investigate the applicability of these conclusions to other settings.

- A follow-up study of the OPC examining how they utilise the technology over time and any associated changes. Such a study would directly echo work by Orlikowski (1996) and Orlikowski and Hofman (1997) in a differing organisational context, so aiding the generalisability of their concepts.

- An examination of the literature has revealed very little consideration on how the use of wordprocessing technologies could be changing the creative process of writing and writing styles. The diffusion of the printing press is said to have lead to changes in writing styles, as the resulting text was intended to be read visually, rather than orally but it was difficult to find anything examining such issues in relation to the diffusion of computerised technologies. Also related to this is the use that people make of computerised technology in the process of writing, the conceptual approach they take and requirements they have. This topic was an area of relevance for the drafters and of interest to anyone using computerised technology in the writing process.

- An examination of the implications of the EnAct system and computerisation generally on the broader processes of enactment and parliamentary processes.

Such future research could further add to the growing and increasingly relevant stream of literature focusing on the process of implementing technologically induced change in organisations and the application of computerised technology in an organisational context.

CONCLUSION

This research provides an insight into changes associated with systems development generally, such as role changes, standardisation and increased technocracy. Given that most systems development texts still only provide what Kling (1994) would refer to as a discrete-entity model of systems development, this chapter provides adequate rationale for the dissemination of some type of "web" model of systems development in practice. It has illustrated how a systems development project can have unplanned social consequences and can induce significant organisational changes. It also strongly suggests that, while normative systems development approaches do not focus on social or organisational change, they are less likely to be successful.

A major contribution of this chapter is a description of legislative drafting during a time of change. Surprisingly, given the critical nature of legislative drafting in public administration and government, there is very little written about the role of drafters and their work processes. The provision of access to legislation is also an important area of law and this chapter has introduced some of the issues associated with it. The trends promoting the LSP are similar in other jurisdictions (Hocking, 1998), and other governments might be tempted to follow the direction of the Tasmanian Government.

This chapter has examined the implications to date and the foreseeable possible impacts of the LSP and adds to a growing body of literature investigating the effects of computerisation in different organisational settings. It has illustrated that computerisation of the processes of enacting, drafting and accessing legislation do not just induce technical and procedural changes, but can potentially impact on the roles, authority structure and culture of those associated with those processes. These changes are significant, not only for those who are interested in the effects of computerisation, but also for those who are interested in the processes of policy creation and implementation and the workings of parliament, the executive government, and public administration generally.

ACKNOWLEDGMENTS

ENDNOTE

[1]   In other countries, such as the United States, Acts are replaced by an entirely new one if they are to be amended. This alternative approach avoids the complication of having to consolidate legislation, but is said to produce delays in introducing amendments into parliament as the whole Act, rather than the amendments, is presented for debate. For the Tasmanian drafters and those involved with the LSP,

the existing method of introducing Amendment Acts to change existing legislation was an objective, unquestionable fact. They believed that to introduce the alternative method would require substantial changes in parliamentary practice and this was outside the brief of the project.

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Chapter XIII

Adoption of Electronic Data Interchange in Small- and Medium-Sized Enterprises

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ABSTRACT

As more and more small- and medium-sized enterprises (SME) adopt information technology (IT) in their daily business operations and even in their strategic planning, the positive impacts of IT are no longer a privilege of large organizations. However, there has been little research conducted and published on the adoption of electronic data interchange (EDI) in SME. Most previous studies on EDI in SME used the case study approach, thus limiting the generalizability of their findings. This study adopts the survey approach to conduct a large-scale empirical study of the key factors that influence EDI adoption in the SME context. A research model consisting of seven factors under three categories, namely characteristics of innovation, organizational context and external influence was proposed and tested against data collected from 644 SME using logistic regression analysis. The findings indicate that the critical factors that determine EDI adoption in the SME context are perceived direct benefits, perceived cost, IT knowledge, government incentives and enforcement, and trading partners' influence. Implications for both research and practice are discussed.

INTRODUCTION

Nowadays, information technology (IT) expenditure has become indispensable in organizations. Consequently, an increasing number of small and medium enterprises (SME) are adopting IT, but the adoption rate of SME still lags behind that of large organizations. Slow IT adoption rates of SME may in fact lower their power to compete with large organizations. The slow rates may also result in a failure to maintain competitive advantage in a particular country if SME constitute a large proportion of organizations there (for example, close to 98% of the organizations in Hong Kong are SME). Consequently, the slow adoption rate of IT in SME cannot be ignored.

The rapid development of the telecommunication infrastructure in recent years has provided broad network coverage with high quality and fast transmission. This factor has facilitated the development of inter-organizational systems (IOS). Electronic data interchange, or EDI for short, is one type of IOS that enjoys the above benefits. EDI is a system that transmits electronic information via telecommunication links in a structured format. By establishing links between different parties, EDI provides a speedy, accurate and efficient means to exchange information. Many benefits such as increasing accuracy, improving productivity and reducing transmission time can be obtained from the adoption of EDI. Notwithstanding these attractive benefits of EDI, adoption rates of EDI are slower than expected (Swatman & Swatman, 1991). One possible explanation is the low adoption rate by SME (Iacovou et al., 1995). However, only a few studies related to the adoption of EDI in the context of SME have been conducted (e.g., Iacovou et al., 1995; Raymond & Bergeron, 1996). There appears to be insufficient understanding of EDI adoption in SME. In other words, study of both EDI adoption and the IT adoption behavior of SME is needed. The present study fills this gap by providing an extensive analysis of EDI adoption in SME in Hong Kong.

The major objective of this study is to investigate and determine what factors would influence EDI adoption decisions in SME. As mentioned above, EDI adoption in SME is not as popular as it is in large organizations. Despite the abundance of the attractive benefits of adopting EDI, SME are still reluctant to use the system. SME contribute the gross domestic product (GDP) and employment rates and thus play an important role in the economy. The overall lack of EDI capability of SME is a serious issue and may very well have a negative impact on the economy of a country. Moreover, owing to the networking nature of the technology, the more organizations that adopt EDI, the higher the benefits are to all adopters. The fact that few SME are joining the EDI community significantly affects the benefits of EDI-capable organizations inside the network. Clearly, recognizing the factors that influence EDI adoption will be useful in suggesting strategies to overcome the constraints that inhibit adoption. This line of inquiry benefits both researchers and practitioners. Researchers will benefit from the study's theoretical insights and explore further EDI adoption and diffusion patterns. Practitioners who learn why organizations adopt EDI and what the related factors are that influence the adoption process will make better strategic decisions concerning the adoption of EDI.

PRIOR STUDIES

Many studies on EDI have been conducted that provide useful knowledge and insights. However, most of them focused on large organizations and have identified

several factors that influence EDI adoption based on the large organizational environment. For instance, Teo et al. (2003) drew on the institutional theory to examine the factors affecting the adoption of financial electronic data interchange. Results indicated that the intention of adoption is predicted by a number of institution-based variables, including mimetic pressures, coercive pressures and normative pressures. Another example is the study conducted by Iskandar et al. (2001), who investigated EDI adoption from the perspective of buyer-supplier relationships in the context of the US automobile industry. Synthesizing previous studies, Chwelos et al. (2001) constructed an EDI adoption model to examine the relative importance of the determinants of adoption intention. Results showed that the intention to adopt EDI is much more significantly affected by external pressure and readiness than perceived benefits.

The applicability of the results obtained in those studies to SME is, however, not without question. For example, Attewell and Rule (1991) criticized the singular focus of studies on EDI adoption in large organizations. They argued that using studies dealing with only large organizations might introduce a potential bias in conclusions when generalizing findings to other organizations, because organizational size plays an important role in various organizational processes. Damanpour's (1992) meta-analysis examined 20 studies to investigate the relationship between organization size and innovation. The findings of the meta-analysis supported the argument that size is a crucial factor in organizational adoption of innovations. Also, many empirical studies on IT innovation found consistent results regarding the influence of organizational size. For example, Lind et al. (1989) looked at microcomputer adoption and Grover (1993) at IOS adoption. These studies showed that there was a relationship between organizational size and IT innovation, which in turn implies that research findings focused on large organizations may not necessarily be generalized to SME (DeLone, 1988; Harrison et al., 1997; Thong et al., 1996). Similarly, McDade et al. (2002) reported that size affects organizational adoption of high-technology products. Its effect is, however, moderated by the degree of product radicalness and organizational preferences. Therefore, EDI adoption issues in the context of SME require further examination.

The number of SME is significantly larger than that of large organizations. Although the influence of large organizations is so large that sometimes it may even change market trends in the business world, SME cannot be ignored due to their economic contributions. According to Iacovou et al. (1995), the 13 million SME in the USA create 90 percent of new jobs and contribute 38 percent of the total US gross national product. A similar situation is found in other countries such as Canada and Singapore. Further, IT as an exclusive privilege of large organizations is an old idea from a time when costs of hardware and software were very expensive and IT experts were rare. Then, only large organizations could afford to adopt IT. It was not until recently, when the price of hardware and software has been rapidly decreasing, that more organizations, especially SME, have had the chance to adopt IT. Cragg and King (1993) agree that there are now more opportunities for SME to adopt IT and offer evidence to support this argument from their empirical case studies. Also, they show that SME have been continuing to upgrade hardware and software. It is reasonable to propose that SME have new opportunities to obtain competitive advantages and improve their business operations by using IT.

Moreover, many researchers have queried how results of studies that look only at large organizations can fit into the SME context due to several fundamental differences between large organizations and SME. Thong (1999) suggests that there is a need to

examine whether models of IT adoption developed in the large organization context can be equally applied to SME. Although many issues related to adoption may be faced by both large organizations and SME, the way they react to these issues may be very different (Blili & Raymond, 1993; DeLone, 1988; Harrison et al., 1997; Thong et al., 1996). In fact, many studies have pointed out that SME are not miniature versions of large organizations (DeLone, 1988; Harrison et al., 1997; Thong et al., 1996). The unique characteristics of SME can be identified in terms of environment, organization and decision making (Blili & Raymond, 1993), which may lead to different technology adoption patterns from those of large organizations. Even when the same factor affects large organizations and SME, its magnitude and effect may not be the same. Therefore, the generalizability of findings of studies on EDI from large organizations to SME requires investigation.

STUDIES OF EDI ADOPTION IN SME

Few EDI adoption studies in the SME context have been conducted. A notable one is Iacovou et al. (1995), which proposed a theoretical model consisting of three contextual factors: (1) perceived benefits of EDI, (2) organizational readiness, and (3) external pressures, which determine EDI adoption in SME. Perceived benefit refers to Rogers' (1983) characteristics of innovation. Organization readiness refers to "availability of the needed organizational resources for adoption." External pressure refers to influences from the organizational environment.

Seven organizations, which were selected from a list of suppliers to the British Columbia government, were investigated by using case studies. The findings indicated that the external pressure from EDI initiators had the strongest explanatory power to influence EDI adoption in SME, followed by perceived benefits. Also, non-adopters had lower levels of awareness of EDI benefits and focused on direct benefits rather than on indirect benefits from adoption. The relationship between organizational readiness and adoption was not strong but the cost of the investment and the lack of technical knowledge were important in the adoption decision.

Iacovou et al.'s study provides preliminary empirical findings on the adoption of EDI in SME. The insights obtained also help to formulate hypotheses and provide theoretical background for further confirmatory investigation. However, the small sample size and the lack of reliability and construct validity tests restrict the validity of the overall findings, suggesting that a large-scale study might be needed to ensure greater reliability.

Raymond and Bergeron (1996) surveyed 39 SME to examine EDI adoption from another perspective. They proposed a model of success factors of EDI in SME. Six factors, namely, organizational support, the implementation process, the control process, internal and external integration and imposition levels were used to study how they affect the advantages to be obtained from using EDI. The results suggest that more benefits from adopting EDI are obtained if more organizational supports such as training for employees are provided. This implies that lack of resources is an important inhibitor for SME to realize the potential benefits of adopting EDI. Also, the imposition level was found to have an adverse effect on obtaining EDI benefits in SME.

The findings of Raymond and Bergeron's study were also compared with those obtained in another study in which the same research model was applied to large organizations. The comparison indicated that factors affecting EDI advantages might be different between large organizations and SME in terms of strengths and directions. One significant difference is the degree of influence of the organizational context on both large organizations and SME. The organizational context, which includes organizational support, the implementation process and the control process, plays a significant role in successful use of EDI in SME, while the impact of the organizational context is not so great for large organizations.

This comparison provides a valuable insight into studying IT adoption or implementation in large organizations and SME. It suggests that large organizations and SME have different issues to face when making the same adoption decision. This is consistent with DeLone (1988) and Harrison et al. (1997), who discuss different considerations in large organizations and SME in IT adoption and implementation. More importantly, the study validates the need for further studies on SME.

Tuunainen (1998) investigated EDI usage by SME in the automotive industry where large partners are dominant. The author found that SME did not actively integrate their systems with EDI systems, although they were aware of the benefits that could be obtained from EDI integration. The reasons for using EDI were to maintain business relationships, because using EDI was a prerequisite to doing business in an industry like the automotive industry. Major barriers that inhibited EDI adoption for SME were the lack of EDI awareness, confounding standards, high costs and technical complexity, indicating that sufficient technical and financial support were essential for EDI adoption and diffusion in SME.

Chen and Bernard (1998) studied the impact of EDI in eight British SME using the case study approach. A major finding is that a positive attitude of the owner or managers towards EDI might result in further development of EDI, and more benefits would thus be obtained. Another finding indicates that the influence of trading partners, especially important partners with a significant proportion of trade, is crucial in adopting EDI. Most organizations follow requests from important partners to adopt EDI but with limited integration. In other words, the main purpose of a SME to adopt EDI is to maintain a business relationship. This finding shows that the influence of trading partners consistently plays an important role in EDI adoption.

Mullins et al. (2001) investigated the training needs of SME on the use of EDI in the United Kingdom, Poland, Slovak Republic, Germany and Portugal. Using case studies, surveys and focus groups, they found that most managers lack training on the business and technical issues associated with the implementation of EDI.

Kuan and Chau (2001) proposed a perception-based small business EDI adoption model using data collected from 575 SMEs in Hong Kong, based on a technology-organization-environment framework. Their findings indicate that the perception of adopter firms differs from that of non-adopters in a number of ways. Adopters perceive higher direct benefits, lower financial costs, higher technical competence, higher government pressure and lower industry pressure than non-adopters.

Stefanson (2002) conducted case studies with over 20 SME on EDI adoption in view of the growing importance of supply chain management. The author pointed out that the SME assumed the risk of being permanently excluded from the integration of supply chain

if they did not adopt EDI after its existence for 30 years. The advancement in the Internet technologies and the proliferation of electronic business, however, should open up new opportunities for adoption in the SME.

These studies contribute significantly to our understanding of factors that influence EDI adoption in SME. However, most studies are case studies, which, on the one hand, help to capture 'reality' in greater detail and provide preliminary and useful findings for further exploration of this research area, but, on the other hand, this method makes it difficult to generalize the results to a large population. Therefore, a large sample study is deemed necessary to provide statistical validity and generalizability. Our study provides such a large-scale empirical investigation.

RESEARCH MODEL

Based on a review of the related research areas, key factors that might have influence on EDI adoption by SME are identified, which then provide a necessary foundation upon which a research model for explaining the EDI adoption decision in SME is developed. As shown in Figure 1, three categories of factors: (1) perceived cost-benefits of EDI, (2) organizational characteristics and (3) external influences are included in the research model.

Perceived Cost-Benefits of EDI

Many researchers suggest that the characteristics of innovation are important attributes in influencing adoption decisions (for example, see Rogers, 1983; Kwon & Zmud, 1987). Among these characteristics of innovation, perceived benefit and perceived cost are suggested to be important factors in the adoption decision in previous EDI studies. When an organization makes decision on whether to adopt a particular innovation, cost-benefit analysis is considered as an unavoidable process which would be done either formally or informally (Chau & Tam, 1997).

Figure 1: Research Model.
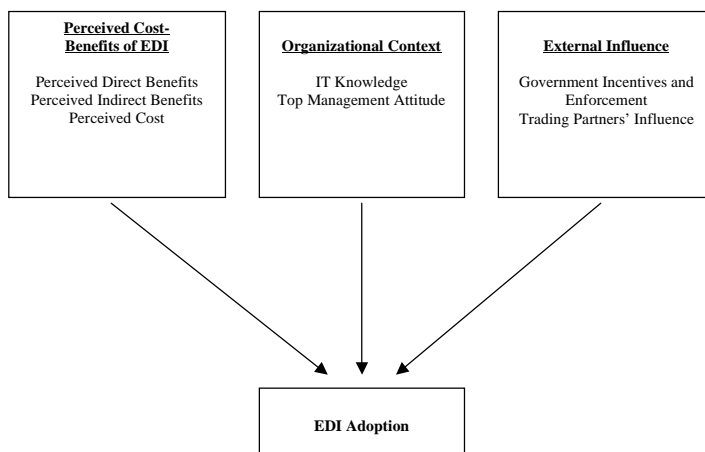
Perceived Benefits

Perceived benefits are defined as the degree to which an innovation is perceived as better than its precursor (Rogers, 1983). Many studies on IT have provided supportive findings of a positive and consistent relationship between perceived benefits and the adoption decision regarding an IT innovation (Tornatzky & Klein, 1982). As a subset of IT, EDI is also found to have a similar relationship between its perceived benefits and the adoption decision. This is supported by many empirical studies (e.g., Premkumar et al., 1994). Specifically, in the SME context, perceived benefits are identified as a vital motivator in influencing the adoption of EDI (Iacovou et al., 1995).

Many EDI studies have found that EDI provides a wide range of benefits including quick response to information, reduced turnaround time in the transaction process, lower cost, improved coordination with trading partners, lower error rates, greater accuracy, improved customer service and enhanced operation efficiency (Cox & Ghoneim, 1996; Fearon & Philip, 1998; Ferguson & Hill, 1989; Premkumar & Ramamurthy, 1995). These benefits can be classified into two major categories: direct and indirect benefits (Iacovou et al., 1995; Pfeiffer, 1992). Direct benefits are the operational savings related to the internal efficiency of an organization. This kind of benefit has an immediate effect on an organization and is easier to identify. Faster communications, increased data accuracy, lower transaction costs, improved information and reduced paper use are examples of direct benefits. Indirect benefits are the impact of EDI adoption on business practices and relationships of an organization. Improved customer services, improved relationships with trading partners and gaining greater competitive advantages are examples of indirect benefits.

Although EDI can generate lots of direct benefits that result in saving resources such as costs and time, many researchers have suggested that strategic benefits and the impact of EDI are crucial to organizational strategic planning or the business reengineering processes (Chatfield & Bjørn-Andersen, 1997; Clark & Stoddard, 1996; Teo et al., 1997). Iacovou et al. (1995) found that EDI adopters considered both direct and indirect benefits as significant factors, but non-adopters focused more on direct benefits as primary motivators for EDI adoption, indicating that there is a low perception of competitive advantages in adopting EDI. This, therefore, suggests that an organization may evaluate the importance of direct and indirect benefits differently when making adoption decisions and these two types of perceived EDI benefits may exert different levels of influence on the EDI adoption decision. The above arguments lead to the following two hypotheses:

H1:   *Higher levels of perceived direct benefits of adopting EDI will positively affect the likelihood of EDI adoption.*
H2:   *Higher levels of perceived indirect benefits of adopting EDI will positively affect the likelihood of EDI adoption.*

Perceived Cost

Recent studies in the EDI literature have suggested that cost is an important factor in EDI adoption decisions (Bouchard, 1993; Cox & Ghoneim, 1996; Mukhopadhyay et al., 1995; Premkumar et al., 1994; Saunders & Clark, 1992). Arunachalam (1995) argued that

since adopting EDI might lead to changes in work procedures, it would incur training costs to equip employees with the skills and knowledge to use EDI. Ferguson and Hill (1998) further argued that the cost of setting up an EDI linkage by installing necessary software and hardware was a significant barrier for some organizations, especially SME, to adopt EDI. Based on the above, it is therefore hypothesized that:

H3:   Higher levels of perceived cost of adopting EDI will negatively affect the likelihood of EDI adoption.

Organizational Context

Since adopting EDI involves substantial efforts in development and has significant impacts on an organization, many organizational factors can be expected to influence the adoption decision (Premkumar & Ramamurthy, 1995). Previous studies have shown that IT knowledge and top management attitude towards EDI are two important factors that influence EDI adoption in SME.

IT Knowledge

IT knowledge refers to the extent of related knowledge to the innovation. Many studies have shown that lack of expertise and lack of IT knowledge are significant barriers in IT adoption (Attewell, 1992; Fichman, 1992). When an organization adopts and uses a new IT innovation, this creates a burden of learning technical knowledge, which is known as the knowledge barrier. The knowledge barrier results in inhibiting the adoption process (Attewell, 1992; Fichman & Kemerer, 1997). In other words, a lack of IT knowledge may inhibit an organization's adoption decision. Also, the difficulty of developing necessary skills and knowledge may affect IT adoption. Organizations tend to postpone adoption when they cannot equip their employees with adequate knowledge and skills. Many studies have identified that IT knowledge is a barrier to IT adoption in SME since a lack of in-house IT expertise is a common situation in SME (Cragg & King, 1993; Fink, 1998; Thong & Yap, 1995).

Fichman (1992) recommended that the complexity of the technology should be included when considering adoption of a particular IT. The requirement of the IT knowledge level is different across different technologies. EDI is considered to be a complex technology, which means there is a requirement of higher knowledge levels. McGowan and Madey (1998) found that the level of technical expertise and EDI knowledge has a significant influence on the EDI adoption process.

According to Fichman and Kemerer (1997), having related knowledge makes it easier to acquire and retain new knowledge because it allows better associative connections needed for understanding related new knowledge. If an organization has experience with an innovation or related knowledge, this will help to diminish knowledge barriers and allow the organization to become better equipped to deal with adoption issues. Thus, if an organization has higher levels of IT knowledge, it will be more likely to adopt EDI. It is therefore hypothesized that:

H4:   Higher levels of IT knowledge will positively affect the likelihood of EDI adoption.

Top Management Attitude towards EDI

Attitude refers to the degree of favorable or unfavorable evaluation of an innovation when making decisions to adopt it. In general, the importance of the relationship between attitude of an organization's "power elite" towards an innovation and successful adoption is vital (Zmud, 1984; Rogers, 1983). Many studies have found that a positive attitude towards an innovation has a positive impact on the adoption decision (Drury & Farhoomand, 1996). In the SME context, the structure of typical SME is relatively centralized, as the owner very often assumes a dual-post as owner-manager (Raymond, 1985). Thus, decision making by top management is important for SME. Top management attitudes towards an innovation are crucial in the adoption decision process. Adopting an innovation invariably requires reallocation of organizational resources. Without active support from management, it is very unlikely that such allocations will occur. It therefore is posited that:

H5:   Better attitudes among top management towards adopting EDI will positively affect the likelihood of EDI adoption.

External Influences

Though cost-benefit analysis is a critical input in the decision of whether or not to adopt EDI, the influence of the external environment, such as the social and relationship context, cannot be ignored (O'Callaghan et al., 1992). Since EDI is an IOS, adopting EDI may involve many parties other than the organization itself. Using EDI may change not only the way an organization operates, but also its business practices and its relationships with other EDI-enabled parties. External influences are always considered as important factors that determine EDI adoption (Bouchard, 1993; Premkumar et al., 1995). In this study, two major external factors are identified: (1) government incentives and enforcement, and (2) trading partners' influence.

Government Incentives and Enforcement

The EDI system examined in this study is a "government-to-business" type of EDI system. Since the government can institute several policies such as mandatory regulations and promotion programs to force organizations to adopt EDI, government incentives and enforcement are absolutely important to EDI adoption. Abrahamson (1993) argued that when government agencies were actively involved in mandating the use of a particular system or technology by using certain administrative techniques such as legitimacy actions or promotion, these influences could not be ignored. Take TradeNet in Singapore as an example. TradeNet is a government initiative and a mandatory EDI system that organizations must use to communicate with the government. Several studies on TradeNet have shown that the success of this nationwide EDI adoption is mainly due to government influence (Neo et al., 1994; Teo et al., 1997). This suggests that government incentives and enforcement can explain an organization's adoption decision.

Apart from the legal enforcement as in the case of TradeNet, the government may also play an important role in guiding organizations to further EDI diffusion. It is suggested that the government can help organizations to adopt EDI by providing more information and IT knowledge (Swatman & Clarks, 1990; Farhoomand & Boyer, 1994). For

example, this can be achieved through promotion. Promotion provides information about EDI adoption that increases the awareness of EDI, which in turn promotes EDI adoption. It is argued, therefore, that:

H6:   Higher levels of government incentives and enforcement will positively affect the likelihood of EDI adoption.

Trading Partners' Influence

Trading partners' influence is another crucial factor of influence in EDI adoption. Neo et al. (1994) suggested that social relation influence on EDI adoption was very important. As EDI is an inter-organizational system, when more organizations adopt the system, more benefits can be obtained by each EDI adopter owing to the enlarging transaction network. This means that, in order to gain more benefits, an organization that has already adopted EDI would like to see its trading partners adopt the technology as well. This argument is empirically supported in both Bouchard's (1993) case studies on EDI adoption and Hart and Saunders' (1997) study on EDI adoption in SME. Based on the above, it is suggested that:

H7:   Higher levels of trading partners' influence will positively affect the likelihood of EDI adoption.

RESEARCH METHOD

The EDI Service

ValuNet, a non-Internet-based EDI service that facilitates electronic submission for trade declarations in Hong Kong, was chosen as the EDI service under study. The service was the first large-scale EDI implementation launched by Tradelink, a major EDI service provider, with the Hong Kong Government as the largest shareholder, in Hong Kong in April 1997.

Operationalization of Constructs

Multiple-item indicators were used for measuring the constructs in the research model in order to ensure proper operationalization and robust psychometric properties for the constructs. All factors except the dependent variable were measured by multi-item indicators. Most of the items were measured using seven-point Likert-type scales. The items used were derived or adapted, wherever possible, from previous studies. Suitable modifications or refinements of items were made in order to make them specifically relevant to EDI.

Perceived Direct and Indirect Benefits

Various perceived benefits of EDI were identified and validated from previous EDI studies (Banerjee & Golhar, 1994; Cox & Ghoneim, 1996; Drury & Farhoomand, 1996; Fearon & Philip, 1998; Premkumar & Ramamurthy, 1995). In this study, perceived benefit was classified into two categories: direct and indirect. Five most commonly recognized benefits of each category were selected according to their definitions. Respondents were

required to evaluate the level of agreement with these benefits that can be achieved after adopting EDI.

Perceived Cost

The measure of perceived cost was adapted from Premkumar et al. (1994). Three items were used in measuring this construct. It assessed the perceived cost in terms of setup, training and running as barriers for adopting EDI. These cost components were also mentioned in previous studies (Bouchard, 1993; Cox & Ghoneim, 1996; Drury & Farhoomand, 1996; Premkumar et al., 1994; Tuunainen, 1998).

IT Knowledge

IT knowledge was operationalized, adapted from Fichman and Karmerer (1997) and McGowan and Maday (1998). Many studies measured IT knowledge using experience of IT staff. Instead of using IT staff to evaluate IT knowledge, it is more appropriate to use end-users because of the lack of IT staff and IT departments in SME. Thus, IT knowledge was operationalized by the extent of the employees' experience with EDI-related technology.

Top Management Attitude

Top management attitude towards EDI was developed based on the guideline of Dacin and Brown (1997). EDI services providers, EDI technology and EDI services themselves may influence the attitude of adopting EDI. Respondents were asked to assess top management attitudes toward (1) EDI, (2) Tradelink and (3) ValuNet.

Government Incentives and Enforcement

Based on the guidelines of Neo et al. (1994), Yap et al. (1994) and King et al. (1994), the measurement for government incentives and enforcement was developed especially for this study. The Government may assert influence from two different aspects: promotion and imposition. The influence was assessed by using three items of which respondents were asked to evaluate the degree of these influences on the adoption decision.

Trading Partners' Influence

The measure of trading partners' influence was adapted from Iacovou et al. (1995), Neo et al. (1994), O'Callaghan et al. (1992) and Premkumar et al. (1997). Respondents were asked to evaluate the influence of trading partners from recommendation and imposition aspects.

EDI Adoption

The dependent variable, EDI adoption, was measured by using a single dichotomous response to determine whether an organization adopted EDI or not. Using a single item for the dependent variable is common in IT adoption studies (e.g., Premkumar et al., 1997; Chau & Tam, 1997). An organization was classified as an early adopter if it had subscribed to ValuNet and had lodged at least one trade declaration using ValuNet in the

past three months at the time of the study. It was a late adopter otherwise (since EDI implementations are mandatory for these SME).

The Sample

Three thousand SME, as defined as companies with fewer than 100 employees, were randomly selected from a database that contains names of organizations that have submitted trade declarations to the Hong Kong Government. As the unit of analysis in this study was the organization, subjects for this study were required to be senior informed respondents within the organization. Therefore, a key informant method was adopted with either the owner or the top manager of the organization being asked to complete the survey.

Names of the randomly selected SME were compared with the database of subscribers to Tradelink's ValuNet services in order to identify early and late adopters at the time of the study based on whether the SME had adopted the system at that time. Two sets of questionnaires were designed for early and late adopters, respectively, since some wordings and tenses could create misunderstandings for the two groups. The appropriate sets of questionnaire (i.e., the sets for early vs. late adopters) were then sent to these SME. Therefore, although two sets of questionnaires were used, a one-to-one correspondence between the two sets of questionnaires was kept as much as possible for purposes of comparison and data analysis[1]. Table 1 summarizes the measures for early adopters. A cover letter, which explained the purpose of this study, and a prepaid reply envelope were sent together with the questionnaires. The respondents were guaranteed confidentiality of their responses. Also, follow-up phone calls were made one week after the questionnaires were made to check if the questionnaires had been returned and if not, to encourage responses.

Seven hundred and seventy-one questionnaires were returned, giving an initial response rate of 25.7% (771/3000). Ninety-three responses containing missing data were excluded. Also, 34 respondents were identified as having more than 100 employees, so they were also excluded. The final sample contained 644 usable responses. The response rate was 21.5% (644/3000).

Results

Sample Characteristics

Among the 644 responses, the numbers of responses from early and late adopters were 245 and 399 respectively. A large proportion (82.9%) of organizations did not have formal IT departments and around seventy percent of the organizations had three or fewer staff members, regardless of department, who were responsible for IT functions. Nearly 89% of the organizations had personal computer(s), while only 19% of the organization had local area networks. Around 25% of the organizations had performed a formal justification analysis for ValuNet adoption. Also, a large number of the organizations (85%) did not have a formal or separate IT budget.

Although the response rate in this study (21.5%) is not very high, it is comparable to many empirical studies in the SME and EDI research areas. In an attempt to assess response bias, a late-response bias test was conducted by comparing responses from those who responded immediately with those who responded after follow-up steps were

Table 1: Summary of All Measures.

Perceived Direct Benefits
At the time your organization decided to adopt ValuNet, to what extent did you agree that EDI in general, and ValuNet in particular, could help achieve each of the following benefits: (Strongly disagree – Strongly agree)
1   Improve data accuracy
2   Improve security of data
3   Improve operation efficiency
4   Speed up application process
5   Reduce clerical errors
Perceived Indirect Benefits
At the time your organization decided to adopt ValuNet, to what extent did you agree that EDI in general, and ValuNet in particular, could help achieve each of the following benefits: (Strongly disagree – Strongly agree)
1   Improve organization image
2   Improve competitive advantage
3   Benefit other business practices
4   Improve customer services
5   Improve relationship with business partners
Perceived Cost
At the time your organization decided to adopt ValuNet, to what extent did you agree that each of the following was an obstacle to the adoption? (Strongly disagree – Strongly agree)
1   High setup costs
2   High running costs
3   High training costs
IT Knowledge
At the time your organization decided to adopt ValuNet, how did you evaluate your organization in each of the following areas?(Very poor – Very good)
1   End-user(s)' experience on using Windows-based software on PC
2   End-user(s)' experience on using ValuNet
3   End-user(s)' experience on using other EDI software packages
Top Management Attitude
At the time your organization decided to adopt ValuNet, how did you evaluate your organization in each of the following areas? (Very poor – Very good)
1   Top management attitudes towards EDI
2   Top management attitudes towards Tradelink
3   Top management attitudes towards ValuNet

taken, as suggested by Armstrong and Overton (1977) and adopted in prior IS studies (e.g., Thong et al., 1996; Hu et al., 1999). Potential bias was assessed by applying appropriate statistical tests to check the difference between the two groups of respondents on the following two groups of measures: demographic data (number of employees and annual turnover) and responses to the questionnaire items on the constructs in the research model. No significant difference, using the chi-square test, was found in terms of number of employees (chi-square $= 3.124$, d.f. $= 4$, p $= 0.537$) and annual turnover (chi-square $= 5.659$, d.f. $= 9$, p $= 0.774$). As for responses to questionnaire items for the seven

Table 1: (continued)

Government Incentives and Enforcement
At the time your organization decided to adopt ValuNet, how much influence did each of the following activities have on your adoption decision?(No Influence At all – Strong Influence)
1   Promotion by government departments (e.g., Custom and Excise Department, Census and Statistics Department, etc.)
2   Progress mandatory measures introduced by the government (e.g., cessation of diskette submission scheme, etc.)
3   Closing of paper-receipt counters by 31 March 2000
Trading Partners' Influence
At the time your organization decided to adopt ValuNet, how much influence did each of the following activities have on your adoption decision? (No Influence At all – Strong Influence)
1   Requested by important business partners
2   Requested by majority of business partners
3   Recommended by important business partners
4   Recommended by majority of business partners

constructs, as shown in Table 2, no significant difference was found. This suggests that non-response biases, if any, should not be serious.

Reliability and Validity of the Constructs

Cronbach's alpha is the most commonly used measure to assess reliability. The reliability values for the various constructs are shown in Table 3. The Cronbach's alphas for the constructs ranged from 0.721 to 0.971, indicating an adequate level of reliability of all constructs.

Validity was examined by assessing both convergent and discriminant validity via factor analysis. The rotated matrix of factor analysis with Varimax rotation is shown in Table 4. Testing for convergent validity requires checking whether or not all items are correctly loaded on the appropriate constructs. The results show that all items correctly converge on the appropriate single construct (due to the high loadings), which means that the items have convergent validity. Testing discriminant validity requires checking the cross loading of items on multiple factors. All items loaded highly on their associated construct but not others (with factor loadings lower than 0.5), thus exhibiting adequate discriminant validity.

Model Results

The hypotheses were tested using logistic regression with the adoption state of the organization (early or late adopter) as the dependent variable. The results are shown in Table 5. Of the seven independent variables, five were significant. Perceived direct benefits, perceived cost, IT knowledge, government incentives and enforcement, and trading partners' influence are significant in determining adoption (early or late). Organizations that perceive high direct benefits and low costs from adopting EDI, have more IT knowledge and are more sensitive to the environment would tend to adopt EDI early.

Examining the overall validity of the research model, the -2 Log Likelihood was found to be insignificant (chi-square value $= 583.65$, $p = 0.932$), suggesting the significant validity of the model in discriminating between early adopters and late adopters. The classification accuracy of the model, 78.11%, which is much better than the chance accuracy at 52.86%, further confirms the usefulness of the model.

DISCUSSION OF RESULTS

Perceived Cost-Benefits of EDI

Perceived direct benefit and perceived cost are found to be important factors in determining EDI adoption. These findings concur with those found in previous studies in organizational innovation and EDI adoption (e.g., Cragg & King, 1993; Iacovou et al., 1995; O'Callaghan et al., 1992; Premkumar et al., 1994). In fact, perceived benefits and perceived cost can be considered as two different aspects — as motivators and barriers — to assess in the adoption decision.

Perceived benefits can act as motivators to encourage the adoption of an innovation because direct benefits are more visible and easier to measure (e.g., reducing paper use, improving turnaround time of transmissions). As most indirect benefits (e.g., improving the organization's image and competitive advantage) are difficult to quantify and it takes a longer period to see their impacts, their influence is not significant in EDI adoption. Another plausible explanation is that since the decision-making process in SME is always short-term and intuitive (Fink, 1998), the organization may thus pay more attention to the more obvious and explicit benefits rather than to the implicit and long-term benefits.

In addition, the benefits from EDI depend on the level of integration. Some EDI benefits, especially indirect benefits, can only be enjoyed through a full integration into an existing system (Hoogeweegen & Wagenarr, 1996; Raymond & Bergeron, 1996). However, many SME have only low levels of integration or even go without any integration planning. The SME that adopt EDI generally implement a less complicated EDI system, which simply allows them to receive EDI documents, print out hard copies of the documents and processes them manually (Tuunainen, 1998). In this scenario, only limited benefits such as faster transmission can be obtained by the SME. The obtained benefits are thus mainly direct benefits. Consequently, indirect benefits may not be considered in making the adoption decision for EDI.

Perceived cost was found to be another important factor in the EDI adoption decision. This finding not only provides empirical support of the previous literature, but also reinforces the argument about the influence of cost on EDI adoption. In traditional adoption and diffusion studies, it is suggested that the less expensive an innovation is perceived to be, the more likely it will be adopted (Rogers, 1983). In many studies, cost is a major barrier for adopting EDI (Arunachalam, 1995; Cox & Ghoneim, 1996).

SME have few resources compared with large organizations. Therefore, these organizations pay more attention to financial resources. When considering adopting new innovations, cost is a critical factor in the adoption decision (Iacovou et al., 1995; Saunders & Clark, 1992). A wide range of cost is required for EDI adoption. Most SME have simple computer infrastructures and have inadequate hardware and software (Iacovou et al., 1995). Also, many SME may not have IT budgets or plans and, therefore,

Table 2: Result of Non-Response Biases Analysis on Responses to Question Items.

Factor	Early Respondents (N = 301)	Late Respondents (N = 343)	Significance
Perceived Direct Benefits (PDB)	4.990	4.815	t = 1.636 p = 0.117
Perceived Indirect Benefits (PIB)	4.100	4.092	t = 0.055 p = 0.955
Perceived Cost (PCOST)	4.211	4.241	t = -0.226 p = 0.885
IT Knowledge (ITKN)	3.345	3.302	t = 0.276 p = 0.782
Top Management Attitude (TMA)	3.650	3.639	t = 0.056 p = 0.955
Government Incentives and Enforcement (GINF)	4.701	4.887	t = -1.638 p = 0.115
Trading Partners' Influence (TPINF)	3.180	3.144	t = 0.255 p = 0.831

the setting-up cost for adopting EDI is considered an unexpected expenditure. To buy a new computer or software for EDI purposes will become a significant barrier. In addition, work procedures may also have to be changed after adopting EDI. Training for staff is essential to catch up with the new technology. These costs create barriers for SME to invest in and adopt EDI (Kalakota & Whinston, 1997).

Organizational Context

IT knowledge is found to be a significant factor in distinguishing between early and late EDI adopters. An organization with greater IT knowledge tends to adopt EDI early. This finding parallels Attewell's (1992) theory that many organizations will postpone EDI adoption until developing the necessary skills and acquiring the required IT knowledge.

Table 3: Descriptive Statistics and Reliability Analysis.

Factor	Items	Mean	Std dev	Cronbach's alpha
Perceived Direct Benefits (PDB)	5	4.897	1.215	0.905
Perceived Indirect Benefits (PIB)	5	4.096	1.329	0.936
Perceived Cost (PCOST)	3	4.227	1.535	0.869
IT Knowledge (ITKN)	3	3.322	1.346	0.811
Top Management Attitude (TMA)	3	3.644	1.310	0.897
Government Incentives and Enforcement (GINF)	3	4.800	1.485	0.721
Trading Partners' Influence (TPINF)	4	3.161	1.662	0.971

Table 4: Rotated Component Matrix of All Constructs (Figures are factor loading).

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
PDB1			0.799				
PDB2			0.751				
PDB3			0.834				
PDB4			0.823				
PDB5			0.770				
PIB1	0.770						
PIB2	0.847						
PIB3	0.830						
PIB4	0.864						
PIB5	0.875						
PCOST1					0.883		
PCOST2					0.902		
PCOST3					0.834		
ITKN1						0.687	
ITKNP2						0.866	
ITKNP3						0.859	
TMA1				0.869			
TMA2				0.883			
TMA3				0.794			
GINF1							0.701
GINF2							0.848
GINF3							0.812
TPINF1		0.931					
TPINF2		0.949					
TPINF3		0.943					
TPINF4		0.942					
Eigen value	7.148	4.265	2.684	2.084	1.920	1.322	1.063
Percentage of Variance	27.492	16.402	10.322	8.016	7.385	5.086	4.090

This implies that less IT knowledge is a barrier to adopting innovations. Many SME, in general, lack IT knowledge and technical skills. SME tend to delay EDI adoption because they have insufficient knowledge to implement and operate EDI successfully.

Another organizational factor, the attitude of the top management towards EDI adoption, was not found to be significant. This suggests that the attitude of top managers does not have a prominent effect on EDI adoption. Two possible explanations are suggested. First, a major difference between this and earlier studies is that adoption of innovation in prior studies was made under voluntary situations. The adoption decision to implement EDI in this study is mandatory. Organizations are required to adopt EDI in order to submit trade declarations to the government. In other words, the government-mandated electronic submission is the only means to submit trade declara-

Table 5: Results of the Logisitic Regression Analysis.

Factor	Coefficient	Wald Statistic	Significance
Perceived Direct Benefits (PDB)	0.218	4.213	0.040*
Perceived Indirect Benefits (PIB)	0.090	0.806	0.369
Perceived Cost (PCOST)	-0.351	21.010	0.000**
IT Knowledge (ITKN)	0.626	39.816	0.000**
Top Management Attitude (TMA)	0.138	1.843	0.175
Government Incentives and Enforcement (GINF)	0.192	6.878	0.009**
Trading Partners' Influence (TPINF)	-0.804	97.249	0.000**
-2 Log Likelihood: Chi-square=583.646; d.f. = 636; p = 0.932 Model Chi-square: Chi-square=271.942; d.f. = 7; p=0.000			

* p<.05   ** p<0.01

tion applications. Top management did not have a choice regarding whether or not to adopt. Under this mandatory situation, top management may face great pressures from the external environment.

Second, the type of innovation helps to explain the insignificance of top management attitude. Unlike traditional innovations such as intra-organizational and IT-specific systems (e.g., CASE tools and Open Systems), the adoption decision to use an IOS may involve different partners like the government or various trading partners and, therefore, is not primarily based on only the organization itself. Influences from different partners have been found to be an important factor in adopting EDI (Bouchard, 1993).

External Influences

In the EDI literature, many researchers have suggested that adopting EDI may be mainly due to imposition from a trading partner and other external influences (Premkumar et al., 1994; Raymond & Bergeron, 1996). The findings of this study indicate that external influence is important in determining adoption of EDI in the SME. The government incentives and enforcement and trading partners' influences were found to be significant in EDI adoption.

Government incentives and enforcement were found to be significant in influencing EDI adoption. The greater government incentives and enforcement as perceived by an organization, the higher the likelihood of the organization to adopt EDI early. As noted above, the adoption of the EDI observed in this study was mandated by the government. The findings show that the legal concerns are among the important factors that influence adoption of EDI. In their study, Neo et al. (1994) examined TradeNet, which was an EDI system that was also mandated by a government, but they did not find significance of government influence in adopting the system. They believe, however, that government influence is vital for ensuring adoption of a nationwide innovation. The significant result in this study also suggests the importance of government incentives and enforcement.

Contrary to one of our hypotheses, trading partners' influence was found to have a negative influence on EDI adoption. This suggests that an organization that is not influenced by trading partners is more likely to be an adopter and vice versa, which differs from existing results and common sense. One possible explanation is that in this study the adopters possessed the necessary resources and perceived high levels of benefits, so they ignored the influence of their trading partners in adopting EDI. Iacovou et al. (1995) suggested that EDI initiators were those that "had recognized the need for EDI, possessed sufficient financial resources, had high levels of IT sophistication and had not been pressured by external factors into adopting EDI" (p. 476). The early EDI adopters in our study could be regarded as EDI initiators in Iacovou et al.'s terms and could be assumed to be more active in adopting EDI because they had adequate resources and knowledge. When making the adoption decision, little consideration was given to trading partners because of the existing initiatives and sufficient resources to adopt EDI.

Alternatively, when the early adopters decided to adopt the technology, there were few within the industrial community that were using it. As a result, the adoption decision of these early adopters was probably made without regard to others but with regard to costs and benefits instead. Also, the very few players in the industry meant that these firms had neither to experience any pressure to meet industry standards (Banerjee & Golhar, 1994) nor to conform to peer company pressure (Premkumar & Ramamurthy, 1995). Those late adopters, however, had pressure to see how their counterparts had done.

The third plausible explanation is that since few organizations had adopted the system, the chance of having recommendations of trading partners was relatively small. When organizations adopt an innovation successfully and gain from using the innovation, this acts as a model for other organizations to imitate. Late adopters might therefore get more information and thus be influenced by other firms in the industry as the trend of using EDI develops.

A fourth explanation suggests that since the use of EDI among organizations was not prevalent, some SME might adopt a "wait-and-see" attitude in order to have a clearer picture of what the actual benefits of the adoption of EDI were. Even when they had the necessary information, they might still prefer to defer the adoption as long as possible because, on the one hand, it might remain unclear to them that their firm would receive any of the benefits (Clemons & Row, 1993), and, on the other hand, they might believe that the technology would result in an overall weaker bargaining position with their business partners and therefore lower profits (Riggins & Mukhopadhyay, 1994).

CONCLUSION

The objective of this study was to identify the key factors that influence adoption of EDI in the specific context of SME. Based on previous studies in the related literature including adoption and diffusion of innovation and related EDI and SME studies, a research model was developed. Seven factors, namely, perceived direct benefit, perceived indirect benefit, perceived cost, IT knowledge, management attitude towards EDI, government incentives and enforcement and trading partners' influence, were posited as important in the adoption decision. Seven hypotheses were proposed to examine the relationships of the factors with EDI adoption. Based on responses from 644 SME, five

244 Chau and Liu

factors were found to be important in distinguishing early EDI adopters from late adopters. The five factors are perceived direct benefits, perceived cost, IT knowledge, government incentives and enforcement and trading partners' influence.

One of the main contributions of this study is that it is one of very few research studies that examined EDI adoption in an *SME environment using the survey approach*, which, at least theoretically speaking, can increase the generalizability of findings in previous studies that mostly used the case study approach. Compared to Raymond and Bergeron's (1996) study with only 39 SME, this large-scale empirical study can provide more accurate assessments and implications for factors affecting EDI adoption in SME that should be of great importance to an SME's strategic decision concerning the adoption of EDI. The results are in general consistent with findings in the innovation adoption literature, as well as related EDI and SME studies, suggesting that findings from previous innovation adoption studies for large organizations might also be applicable to SME.

As with all empirical studies, there are several limitations that, however, must be taken into consideration. First, the study was "ex post facto" research, which always has a methodological problem of requesting respondents to look back in time to explore possible causes and relationships of the effects on the dependent variables such as an adoption decision. To overcome or to minimize the seriousness of this problem, in our study, the respondents were reminded that contextual factors were to be measured prior to the adoption decision. Note that the early adopters were asked to provide the ratings/measurements at the time of adoption, whereas late adopters were asked to provide the feedback as of the time of the study. However, we cannot be completely sure that the respondents' answers were not influenced by the experience of EDI adoption. Also, since the early adopters were asked to provide the ratings at the time of adoption, whereas late adopters were asked to provide the responses as of the time of the study, this time difference might be a cause or reason why trading partners' influence is negatively correlated with EDI adoption. As argued above, when the early adopters decided to adopt the technology, there were few within the industrial community that were using it. Trading partners' influence, if any, should be little. Contrarily, late adopters might receive more influence from their trading partners as many might have already adopted the system in this late stage.

Second, all the data in this study were obtained via self-reports from a single respondent in each SME. The data thus possess the potential bias for inflated correlation due to common method variance. Applied multi-item indicators for each contextual factor in our study were therefore used to lessen the common method variances. Also, results of validity and reliability tests help to provide sufficient confidence levels for each contextual factor in this study. The single respondent, key informant method might also be a problem. However, since in general, the size of SME is relatively small and the structure of SME is rather simple, the owner, who in most cases was the key informant, could be comfortably assumed to be knowledgeable of the EDI adoption decision process and of related organizational information and his/her responses would be representative of the factors.

Third, the EDI service examined in this study was a business-to-government type of EDI. Findings of prior studies on the role of power and trust between firms on the adoption and use of EDI (for example, Hart and Saunders, 1997) may therefore be difficult to compare with our findings, and vice versa. In other words, interpretation of the

findings should be made with care when extending them to those EDI services/products of a business-to-business nature. Also, the business-to-government nature of the EDI service being studied here precluded us from looking at the influence of competitors on EDI adoption in small businesses.

The study was conducted in late 1998 when Internet-based EDI systems were still not popularly advocated by major EDI industry players. Some of the significant factors found in this study, such as perceived costs, might become less of an issue when small businesses begin to conduct EDI via the Internet. Other significant factors, such as perceived direct benefits and government incentives and enforcement, however, are believed not to be impacted by the change from value-added networks to the Internet as these factors focus on the values/services provided by the technology, rather than the "operating platform". IT knowledge might become more of an issue as small businesses now have to cope with another operating platform, the Internet, with which they might be even more unfamiliar. On the other hand, this factor might also become less of an issue as Internet-based platform is more universal and hence businesses are more likely to find knowledgeable IT staff. It should be useful and interesting to test the validity of the research model again with an Internet-based EDI system.

Finally, the results in this study provide a useful understanding of EDI adoption in the SME context. As this study was conducted on SME in Hong Kong, caution should be taken when generalizing the results to SME in other countries. Different cultural contexts and institutional policies may cause differences or variations in outcomes. The above "culture-related" factors may or may not be related to an organization facing the adoption decision. Thus, replication in different countries in the context of SME would greatly improve the external validity of the findings.

Implications for Research

Despite the above limitations, the findings of this study have several research implications. First, the study examined several variables that might influence EDI adoption. The factors and relationships outlined provide the foundation for the development of a more robust and rigorous model for future research. Rigorous validation of the contextual factors in replicating this study is suggested. Also, one limitation of a parsimonious model is that some additional significant factors are not included in the model. Other factors identified by other related studies may be useful to increase the explanatory power of this research model and to provide a more extensive or complete model. For example, Thong (1999) suggested that external IT expertise such as vendor support or consultants helped to explain adoption and implementation of IT in SME. Besides external expertise, factors like CEO involvement, organizational structure and organizational culture, which are possible influences on EDI adoption in SME, are suggested to be included in future research.

The study found that governments could play vital roles in the adoption and diffusion of new technologies. This study, however, did not assess how and exactly what a government can do to influence the adoption and diffusion process. Government influence may vary from country to country and different policies may help to promote adoption of EDI to different extents. Therefore, governments should choose policies that fit the specific institutional and industrial environment. To what extent the government

should be involved in intervention and actions in order to maximize adoption of EDI or new technologies is an interesting and important issue. Thus, a detailed investigation of government influence in the adoption and diffusion of an innovation can provide insights into the promotions of innovations.

A related issue is the relationship between dependency on government/trading partners and EDI adoption. Our study looked at an EDI-focused on trade declarations, which are required for firms doing import/export trading business. The partnership between the firms and the government is mandatory. In other business-to-business or non-mandatory business-to-government types of EDI, this "dependency" factor would be an important construct to be included in the analysis.

The finding of a negative relationship between the importance of trading partners' influence and small business EDI adoption is both interesting and thought provoking. The rationale we have provided for this "unexpected" result is that since the adoption and/or diffusion of EDI in the small business sector was still at the early stage with very few firms using it, there was just not enough critical mass to make this factor influential. This suggests an interesting and possibly fruitful line of research that investigates the validity of the theoretical model and the significance of the factors involved along the "life cycle" of the diffusion of the technology. A longitudinal study that examines the model at different stages of the diffusion of a technology is recommended.

EDI is a kind of technology that is sitting between "old" technologies using ANSI X12 or EDIFACT standards and "new" Internet-based XML or Open EDI platforms. It has been estimated that while VANs carried about 95% of all EDI volume in 1997, half of the volume might be moved to Internet-based platforms by 2002 (Wilson, 2000). It therefore would be interesting to investigate how firms, both large and small, move from using an old technology to a new technology which basically provides the same services, from a technology adoption perspective.

Organizational innovation is explained through a stage model. This study examines only the adoption stage. Other interesting research issues would be to examine the impact of these factors on the next stage of the adoption-diffusion process, the impact of the technology (Iacovou et al., 1995). Many researchers have argued that different impacts or effects of factors exist in different stages of the adoption-diffusion process (Cooper & Zmud, 1990). For example, while the investment cost of adopting an innovation is a factor that has a negative influence on adoption, there is evidence that it can have a positive influence in the implementation stage. An organization is unlikely to adopt an innovation that requires high investment. Once it decides to adopt, high investment cost will act as a motivator for an organization to diffuse the innovation further inside the organization because more benefits may be obtained from wide diffusion of the innovation and these finally may be commensurate with the investment cost. It would be useful to determine whether the same set of factors that are important in adoption are relevant as determinants in the diffusion stage.

From a related but slightly different perspective, the focus of the study was on adoption of EDI, which should be considered as part of a broader issue, the management of technology. As adopting a technology should eventually lead to some form of positive impacts or advantages, which can be operational, managerial, and strategic in nature, for an organization, evaluation and assessment of the adoption and implementation of the technology are important too. Added work should therefore be done to extend the model

examined in this study to include integration and impact, as suggested by Iacovou et al. (1995).

Implications for Hong Kong SME

Because of the different profiles of industries in Western countries and Asian countries, EDI adoptions in Asian countries have been relatively slower than in North America and Europe (Burn, 1995). Within Asia, EDI adoption in Hong Kong further lags behind its competitors. This study shows that the government's intervention is crucial in EDI adoption. To foster the adoption, governments may direct their own agencies to adopt EDI and require organizations to communicate with them through the system in order to promote the use of EDI. In the context of Hong Kong, Tradelink, with the Hong Kong Government as the largest shareholder, is the largest EDI services provider for providing electronic communication for trade-related documents between the Government and Hong Kong organizations. The above finding reinforces the decision of the Hong Kong government to require all organizations in Hong Kong to use electronic submission of trade declarations through Tradelink by mid-2000. Under direction from the government, this mobilization of adopting EDI helps SME in Hong Kong to reach the "critical mass", thus overcoming the network externality problem of EDI adoption.

In addition to being a mandatory service, the success of TradeNet in Singapore was also attributed to a range of government subsides and technical backup provided to support the EDI adoption (Teo et al., 1997). Iacovou et al.'s (1995) EDI study also found evidence of subsidies in the early stage of expansion facilitating faster adoption by SME. The Hong Kong government has also been providing various kinds of financial subsides and technical supports to SME through its Industry Department, Trade Development Council, Productivity Council, etc. SME should make full use of this assistance in order to overcome the substantial burden, both financial and technical, especially in the early stage of the adoption.

Moreover, the finding of the importance of perceived direct benefits on the EDI adoption decision also suggests that EDI initiators or service providers in Hong Kong, including Tradelink and other relevant organizations and institutions, should make greater efforts in marketing EDI technologies to let the SME appreciate the benefits of adopting EDI. This kind of greater exposure to the potential benefits and impacts of EDI on business operations and greater knowledge about the technology may lead to faster EDI adoption by SME.

In conclusion, it is believed that a better knowledge of executive decisions about adoption of information technology in small businesses should be helpful to their practicing managers in understanding the qualifying factors for which EDI is most appropriate to their organizations. This study has obtained some interesting findings that advance our understanding on this issue.

ACKNOWLEDGMENT

ENDNOTES

[1]   The two sets of questionnaires, however, are not completely equivalent since early adopters were asked to respond based on the perceptions as of the time a decision was made to adopt the system whereas the perceptions of late adopters were those at the time of the study. This data collection limitation is further elaborated in the Limitations section.

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Chapter XIV

How Can We Enhance Member Participation in Virtual Communities?

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ABSTRACT

The purpose of this study is to find the factors that enhance member participation in virtual communities. Although there are many factors influencing member participation, this study limits its independent variables to those of managing strategy and information system quality. In addition to finding their direct impacts, this study identifies indirect effects through two mediating variables such as member visit and sense of community. The results of this study revealed that there was no significant direct path from managing strategy to participation. However, the path from sense of community to participation was strongly supported by the results. This then implies that a manager of a community has to emphasize the sense of community, membership in particular, in order to enhance participation. In addition, the results showed that sense of community could be enhanced by an appropriate managing strategy, while the number of visits could be increased by the information system's quality.

INTRODUCTION

The proliferation of the Internet has created a lot of new phenomena, some never before imagined. One such example is that of the "virtual community". Communities were once thought of in terms of geographical boundaries such as a township or neighbor-

hood. Now, however, we have the concept of virtual communities. People can interact based upon common interests and goals regardless of their location. Martin (1999) pointed out the virtual community as one of seven factors that would change the way of business in the 21st century, while Sculley and Woods (1999) argued that the virtual community would be the key factor for the success of the B2B e-Marketplace. In fact, communities are considered to be one of the three most important factors, along with content and commerce, which compose Internet business. In the United States, 'iVillage' (http://www.ivillage.com) has a typical business model that uses virtual communities as the primary source of revenue. This site achieved, on average, 365 million monthly page views during the second quarter of 2003, and its membership grew to approximately 11 million users during the same period. Meanwhile, Daum Communication of Korea (http://cafe.daum.net) has 21 million members and 17.3 billion page views per month as of March 2003. During the year 2000, the most successful site in Korea was 'I Love School' (http://www.iloveschool.co.kr), which attracted 9 million members and achieved 2 billion page views per month by June 2001. The site succeeded by furnishing all the schools in Korea with virtual communities. In October 2000, Daum and 'I Love School' were ranked fourth and sixth respectively by Alexa (http://www.alexa.com). And the iVillage was ranked 18th by Jupiter Media Metrix in July 2001.

Then why is the virtual community highlighted in this Internet era? There are three explanations. First, the virtual community could be the new market for a business; thus large numbers of companies could develop this for the purpose of commerce (Hagel III & Armstrong, 1997). Second, the virtual community could be used for enhancing customer loyalty for a specific brand (Reichheld & Schefter, 2000; McWilliam, 2000). The third and most important reason is the basic human need for personal relationships (Rheingold, 1992). Whatever the explanation, the Yankee Group reports that US companies invested more than $300 million in community software, implementation and management in 1999 (Meehan, 2000).

The purpose of this study is to find the factors that enhance member participation in virtual communities. In the beginning stages, virtual communities were evaluated by how many members they acquired. But as more and more virtual communities arose on the Internet and people joined multiple communities, the numbers of hyper-affiliates — people who are passionate about their communities — became more important (Cothrel, 2000). Meanwhile, each community's revenue source had changed from online advertisement to shopping and brokerage commissions. Thus it is believed that participation should be enhanced for the community to become more successful.

There are two different approaches that address virtual community participation strategy. One is to approach it from a social perspective and the other from a socio-technical perspective (Koh & Kim, 2003). The socio-technical perspective emphasizes both sociability and usability, and the fit between them. We believe that the socio-technical approach (Pasmore, 1995) is useful to address virtual community as a dynamic process (Preece, 2000). So, this study limits its independent variables to managing strategy and information system quality, which are thought to be important factors in a community operator's perspective (Kim, 2000). In addition to finding their direct impacts, this study identifies indirect effects through two mediating variables, member visit and sense of community.

PRIOR RESEARCH

Virtual Community

Definition

The term 'virtual community' was first used by Howard Rheingold (1992), who defined it as a "social aggregation that emerges from the net when enough people carry on public discussion long enough, with sufficient human feeling, to form webs of personal relationship in cyberspace." However, Hagel III and Armstrong (1997) have described it in a different way, as "groups of consumers united by a common interest." And Williams and Cothrel (2000) defined it as a "group of people who engage in many-to-many interactions online." Likewise, The Yankee Group defined virtual community as a large targeted audience of loyal and highly interactive users.

Taking all these into consideration, it is possible to categorize the above definitions in two groups, narrow and broad. The narrow definitions include those of Rheingold and the Yankee Group, while the broad definitions include those of Hagel III and Armstrong and Williams and Cothrel. Following the narrow definition, this research identified four requirements for a virtual community, based on prior research. These requirements are commonness, interactivity, continuance, and cyberspace (see Figure 1). Commonness suggests a similarity in terms of interest, experience, geographic feature, or demographics. Interactivity includes two types of interactions, one between system operator (SYSOP) and member and the other between member and member. Continuance refers to those interactions that have to continue for a certain period of time. Finally, cyberspace includes all aspects of the online world regardless of underlying infrastructure, such as IP (Internet, extranet, intranet) or mobile networks.

Managing Strategy

Then how does one build and operate a successful virtual community? There is little empirical research on this issue, but there are some ideas. Hagel III and Armstrong (1997) argued that people join in a virtual community to fulfill their needs for things such as information, transactions, relationships, and fantasies. Thus the virtual community

Figure 1: Four Requirements of a Virtual Community.
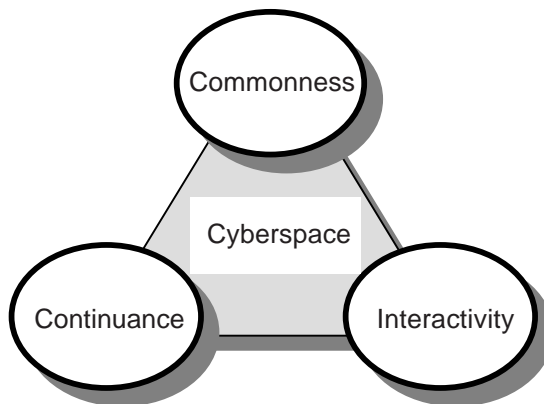
should satisfy these needs through the use of content, communication, and commercialization.

Kim (2000) has focused more on the design and operation of communities by drawing on nine design principles for community-building from her own experience (see Table 1). These principles include: 'define and articulate the community's purpose', 'build flexible and extensible gathering places', 'create meaningful and evolving member profiles', 'provide a range of roles', 'promote effective leadership by developing a strong leadership program', 'define a clear-yet-flexible rule such as code of conduct and etiquette', 'organize and promote cyclic events', 'integrate a community with the real world through rituals', and 'facilitate member-run subgroups'.

Williams and Cothrel (2000) pointed out three keys to sustaining a virtual community: member development, asset management, and community relations. Member development means that communities should increase the size of their community membership and enhance member activities. Member development is important because communities need critical mass to remain active and to hold the attention of members. In addition, communities have to manage assets effectively, regardless of their source. Assets to be maintained include content, alliances, knowledge, experience, and the

Table 1: Nine Design Strategies.

Strategy	Details
Purpose	— Construct a mission statement — Create a strong site personality
Places	— Provide a good system overview — Include rich communication features
Profiles	— Make profiles easy and fun — Keep the profiles up-to-date and evolving
Roles	— Offer increased privileges to regulars — Recruit leaders and mentors from within
Leadership	— Set up your program to grow — Set reasonable expectations for online support
Rule	— Create and enforce your code of conduct — Define an escalation path
Events	— Hold regular, hosted themed events — Conduct community surveys
Rituals	— Celebrate events that reinforce social identity — Acknowledge important personal events
Subgroups	— Provide features that facilitate small groups — Create contests for subgroups

community infrastructure (hardware, software, and interface). Finally, communities can turn visitors into participating members by strengthening their relations. For example, off-line events could help cement relationships that have been established online.

While Hagel III and Armstrong (1997) explain basic ideas, Kim (2000) and Williams and Cothrel (2000) propose some solutions that can be followed by the community SYSOPs who want to create and manage virtual communities. In particular, the nine design principles of Kim (2000) cover most of the factors that were referred to by Williams and Cothrel (2000).

Sense of Community and Participation

Sense of Community

Sense of community has been studied by many sociologists and psychologists since the late 1970's. Sociologists have been interested in the factors that affect the sense of community, while psychologists have been interested in the relationship between sense of community and other psychological concepts such as satisfaction and happiness (Brodsky et al., 1999).

McMillan and Chavis (1986) developed the Sense of Community Index (SCI) based on prior research. They proved the reliability and validity of this index by applying the SCI to a real-world situation (Chavis et al., 1986). This SCI is composed of four constructs: membership; influence; integration and fulfillment of needs; and shared emotional connection. Each of these constructs has its own component factors (see Table 2). The membership construct consists of the dimensions of boundary and common symbols. Narrowing the boundary of the community leads to emotional safety and an increase in membership. Common symbols such as dress, ritual, and language also increase membership.

The second construct is influence. There are two types of influences in communities. One is the influence of a community on its members and the other is the influence of members on a community. The first influence is contingent on members' cohesiveness and conformity to a community. Both could be reinforced when the community's norms and justice are consensually validated. However, the second influence is dependent on each member's nature. If a member fully understands the purpose of the community and participates in a community with a high level of leadership, he or she can increase his or her influence on the community.

The third construct is integration and fulfillment of needs. Because need fulfillment is a primary function of a cohesive community, each community should make efforts to first identify the members' needs. The best situation is when members and their community fit each others' objectives and have shared values. However, in a given situation, a community can better fulfill the members' needs by rewarding contributing members through elevated status and privileges.

The last construct is emotional connection. It can be consolidated by quantity and quality of interactions. Thus each community has to offer shared and worthwhile events as often as possible.

Participation

Participation in a community has been considered a measurement of the community's success because it shows member satisfaction, while at the same time advancing

Table 2: Sense of Community and the Factors Influencing It.

Sense of community	Factors
Membership	– Boundary – Common symbol system: dress, ritual, language
Influence	– Cohesiveness, conformity and consensual validation – Understanding of community's needs and leadership
Integration and fulfillment of needs	– Person and environment fit – Effective reinforcement by rewarding contributors
Emotional connection	– Number of contacts and quality of interaction – Opportunities for shared worthwhile events

important community goals (Julian et al., 1997). A great deal of research has thus focused on developing strategies that promote participation, such as creating individual psychological benefits and a sense of community, power, and involvement (Zimmerman & Rappaport, 1988; Teo, Chan, Wei, & Zhang, 2003; Koh & Kim, 2003).

Participation is highlighted in virtual communities as well. Community leaders must have the necessary skills to stimulate member involvement and participation as well as to attract and shepherd new members (McWilliam, 2000). Since the measurement for community success is changing from quantity measurement to quality measurement, member activity is more important than the number of members in the community (Park et al., 2000; Kozinets, 2000). Sense of community, participation, and involvement were suggested as measurements for evaluating a community in terms of its quality (Cothrel, 2000).

Information System Quality and Its Use

Information System Quality

Information system quality can be divided into two aspects — system quality and information quality. System quality refers to the user's perception of the system and was first developed to measure system performance. Information quality refers simply to the quality of information generated by the system.

DeLone and McLean (1992) summarized dependent variables that had been used to measure system quality and information quality, and assumed that both are highly related to system use and its performance. These relationships were validated through later empirical research. Information quality and system quality were shown to have indirect influences on system use (Seddon, 1997; Kim & Ahn, 1998).

This relationship was studied with respect to Internet web sites by Liu and Arnett (2000). To explore factors associated with web site success, they combined the factors of information and system quality with four others. It was revealed that web site success was related to four major factors: quality of information and service, system use, playfulness and system design quality.

System Use

System use is one of the most frequently reported means of measuring the success of an information system, and it reflects the attitude of the user toward the system (DeLone & McLean, 1992). While DeLone and McLean argued that information and system quality have a direct influence on system use, Seddon (1997) maintained that they had an indirect influence on it by way of usefulness and user satisfaction. In this study, system use can be viewed as a "visit" to the community.

RESEARCH MODEL

Research Model

Figure 2 shows the research model which seeks to examine the impact of managing strategy and information system quality on member participation in virtual communities.

Since previous research (Kim, 2000; Williams & Cothrel, 2000; McWilliam, 2000) argued that appropriate managing strategy could build up cohesive virtual communities, the managing strategy may have a direct impact on members', visits, sense of community and member participation. On the other hand, information system quality is highly related to its use (Delone & McLean, 1992; Liu & Arnett, 2000). Thus, information system quality may have a direct influence only on a member's visit. However, the model also shows that managing strategy and information and system quality may affect participation indirectly through the members' visits and their sense of community.

Research Hypotheses

Managing Strategy

Many community-related articles argued that how a community is managed could determine its success (Kim, 2000; Williams & Cothrel, 2000). How to define the purpose of community, how to define and enforce its rules, how to promote events, and how to facilitate subgroups might lead a community to success in terms of member visits, sense of community, and participation. In addition, prior research about off-line communities has shown that appropriate community operations could reinforce the members' sense

Figure 2: Research Model.
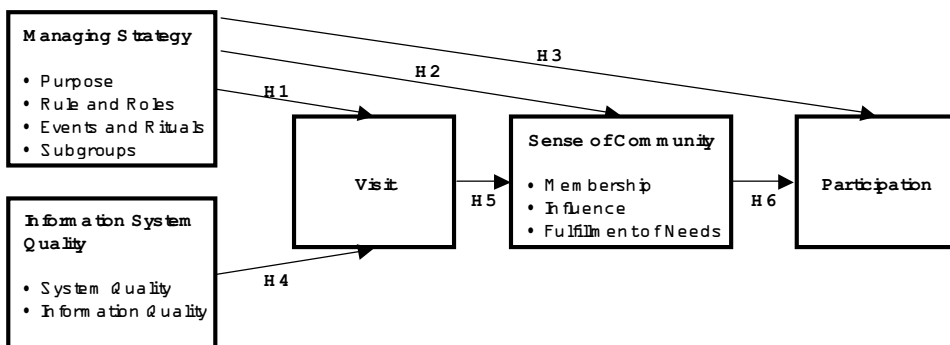
of community and therefore increase their participation (McMillan & Chavis, 1986; Julian et al., 1997). This leads to the following hypotheses:

H1. Managing strategy has a positive influence on member visits.
H2. Managing strategy has a positive influence on members' sense of community.
H3. Managing strategy has a positive influence on member participation.

Information and System Quality

There has been some discussion about the relationship between IS quality and its use. DeLone and McLean (1992) have argued for a direct relationship while Seddon (1997) and Davis (1986) have argued for an indirect relationship. However, both agree that there is a relationship between information system quality and its use. In a recent publication on e-commerce, Liu and Arnett (2000) found that information and system quality were highly related to system use. Since system use in a virtual community may be measured in terms of the number of member visits, the following hypothesis is proposed:

H4. Information system quality has a positive influence on member visits.

Sense of Community

The relationship between sense of community and participation is not well understood. Many theories and past research suggest two different models: that sense of community leads to participation (Bachrach & Zautra, 1985); and, conversely, that participation leads to sense of community (Heller, 1989). The first model is particularly appealing in that planners should be able to promote participation through a strategy that enhances the sense of community and thus improve the value of community. In fact, current research has suggested that sense of community promotes participation. In a study of neighborhood block associations, Chavis and Wanderman (1990) found empirical evidence of a causal relationship in which sense of community has a direct as well as an indirect effect on participation.

McMillan and Chavis (1986) argued that the quantity and quality of interactions between members could enhance sense of community, especially emotional connection. In addition, Park et al. (2000) revealed that there was a high relationship between the number of visits and a member's influence on a community. Thus member visits could lead to sense of community and sense of community could lead to member participation. This suggests the following hypotheses:

H5. Member visits have a positive influence on members' sense of community.
H6. Members' sense of community has a positive influence on member participation.

RESEARCH METHOD

Selected Communities

To aid in generalizability, eight different communities were selected instead of one. Four were nonprofit communities which were selected from community-service sites such as GeoCities, and the other four were selected from among independent and profit-

oriented sites such as iVillage. The most popular community-service sites in Korea are Daum (http://café.daum.net) and Freechal (http://www.freechal.com). We selected four very successful nonprofit communities from these sites. Four profit-oriented communities were chosen from 100hot (http://www.100hot.co.kr), which lists the 100 hottest sites for every category.

To control the effect by size and operation period, the number of members was constrained to be more than 2,000 for the nonprofit community and more than 200,000 for the profit-oriented community. To provide sufficient time to establish a community, both types of communities had to have been established for at least six months.

Procedure

The questionnaire was designed to be completed online by each respondent. Since all questions were measured on a Likert 7 scale, JavaScript programming was added to the online survey to check for missing responses and to prompt the user to answer them. A pretest of the questionnaire was conducted two weeks prior to the administration of the main survey, resulting in some sentences being reworded to avoid ambiguity.

Before the survey, we contacted SYSOPs of each community and asked them to support our research by notifying their members about our research through e-mail, a message board, and an advertisement banner. To promote participation, one hundred people determined by lottery would receive gift certificates.

Measures

Managing Strategy

After categorizing the factors that had been referred to in previous research (Kim, 2000; Williams & Cothrel, 2000), six factors of the construct managing strategy were developed. These are purpose, rule, role, event, ritual, and subgroup of the virtual community. In detail, we measured the clarity of purpose, the rationality of rule and role, the frequency and quality of event and ritual, and the diversity of the subgroup. To improve the validity and reliability of this measurement, four experts in this area verified each sentence of measure and conducted the pretest for one community.

Information and System Quality

Information system quality is composed of system quality and information quality. After considering a community's features, the five measures of speed, reliability, ease of use, functionality, and recovery were developed to measure system quality from Kim and Ahn's (1998) measures. In similar fashion, the five measures of timeliness, accuracy, abundance, customized information presentation, and useful information presentation were developed to measure information quality.

Visit

Since the concept of visit in this research is similar to system use in IS research, the means of measuring system use were applied to measure visits in a virtual community. As previously stated, visits to a community may serve as a proxy for the construct of system use. Park et al. (2000) used the frequency of visits and the average visit duration

to quantitatively measure the value visit to a virtual community. Thus, member visit was measured by the frequency and time of each member's visit.

Sense of Community

SCI (Chavis et al., 1986) was used to measure sense of community. Since this index was developed for off-line communities, some rewording was necessary to modify it for an online environment. After the modification, a pilot test was conducted to increase the validity of the questionnaire and to ensure it was clear to respondents.

Membership was measured by how many members were recognized in that community, how comfortable they were in that community, and how strongly they believed themselves to be members of that community. Influence was measured by how much members cared about what others thought of their actions, how much influence the community had on them, and how much influence they had on the community. Integration and fulfillment of needs was measured by how worthwhile the community was in terms of their time, how well their needs were fulfilled, and how integrated their needs were with the needs of others. Emotional connection was measured by how important this community was to them, how well all members got along within that community, and how long they wanted to stay in that community.

Participation

While "visit" implies a low level of involvement, participation implies a high level of involvement in a community. Park et al. (1999) used two types of participation to measure member loyalty — participation in community operation and participation in communication with other members. Building on these two participation types, it is proposed that there are four aspects of participation: participation in community operation, participation in subgroup or event, participation in regular message boards, and participation in chatting or e-mail with other members. The frequency of each type of participation was used to measure participation.

DATA ANALYSIS

Data Collected

Surveys were collected over ten days with a response of 2,094 questionnaires. To ensure the respondents' reliability, one question was asked twice in a reverse direction. Of the total responses, 186 questionnaires did not show consistency between these questions, and 21 questionnaires showed the same mark for more than 20 questions in row. Both were considered as having low reliability and were removed from the sample. Thus, after deleting 207 questionnaires (about 10%), 1,887 questionnaires were used for further analysis.

The demographics were as follows. The respondents were 57.6% female and 42.4% male. The occupations of the respondents fell into the following categories: 49.3% were white-collar workers, 37.9% students and 12.8% housewives. The average age was 26.8, with a range from 11 to 60. The average period of participation per member was 4.9 months.

Table 3: Factor Analysis of Managing Strategy.

	Component			
	1	2	3	4
Rule1	.837			
Rule2	.708		.244	
Role2	.571	.201		
Role1	.523		.239	.354
Ritual1		.809		
Event2		.715	.226	
Ritual2	.267	.616		.205
Event1	.342	.444	.226	
Purpose2			.905	
Purpose1			.905	
Subgroup1				.873
Subgroup2				.860

Validity and Reliability of Measure

Factor analysis with varimax rotation was performed to ascertain the discriminant validity of each construct. Table 3 shows that among the managing strategies, rule and role as well as event and ritual could not be discriminated. Thus, it was decided to reduce the number of managing strategies to four, based upon these results, by merging rule and role into one factor, as well as event and ritual into another.

Table 4 shows that system and information quality could be discriminated except for system quality 4 (functionality). In prior research (Liu & Arnett, 2000; Kim & Ahn, 1998), this was used for system quality, and the question hardly could be interpreted as information quality. Thus, it was decided to follow the original construct[1].

Sense of community resulted in three discriminant factors instead of four. Table 5 shows that emotional connection has no discriminant validity. Two questions of this went to integration and fulfillment of needs and one other went to membership. Prior research has found that sense of community could show the different structure of factors by the types of communities or the features of members (Chipuer & Pretty, 1999). Thus, based upon the results of factor analysis, sense of community was composed of three distinct factors such as membership, influence, and integration and fulfillment of needs. Meanwhile, visit and participation show high construct validity, as shown in Table 6.

In order to ensure that the variables comprising each proposed research construct were internally consistent, reliability assessment was carried out using Cronbach's alpha. As Table 7 shows, all Cronbach's alphas were greater than 0.64, satisfying a minimum requirement of 0.6 (Van de van & Ferry, 1980).

Hypotheses Testing

To avoid being dominated by a single community, we gathered data from eight different communities. However, the numbers of respondents from each community were quite diverse. The recommended sample size for LISREL is around 200; if the sample size greatly exceeds 200, the chi-square statistic can become too sensitive to its sample size

Table 4: Factor Analysis of IS Quality.

	Component	
	1	2
Information Quality 5	.799	
Information Quality 1	.788	
Information Quality 4	.756	
Information Quality 2	.754	
Information Quality 3	.736	.218
System Quality 4	.610	.361
System Quality 1		.784
System Quality 2		.729
System Quality 3	.298	.696
System Quality 5	.326	.653

difference and overall model fitness can be decreased (Hair et al., 1998). Therefore, we randomly selected 30 cases from each of the eight communities for a total of 240 cases to be analyzed by LISREL.

The LISREL test results are presented in Figure 3, showing the significant paths (p-value < .05) in solid lines. The goodness of fit was 0.98 and the normed fit index was 0.96. The root mean square residual was 0.033. These fitness indices show that the model quite well explains the relationships between variables.

Among the hypotheses regarding managing strategy, hypotheses 1 and 2 were accepted, but hypothesis 3 was rejected. The LISREL results showed that managing strategy has a positive influence on visit (g=0.18) and sense of community (g=0.39), while it has no influence on participation. The visit was positively influenced by IS quality (g=0.26). Thus, hypothesis 4 was accepted. Moreover, visit was positively related with sense of community (b=0.32), and sense of community was positively related with participation (b=0.53). Thus, hypotheses 5 and 6 were also accepted.

Table 5: Factor Analysis of Sense of Community.

	Component		
	1	2	3
Integration and Fulfillment of Needs 2	.841		
Integration and Fulfillment of Needs 1	.785	.229	
Integration and Fulfillment of Needs 3	.700		
Emotional Connection 3	.564	.316	.317
Emotional Connection 1	.511	.424	.366
Membership 1		.863	
Membership 2	.325	.765	
Emotional Connection 2	.211	.653	.341
Membership 3	.412	.606	.285
Influence 2	.227		.835
Influence 3	.250		.814
Influence 1		.425	.517

Table 6: Factor Analysis of Visit and Participation.

	Component	
	1	2
Participation 3	.844	
Participation 4	.811	
Participation 1	.750	
Participation 2	.744	.243
Visit 1		.937
Visit 2	.250	.900

Further Analysis

Because the result of the hypothesis test cannot show the detailed implication for community manager, a LISREL analysis for the detailed factors of each construct was conducted. Although overall fitness was marginally acceptable (Ratio: 11.76 = chi-square 188.24/degree of freedom 16, GFI: 0.88, RMR: 0.086, NFI: 0.78), it was deemed sufficient to proceed to show the detailed relationships.

As in Figure 4, among the three constructs of sense of community only membership (b=0.52) had an influence on participation. Membership was influenced by purpose (g=0.16), subgroups (g=0.13), and visit (b=0.20). Meanwhile, subgroups (g=0.18) and information quality (g=0.31) had an influence on visit.

To specify the result of test by the type of community, the LISREL analysis was performed twice. As in Figure 5 (nonprofit communities), membership (b=0.22) and integration and fulfillment of needs (b=0.45) had an influence on participation. Integration and fulfillment of needs was influenced by purpose (g=0.30), rule (g=0.22) and visit (b=0.36). Membership was influenced by subgroups (g=0.20) and visit (b=0.33). Meanwhile, only purpose (g=0.23) had an influence on visit.

As in Figure 6 (profit-oriented communities), among the three constructs of sense of community only membership (b=0.63) had an influence on participation. Membership

Table 7: Cronbach's Alpha of All Constructs.

Construct	# of Questions	Cronbach's Alpha
Purpose	2	0.8582
Rule	4	0.6675
Event	4	0.6407
Subgroup	2	0.7749
System Quality	5	0.7492
Information Quality	5	0.8521
Visit	2	0.8601
Participation	4	0.8139
Integration and fulfillment of needs	5	0.8172
Membership	4	0.8222
Influence	3	0.6894

Figure 3: Path Estimates of Structural Model (N=240).

Fitness	Index
X^2 (Degree of Freedom : 3)	11.04
Goodness of Fit Index (GFI)	0.98
Root Mean square Residual (RMR)	0.033
Normed Fit Index (NFI)	0.96
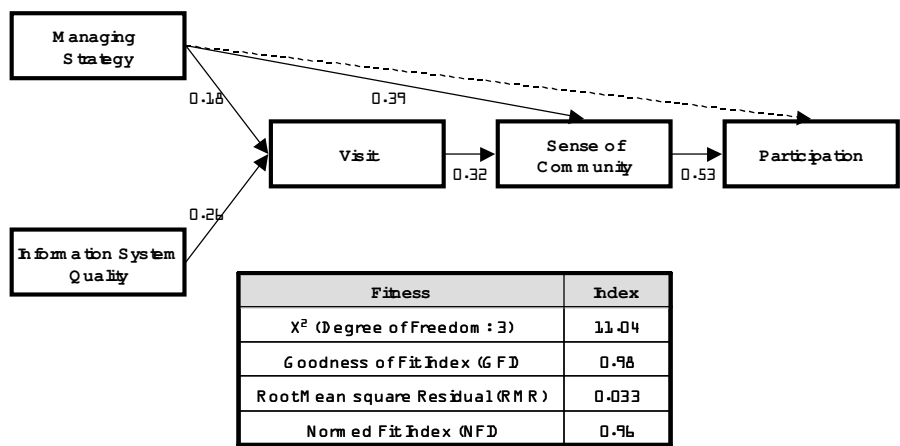
was influenced by visit (b=0.19). Meanwhile, event (g=-0.20) and information quality (g=0.55) had an influence on visit.

DISCUSSION AND CONCLUSIONS
Discussion of Findings

This research examined all the possible paths leading to participation in a virtual community with two independent variables and two mediating variables. The results show the three following findings.

First, participation could not be enhanced directly. It was revealed that there was no significant direct path from managing strategy to participation. However, the path from sense of community to participation was strongly supported by the results. This then implies that a community manager has to consolidate the sense of community, with membership in particular, in order to enhance participation.

Second, sense of community could be enhanced by an appropriate managing strategy. The path from managing strategy to sense of community has a higher estimate than the estimate of path from visit to sense of community. This implies that an appropriate managing strategy could enhance the sense of community without a high number of visits. If a community is managed in the way that the members want, they can feel a sense of community directly without visiting that community that many times. The detailed model shows that membership, a dominant factor of participation, is influenced by purpose and subgroups. However, the path from visit to sense of community should not be ignored.

Third, the number of visits could be increased by the information quality. More than any other factor, information quality had the highest influence on the number of visits. This implies that the visits of most members are determined by information quality. A community having high information quality would enjoy more visits than other commu-

Figure 4: Path Estimates of Detailed Structural Model (N=240).

Fitness	Index
X^2 (Degree of Freedom : 16)	188.24
Goodness of Fit Index (GFI)	0.88
Root Mean square Residual (RMR)	0.086
Normed Fit Index (NFI)	0.78
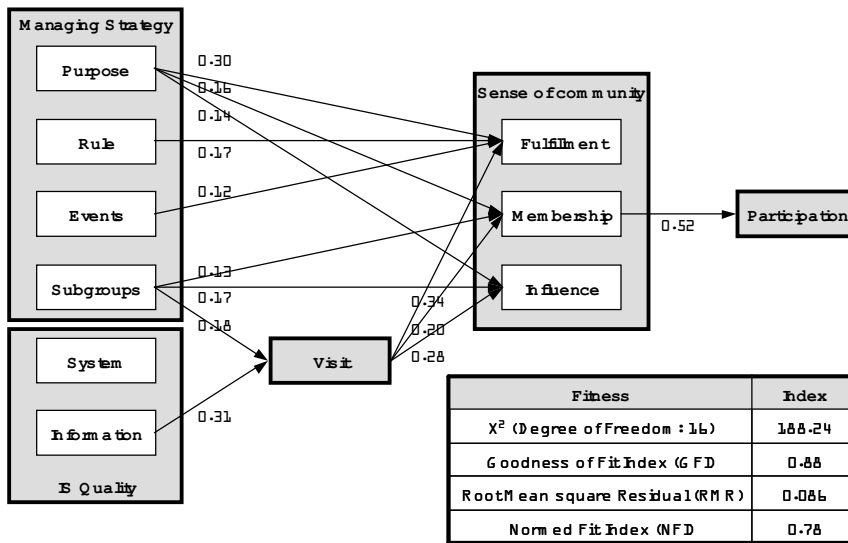
Figure 5: Path Estimates of Non-Profit Community (N=120).

Fitness	Index
X^2 (Degree of Freedom : 16)	127.95
Goodness of Fit Index (GFI)	0.84
Root Mean square Residual (RMR)	0.098
Normed Fit Index (NFI)	0.74
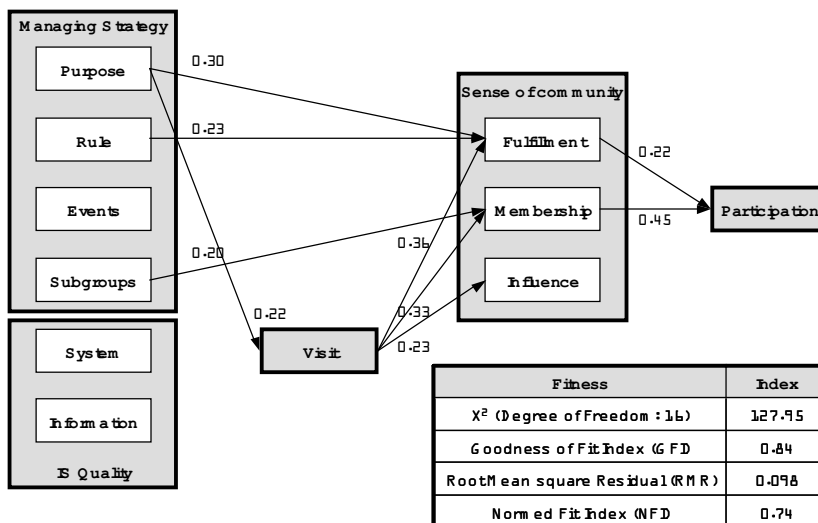
Figure 6: Path Estimates of Profit-Oriented Community (N=120).

Fitness	Index
X² (Degree of Freedom : 16)	92.33
Goodness of Fit Index (GFI)	0.88
Root Mean square Residual (RMR)	0.083
Normed Fit Index (NFI)	0.81
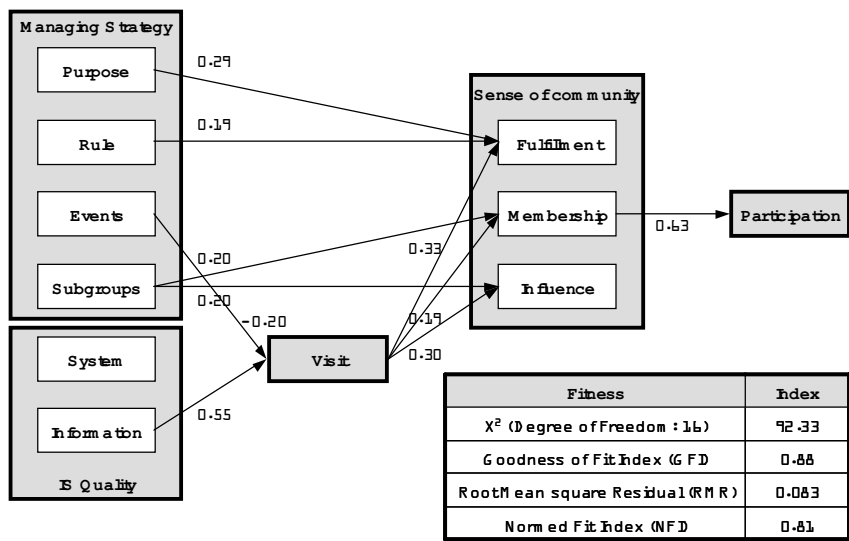
nities. If a community manager wants to increase members' visits, he or she has to control information quality.

Implications

The study has both theoretical and practical implications. Regarding its theoretical worth, this study provides a research model about the performance variables in a virtual community by finding relationships between members' behaviors and their sense of community.

The study results also have practical implications. For example, there are potential implications for the expansion of virtual community. Members' visits and sense of community play a role as a mediating variable to members' participation. Managing strategies have no direct influence, but they do exert an indirect influence on participation. For enhancing participation, operators of communities should focus on ways of enhancing membership.

For enhancing participation, operators have to use different approaches according to the type of community. There are various paths for enhancing participation between nonprofit and profit-oriented communities. In profit-oriented communities, managing information quality is important because information quality is the most influential factor when it comes to visits. In nonprofit communities, operators should identify the needs of community members and focus membership to enhance member participation.

Limitations

The primary limitation of this research is that each relationship is observed at a certain point of time. This might ignore the possibility that one member's sense of community could evolve into participation during a certain period with interactions of

a SYSOP or other members. In addition, a member's visit could be increased as a result of member participation. Thus, a longitudinal study that observes members' evolution from low involvement to high involvement may be required to overcome this limitation.

Another limitation is that the results cannot be generalized for all communities. It is true that there are many different types of communities on the Internet. Each community might have a different kind of path leading to participation, or a different managing strategy that is most appropriate. To resolve this question, research that shows the difference between a community's categories should be conducted.

ACKNOWLEDGMENTS

ENDNOTES

[1]   The result of using system quality 4 as information quality is the same for using that of the original construct.

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Chapter XV

The Role of Inter-Organizational Trust in B2B E-Commerce

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ABSTRACT

This chapter seeks to understand inter-organizational-trust as an antecedent factor in the adoption of and participation in e-commerce. Exploratory research from different theoretical perspectives including the inter-organizational relationship theory, transaction cost economics theory, resource dependency theory, and a literature review on trust in business relationships, and trust and security based mechanisms paved the way to the development of a conceptual model. The model was tested via four case studies consisting of a large public sector organization and three Small-Medium Enterprises (SME) involved in customs clearance. SME included an Internet service provider, a customs broker (agent) and an importer. Data was collected via in-depth interviews, discussions with key personnel, and from existing documents. The findings suggest that there are two forms of trust; trust in the technology and trust in the trading partner. Further, the findings strongly indicate that inter-organizational-trust is important for e-commerce participation, as organizations need to cooperate, collaborate and communicate timely and relevant information in order to facilitate e-commerce. This entails not only technological proficiencies, but also trust between trading parties, so that business transactions are sent and received in an orderly fashion.

INTRODUCTION

E-commerce is the sharing of business information, maintaining business relationships, and conducting business transactions by means of telecommunications networks. The hype and growth of B2B (B2B) e-commerce has been accelerating in recent years. Forrester research predicts that e-commerce in the United States worth $131 billion in 1999 B2B is projected to reach $1.5 trillion by 2003. However, there seems to be a perception by businesses that e-commerce transactions may be both insecure and unreliable. Despite the assurances of security and reliability of technological security mechanisms (such as encryption mechanisms, authorization mechanisms, digital signatures, and certification authorities), trading partners in B2B e-commerce do not seem to trust the *'people side'* of the transactions (Marcella et al., 1998). Lack of trust in e-commerce activities leads to uncertainties in the e-commerce environment, which in turn creates a perception of increased risk, thereby inhibiting the tendency to participate in e-commerce. Uncertainties reduce confidence both in the reliability of B2B transactions transmitted electronically and, more importantly, in the trading parties themselves. Based on the above reasoning we suggest that there are two types of uncertainties. First, uncertainties in the e-commerce system and environment (as in third party services, national and international standards, taxes, also known as environmental uncertainty), and secondly, uncertainties in the trading partner (i.e., being dishonest and unreliable, also known as behavioural uncertainty).

The adoption of Internet-based commerce requires a certain level of trust, both in the technology being used to transact business messages and in the trading partners with whom trade is being conducted. The evolution of Internet provides the ability to conveniently and flexibly share information across organizations, thus radically transforming organizational procedures. Consequently, Internet-based B2B e-commerce applications can potentially lead to profound changes in inter-organizational relationships. Moreover, by reaching trading partners through the Internet, organizations are able to implement more effective targeted marketing and relationship building strategies with lower overheads. For example, extranet e-commerce applications have provided the ability to track real-time information with lower costs and flexibility (Riggins & Rhee, 1998; Senn, 1998). Thus, there is a two-way or cyclic relationship between participation in e-commerce and trust — trust as an antecedent of participation — and participation in e-commerce can in turn modify trust.

The objective of this study is to examine the importance of inter-organizational-trust in the adoption of and participation in B2B e-commerce. E-Commerce participation refers to the *extent* an organization has adopted and integrated e-commerce. Sydow (1998) defines inter-organizational-trust (IOT) as *"the confidence of an organization in the reliability of other organizations regarding a given set of outcomes or events"* (p. 35). This study defines inter-organizational-trust as *"the confidence in the reliability of two organizations in a possibly risky situation that all trading partners involved in the action will act competently and dutifully."*

The rest of the chapter is structured as follows. The next section discusses the theoretical foundations leading to the development of a conceptual model. This is followed by a section describing the research process, which includes a case study design, data collection and analysis procedures. The following section discusses the

key findings. The chapter concludes with contributions made to this study and directions for future research.

DEVELOPMENT OF THE CONCEPTUAL MODEL

The conceptual model developed for this study was derived from theories in a multi-disciplinary literature, including marketing, management, sociology, information systems and e-commerce. Five theoretical perspectives contributed to the constructs in the conceptual model. A brief description of trust in business relationships, inter-organizational-relationships theory (IORs), transaction-cost-economics theory (TCEs), resource-dependency theory and trust and security-based mechanisms in e-commerce is given below.

Inter-Organizational-Relationships Theory (IORs)

It is only recently that IS literature has recognized the complementary, and at the same time, competing roles of technology and trust in inter-organizational business relationships. For example, while some scholars (Malone et al., 1987; Clemons et al., 1993) have focused primarily on information technology as a means of reducing inter-organizational transaction costs, Kumar et al.'s (1998) findings suggest the substitutability of trust and technology in reducing transaction costs in inter-organizational-systems (IOSs). Inter-organizational-relationships arise from inter-organizational-systems (IOSs), and occur when two or more organizations exchange resources (e.g., money, physical facilities and materials, information, customer or client referrals, and technical staff services) between each other (Bensaou & Venkatraman, 1996; Clemons et al., 1993; Malone, 1987). Inter-organizational-relationships focus on situational, procedural and structural factors. Situational factors drive the need for reasons and conditions that form relationships and inter-organizational-relationship theory provides insights into inter-actions and, environmental and contingent factors, thus capitalizing on the formation and structure of cooperative IORs (Ring & Van de Ven, 1994). For example, trading partners often negotiate written procedures and contracts on how to undertake their e-commerce operations, thereby leading to procedural factors. Procedural factors empha-size on trading partners' roles and responsibilities outlined in their service level agreements and trading partner agreements, thus ensuring quality of services. Structural factors include governance mechanisms in the form of institutional arrangements that prescribe an overall pattern of interactions in inter-organizational-relationships. Governance mechanisms include: procedures, policies, standards, and trading partner agreements that enable structured routines to take place. Furthermore, structural factors include standardized routines that capitalize on complete and correct e-commerce operations, thereby contributing to economic benefits from savings in time and cost. Hence, by properly managing these situational, procedural and structural factors in e-commerce, outcomes from inter-organizational-relationships may be monitored to achieve high standards and quality.

Transaction-Cost-Economics Theory (TCEs)

Transaction-cost-economics (TCEs) focus on economic efficiencies that provide insights into economic exchanges. They deal with optimum governance mechanisms (markets or hierarchies), thus minimizing production and transaction costs (Williamson, 1975). Economics researchers focus on trading partners' transactions and theorize that trading partners make trust choices based on rationality derived costs and benefits (Williamson, 1993). In other words, trading partners' decide to partake in a trusting relationship based on whether their perceptions of the potential costs they would incur by engaging in the trusting behavior outweighs the expected benefits of engaging in the trusting behavior. For example, trading partners usually negotiate and monitor trading partner agreements as legal contracts before engaging in e-commerce in order to protect themselves against opportunistic behaviors. Hence, transaction-cost-economics contribute to perceived benefits and perceived risks of e-commerce.

Resource-Dependency Theory

Resource-dependency theory provides a holistic approach with explicit recognition of economic and socio-political dimensions of trading partner relationships (Pfeffer & Salanick, 1978). Specifically, resource-dependency theory focuses on three aspects. First, external forces in an e-commerce environment within which the dyad operates, thus contributing to perceived risks via computer viruses, and open standards. Second, internal organizational dimensions that structure and shape written policies and procedures, thus contributing to perceived benefits, and finally, trading partner interactions (as in behavioral dimensions) in their daily e-commerce exchanges, thus contributing to trading partner trust (Pfeffer & Salancik, 1978; Reekers & Smithson, 1996).

THE IMPORTANCE OF TRUST

Previous scholars who examined trust in business relationships have identified trust to be a key factor for successful long-term trading partner relationships. For example, trust has been found to increase cooperation, thereby leading to communication openness and information sharing (Doney & Cannon, 1997; Ring & Van de Ven, 1994; Smith & Barclay, 1997). Based on an earlier version of this study we argue that trust is derived from two forms. First, technology trust refers to institutional structural assurances and security mechanisms embedded in e-commerce technologies. Technology trust consists of security services and best business practices that serve as control protective mechanisms. Second, relationship trust refers to the extent the partner is competent, predictable, reliable, and exhibits benevolence in the e-commerce relationships.

Technology Trust in E-Commerce

Technology trust is defined as *"the subjective probability by which organizations believe that the underlying technology infrastructure is capable of facilitating transactions according to their confident expectations"* (Ratnasingam & Pavlou, 2002:22). In her seminal study, Zucker (1986) suggests that institutional trust is the most important

mode of trust and it is created in an impersonal economic environment without familiarity and similarity. She identified two dimensions, namely, third party certifications such as licenses, regulations, and laws used to define trustworthy behaviors, and secondly, escrows. Similarly, McKnight and Chervany (2002) described institution-based trust as part of Internet transactions and identified two dimensions of institutional trust. First, situation normality referring to beliefs that success is anticipated because the situation is normal and secondly, structural assurances such as contracts regulations and guarantees. We adapted this reasoning and proposed the term technology trust to fit the context of B2B e-commerce. Technology trust is derived from trust and security-based mechanisms embedded in the e-commerce technologies including digital signatures, encryption mechanisms (via public key infrastructure), authorization mechanisms (via User IDs and passwords), and best business practices (via regular audit, top management commitment, standards and contingency procedures) (Bhimani, 1996; Jamieson, 1996; Parker, 1995; Marcella et al., 1998). They provide technological, organizational, and relationship benefits from the automated processes that include timely, accurate, complete transmission and receipt of transactions, thereby achieving transaction integrity, authentication, confidentiality, non-repudiation, and availability. Table 2 provides a definition of technology trust and its dimensions applied in this study. Hence, by properly managing these mechanisms and their dimensions, organizations can perceive benefits of e-commerce. Alternatively, with poor business practices such as incomplete, incompatible, insecure systems, together with inadequate backups and a lack of training given to staff operating e-commerce applications, risks of e-commerce may escalate.

RELATIONSHIP TRUST IN E-COMMERCE

Relationship trust is defined as *"the subjective probability with which organizational members collectively assess that a particular transaction will occur according to their confident expectations"* (Ratnasingam, 2003). Thus, certainty in an e-commerce relationship requires that both the people and the technical systems are reliable. Table 1 presents three types of relationship trust identified from previous research. They include competence, predictability, and goodwill relationship trust.

Competence Relationship Trust

Competence relationship trust emphasizes reliance on trading partners' skills, technical knowledge, and ability to operate B2B e-commerce applications correctly. Previous research suggests that large powerful buyers in the automotive industry sign contractual service level agreements with their smaller suppliers in order to monitor their performance. Performance assessment includes quality of goods, services, timely delivery, and accuracy of data received (Helper, 1991; Webster, 1995).

Predictability Relationship Trust

Predictability relationship trust emphasizes reliability in trading partners' consistent behaviors that provide sufficient knowledge for other trading partners to make predictions and judgements due to prior experiences. Thus, a chain of positive

consistent behaviors makes trading partners reliable, predictable, and therefore trust-worthy.

Goodwill Relationship Trust

Goodwill relationship trust emphasizes the reliance upon trading partners' care, concern, honesty and benevolence that allows trading partners to further invest in their trading partner relationships. Goodwill trust is characterized by an increased level of cooperation, open communication, commitment, and sharing of knowledge and informa-tion, thereby leading to increased e-commerce participation. Thus, these three types of relationship trust, competence, relationship predictability trust, and goodwill relation-ship trust, form the underlying taxonomy of inter-organizational or trading partner trust used in this study.

CONCEPTUAL MODEL FOR EXAMINING THE ROLE OF INTER-ORGANIZATIONAL TRUST IN E-COMMERCE PARTICIPATION

Perceived Benefits of E-Commerce

Perceived benefits refer to business value received by organizations that have adopted e-commerce. We identified three types of perceived benefits — perceived economic, perceived relationship-related, and perceived strategic benefits (Doney & Cannon, 1997; Fearson et al., 1998; Ganesan, 1994; Morgan & Hunt, 1994; Nath et al., 1998; Riggins & Rhee, 1998; Senn, 2000; Smith & Barclay, 1997). First, perceived direct or economic benefits are derived from the automated processes that contribute to direct

Table 1: Different Types of Trust in Business Relationships.

Source	Competence Relationship Trust Economic Foundation	Predictability Relationship Trust Familiarity Foundation	Goodwill Relationship Trust Empathy Foundation
Gabarro (1987)	Character Role competence	Judgement	Motives/ Intentions
Mayer, Davis & Schoorman (1995)	Ability	Integrity	Benevolence
McAllister (1995)	Cognitive	Cognitive → affective	Affective
Lewicki & Bunker (1996)	Deterrence/ Calculus	Knowledge	Identification
Mishra (1996)	Competence	Reliability	Openness Care Concern

savings in costs and time. Second, perceived relationship-related or personal benefits refer to positive trading partner trust relationships in the form of open communications, information sharing, cooperation, and commitment. Finally, perceived strategic or symbolic benefits refer to closer ties between trading partners, and improved reputation that increases business continuity and organizational performance.

Perceived Risks of E-Commerce

Perceived risks refer to potential weaknesses, barriers and losses faced by organizations that have adopted e-commerce. Risks can either occur internally or externally, by human or nonhuman (e.g., technology-related risks), accidental or intentional, and could be caused by disclosure, destruction, modification of e-commerce transactions, and by denial of service attacks from hackers (Das & Teng, 1996; Jamieson, 1996; Marcella et al., 1998). Ring and Van de Ven (1994) also classified risks as technology-performance related risks versus relational risks. This study identifies three types of perceived risks. First, perceived technology performance-related risks refer to misuse of e-commerce technologies, incompatible infrastructure, and uncertainties of e-commerce operations. Second, perceived relational risks refer to trading partners' lack of knowledge, exercising opportunistic behaviors, conflicting attitudes, and reluctance to change. Third, perceived general risks refer to poor business practices, environmental risks, and lack of standards and policies.

Participation in E-Commerce

Participation in e-commerce is the degree to which an organization is willing to engage in B2B e-commerce and it is measured in two ways. First, an economic view deals with the transaction volume, dollar value, sales, and profit that contribute to tangible business value. Second, a relational view examines the extent of organizational satisfaction and commitment in business relationships that result in intangible business value. The conceptual model (see Figure 1) below aims to examine the impact of inter-organizational-trust in e-commerce participation.

The conceptual model above was developed from theories in a multi-disciplinary literature. They include trust in business relationships and inter-organizational-relationship theory that helps to identify situational, structural, and procedural factors, thus contributing to governance mechanisms, perceived benefits, and uncertainties/risks of e-commerce. Similarly, transaction-cost-economics theory focuses on perceived benefits, such as economic advantages from savings in transaction costs, and perceived risks derived from uncertainties, task complexities, and interdependencies of trading partners leading to opportunistic behaviors. Resource dependency theory contributed to perceived risks of e-commerce derived from interdependencies between trading partners that created a situation of imbalance of power leading to conflicts, and finally, trust and security-based mechanisms (technology trust) contributed to perceived benefits of e-commerce derived from best business practices and technical security solutions embedded in the e-commerce technologies. Hence, perceived benefits and perceived risks derived from the above theories help determine the extent of e-commerce participation in the form of e-commerce performance and relationship trust development.

The aim of the conceptual model is to provide a comprehensive and complete approach in understanding the importance of inter-organizational-trust in e-commerce participation. The next section outlines the research propositions derived from the conceptual model followed by Table 2, which presents the definitions of the constructs and subconcepts in the conceptual model.

RESEARCH PROPOSITIONS

The following research propositions were derived from the conceptual model in Figure 1.

- *Research Proposition 1:* Technology trust is positively associated with perceived benefits of e-commerce.
- *Research Proposition 2:* Technology trust is negatively associated with perceived risks of e-commerce.
- *Research Proposition 3:* Relationship trust is positively associated with perceived benefits of e-commerce.
- *Research Proposition 4:* Relationship trust is negatively associated with perceived risks of e-commerce.
- *Research Proposition 5:* Perceived benefits of e-commerce are positively associated with e-commerce participation.
- *Research Proposition 6:* Perceived risks of e-commerce are negatively associated with e-commerce participation.

Table 2 outlines the constructs, subconcepts (dimensions), definitions, and sources applied in the conceptual model.

Figure 1: Conceptual Model of Inter-Organizational-Trust in E-Commerce Participation.

Table 2: Summary of Constructs, Sub-Concepts (Dimensions), Definitions, and Sources.

Constructs	Sub-concepts Dimensions	Definitions	Source
Technology Trust in E-Commerce		the subjective probability by which organizations believe that the underlying technology infrastructure is capable of facilitating transactions according to their confident expectations	Jamieson, (1996); Marcella et al., (1998); Parker, (1995)
	Confidentiality	protection of e-commerce transactions and message content against unauthorized reading, copying, or disclosure via encryption mechanisms	Bhimani, (1996); Jamieson, (1996)
	Integrity	transaction accuracy and assurance that e-commerce transactions have not been altered or deleted via acknowledgment procedures applying digital signatures	Bhimani, (1996); Jamieson, (1996)
	Authentication	trading partner's transaction quality of being authoritative, valid, true, genuine, worthy of acceptance or belief by reason of conformity to the fact that reality is present via digital signatures, User IDs, and passwords	Bhimani, (1996); Jamieson, (1996)
	Non-repudiation	originator of e-commerce transactions cannot deny receiving or sending that transaction via acknowledgement procedures applying digital signatures	Bhimani, (1996); Jamieson, (1996)
	Access Controls	protection of e-commerce transactions against weaknesses in the transmission media and protection of the sender against internal fraud or manipulation via authorization mechanisms such as User IDs and passwords	Bhimani, (1996); Jamieson, (1996)
	Availability	assurance that passes or conveys e-commerce transactions without interruption by providing authorized users with e-commerce systems via authorization mechanisms	Bhimani, (1996); Jamieson, (1996)
	Best Business Practices	policies, procedures and standards that ensure smooth functioning of e-commerce via written policies, procedures and top management commitment	Jamieson, (1996); Marcella et al., (1998)
Relationship Trust in E-Commerce		the subjective probability by which organizations' members believe that their partner will behave according to their confident expectations	Doney & Cannon, (1997); Ring & Van de Ven, (1994); Smith & Barclay, (1997); Mayer et al., (1995)
	Competence Trust	reliance upon the ability, skills, knowledge and competence of trading partners to perform B2B e-commerce correctly and completely	Lewicki & Bunker, (1996); Mayer et al., (1995)
	Predictability Trust	reliance upon the consistent behaviors of trading partners that allows another trading partner to make predictions and judgements due to past experiences	Lewicki & Bunker, (1996) Mayer et al., (1995)
	Goodwill Trust	reliance upon the care, concern, honesty, and benevolence shown by trading partners that allows the other trading partner to further invest in their trading partner relationship	Sako, (1998) Mayer et al., (1995)

Table 2: Summary of Constructs, Sub-Concepts (Dimensions), Definitions, and Sources.

Constructs	Sub-concepts Dimensions	Definitions	Source
Perceived Benefits of E-Commerce		Perceived benefits of e-commerce are gains received by organizations that have adopted e-commerce	Scala & McGarth, (1993); Saunders & Clark, (1992); Premkumar et al., (1994)
	Direct (economic) benefits of e- commerce	Benefits derived from direct savings in costs and time	Scala & McGarth, (1993); Saunders & Clark, (1992)
	Relationship-related (personal) benefits of e-commerce	Benefits derived from open communications, information sharing, cooperation, and commitment	Ganesan, (1994); Gulati, (1995); Ring & Van de Ven, (1994); Smith & Barclay, (1997)
	Strategic (symbolic) benefits of e-commerce	Benefits derived from closer ties between trading partners, and improved reputation, thus leading to business continuity	Scala & McGarth, (1993); Saunders & Clark, (1992)
Perceived Risks of E-Commerce		Perceived risks of e-commerce are the potential weakness, barriers and losses faced by organizations that have adopted e-commerce	Bhimani, (1996); Jamieson, (1996)
	Technology-performance related risks of e- commerce	Risks derived from misuse of e-commerce technology, such as unauthorized access, integrity, viruses, confidentiality, availability	Bhimani, (1996); Jamieson, (1996)
	Relational risks of e-commerce	Risks derived from trading partners' lack of knowledge and training in e-commerce, such as uncertainties, imbalance of power, mistrust, opportunistic behaviors	Parkhe, (1998); Ring & Van de Ven, (1994); Williamson, (1975)
	General perceived risks of e-commerce	Risks derived from poor business practices, environmental risks, standards and audit policies	Marcella et al., (1998)
Participation in E-Commerce		Participation in e-commerce is the degree to which organizations are willing to engage in B2B e-commerce	Doney & Cannon, (1997); Iacovou et al., (1995); Morgan & Hunt, (1994); Smith & Barclay, (1997)
	E-Commerce Performance	Is the volume, dollar value, and types of business transactions exchanged between trading partners	Smith & Barclay (1997); Hart & Saunders (1997)
	Trading Partner relationship development	Is the extent of trading partner satisfaction	Morgan & Hunt, (1994)

RESEARCH METHOD

Studying inter-organizational-trust in B2B e-commerce participation phenomenon requires the context of real organizations using e-commerce systems or operating in an e-commerce environment (Yin, 1994). A case study approach was seen as appropriate, particularly in an area where few previous studies have been conducted (Hart & Saunders, 1997; Sako, 1998). Organizations that participated in this study included a public sector organization involved in customs clearance, their Internet service provider, a customs agent (broker), and an importer.

Entry into the case sites was obtained by making initial telephone calls to key representatives in the e-commerce organizations. A brief description and purpose of the study was discussed over the telephone before requesting them to participate. The telephone conversation was followed by an email including an attached file describing the purpose of the study that was sent to the respondents. Most of the participants did indicate their interest to participate in the study and did request a case study report containing aggregate findings of all cases to be given to them at the end of the study. Once confirmation of their willingness to participate in the study was received, appointment dates for interview sessions were arranged at a convenient time suitable for the interviewees. Subjects were requested to answer focused questions, as well as open-ended questions via a semi-structured questionnaire in four (two-hour) session interviews. The interview sessions were recorded, and a draft report of their responses was sent back for verification and confirmation of their respondents. A report of the final findings, together with a thank you note, was sent to each organization that participated in the research.

Case Study Design – Data Collection and Analysis

According to Yin (1994), the following components make up the research design.

- A case study's questions, 'how' and 'why' types of questions, were considered in this study. How and why does inter-organizational-trust influence the perception of e-commerce benefits and risks, thus leading to the extent of its participation?

- The research propositions shown in Figure 1 help focus the study. Although the concept of trading partner trust is new to this study, evidence from the marketing and management literature clearly indicates that high levels of trust in business relationships can lead to low risks and controls (Cummings & Bromiley, 1996; Doney & Cannon, 1997; Gulati, 1995; Ganesan, 1994).

- Unit of analysis. This study identifies two units of analysis. The primary unit of analysis is the participants (that is, the e-commerce coordinators and managers involved in e-commerce participation). The next level of analysis is the inter-organizational-trust dyad, involving trading partners from organizations interacting with each other. Hence, even though only two organizations are involved in an inter-organizational-dyad, the relationship between the trading partners could be one-to-one, one-to-many, many-to-one or many-to-many relationships. The four case studies then formed inter-organizational-dyads shown (as oval shapes A, B, and C); that is, between NZ Customs and their ISP (A), ISP and customs broker (B), and the customs broker and importer (C). Furthermore, e-commerce applications, existing documents and standards were examined as units of analysis within each case. For example, trading partner agreements, organization charts, web sites, and internal security policies gave evidence of the organization's best business practices and background information of the organization and its products.

- The logic of linking the data to the propositions. Multiple case studies paved the way for both qualitative and quantitative analysis of the data collected. One method used to link the data and propositions of this study was via pattern matching across cases. The criteria for interpreting the findings were directly related to ways of linking data and propositions of study. The criteria applied included pattern matching and explanation building (as in narrative descriptions

and causal explanations), thereby leading to analytic generalizations that formed a story line and predictions to be made. The first step involved identifying recurring patterns and themes from the data collected during the interviews. Then similarities and differences between the participants were identified, which was followed by a cross case analysis of the cases that paved the way for generalizations to be made.

FINDINGS AND DISCUSSION
Background Information of the Case Sites

The importer in Figure 2 provides shipment information to the customs broker, who then prepares customs clearance documents in order to clear the importer's goods. The customs broker transmits those documents to the ISP, who translates them to suit the format required by NZ Customs. NZ Customs follows a routine check, which includes intelligence testing, and issues a delivery order to their Internet service provider, who translates it back to suit the format of the customs broker. The customs broker then issues an invoice, together with a customs declaration document, to the importer who can now collect their goods. Figure 2 also shows three inter-organizational-dyads (shown as oval shapes A, B, and C); that is, between NZ Customs and their ISP (A), ISP and customs broker (B), and the customs broker and importer (C).

Antecedent trust between the importer and customs broker is high, as the customs broker requires complete accurate shipment information from the importer in order to prepare customs clearance documents. Alternatively, the importer is dependent and relies on the ability of the customs broker to clear their goods quickly and promptly. On the other hand, the situation between NZ Customs and their Internet Service Provider (ISP) was slightly different. It was expected of the Internet service provider to undertake prompt delivery and receipt of B2B e-commerce transactions (documents) within certain time frames, as some goods may be perishables. Hence, inter-organizational-trust was important, as it determines the extent of e-commerce participation by all four sites.

Background Information of the Case Sites

The first case, NZ Customs, is a large public sector organization with seven hundred employees. NZ Customs undertakes the clearance of importing and exporting documents. It uses CusMod (Customs Modernization), a complex sophisticated alert system that performs intelligence testing via message queue series (a priority-based software). CusMod uses X400 with EDI, integrates information and electronic processes in order to identify and process goods and passengers. The objectives of CusMod included:

- have all invoice information transmitted electronically before shipment,
- enable pre-clearance of most shipments,
- enable consistency of declarations to customs,
- reduce customs clearance costs through the elimination of line fees, and
- assist with automated calculation of landed costs.

CusMod's main business functions include providing clearance service and information regarding import and export (of goods, services and people) coming in and leaving

Figure 2: Contextual Rich Picture of the Four Sites.
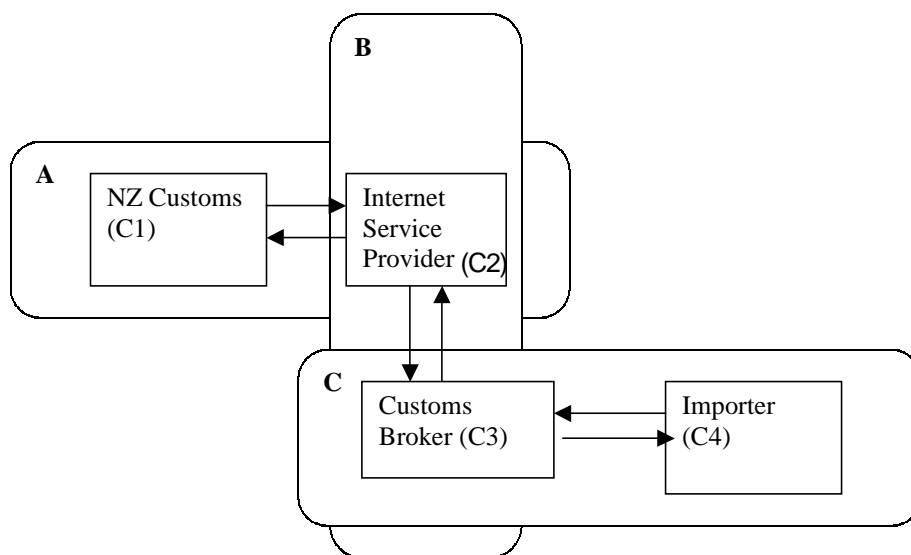
the country (both nationally and internationally). NZ Customs has more than 200 trading partners, including custom brokers, (agents), regular importers and exporters. Their B2B e-commerce transactions include cargo information, shipping documentation, clearance documents, and passenger information (both flight and sea) that are transmitted via Cusmod. All incoming transactions have to go through NZ Customs Internet service provider.

The second case is NZ Customs Internet Service Provider (Electronic Commerce Network Limited (ECN)). It is New Zealand's leading trusted electronic business intermediary. ECN's main role is to facilitate technical and operational processes for organizations that want to adopt B2B e-commerce, and they provide services that enable business transactions between applications across any network and organizations. In other words, ECN outsource their client-based technological services and operations to almost four thousand trading partners. ECN's technology provisions are designed to meet their trading partners' business requirements through mapping and translation services. ECN thus creates a gateway for business electronic transactions (including purchase orders, invoices, way bills, compliance with government agencies, and value added services, such as payment and fulfillment transactions).

The third case, Customs Agent Wellington Limited (CAWL), is a customs broker. It is a small organization with seven employees. Their main role (as a trade facilitator) is to provide customs clearance services for importers and exporters. Their business reach is local (that is, within the Wellington region), where they serve fifteen importers (their trading partners). They use *'Trade Manager'*, a software designed to meet the needs of New Zealand exporters and importers. Trade Manager is an e-commerce application which uses Microsoft access together with visual basic application, and provides real-time tracking information. The system enables the creation of purchase

Table 3: Case Study Characteristics.

Case Sites	Organization Type, Size and Number of Employees	Nature of business	Type of B2B e-commerce application
Case Study – 1 (C1)	NZ Customs Public Service Sector Large 700 employees	Intelligence and clearance testing of goods imported and exported	Custom Modernization (CusMod) since 1997 EDI X400, X25, now via the Internet
Case Study – 2 (C2)	Internet Service Provider Private organization SME 14 employees	Service provider for electronic transactions exchanged between Customs NZ and their trading partners (importers & exporters)	Internet EDI X400, X25
Case Study – 3 (C3)	Customs Broker (Agent) Private organization SME 7 employees	Clear goods from customs for importers and exporters	Trade Manager using Microsoft Access and Visual basic applications
Case Study – 4 (C4)	Importer Private organization SME 13 employees	Imports kitchen gadgets, plastic, baby wear and cosmetics	Trade Manager Using Microsoft Access and Visual basic applications

orders, thus helping to manage shipping procedures. Exporters use it to prepare export documentation, including invoices, shippers' letters of instruction, picking and packing lists, order acknowledgments, certificates of origin, and customs declarations. Importers use Trade Manager to manage their orders, keep a database of all their shipments, and calculate accurate landed costs. All events are recorded against each job and order on a date/time basis, and memos can be created and referenced/filed to each job for future reference, thus enabling importers to achieve lower clearance costs.

The fourth case is an importer who imports kitchen gadgets, plastic, baby wear, and cosmetics, and distributes them to the big five supermarkets in New Zealand (including Woolworth, New Worlds, Big Fresh, Countdown, and Pak & Save). The importer obtains their goods cleared through their customs broker. The importer has been using Trade Manager for the past five years. Their business transactions include invoices, line items, local charges, freight charges and storage charges. Most of these charges are automatically calculated in the Trade Manager via prearranged agreements on prices and charges. Thus, when a shipment arrives at the port the importer provides information to their customs broker, who will then process the clearance of their shipment through customs.

Tables 3 and 4 provide additional background information about the four case sites.

In Table 4, e-commerce experience was measured via a Likert (Minimum – (0-3), Medium – (4-6), Mature – (7-10)). The data collected from the interviews, discussions and documents were analyzed in order to test the research propositions. The next section discusses the findings of the four case studies.

Research Proposition 1 - Technology Trust is Positively Associated with Perceived Benefits of E-Commerce

The findings suggest that the relationship between trading partner trust and perceived benefits of e-commerce was strongly supported. NZ Customs outsource all

Table 4: Characteristics of Participants.

Case Study Participants	Job Title	Age Range	E-commerce Experience
Case Study 1 (C1)	Intranet administrator	40-50	Mature – 9
Case Study 1 (C1)	Consultant	40-50	Medium – 6
Case Study 1 (C1)	CusMod coordinator	35-45	Medium – 5
Case Study 1 (C1)	Manager – IT Services	35-45	Medium – 6
Case Study 2 (C2)	Chief Executive Officer	45-55	Mature – 9
Case Study 3 (C3)	Director	50-65	Mature – 9
Case Study 4 (C4)	Financial Administration Manager	20-29	Minimum – 2

incoming and outgoing business transactions to their Internet Service Provider, who is responsible for accurately and correctly processing these transactions before transmitting them to NZ Customs for intelligence testing.

The intranet administrator of NZ Customs stated:

"This massive re-engineering of computer systems and processes is our single biggest investment made by the government, and it has put us firmly at the forefront of Customs innovation world-wide. If our ISP was unable to provide us with security and efficiency, then we always have a choice to outsource our business processes to another Internet service provider."

NZ Customs sales consultant stated:

"Since, we are paying our ISP, we trust them to provide us with transaction integrity. We have to establish a successful track record in order to survive the competitive e-commerce environment."

Thus, role competence (as in quality of services) from the ISP led to increased credibility and confidence.

The importer indicated that:

"By demonstrating a willingness to share information, that is timely, accurate, and relevant, we are able to perceive high competence trust from our customs broker. Competence trust was seen in the form of receiving real time tracking information thus saving the importer with a lot of time, and costs. Furthermore, the customs broker also assisted us in building our reputation, as we were able to provide accurate estimate arrival dates of goods to our customers."

Therefore, trust reduces the need to implement extreme control safeguards and paper trials contributing to economic benefits, and opened up the willingness to share information and communicate.

NZ Customs reported that:

"The entire process involving intelligence testing was automated and cannot be tampered by NZ Customs employees or any unauthorized persons. However, when we first implemented CusMod, the error rate was 40-50%, but with tolerance from our ISP, and adequate training given to our

employees, we now achieve an error rate of less than 10%. Furthermore, the Cusmod system, produces three outputs namely, CUSDER for customs declaration, CUSCAR for customs cargo, and CURRES for customs response that either confirms or rejects CUSDER and CUSCAR. If the output was confirmed, then the system will automatically issue a delivery order and an invoice, or else, return an error message. The error message in most cases is due to insufficient information about the goods to be cleared."

The director of ECN stated:
"Sometimes we need to deliver EDIFACT format type of messages. During these times we will charge our trading partners a transaction fee for receiving and transmitting messages in EDIFACT format. We do consult with other trading partners regarding electronic trading as most small businesses lack the capital, knowledge, skills and awareness of the full potential of Internet e-commerce applications, and in order to remain competitive in the global e-commerce market (other trading partners) they have outsourced their business transactions to us."

The Internet service provider also provides additional services that include 24 hours x seven availability of the network, maintenance of network, help desk, maintenance of trading partner relationships, providing (correct details), reporting of fault, and direct debit authority schedules that contributed towards economic and relationship related benefits. The ISP CEO stated:
"We do have a firewall in our system in order to separate the flow of transactions between our trading partners. We allocate unique identifiers for each of our 4000 trading partners. Furthermore, our trading partners used a dial-up facility to access our mailbox. Hence, each one of them have to log onto our system via User IDs and passwords, thus achieving confidentiality, authenticity, non-repudiation, availability and transaction integrity."

NZ Customs sales consultant stated:
"Since, we are paying our ISP, we trust them to provide us with transaction integrity."

NZ Customs and the importer reported that:
"They have installed an anti-virus software program in all their computer systems, in order to protect their databases. In addition, NZ Customs undertakes a daily backup of their system, while the importer carries a hardcopy version of all purchase order numbers, invoice numbers, reference numbers as a daily backup via a ledger."

In order to provide a basis for comparison between technology and trust, some argue that benefits are derived from technology, rather than from the trading parties. Nevertheless, it is the trading partners who actually input data into the system for responses.

Research Proposition 2 – Technology Trust is Negatively Associated with Perceived Risks of E-Commerce

The findings suggest that the relationship between technology trust and perceived risks of e-commerce was not strongly supported. One possible explanation for this could be the role of the Internet service provider, who is responsible for all incoming and outgoing transactions. The importer indicated that:

"Their risks lie in their shipment information being leaked out to other competitors by their customs broker, whom they say sometimes fax documents, and the fax may be seen by their employees. The fax actually reveals our quantity of stock imported for each delivery order."

Hence, there are risks in applying poor business practices, particularly in a small firm, as most employees perform multi tasks, and hence, the risks of information being exposed is even greater.

Research Proposition 3 – Relationship Trust is Positively Associated with Perceived Benefits of E-Commerce

The findings suggest that the relationship between relationship trust and perceived benefits was strongly supported. NZ Customs outsource all incoming and outgoing business transactions to their Internet Service Provider, who is responsible for accurately and correctly processing these transactions before transmitting them to NZ Customs for intelligence testing. The ISP CEO stated:

"We have to establish a successful track record in order to survive the competitive e-commerce environment."

Thus, the consistent competence relationship trust (as in quality of services) from the ISP led to increased credibility and confidence.

Research Proposition 4 – Relationship Trust is Negatively Associated with Perceived Risks of E-Commerce

The findings suggest that the relationship between relationship trust and perceived risks was not strongly supported. The importer admitted that:

"We did face initial uncertainties in using the Trade Manager which led to dependence on our customs broker. These interdependencies gradually led to an imbalance of power. Although, our customs broker did provide us with free software, and initial training, we were left in a difficult position. It is not something that you have outsource as, we had to change our internal business processes, in order to facilitate and simplify the business processes of the customs broker which took us some time to get it completely right."

Opportunistic behaviors between trading partners led to perceived relational risks of e-commerce. The importer reported:

"Our customs broker did appear to exercise opportunistic behaviors, when they increased the charges and costs for clearance. Thus handling

discrepancies arose from a misunderstanding in calculating charges, due to the conversion of currencies from different countries did cause a situation of conflict. In most cases the customs broker had to end up explaining to us, how they derived at the figures."

Research Proposition 5 – Perceived Benefits of E-Commerce are Positively Associated with E-Commerce Participation

The findings suggest that the relationship between perceived benefits of e-commerce and e-commerce participation was strongly supported. All four cases reported a gradual increase in the volume and dollar value of their B2B transactions sent and received via e-commerce applications. NZ Customs stated, *"it was a legal thing, we had to provide a statutory declaration via an electronic signature stating that the goods were cleared."* Furthermore, both NZ Customs and the importer reported that they did experience savings from storage costs. The importer indicated:

"Our customs broker did assists us in maintaining long-term relationships with their trading partners' due to fast and efficient service that contributed to accurate real time information, in turn enabling them to make strategic decisions."

Research Proposition 6 - Perceived Risks of E-Commerce are Negatively Associated with E-Commerce Participation

The findings suggest that the relationship between perceived risks of e-commerce and e-commerce participation was not strongly supported. NZ Customs admitted that it was a big decision for them to outsource their transactions to their Internet service provider. Their concern was that poor business practices could lead to perceived risks of e-commerce. The security analyst indicated that:

"The time we required to train our staff on the new system and managed our 250 trading partners (comprising of regular exporters, importers, customs brokers and agents) would have created additional administrative time and costs."

Although a cost benefit analysis was seen as critical in e-commerce participation, we realized that establishing a cooperative network of trading partner relationships was equally important in order for trading partners to communicate, cooperate, and collaborate effectively.

The refined model of inter-organizational-trust within inter-organizational-dyads in e-commerce participation was developed from both the multiple case study findings and the theoretical foundations on trust in business relationships. Table Five outlines the characteristics of a refined model of the three stages of inter-organizational-trust in e-commerce participation. The similarity between NZ Customs, customs broker and importer was trading with each other, which was almost 10 years. The impact of e-commerce participation by smaller organizations such as the customs broker and importer was successful. One possible explanation for this is the simplicity of their e-commerce application, and that for security reasons their e-commerce application was not connected to the networks. The differences between NZ Customs and their Internet service provider include the outsourcing of part of their e-commerce processes to their Internet service provider.

It is clear that trust needs time to develop, and it evolves gradually from one stage to the next stage, although B2B e-commerce systems and applications facilitate the development of initial competence trust. The model identified three stages leading to the development of inter-organizational-trust, thus paving a way for trading partners to identify which stage of trust they and their trading partners belong to. For example, new e-commerce adopters would concentrate on training trading partners to use their e-commerce applications correctly, thus taking a bottom-up approach in analyzing antecedent trust behaviors. Hence, the focus is on an individual trading partner's competence, skills, and ability to operate B2B e-commerce applications, transactional objective trust, thereby emphasizing economic benefits.

Business promises derived from automated e-commerce applications provide economic benefits and consistent positive behaviors of trading partners led to trading partner satisfaction, thereby contributing to relationship-related benefits. Consistent positive competence trust led to interpersonal interactions between trading partners of both organizations. Repeated, consistent achievement of relationship-related benefits from reliable trading partners led to predictability and trustworthy behaviors of trading partners. This further encouraged trading partners to invest in their trading partner relationship (as in renewing the trading partner contract), increasing the order (as in volume, dollar value of goods), and reducing opportunistic behaviors (power, control, and imposing strict deadlines). Thus, repeated behaviors of trading partners enable predictability trust to develop, thereby leading to a middle-out approach in analyzing antecedent trust behaviors. Hence, the focus gradually evolves from transactional objective trust to relational subjective trust. Finally, goodwill trust focused on institutional (organizational) reputation and brand names of products accomplished through best business practices, which in turn contributed towards perceived strategic benefits. Although goodwill trust is an accumulation of both competence and predictability trust, the focus is on the organization as a whole, thus taking a top-down approach in analyzing antecedent trust behaviors of trading partners. Figure 3 presents the model of inter-organizational trust within inter-organizational dyads.

The model demonstrates the impact of trading partner trust in a socio-economic e-commerce situation, where business relationships begin with transactional trust that gradually moves to relational trust, where the focus is on building trading partner relationships.

CONCLUSIONS AND CONTRIBUTION OF THE STUDY

This chapter discussed the importance of inter-organizational-trust in B2B e-commerce. The findings did support and validate the research propositions outlined in this study. The findings also contributed to theory derived from the development of an integrated model of inter-organizational-trust in e-commerce participation from a multi-disciplinary literature. The first contribution made to theory is the successful bridging of ideas from multi-disciplinary literature. The integrated conceptual model tested in this study was developed on the basis of several well established theories from multi-disciplinary literature, including the marketing, management, sociology, information

Figure 3: Model of Inter-Organizational Trust within Inter-Organizational Dyads in E-Commerce Participation.
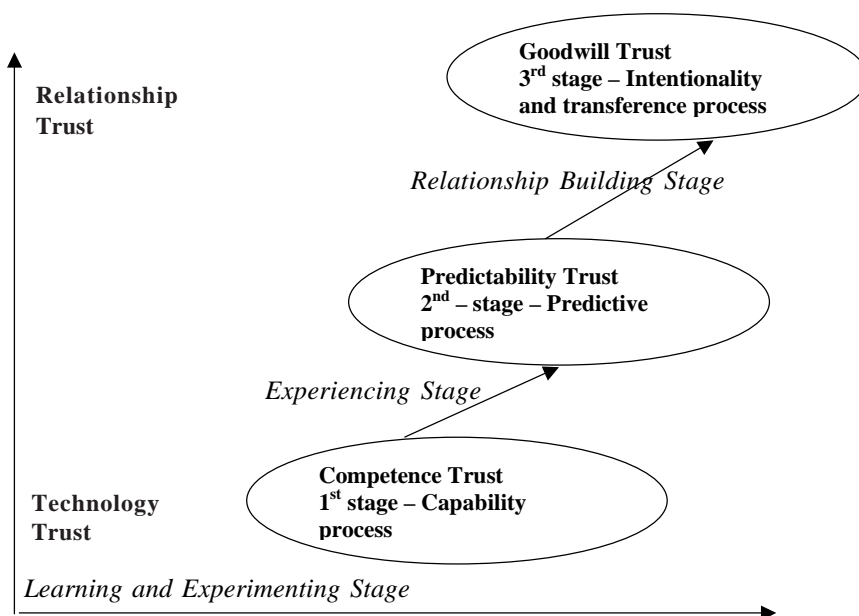
systems, and e-commerce literature that led to the development of the constructs in the model. A synthesis of the above theories provided a new approach for exploring, studying, and describing inter-organizational-trust relationships in e-commerce participation. Previous research on e-commerce mostly focused on technological benefits and its competitive advantages. This study not only tested the technological perspective, but also the behavioral, economical, organizational and socio-political perspectives of trading partners. Furthermore, previous research examined either the suppliers or buyers from one type of industry. This study examined both trading partners within an inter-organizational-dyad, and from a cross selection of industries including organizations involved in customs clearance (i.e., the Internet Service Provider, customs broker and importer). Thus, inter-organizational-trust was seen at two levels, namely, (1) the ability to operate e-commerce applications correctly (technology trust), as in human data input (that is accurate, complete and correct), thereby enabling transactions to be read and interpreted correctly. The tendency to send incorrect data due to a lack of awareness and education has led to high costs and expenses, as trading partners had to re-send the transactions; and (2) trading partner trust (or relationship trust), as in the ability to work cooperatively, and being willing to support, encourage, share information, and commit to their business, rather than work according to a trading contract.

The contributions to practice and businesses came from an increased awareness on the importance of inter-organizational-trust by case study participants. Further, empirical research via case studies was conducted in the telecommunications, computer and communications, and automotive industries. The findings clearly provided evidence

Table 5: Characteristics of a Refined Model of Inter-Organizational Trust in E-Commerce Participation.

Constructs in the Conceptual model	Competence Trust Economic Foundation	Predictability Trust Familiarity Foundation	Goodwill Trust Empathy Foundation
Technology Trust	Trust and security-based mechanisms include: Confidentiality Authentication Integrity Access controls Availability Access controls Non-repudiation	Consistent and extensive use of trust and security-based mechanisms leading to trading partner satisfaction	Consistent and extensive use of trust and security-based mechanisms and best business practices in the form of regular audits, top management commitment, and contingency procedures Increased trading partner satisfaction
Development of trust	Transactional trust – based on B-B EC transactions	A combination of transactional and relational trust	Relational trust based on trading partner's trust behaviors
Relationship Trust Trust	Formal – objective (hard-trust)	Formal and informal	Informal – subjective (soft-trust)
Perceived Benefits of E-Commerce	Direct (economic) benefits derived from savings in costs and time	Indirect (personal) benefits or (relationship) benefits	Strategic (symbolic) benefits
Perceived Risks of E-Commerce	Technology-related risks are derived from incompatible e-commerce systems, lack of skills, expertise and training	People-related risks are derived from trading partner's opportunistic behaviors, such as coercive power tactics and conflicts	General risks are derived from poor business practices
Extent of E-Commerce Participation	Short-term fixed contracts (0-3years) with fixed volumes, dollar values and types of business transactions Explores trading partner trust Evaluates formal technological mechanisms	Mid-term contracts (3-5 years) Explores new types of transactions Develops predictability trust from past experiences	Long term contracts (5-10 years) Increases in the volumes, dollar value and types of transactions Establishes a commitment to trust of their trading partners Experiences trading partner satisfaction and goodwill Increased reputation

on the importance of inter-organizational-trust in e-commerce participation. Future research will be undertaken as part of a longitudinal study, which aims to examine the refined model of inter-organizational-trust extensively via a survey research method.

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Chapter XVI

Perceptions and Attitudes About eCommerce Development in China:
An Exploratory Study

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ABSTRACT

It is widely recognized that eCommerce represents a critical resource for most business organizations. With over 1.25 billion people and double-digit economic growth, China could potentially emerge as the largest Internet and telecommunications market in the world if certain economic, environmental, and organizational barriers are effectively addressed. This chapter develops a descriptive profile of Chinese business managers with respect to their awareness of the technological infrastructure as well as their perceptions and attitudes regarding eCommerce. Management's viewpoint on a variety of environmental, organizational, and personal factors provides insight into the future of eCommerce in China within the framework of organizational commitment to eCommerce driven innovation. Findings indicate that firms interested in engaging in eCommerce in China will find a knowledgeable and supportive business climate; however, eCommerce initiatives may be hindered by constraints imposed by the current infrastructure.

INTRODUCTION

The business potential of eCommerce technologies is seemingly irrefutable given the nearly 200 million Internet users worldwide. Of these 200 million users, the largest share, 80 million or 40 percent, reside in the United States. Although growth in both the U.S. and abroad is expected to continue unabated, analysts predict that the U.S. share of this global market will gradually decline. In contrast, China, with the third largest user population, is expected to gain market share–particularly in light of the prediction that it will surpass Japan and become the largest Asian Internet market during the coming year (The Yankee Group, 2001). While the China Internet Network Information Center (CINIC) reports 16.9 million Internet users (Statistic Report of Internet Development in China, 2000)—a figure that is double that of a year ago (Steinert-Threlkeld, 2000)—some analysts predict exponential growth with users totaling 120 million by 2004 (Pfaffenberger, 2000). These developments are in line with the rate of adoption theory, which describes the IT diffusion process as initially proceeding through a slow, gradual growth period, followed by dramatic and rapid growth, then gradual stabilization, and finally a decline (Rogers, 1995). With over 1.25 billion people and double-digit economic growth, China could potentially emerge as the largest Internet and telecommunications market in the world if certain economic, environmental, and organizational barriers are effectively addressed. Revenues generated through eCommerce transactions remain dismal, even as the technology experiences unprecedented growth. A recent report published by the Ministry of Information Industry of China reports Internet-based transactions totaled nearly U.S. $100 million for the year 2000—a mere fraction of the total traditional business revenue (China News, 2000). Comparatively, U.S. online sales (not including business-to-business eCommerce) for the first quarter of 2000 totaled $5.26 billion or 0.7 percent of the $747.8 billion in retail sales (Blackmon, 2000). In spite of this paucity of earnings, the Internet provides the Chinese with easy access to the outside world, and many are eager to embrace this new technology.

Four pivotal environmental or structural conditions adversely affect the development of a viable eCommerce market in China. First, Internet purchases are generally credit card transactions—a payment system that represents a direct contrast to China's cash-based consumer culture (Markus and Soh, 2002; Steinert-Threlkeld, 2000). A second yet related condition stems from the fact that the use of credit cards requires an infrastructure capable of handling electronic payments. China's substandard IT/electronic payment infrastructure (Markus and Soh, 2002; Steinert-Threlkeld, 2000) creates a somewhat formidable obstacle. Third, current governmental restrictions hamper the development of a vibrant eCommerce market in China (Markus and Soh, 2002; Rosen, 1999), and major changes are not anticipated in the foreseeable future. The final structural impediment stems from China's substandard telecommunication system (Markus and Soh, 2002). Collectively, these structural deficiencies may provide some basis for the fact that very few of the eCommerce initiatives in China have been successful to date (Martinsons, forthcoming).

A variety of environmental, organizational, and personal factors are not only instrumental in advancing IT diffusion, but also have a marked impact on management's perceptions and attitudes regarding eCommerce. Environmental factors, such as business-friendly government regulations and infrastructure improvements, are critical if eCommerce is to live up to its potential in China. Organizational factors highlight

management's role in advocating the use of eCommerce within the firm. In general, a manager's perception of eCommerce will influence attitudes and managers must be cognizant of the potential of eCommerce if they are to remain competitive and capable of positioning their companies to meet the standards of the globally wired business community. Personal factors pertain to an individual's level of knowledge in IT and eCommerce domains.

Clearly, structural conditions have impeded the diffusion of IT in China. Of commensurate importance, however, is the need to examine whether management's perceptions and attitudes present yet another obstacle to the widespread diffusion of eCommerce in China. This research is designed to develop a descriptive profile of Chinese business managers with respect to their awareness of structural conditions as well as their perceptions and attitudes regarding eCommerce. Management's viewpoint on a variety of environmental, organizational, and personal factors should provide some insight into the future of eCommerce in China within the framework of organizational commitment to eCommerce driven innovation. The sections that follow present an overview of the literature, the research design, sampling procedure, data collection procedures, and data analysis, findings, and conclusions.

LITERATURE REVIEW

Collectively, the literature suggests that a variety of external factors significantly influence the extent of IT innovation and diffusion. The IT diffusion of innovation (DOI) process may be viewed within the context of Innovation Decision Process theory (Rogers, 1995) which posits that potential adopters of a technology must learn about the innovation (knowledge); become persuaded of the value of the innovation (persuasion); decide to adopt it (decision); implement the innovation (implementation); and finally reaffirm or reject the innovation (confirmation). Researchers often employ Davis' (1986) Technology Acceptance Model (TAM) as a theoretical framework to examine external variables, conceivably because of its goal to "provide an explanation of the determinants of computer acceptance that is general, capable of examining user behavior across a broad range of end-user computing technologies and user populations" (Davis et al., 1989). The model, grounded in social psychology, reflects Fishbein and Ajzen's Theory of Reasoned Action (TRA), which theorizes that behavior is determined by intentions that are in part influenced by attitude (Fishbein and Ajzen, 1975). Attitude, or the "predisposition to respond favorably or unfavorably to a computer system, application, system staff member, or a process related to the use of that system or application" (Melone, 1990, pp. 81), has a strong theoretical background and previous research has conclusively proven that attitude is an accurate predictor of use. TAM postulates that actual behavior is influenced by attitudes that are shaped by external variables as well as perceptions regarding the usefulness and ease of use of the technology under study. In fact, a key premise in TAM is that a user's attitude toward using information technology is a major determinant of whether the person actually uses the technology. Several extensions or modifications to the TAM have incorporated theoretical perspectives or constructs that reflect the salience of beliefs and attitudes, social or normative influences, and end-user characteristics on acceptance and adoption. Other research augments the TAM with individual, organizational, and system characteristics; many of

which have received empirical support as moderators of IT acceptance (Igbaria et al., 1997; Mathieson et al., 2001; Jackson et al.; 1997, Agarwal and Prasad, 1999; Davis, 1993).

The research model for this chapter examines environmental, organizational, and personal factors as antecedents to perceptions of eCommerce. Bharaadwaj et al.'s (1999) multi-stage research framework, which was developed to conceptualize factors that govern a firm's IT capability, provides some justification for focusing on these external variables. With the assistance of Delphi panels and focus groups, the researchers identified 30 IT capabilities that were distributed among the following six categories: IT business partnerships, external IT linkages, business IT strategic thinking, IT business process integration, IT management, and IT infrastructure. The authors concluded that an enterprise-wide IT capability embodies both organizational and technological capabilities which, in turn, reflect the firm's ability to sustain IT innovation and respond to changing market conditions.

Several researchers (Devaraj et al., 2002; Gefen and Straub, 2000; Jiang et al., 2000; Moon and Young-Gul, 2001; Lederer et al., 2000) have employed the TAM to examine a variety of external variables related to eCommerce. Collectively, the findings suggest that TAM is a suitable theoretical framework for eCommerce-based studies. In studying user acceptance of digital libraries, Hong et al. (2002) employed the TAM to examine individual differences (self efficacy and knowledge of search domain) and system characteristics (relevance, terminology, and screen design) within the context of user acceptance of digital libraries. The researchers concluded that results strongly supported the utilization of TAM in predicting users' intention to adopt digital libraries. Venkatesh and Davis' (2000) TAM2 examined user acceptance through social influence (subjective norm, voluntariness, and image) and cognitive instrumental processes (job relevance, output quality, result demonstrability, and perceived ease of use) while Mathieson et al. (2001) augmented the TAM with a perceived resources construct as a means to examine the influence of organizational infrastructure on use. In each case, TAM proved to be a parsimonious model for predicting user acceptance.

The role of perceptions in predicting acceptance and usage decisions has also received considerable attention (Moore and Benbasat, 1991; Davis, 1993; Gefen and Straub, 1997; Morris and Dillon, 1997; Venkatesh, 1999; Agarwal, 2000; Mathieson et al., 2001). Notably, both Agarwal (2000) and Moore and Benbasat (1991) examined the influence of perceptions on IT acceptance and adoption while Mathieson et al. (2001) emphasized the need to more fully explore perceptions of real world artifacts such as technology. Possibly in response to TAM and DOI's effectiveness in explaining the propensity to use an IT, Agarwal and Prasad (1997) merged the two theories. After examining the diffusion constructs within the context of Internet usage, the researchers concluded that visibility, compatibility, and trialability influenced current levels of usage, while perceived usefulness and result demonstrability influenced continued use decisions.

In a recent editorial, Chin and Marcolin (2001) emphasized the continued need to develop "deep usage" models as well as "conceptualizations of usage as they lead to individual and performance outcomes." Clearly, then, a review of the literature establishes a precedent for developing models that are derived from the constructs originally presented by Davis.

The purpose of this study is to develop a descriptive profile of Chinese business managers' perceptions and attitudes regarding eCommerce. As such, this study should

not be construed as an attempt to offer yet another extension of TAM nor to validate previous findings. Instead, the research model incorporates key TAM constructs in an effort to present a comprehensive profile that represents the triangulation of external variables, perceptions, and attitudes. The theoretical foundation for the model is derived from human behavior theory, which posits that behavior is largely a function of attitudes; attitudes are formed from individual perceptions; and individual perceptions are influenced by external variables.

RESEARCH METHODOLOGY

Research Model

The model, shown in Figure 1, adopts the view that a variety of environmental, organizational and personal factors serve as antecedents to perceptions and attitudes regarding eCommerce. Environmental factors are defined within the context of structural conditions that exhibit a strong influence on eCommerce development including electronic payment systems, government regulations, legal issues, and telecommunications. Organizational factors, namely, managerial leadership, commitment, and support, influence the level of technology adoption as well as the behavior of employees in the organization (Agarwal, 2000). Innovation and diffusion of technology requires active leadership and vision by top corporate leaders who are willing to commit scarce resources (Agarwal, 2000). Of equal importance is the influence of executive support and leadership in advocating the use and acceptance of eCommerce. Personal factors pertain to an individual's knowledge of IT and eCommerce as well as information received through communication with colleagues.

The core of the model examines perceptions about eCommerce, which are measured through the following variables:

*   Usefulness—The degree to which a person believes that using a particular system would enhance his or her job performance (Davis, 1989).
*   Ease of use—The degree to which a person believes that using a particular system would be free of effort (Davis, 1989).
*   Importance—The perception of the degree to which eCommerce will aid or improve business functions.
*   Security—An individual's expectations or trust in using eCommerce

The model postulates that environmental, organizational and personal factors serve as antecedents to perceptions of eCommerce, which in turn, moderate an individual's attitude regarding the implementation and use of eCommerce applications.

Research Design and Sampling Procedure

The study, which targeted MBA students in China, entailed administering an Internet-based questionnaire. Managerial experience is generally a prerequisite for enrollment in Chinese MBA programs; thus, MBA students possess sufficient familiarity with environmental, organizational, and technological factors to provide an accurate

Figure 1: Research Model.

Environmental Factors

Organizational Factors

Personal Factors

Perceptions of eCommerce

Ease of Use

Usefulness

Importance

Security

Attitudes about eCommerce
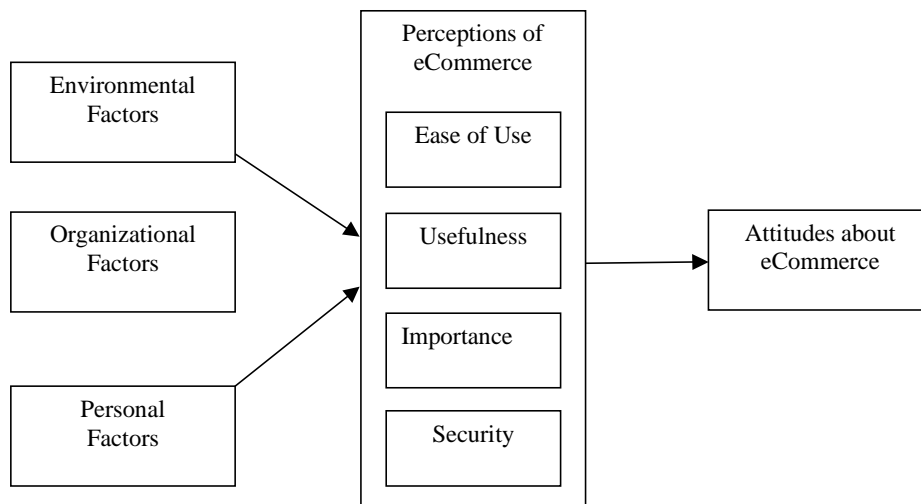
profile of Chinese business managers' perceptions and attitudes regarding eCommerce. Other factors contributing to the decision to target this population include:

- Reports indicating that 95 percent of Chinese MBA students are enrolled part time and hold a managerial position in a corporation (http://www.mba.org.cn, 2000).
- The status accorded to an MBA degree coupled with the required managerial experience implies that respondents can reasonably be expected to have some impact on the future of eCommerce in China.
- MBA students are part of generation X, or those born between 1961-1981 (Generation X: Definitions, 2002), and as such represent key players in the new economy in China. Based on their age and education, it is reasonable to assume that this group has a solid understanding of eCommerce.
- Enrollment in an MBA program is contingent upon successful performance on a rigorous English language capability test; thus, MBA students possess the linguistic ability to read and understand a questionnaire written in English. This point is particularly relevant since technical difficulties hindered efforts to place a viewable Chinese version of the survey questionnaire on the Internet.

Data Collection Procedures

Likert-based rating scales were developed to measure the variables identified in the research model. A small pilot test was conducted to assess the readability of the survey instrument. The instrument was then distributed to five business managers in China. Based on their feedback, slight modifications were made to the terminology. A final version of the Internet survey questionnaire was then designed and published.

 A mailing list was prepared by collecting email addresses from MBA web sites in China. The first mailing list included about 530 addresses. An email message was prepared inviting individuals to participate in the study. After nearly 50 percent of the email addresses were returned because of delivery problems, a second mailing list was prepared using email addresses from the most active MBA web sites in China. The second mailing list, which contained approximately 350 addresses, resulted in a 70 percent delivery rate. In total, about 500 emails were successfully delivered for this survey. Sixty-six usable questionnaires were received for a response rate of 13 percent, an acceptable rate given this type of on-line survey. Notably, the low response rate may be attributed to the length of the survey, language barriers, and/or the fact that web server logs indicated some participants encountered technical difficulties in accessing the survey. When a follow-up investigation did not provide any conclusive results, further adjustments were deemed unwarranted, although we believe the response rate is understated.

Data Analysis

In developing a demographic profile of the respondents, Chi-square analysis was used to determine if significant differences existed with regard to perceptions and attitudes toward eCommerce. The fact that no significant differences were found between 1) male and female respondents, 2) age categories, 3) years of experience as an IS user, or 4) hours using the Internet a week, indicates respondents represent a fairly homogeneous group. The aggregated results provide a comprehensive profile of eCommerce use in China by upwardly mobile, well-educated individuals. Demographic information is found in Table 1.

To operationalize managerial perceptions and attitudes, descriptions were developed for each of the constructs included in the research model. These descriptions are found in Tables 2 -11. Pearson product/moment correlation analysis was employed to assess the relationship between the research constructs (external, organizational, and personal factors, the perception variables, and attitude) and was derived by calculating the mean of the individual components for each variable. Table 12 contains the results of the correlation analysis, which is limited to those factors that were correlated at a significant level. The Cronbach's alpha for the constructs included in the correlation analysis was 0.7417.

FINDINGS

Demographic Data

Typically, respondents were male, between the ages of 25 and 34, active Internet users, and employed by a small manufacturing or service company. Table 1 presents a demographic profile of the respondents.

Environmental Factors

The literature suggests that China's slow development in the area of eCommerce is due to structural conditions or environmental factors such as a poor electronic

Table 1: Demographics (in %).

Organizational Level	
President/Director	7.8
Employee under supervision - Level 1	60.9
Employee under supervision - Level 2	31.3
Management Experience (in years)	
More than 10	4.8
6 - 10	20.6
3 - 5	38.1
1 - 3	34.9
Less than 1	1.6
Type of Organization	
Manufacturing	40.9
Service	36.5
Commercial – Wholesale	14.3
Commercial – Retail	1.6
Government	4.8
Firm's # of Employees	
>10,000	7.8
5,000 – 9,999	4.7
1,000 - 4,999	12.5
500 - 999	7.8
100 - 499	34.4
< 100	32.8
Sex	
Male	75.4
Female	24.6
Age	
18 – 24	10.3
25 – 34	82.5
> 34	7.2
MBA Concentration	
General Management	24.1
Marketing, Sales, Advertising	24.1
Finance, Accounting,	8.6
Information Technology	25.9
Other	17.2
Years Experience as IS User	4.8
> 10	20.6
6 – 10	38.1
3 - 5	34.9
1 - 3	1.6
< 1	
Internet Usage – Hours Per Week	
0 – 1	1.6
2 – 4	9.4
5 – 6	1.6
7 – 9	17.2
10 – 20	34.4
21 – 40	18.8
> 40	17.2

Table 2: Environmental Factors (in %).

	Extremely Encouraging 1	2	3	4	Extremely Discouraging 5	MEAN
The on-line payment system is:	2	5	20	36	38	4.03
Government Internet policies are:	9	27	30	23	11	3.00
The legal framework is:	2	13	31	33	22	3.61
The telecommunications environment is:	2	22	27	23	27	3.52

payment infrastructure, strict government regulations, legal issues, and poor telecommunications. The questionnaire queried respondents on their view regarding these factors (see Table 2) and findings provide empirical support for this observation, particularly in the area of on-line payment systems.

Organizational Factors

Organizational factors are defined within the context of two variables: 1) executive support/leadership and 2) use of eCommerce in the firm (see Table 3). With respect to executive support and leadership, most respondents (54 percent) rated their CEOs' vision for eCommerce along the lower end of the rating continuum, while a comparable

Table 3: Organizational Factors (in %).

Executive Support/leadership:	
Does your CEO endorse major eCommerce investments that have not been endorsed by traditional justification criteria and procedures?	
1. Frequently	27
2. Occasionally	52
3. Rarely	21
What is your CEO's vision for eCommerce?	
1. Strong vision	23
2. --	23
3. --	29
4. No stated vision	25
Use of eCommerce in the Firm:	
How would you describe your firm's use of information technology	
1. Industry leader	19
2. Close follower	28
3. Middle of the pack	23
4. Somewhat behind	22
5. Laggard	9
The organization I work for uses the Web effectively	
1. Strongly agree	38
2. Somewhat agree	45
3. Neither agree nor disagree	5
4. Somewhat disagree	7
5. Strongly disagree	5
Is there a research and development (R&D) budget for investments in eCommerce?	
1. Industry leader in discretionary funding for emerging eCommerce	0
2. Modest budget for investments in new technology piloting	23
3. Inadequate for our needs	31
4. There is no budget	47

Table 4 : Personal Factors: IT Knowledge (in %).

Level of ability to…	Extremely High 1	2	3	4	Extremely Low 5	MEAN
program (e.g., in C, C++, Visual Basic, Java, etc.).	5	12	20	35	28	3.69
use software packages (e.g., Lotus 1-2-3, MS Office, etc.).	26	32	32	9	0	2.25
build models (e.g., formulate and solve complex simulation models).	9	26	9	31	25	3.35
recognize which management science model is appropriate for a particular problem.	6	35	24	27	8	2.95
access data (e.g., data retrieval, queries, etc.).	22	28	23	23	5	2.62
develop (design and implement) databases using generalized database management systems.	11	22	25	28	14	3.13

percentage indicated that their CEO occasionally endorsed major eCommerce invest-ments. Ratings pertaining to the firm's use of eCommerce indicated an effective use of the web although most respondents reported an inadequate or non-existent eCommerce R&D budget. In addition to the findings reported in Table 3, 54 percent of the respondents believe that their CEO considers eCommerce as one of the most vital parts of the firm's competitive strategy while 57 percent indicated that their CEOs think that funds spent on eCommerce represent a strategic investment.

Personal Factors

Tables 4 through 6 depict three personal factors; namely, IT knowledge, eCommerce knowledge, and eCommerce communication. With regard to IT knowledge, the majority of the respondents possess fundamental IT skills including a solid understanding of how to use software packages and the ability to access data as needed. However, most lack skills in high-level areas such as computer programming and database design and implementation.

Table 5 addresses eCommerce knowledge and indicates that the majority of the respondents recognize the potential of eCommerce within the organization and under-

Table 5: Personal Factors: eCommerce Knowledge (in %).

Knowledge about the…	Extremely High 1	2	3	4	Extremely Low 5	MEAN
eCommerce policies and plans within the organization.	9	20	32	17	22	3.22
fit between eCommerce policies and plans and the overall goals and objectives of the organization.	6	25	28	25	17	3.22
existing eCommerce applications within the organization	9	25	27	20	19	3.14
potential for eCommerce technology within the organization	13	42	16	23	6	2.69
potential use of eCommerce technology to achieve competitive advantage	16	42	27	11	5	2.47

stand how it can be used to achieve a competitive advantage. Respondents are less clear about policies and plans within the organization for the adoption of eCommerce, how eCommerce policies and plans fit with the overall goals and objectives of the organization, and the existing eCommerce applications within the organization; possibly a consequence of the inadequacy of funds invested in eCommerce and/or the failure of top-level executives to adequately communicate their technological vision.

Table 6 examines eCommerce communication as it relates to information received through communication with colleagues and business associations. Respondents gave higher ratings to information related to global eCommerce than information pertaining to eCommerce in China.

Perceptions About eCommerce

The framework for perceptions of eCommerce is comprised of four variables: usefulness, ease of use, importance, and security (Tables 7-10). The majority of the respondents strongly agreed that eCommerce would have a positive impact on career performance and therefore eCommerce was perceived to be very useful. Respondents also perceived that using eCommerce applications fit within the context of their work style thereby making it easy to use. Most expressed support for the perception that eCommerce technologies provide strategic and competitive advantages and perceived themselves as having the skills, resources, knowledge, and control to effectively use eCommerce applications. Finally, security issues influenced the decision to conduct business online with most respondents reporting a high level of concern when making purchases or banking over the Internet.

Attitudes Toward eCommerce

Table 11 clearly indicates that the majority of respondents have a strong positive attitude toward implementing and using eCommerce applications.

CORRELATION ANALYSIS

Pearson product/moment correlation analysis was employed to assess the relationship between the environmental, organizational and personal factors, perception, and attitudes. The results of the analysis can be found in Table 12, which is limited to those factors that were correlated at a significant level.

As Table 12 illustrates, environmental factors relating to eCommerce (ECE) are positively correlated to eCommerce knowledge (ECK), which suggests that respondents

Table 6: Personal Factors: eCommerce Communication (in %).

How would you describe the information you have received from colleagues, business associations, etc. about…	Very Positive 1	2	3	4	Very Negative 5	MEAN
global eCommerce	29	31	29	11	0	2.23
eCommerce in China	20	34	31	12	3	2.45

Table 7: Perception of eCommerce: Usefulness (in %).

	Strongly Agree 1	2	3	4	5	6	Strongly Disagree 7	MEAN
ECommerce will be of benefit to me personally.	50	16	9	6	9	5	5	2.42
Using eCommerce applications will improve my performance.	48	16	11	9	3	2	11	2.52
The advantages of eCommerce to me will outweigh the disadvantages.	42	25	14	5	5	0	9	2.42
Overall, using eCommerce will be advantageous to me.	52	22	8	5	3	2	9	2.28

Table 8: Perception of eCommerce: Ease of Use (in %).

	Strongly Agree 1	2	3	4	5	6	Strongly Disagree 7	MEAN
I have the skills, capability and knowledge necessary to use eCommerce applications.	42	24	13	11	2	3	5	2.35
Using eCommerce applications is entirely within my control.	14	33	21	14	5	6	6	3.06
Using eCommerce will fit well with the way I work.	41	23	20	11	2	0	3	2.22
Using eCommerce will fit into my work style.	38	23	20	13	3	0	3	2.33
The setup of eCommerce will be compatible with the way I work.	32	24	22	14	3	2	3	2.51

Table 9: Perception of eCommerce: Importance (in %).

Importance in terms of …	Extremely Important 1	2	3	4	5	6	Extremely Unimportant 7	MEAN
creating new business processes.	39	33	14	5	3	3	3	2.22
improving business relationships.	30	39	16	9	0	3	3	2.33
creating new distribution channels.	33	43	8	10	0	2	5	2.24
increasing sales.	21	31	31	8	7	0	3	2.61
improving customer satisfaction.	32	22	29	8	5	2	3	2.49
creating new products.	13	22	31	17	8	8	2	3.16
enhancing the global presence of the company.	42	23	27	5	2	0	2	2.08

who are familiar with eCommerce are aware of the issues associated with China's structural conditions. Variables related to organizational factors include both executive support/leadership (ESL) and the firm's use of eCommerce (FUEC). As one would expect, a positive correlation exists between these variables. Further, both executive support/ leadership and the firm's use of eCommerce are positively correlated with eCommerce knowledge (ECK). This suggests that the greater the executive's eCommerce knowledge, the greater the influence in shaping opinion, providing leadership, and creating a

Table 10: Perception of eCommerce: Security (in %).

How concerned are you about…	Not at all Concerned 1	2	3	Very Concerned 4	MEAN
Security in relation to making purchases or banking over the Internet	9	5	16	70	3.47
Security features when choosing whether or not to do business with an Internet-based company	2	20	55	23	3.00

Table 11: Attitudes toward eCommerce (in %).

	Strongly Agree 1	2	3	4	5	6	Strongly Disagree 7	MEAN
Implementing eCommerce is a good and wise idea	56	25	11	5	0	0	3	1.80
I like the idea of implementing eCommerce	52	30	10	5	0	0	3	1.83
Using eCommerce applications would be a pleasant experience	43	30	18	5	0	3	2	2.05

Table 12: Pearson Correlations.

	ECE	ESL	FUEC	ITK	ECK	COMM	PU	PEOU	PIO	PS	ATTITUDE
ECE					.301*						
ESL			.457**	.315*	.506**						
FUEC		.457**			.594**						
ITK		.315*			.590**	.331**		.325**			
ECK	.301*	.506**	.594**	.590**		.352**	.306*	.271*			
COMM				.331**	.352**		.277*				
PU					.306*	.277*		.441**	.658**		.579**
PEOU				.325**	.271*		.441**		.667**		.677**
PIO							.658**	.667**			.759**
PS											
ATTITUDE							.579**	.677**	.759**		
** Correlation is significant at the 0.01 level (2-tailed).											
Correlation is significant at the 0.05 level (2-tailed).											

technology-infused organizational environment. Analogously, executive support/ leadership is positively correlated with personal IT knowledge (ITK), which is perhaps an indication that IT savvy managers are more positive about executive leadership and support.

Variables that model personal factors include IT knowledge (ITK) and eCommerce knowledge (ECK) and communication (COMM) about eCommerce. Again, findings indicate a positive correlation among these variables. IT and eCommerce knowledge are both positively correlated with the perception of ease of use (PEOU) while eCommerce

knowledge and communication are positively correlated with perceptions of personal usefulness (PU).

The perception of eCommerce is manifested in the perception of personal eCommerce usefulness (PU), the perception of ease of use (PEOU), and eCommerce importance to the organization (PIO) variables. These variables exhibit a positive intercorrelation as well as a moderating influence on attitude about eCommerce.

While the model's variables exhibit a positive intergroup correlation, findings indicate that environmental and organizational factors do not play a role in shaping perceptions or attitudes. This suggests that Chinese managers' perceptions and attitudes toward eCommerce are independent of current environmental and organizational conditions. One implication is that this new generation of managers may be expected to continue technological pursuits in spite of the environmental shortcomings. Personal factors are partially correlated to usefulness and ease of use, but not to perceptions of importance and security. With the exception of security, all of the perception variables demonstrated a positive correlation with attitude while other factors influence perception. Perhaps because all respondents are enrolled in the university system, their educational experiences may have shaped and/or influenced their perceptions and thus attitudes toward eCommerce.

CONCLUSIONS AND IMPLICATIONS

It is widely recognized that eCommerce represents a critical resource for most business organizations, whether in a role of supporting business operations and managerial decision making or, increasingly, as a means of gaining a strategic competitive advantage. The majority of the participants in this study are cognizant of current structural deficiencies, particularly with regard to payment systems, government regulations, and telecommunications. Yet in spite of these deficiencies, most reported a positive attitude toward implementing eCommerce, agreeing that it is a "good and wise idea." Respondents indicate that enhancing the global presence of the firm, creating new business processes and distribution channels, and enhancing customer satisfaction and business relationships are of key importance. One implication is that current structural conditions should not seriously impede efforts to implement eCommerce initiatives since the current focus targets relationship and process enhancements which do not require radical changes to the current infrastructure. Findings indicate that a better understanding of the organizational plans and policies regarding IT and specific eCommerce technologies is correlated with more positive perceptions about its usefulness, ease of use, and importance. A higher level of knowledge is also correlated with stronger managerial leadership. By juxtaposing executive support and leadership with vision and investment, inferences may be made with respect to organizational commitment to the implementation of eCommerce initiatives. The occasional investments in eCommerce coupled with the absence of a stated vision hampers dramatic technological innovations in the near future. However, this younger generation of Chinese managers seems not only to recognize the potential benefits of eCommerce but to also embrace the opportunities presented by eCommerce activities. One implication is that firms interested in engaging in eCommerce in China will find a knowledgeable and supportive business climate; however, eCommerce initiatives may be hindered by constraints imposed by the current

infrastructure. Certainly, increased funding of R&D initiatives will allow organizations to implement eCommerce strategies that suit Chinese business practices while enhancing the ability to meet current and future eCommerce initiatives.

While this study provides a succinct profile of the perceptions and attitudes of young Chinese MBA students employed in a variety of fields, future research would benefit from expanding the sample to include a broader audience base. By doing so, additional validation tests and factor analysis can be performed. In addition, Internet-based surveys tend to have low response rates, particularly when they are not written in the native language of the population being surveyed. Therefore, a more traditional approach to survey distribution may be warranted. Finally, additional external variables must be identified to facilitate a clearer understanding of the antecedents to eCommerce perceptions.

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Chapter XVII

A Comparative Analysis of Major ERP Life Cycle Implementation, Management and Support Issues in Queensland Government

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ABSTRACT

This chapter reports on a study of issues across the ERP life cycle from the perspectives of individuals with substantial and diverse involvement with SAP Financials in Queensland Government. A survey was conducted of 117 ERP system project participants in five closely related state government agencies. Through a modified Delphi technique, the study inventoried, synthesized, then weighted perceived major-issues in ongoing ERP life cycle implementation, management, and support. The five agencies each implemented SAP Financials simultaneously using a common implementation partner. The three Delphi survey rounds, together with a series of interviews and domain experts' workshops, resulted in a set of 10 major-issue categories with 38 sub-issues.

Sub-issue weights are compared between strategic and operational personnel within the agencies in order to understand where the organizations should focus their resources in order to avoid, minimise, or eliminate these issues. Study findings confirm the importance of this finer partitioning of the data, and distinctions identified reflect the unique circumstances across the stakeholder groups. The study findings should be of interest to stakeholders who seek to better understand the issues surrounding ERP systems and to better realize the benefits of ERP.

INTRODUCTION

Organizations worldwide, whether public or private, are moving away from developing Information Systems (IS) in-house and are instead implementing Enterprise Resource Planning (ERP) systems and other packaged software (AMR Research, 1998; IDC Software Research, 2000; Price Waterhouse, 1995). ERP has been referred to as a business operating system that enables better resource planning and improved delivery of value-added products and services to customers. ERP systems have, in recent years, begun to revolutionise best practice business processes and functions. They automate core corporate activities such as manufacturing and the management of financial and human resources and the supply chain, while eliminating complex, expensive links between systems and business functions that were performed across legacy systems (Bingi et al., 1999; Gable et al., 1998; Klaus et al., 2000; Rosemann and Wiese, 1999).

Despite warnings in the literature, many organizations apparently continue to underestimate the issues and problems often encountered throughout the ERP life cycle, as evidenced by suggestions that: (1) more than 40% of large software projects fail; (2) 90% of ERP implementations end up late or over budget; and (3) 67% of enterprise application initiatives could be considered negative or unsuccessful (e.g., Martin, 1998; Davenport, 1998; Boston Consulting Group, 2000).

ERP life cycle-wide management and support are ongoing concerns rather than a destination. The pre-implementation, implementation, and post-implementation stages continue throughout the lifetime of the ERP as it evolves with the organization (Dailey, 1998). Unlike the traditional view of operational IS that describes a system life cycle in terms of development, implementation, and maintenance, examination of ERP implementations is revealing that their life cycle involves major iterations. Following initial implementation there are subsequent revisions, re-implementations, and upgrades that transcend what is normally considered system *maintenance*. As the number of organizations implementing ERP increases and ERP applications within organizations proliferate (Bancroft, 1998; Davenport, 1996; Hique et al., 1998; Shtub, 1999), improved understanding of ERP life cycle implementation, management, and support issues is required so that development, management, and training resources can be allocated effectively (Gable et al., 1998). A better understanding of ERP life cycle issues will also help direct the ERP research agenda.

Although ERP sales in 2000 declined for the main vendors (e.g., SAP, Baan, ORACLE, JD Edwards, Peoplesoft) due to post-Y2K curtailment in IT/IS activity and to saturation of large organizations, the outlook through to 2004 is for compound annual growth of 11.4% for license, maintenance, and related service revenue associated with enterprise resource management applications (IDC Software Research, 2000). This sustained interest in implementing and realising the benefits of ERP systems, and the

consequent life cycle issues, provide the rationale for this study (this need is further outlined in Gable et al., 1997a; 1997b; Gable, 1998; Gable et al., 1998).

The chapter proceeds as follows. First, the study background is described. Second, the research methodology is related. Third, study results are presented. Fourth, implications of the study findings are explored. Lastly, several broad conclusions are drawn.

BACKGROUND OF THE STUDY

The Study Context

In 1983, the Queensland Government Financial Management System (QGFMS) was successfully implemented to provide a common financial management system to all Queensland government agencies. Over the years, the Government reaffirmed strong support for central coordination of financial information systems as a fundamental strategy underpinning sound financial management in the government budget sector. These activities created benefits associated with improved coordination and economies of scale. They include the provision of timely, current information on a government- or sector-wide basis and cost savings in the areas of training, relocation of staff, single-point market investigation, development, and support (*Financial Management Strategy,* 1994).

Nevertheless, QGFMS must continually evolve to support new initiatives aimed at improving the budget sector's effectiveness. Three related initiatives that continue to shape the Queensland Government budget sector environment are: program management, accrual accounting, and accrual output budgeting. These initiatives are being implemented across the departments under guidelines of *Managing for Outcomes* (MFO)—an integrated planning, budgeting, and performance management framework (*Financial Management Strategy*, 1998).

In 1995 an ERP system, SAP Financials, was chosen to become the "new generation" of QGFMS. The SAP system was selected based on the following requirements: the ability to quickly and easily adapt to changes in organizational structures and business environments; and the need for cash, accrual accounting, and year 2000 compliance. By the end of 1999 most Queensland Government agencies had completed their initial SAP Financials implementation.

Motivation for the Study

Although SAP Financials have now been established in some agencies for a considerable period, new issues associated with the system's ongoing support and evolution continue to arise. A standard accounting environment driven by central government (Treasury) regulation, combined with other centrally driven reporting requirements, as well as the same software (SAP) existing across all agencies, provided an excellent opportunity to study ERP-related issues. All key players (software vendors, implementation partners, and user organizations) involved in ERP life cycle implementation, management, and support can potentially benefit from a better understanding of these issues. ERP software vendors seek to redress negative perceptions that ERP implementation duration and costs are difficult to manage, and to improve ongoing customer support and satisfaction. Consulting firms seek to streamline implementation

and share in the savings with clients. Both software vendors and consultants seek to increase the size of the ERP market through reduced costs and increased benefits to clients. Also, when software vendors and their implementation partners are more attuned to the issues identified, they will be well placed to further support clients throughout the ERP life cycle. Potential benefits to clients from identifying and analyzing ERP life cycle-related issues include: rationalised and more effective support from both the software vendor and implementation partner; improved ability to react to a changing environment; lower costs; and ERP systems that more accurately reflect business needs.

Information systems management community members (e.g., professional societies, educators, trainers, researchers), who seek to effectively serve their community, must also be aware of major ERP life cycle issues. Professional societies serve the community by arranging conferences, sponsoring guest lectures, and disseminating information through their publications. Educators and trainers need information on key issues to develop graduates with the necessary skills to address these concerns. Furthermore, researchers will be more successful in attracting sponsorship if they undertake studies that are closely aligned to the concerns of the marketplace.

Clearly there is a need for research aimed at identifying and explicating the specific client-centerd ERP life cycle implementation, management, and support issues experienced by different individuals in organizations in order to understand where the organization should focus their resources so that they will able to avoid, minimise, or eliminate these issues. The extensive deployment of ERP in private and public sector and the rapidly growing and changing portfolio of software applications on which the Queensland Government is dependent, magnify the imperative.

METHODOLOGY
Data Collection and Analysis

A three-round, non-anonymous Delphi-type open survey was conducted, using personalized e-mail with attached survey instruments. Chang and Gable (2000) critique the Delphi method in the context of IS key issues studies and its application within the context of the current study. The study involved three survey rounds: (1) "inventory" round, (2) "confirmation" round, and (3) "weights" round. Round-One sought to inventory the morass of issues perceived by the contacts. Subsequent to Round-One a "tentative set" of issue categories was synthesized. In Round-Two, a "preliminary set" was confirmed with respondents. Having established a "master set," in Round-Three respondents were asked to score or weight the issues in the master set, indicating their perceived relative importance.

In coding and synthesizing the survey responses from Round-One, several potential coding schemes were examined and tested. Attempts to map the data onto existing models (e.g., MIT90s framework, ERP life cycle) failed to provide a satisfactory level of discrimination between substantive issues. The strengths and weaknesses of potential coding methods and synthesis procedures are discussed in Chang et al. (2000). Qualitative data analysis techniques (Gadamer, 1977, 1985; Husserl, 1985; Lacity and Janson, 1994; Ramm, 1970; Tesch, 1991; Winograd and Flores, 1986) also served as a guide to coding and synthesis (e.g., how to deal with a large amount of non-numerical, unstruc-

tured, and rich data; how to ensure that when synthesized, those issues accurately reflect the respondents' concerns) that confront Delphi method researchers. Ultimately, an open coding approach was adopted to structure the issues identified in Round-One. The major strength of the open coding approach is that it is data driven–the categories so formed reflect the range of issues that were collected, rather than some pre-defined scheme. Because the categories are determined from the data themselves, respondents should comprehend them more readily in subsequent survey rounds.

To support the interpretation of study findings, an understanding of the contextual background of the Queensland budget sector and the study organizations in relation to their SAP Financials project was essential (i.e., organizational nature/background, major services/roles/responsibilities of the agency, history/initiatives of the financial management system, overview of agencies' SAP project). Thus, a series of interviews and domain experts' workshops that involved senior staff members from the respondent groups were conducted before, during, and after the Delphi survey rounds.

Study Population

During 1998 and early 1999, the study case (a group of five government agencies) proactively moved as a team and implemented the SAP Financials. Individuals from the implementation partner (IP), a "big 5" Consulting Firm, and these five closely related government client agencies (agency A to E) were pre-identified and contacted for study participation. To qualify for study participation, they were required to possess substantial involvement with SAP Financials: at any level, in any role, in any phase of the life cycle, with any of the modules implemented. Employing formal "Survey Participants' Selection Guidelines," and through interviews of senior sponsors in each agency, 117 individuals were identified and included in the contact database. Note that the term "client" herein refers to employees of the agencies, who are "clients" of both the ERP vendor and the implementation partner. Owing to the full support of the Queensland Government in this study and to the assistance of key contacts in each organization, the 117 contacts selected approximate the 'population' of knowledgeable individuals (rather than a "sample").

STUDY FINDINGS

Round 1–Inventory Round

In October 1999, a total of 117 "inventory" round questionnaires were distributed to individuals who had been substantially involved in the five government agencies' SAP Financials Project. Before the e-mailout, the survey questionnaire (Word attachment) and covering email were pre-tested for clarity and ease of understanding by several senior personnel in the government agencies. Minor cosmetic changes resulted. In all, 78 questionnaires were returned, yielding a 67% response rate. A total of 61 valid questionnaires were eventually obtained from the first-round survey (Table 1), providing a net response rate of 52%. More than two-fifths (44%) of the respondents were from Agency A, the lead agency on the implementation and a corporate services provider to the other agencies. Other agencies had comparatively fewer participants.

Table 1: Inventory Round Survey Responses.

Organization	#	%	Role	#	%	Level	#	%
IP	7	11	IP	7	11	Strategic	12	22
Agency A	27	44	Agency	54	89	Operational	42	78
B	12	20						
C	7	11						
D	2	3						
E	6	10						
Total	61	100	Total	61	100	Total	54	100

Respondents from the five agencies were further differentiated by organizational level of involvement, where (1) strategic = steering committee members, project sponsors, project managers, and (2) operational = business process team members, power users, help-desk team members, change-management team members. Approximately four-fifths (78%) of the respondents were involved at the operational level, the rest (22%) representing the strategic level.

Respondents were asked to identify any issues regarding implementing, managing, and supporting the SAP Financials throughout their life cycle in their 'home' agency. The 61 respondents identified 274 issues, or an average of 4.5 issues per respondent. Approximately 41% or 115 of the issues identified originated within Agency A. This is not surprising given the lead role played by this agency and given that 44% or 27 of the total respondents are from this agency. Approximately one-tenth of the issues identified were from the implementation partner. From within the agencies, approximately 28% of the issues identified were from the strategic level and 72% from various operational levels. In general, the number of issues identified by the various respondent groups was in proportion to the number of respondents in these groups. Table 2 shows responses by stakeholder groups.

Having identified 274 issues from 61 survey respondents, the study then sought to distill these issues into a summary set of major-issue categories and related sub-issues. This resulted in a "tentative set" of 12 major-issue categories, with 40 sub-issues pending further validity and reliability testing in Round-Two.

As a validity test, and in order to establish a summary set of major-issues representing the respondents' main concerns, a domain experts' workshop was conducted soon after the "tentative set" of major-issues was derived during July 2000. Four out of five representatives from the government agencies and five research team members agreed to participate in this "synthesis" workshop. The workshop was organised to allow time for information sharing and discussion with the participants. The workshop yielded valuable insights and a greater level of understanding of SAP Financials issues in the agencies and resulted in a "preliminary set" of major-issues that were more relevant and meaningful to the study stakeholder groups, pending confirmation from all survey respondents.

Round 2–Confirmation Round

Having rationally synthesized and logically restructured the "preliminary set" of issue categories and related sub-issues through the coding and synthesis exercises and

Table 2: Cross-Tabulation of Responses by Stakeholder Groups.

Organization	Issue #	Issue %	Response #	Response %	I/R
IP	26	10	7	11	3.7
Agency A	115	41	27	44	4.3
B	48	18	12	20	4.0
C	34	12	7	11	4.9
D	14	5	2	3	7.0
E	37	14	6	10	6.2
Total	274	100	61	100	4.5

Role	Issue #	Issue %	Response #	Response %	I/R
IP	26	10	7	11	3.7
Agency	248	90	54	89	4.6
Total	274	100	61	100	4.5

Level	Response #	Response %	Issue #	Issue %	I/R
Strategic	75	28	12	22	6.3
Operational	173	72	42	78	4.1
Total	248	100	54	100	4.6

domain experts' workshop, in the second "confirmation" or interim survey round, the study sought respondents' comments on and confirmation of the "preliminary set" of major-issues. For each respondent from Round-One, a custom report was prepared. The report included the hierarchy of major- and related sub-issues in the "preliminary set." The report also clearly indicated the link between each of the respondent's original round-one issues and the related sub-issues with which they had been associated. A total of 61 Round-Two reports were distributed to individuals who had responded in the Round-One survey. Although participants were instructed that there was no need to formally respond if they agreed in principle with the "preliminary set" of major-issues, about one quarter of questionnaires were returned showing their further comments and agreement.

The comments on and confirmation of the issue categories from the domain experts' workshop and the Round-Two survey respondents, resulted in a minimally revised "master set" of 10 major-issue categories from M-1 to M-10 with 38 sub-issues from S-1 to S-38 (Appendix A). Figure 1 shows the incidence of the initial 274 issues from the 61 respondents across the 10 major-issues categories.

Using the incidence of overall citation as an early crude indicator of severity, it is noted that 63% (172) of all 274 initial issues cited pertain to: *Operational-Deficiencies* (67 issues); *Knowledge-Management* (55 issues); and *System-Development* (50 issues). We recognise that the number of sub-issues in other major-issue categories were relatively fewer, accounting to some extent for the lesser citations, and that not all issues listed are issues for all respondents (a further fallibility of citations as an indicator of issue severity). Nonetheless, the aim of the study was to be as inclusive as possible in this master set of issues, with further relative evaluation in the next "weights" round of the survey.

Round 3–Weights Round

During September-October of 2000, a total of 100 Round-Three questionnaires were sent to Round-One contacts, excluding those who had indicated they would be unable to participate but including those who had not responded in the previous rounds. Respondents were asked to rate the importance of each of the 38 sub-issues on a scale from 1 to 10 where 1 means "not important" and 10 means "very important." Prior to its e-mailing, the survey was pre-tested for clarity and ease of understanding by several senior personnel in the government agencies. Slight changes were made.

Approximately one week after the due date, in an effort to boost the response rate, follow-up e-mail messages and phone calls were made to those who had not yet responded. When necessary, another copy of the questionnaire was e-mailed to those respondents who had "misplaced" the survey. The follow-up phone calls resulted in 15 additional returns. A total of 58 questionnaires were returned, yielding a 58% response rate. A total of 42 valid questionnaires were eventually obtained from the final round survey, providing a net response rate of 42%. Known reasons for non-response were: some respondents had discontinued their SAP responsibilities; others had left their organization; some were on holiday or maternity leave; several respondents did not wish to participate because of the time required to complete the questionnaires. The distribution of the survey respondents in this final-round survey by agency, role, and organizational level is shown in Table 3.

Table 4 shows the overall mean scores and rankings of the 10 major-issue categories from the "weights" round survey (where the mean for the major-issue is simply the average of the mean scores for its constituent sub-issues). A total of 1,134 valid scores for the 38 sub-issues were received from the 42 respondents (71% = 1,134/(42*38)). The number of respondents varies between 29 and 34 across the sub-issues from which major-issue scores are derived.

Though *OPERATIONAL-DEFICIENCIES* ranked highest based on number of citations in the survey Round-One (see Figure 1), they have moved to fifth place based on Round-Three weights. This may suggest that though *OPERATIONAL-DEFICIENCIES* were prominent in many respondents' consciousness during Round-One, subsequently when listed alongside other sub-issues in Round-Three, they were felt by respondents to be somewhat lower in importance than the earlier relative incidence of citations implied. Note that frequency of citation was known from the outset to be a much cruder indicator of issue importance than weights. Many may feel that something is an issue, while at the same time universally believing it to be a relatively lesser issue. Regardless, with a mean score of 5.62, *OPERATIONAL-DEFICIENCIES* are yet marginally above the scale mid-point (5.5), suggesting that these at a minimum, are perceived to be moderately important issues. Even *SYSTEM-PERFORMANCE* issues with a mean score of 4.28, more than a full point below the scale mid-point, and ranked last (10th) based on weights, should not be overly discounted. These too are issues cited by multiple

Figure 1: Distribution of Issues Across the 10 Major Issue Categories.
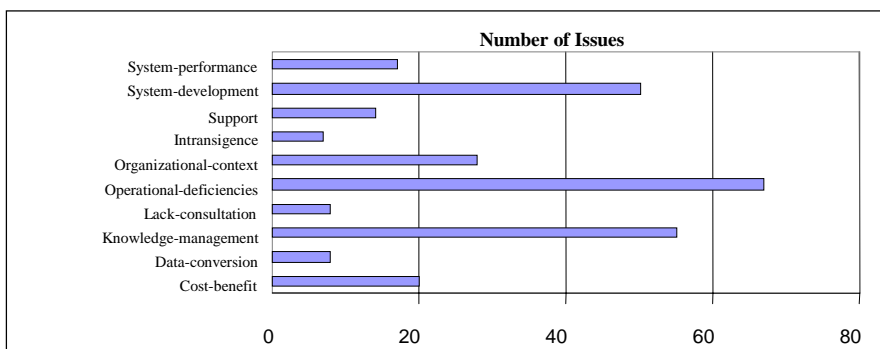
Table 3: Third-Round Survey Responses.

Organization	#	%	Role	#	%	Level	#	%
IP	6	14	IP	6	14	Strategic	11	26
Agency A	15	36	Agency	36	86	Operational	25	74
B	7	17						
C	3	7						
D	3	7						
E	8	19						
Total	42	100	Total	42	100	Total	36	100

respondents in Round-One, and here in Round-Three scored as moderately important. *KNOWLEDGE-MANAGEMENT* major-issues have moved from second place based on citations to first place based on weights. *SYSTEM-DEVELOPMENT, SUPPORT*, and *DATA-CONVERSION* are ranked 2nd through 4th respectively based on weights.

The detailed mean scores and ranks of the 38 related sub-issues (Appendix A) and comparisons between the strategic and operational personnel within agencies are discussed in the following section.

ANALYSIS

In an attempt to understand areas of consensus and disagreement between the stakeholder groups, in addition to reviewing ranks of the sub-issues based on overall-agency mean scores, this section presents a comparison between strategic vs. operational personnel across the agencies. The number of IP (consultant) respondents was too few to yield meaningful comparison between the IP and the agencies, and the agencies were not surprisingly interested in agency perspectives. (Note that IP versus agency perspectives are being compared in a follow-up study of all agencies of Queensland Government nearing completion as of this writing. This larger study will also facilitate cross-agency comparisons.) The results of the "weights" round survey for these demographic groupings are presented in Appendix A. The sub-issues are numbered S-1 to S-38 in rank-order based on overall agencies' mean scores. A rank of 1 is

Table 4: Overall Ranking of Major Issue.

M-#	Mean	Std Dev	Rank	Major Issue Categories
3	6.19	2.53	1	Knowledge-management
9	6.00	2.34	2	System-development
8	5.79	2.68	3	Support
2	5.69	2.97	4	Data-conversion
5	5.62	2.73	5	Operational-deficiencies
4	5.58	2.53	6	Lack-consultation
1	5.25	2.86	7	Cost-benefit
6	5.06	2.70	8	Organizational-context
7	4.79	2.84	9	Intransigence
10	4.28	2.82	10	System-performance
Overall	5.57	2.67		

ascribed to the sub- issue with the highest computed mean score, and a rank of 38 is ascribed to the sub-issue with the lowest mean score.

A total of 36 valid agency responses were eventually obtained from the "weights" round–30% (11) strategic respondents and 70% (25) operational respondents. Figure 2 is a line-chart of strategic and operational mean scores on the 38 sub-issues. Analysis of variance (independent sample t-test) identified only one significant difference: S27–*organization appears unable or unwilling to be responsive to requests for changes in the system to resolve operational problems.* Operational personnel rated this sub issue higher (mean=5.60 yielding a rank of 24) than strategic personnel (mean=3.17, rank=37). Regardless, for neither group was this sub-issue ranked in the top 10 of the sub-issues. Furthermore, although strategic personnel may be expected to be more concerned about management-related issues while operational personnel focus on operations-related issues, it is observed that there is broad consensus between these two groups, with only the one significant difference identified.

It is noted that six sub-issues are ranked in the top-10 (S30, S13, S12, S21, S7, S9) based on both strategic and operational respondent weights (again suggesting broad concurrence of views–see Appendix A). These areas of agreement between strategic and operational respondents are discussed next, followed by brief discussion on issues of relatively greater concern to strategic respondents, those of relatively greater importance to operational respondents, and those of relatively lesser importance to both respondent groups.

Issues of Relatively Greater Importance to Both Respondent Groups

The *SYSTEM-DEVELOPMENT*–related issue, *complexity of SAP means few, if any, people understand SAP beyond a single module, making overall design decisions very difficult* (S30) was the number one issue overall. Survey respondents suggested that

Figure 2: Strategic and Operational Personnel Mean Scores on 38 Sub-Issues.
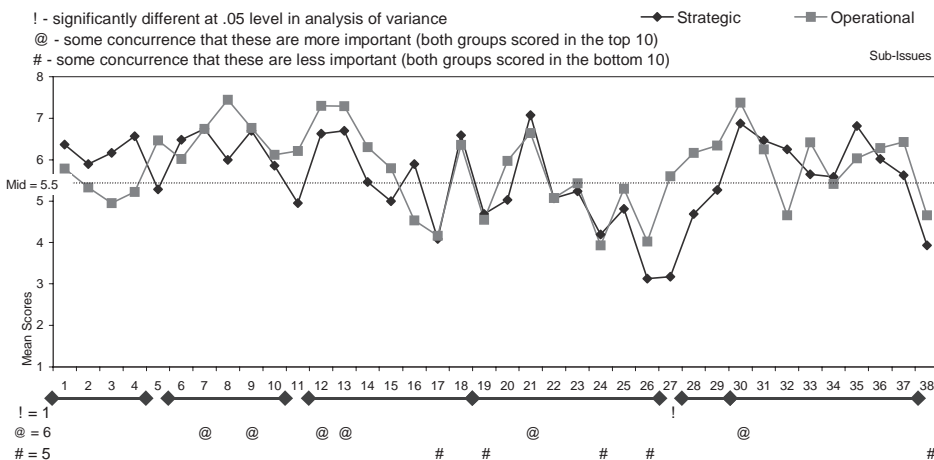
complexity and the integrated nature of SAP make it difficult to configure without being aware of potential consequences for other modules. Furthermore, they indicated that in-depth understanding of SAP is difficult to obtain within a short period of time and that the lack of sufficient understanding has an enormous impact on ability to use the system efficiently and effectively. Recent research too suggests that lack of ERP product knowledge has been a major concern in the late 1990s (Davenport, 1998; Markus, et al., 2000) for many organizations. Most organizations use consultants to facilitate the implementation process. Consultants may have experience in specific industries, comprehensive knowledge about certain modules, and may be better able to determine which suite will work best for a given organization (Davenport, 2000; Piturro, 1999; Thong et al., 1994). Evidence from workshop participants, however, suggested that although several knowledgeable experts in particular modules of SAP were involved, no one seemed to have a broad knowledge and expertise across SAP. This resulted in significant concerns for decision makers who had to decide on a complete business design rather than a module by module design. Other issues identified also reflect consequences of insufficient knowledge of SAP.

Two *OPERATIONAL-DEFICIENCIES*–related issues, *developing reports is difficult in SAP (S12)* and *not all required reports were available at implementation time (S13)* were ranked 2nd and 3rd based on overall agency scores (ranked 7th and 5th for strategic respondents and ranked 3rd and 4th for operational respondents). SAP was vastly different, in both presentation and functionality, to the previous QGFMS of which the agencies had deep experience, extending over the period 1983 to 1998. During this 15-year period, the agencies undertook significant customisation, particularly in reporting and in enhancing their business processes. With the advent of SAP, the agencies were faced with abandoning a system they had been using for 15 years and forfeiting the knowledge, development, and sophistication of reporting that had developed over that period. They were unprepared for SAP standard reports. Furthermore, survey respondents indicated that it was easier to develop reports on the old system (e.g., because the table names and field names were in English rather than German, as was the case with the then SAP standard report system). Differences in system operation were also perceived to impact on the accuracy and efficiency of operations and ease of use of the system. Some agencies found that the standard ERP reports do not offer the presentation and flexibility to which users are accustomed. This has resulted in some clients buying separate tools or developing their own in-house reporting system. It must be noted that views expressed at the workshops on reporting were sometimes diametrically opposed, with those who were more intimate with SAP reporting touting its advantages. This again suggests problems with knowledge of the product, rather than with the product itself.

The *ORGANIZATIONAL-CONTEXT*–related issue, *implementation across multiple agencies led to sub-optimisation of the system configuration (S21)*, was ranked most important by strategic respondents (5th overall and 7th by operational respondents). When government is considering the adoption of an ERP package, management may have opportunity to choose between a single system across all of government, versus allowing each department to choose its own system and to bear responsibility for changing their processes to fit the system or the system to fit their processes. A main guiding management principle on the SAP Financials implementation in Queensland

Government was to maximize commonality across the agencies. Workshop participants believed that, to have allowed greater latitude to the individual agencies would have significantly added to the cost and duration of implementation, and that unique agency systems would constrain their ability to benefit from vendor software maintenance and upgrades. Researchers also suggest that "configuration" should only be requested when essential, or when the competitive advantage derived from using non-standard processing can be clearly demonstrated (Appleton, 1997; Holland and Light, 1999; Janson and Subramanian, 1996; Parr and Shanks, 2000; Escalle and Cotteleer, 1999). Nonetheless, differences in business orientation, organization size, and related requirements may argue for unique processes. It is clear from the rank ascribed to this sub-issue that many felt important compromises had been made to achieve the level of standardisation sought.

Two *KNOWLEDGE-MANAGEMENT*–related issues, *insufficient resources and effort put into developing in-house knowledge (S7)* and *shared knowledge among project team members was a problem–agency staff did not understand SAP and implementation personnel did not cover the diversity of circumstances encountered in normal daily operations (S9)*, rank 4th and 5th for the strategic respondents and 6th and 5th based on the operational respondent scores. Survey respondents felt that insufficient long-term planning had been undertaken for maintaining a knowledgeable and skilled in-house SAP team. The acquisition and maintenance of skilled personnel proved both difficult and expensive. Workshop participants further suggested that when SAP is implemented, it is important to retain the knowledge and skills gained by staff involved on the project and to ensure that sufficient ongoing training is provided within the agencies so that this is then converted to organizational knowledge. Grover et al. (1995) found that failure to commit required financial, human, and other resources is common-place in reengineering projects and highly likely to be a problem with other related projects, like ERP implementation. According to the SAP Financials Project Business Case, skill transfer from contractors/consultants to permanent staff was a prime objective of the project. However, the ability to share knowledge among project team members was found to be a problem.

Several implementation concerns arose during the project when agency staff had insufficient knowledge of the workings of SAP, and the implementation partner had too little knowledge of the agency requirements. Workshop participants believed that continuing development of internal skills in SAP, and ensuring that appropriate primary and secondary functional support is in place for each SAP module, is key to addressing the *KNOWLEDGE-MANAGEMENT*–related issues raised by the workshop participants. Thus, it is suggested that dedicated resources for sharing experiences and knowledge gained are critical to realize the benefits associated with ERP (Davenport, 2000; Gable et al., 1998; Robinson and Dilts, 1999).

Though not amongst the overall top-10 sub-issues, broad consensus is noted on the *OPERATIONAL-DEFICIENCIES*–related issue S18–*security is difficult to maintain in SAP resulting in some users being granted too much access and others not having access to data they need* (ranked 8th and 11th by strategic and operational respondents). SAP security is considered complex and resource-intensive to maintain. Survey respondents suggested that there is a requirement for better definition of security management. Furthermore they indicated that with so many different security profiles in the new

system, it is difficult for smaller agencies to comply with segregation requirements when implementing ERP. It is very important for the project team to consider how to handle security. The system must have proper access controls and partitioning so that unauthorised users cannot access information. In addition to general system security, other activities (e.g., data warehousing and e-commerce add-ons, and outsourcing of the ERP maintenance) require extra security controls (Riet et al., 1998).

Issues of Relatively Greater Importance to Strategic Personnel

The *SYSTEM-DEVELOPMENT*–related issue S35, *requested system functionality was sacrificed in order to meet implementation deadlines*, was ranked 3rd most important by strategic respondents, but only 19th by operational respondents. While sacrifices were undoubtedly made to keep the project on track, workshop participants indicated that the weekly cost of continuing the implementation project was very high, and that this was not widely understood across the agencies. The feeling was that tradeoffs are unavoidable, and that those made were well informed and well considered.

A further *KNOWLEDGE-MANAGEMENT*–related issue S6, *difficult to retain people with SAP skills due to market pressure to leave*, is ranked among the top-10 (10th) by strategic respondents (ranked 20th by operational respondents). A stable team of SAP skilled personnel is necessary for the smooth implementation and running of the SAP system. Nonetheless, personnel with SAP experience were much sought after in the marketplace, particularly in the late 1990s, thereby further complicating the task of building a strong base of SAP knowledge within the agencies. The study found little evidence of special incentives for SAP skilled personnel in agencies, at a time when employee turnover was relatively high. These difficulties with finding and retaining skilled ERP people, staffing the project team, and maintaining staffing post-implementation have been recognised in prior studies (Bryan, 1998; Markus et al., 2000; Niehus et al., 1998; Somers and Nelson, 2001).

The *COST-BENEFIT*–related issue, *SAP implementation benefits do not justify costs (S4)*, is ranked 9th by strategic respondents, yet 29th by operational respondents. Survey respondents claimed with hindsight that the value for money obtained from any SAP implementation has to be carefully evaluated. They suggested that the implementation costs increase as the degree of customisation increases, and the cost of hiring consultants can consume a substantial proportion of the implementation budget. A recent survey of Fortune 1000 companies regarding ERP customisation policies indicates that 41% of companies re-engineer their business to fit the application, 37% choose applications that fit their business and customise only marginally, and only 5% customise the application to fit their business (Davis, 1998). As suggested earlier, because customisation is usually associated with increased information systems costs, longer implementation time, and the inability to benefit from vendor software maintenance and upgrades (Janson and Subramanian, 1996), it should only be requested when essential.

Many researchers suggest that a key benefit of ERP is the seamless integration of information flowing through the organization (Bryan, 1998; Shang and Seddon, 2000; Somers and Nelson, 2001; Sumner, 2000). To successfully achieve this benefit, the business processes and functions must be integrated (Davenport, 2000). Although it is

likely that many benefits will not be realized for some time post-implementation, workshop participants indicated that the agencies have been able to accomplish tasks with SAP that would not have been possible with the previous system. With the aim of increasing benefits from the SAP investment, a continuous improvement process and benefits realisation program was established across the government agencies after "go live" of the system.

Though not among the top-10, it is noteworthy that the four "costs"-related sub-issues (S1, S2, S3, S4) are all ranked relatively higher by strategic respondents (12th, 18th, 14th, 9th) than by operational respondents (23rd, 27th, 31st, 29th). Clearly, and understandably, strategic respondents are more attuned to costs of the new system than are operational respondents. Having said this, the overall rankings of these 4 sub-issues (19th, 25th, 28th, 22nd) puts them all in the bottom half of the sub issues (moderately important).

Issues of Relatively Greater Importance to Operational Personnel

Operational personnel viewed the *KNOWLEDGE-MANAGEMENT*–related issue, *training provided was inadequate and did not cover the diversity of circumstances encountered in normal daily operations (S8)*, as most important overall (ranked 16th by strategic respondents). This concern would be close to the consciousness of staff who are responsible for the day-to-day running of the system or handling month- and year-end processes. Survey respondents suggested that significant problems were encountered with interfaces, business-area balancing, legal consolidations, and controlled and administered reporting, which were not well-documented, nor was adequate training provided. Several studies have suggested that when implementing an ERP package, training is an important component and should be a high priority (Bryan, 1998; Crowley, 1999; Ross, 1999; Wilder and Davis, 1998). Organizations in the current study are realising the need for improved training, not only in the software, but also in the new job function. Workshop participants suggested that the government agencies have already taken action, soon after "go live" (e.g., making a large investment in staff training and ongoing support of the SAP system), to minimise reliance on external contractors and to build in-house expertise. A performance planning and development program within the agencies (which looks at staff training over time) was implemented to manage this issue with in-house skills development, and to ensure all staff receive appropriated SAP training prior to the pending upgrade project.

The *DATA-CONVERSION*–related issue S5, *errors were found in data converted from former QGFMS*, is ranked 8th most important by operational respondents (ranked 24th by strategic respondents). A fundamental requirement for the effectiveness of the ERP system is the availability and timeliness of accurate data. Somers and Nelson (2001) suggest that management of data entering the ERP system represents a critical issue throughout the implementation process. Data conversion problems can cause serious implementation delays and cost overruns (Neihus et al., 1998; Holland and Light, 1999). Survey respondents stated that the new fields did not always encompass the old-field data during data conversion testing. They further indicated that a substantial number of transactions were posted to a "blank business area" before anyone realized the extent of the problem. Data adopted from prior systems must be mapped into the correct fields

and subsequently maintained. *DATA-CONVERSION* can be an overwhelming process, especially if organizations do not understand what should be included in the new systems and what needs to be omitted. Workshop participants indicated that this issue has been addressed but needs to be considered more carefully in any future conversion exercise.

Two *SYSTEM-DEVELOPMENT*–related issues, *too little effort put into redesigning the underlying business processes, resulting in a system that represented a "technology swap" that failed to capture many of the benefits of SAP (S37)* and *inadequate system testing left many errors in the implemented system (S33)* are ranked 9th and 10th most important by operational respondents (24th and 21th respectively by strategic respondents). Implementing an ERP system involves re-engineering existing business processes to meet the best business process standard (Davenport, 2000; Markus et al., 2000). One major benefit of ERP comes from re-engineering the organization's way of conducting business. However, workshop participants indicated that the costs and benefits of aligning with an ERP model can be very high because it is difficult to gain agreement to the new process from all who are affected. Furthermore, they suggested that some existing business processes are so specific to the agency(ies) that they need to be preserved or appropriate steps taken to customise them.

Clear goals and objectives are critical in any ERP implementation. Owing to the Y2K deadline, the then looming GST and the uncertain costs/benefits of business re-engineering, management chose to pursue a "technology swap" for the five agencies. Workshop participants too felt that it was easier and appropriate to first complete the project, secure the system, and resolve problems, and then seek to realize the benefits. Nonetheless, a surprising number of transactions failed on implementation due to insufficient testing and lack of time. A general finding is that too much was relegated to "being fixed later" in an effort to meet "go live" deadlines. Workshop participants suggested that the areas experiencing the most problems tended to relate to functionality that was added to SAP to meet a specific business requirement. It is clearly necessary to ensure comprehensive testing during user acceptance testing and to ensure sign-off of test results.

Issues of Relatively Lesser Importance to Both Respondent Groups

Strategic and operational personnel concur on the relatively lesser importance of the five sub-issues *ORGANIZATIONAL-CONTEXT*: *S19–differences in work ethic among project personnel*, *S24–political issues had negative impact on the project*, and *S26–timing of implementation was inappropriate because of change underway in the public sector*; *OPERATIONAL-DEFICIENCIES*: *S17–SAP lacks some functionality of QGFMS*; *SYSTEM-PERFORMANCE*: *S38–system performance is inadequate to meet operational requirements*. The fact that only one of the eight sub-issues associated with the *ORGANIZATIONAL-CONTEXT* major-issue was rated in the top-half of the rankings (S7), and five of these 8 are rated in the bottom-10 by both operational and strategic respondents, is strong evidence that agencies did not perceive *organizational context* as a primary concern overall.

CONCLUSION

This research began with the proposition that for those who implement, manage, and support ERP systems, there is benefit in knowing the major ERP life cycle issues and the relative importance of these issues as they affect various stakeholder groups. It was noted that numerous studies of IS issues have been conducted for the benefit of private sector organizations, but that there has been little study of public sector organizations. Accordingly, a modified Delphi-type survey, together with a series of interviews and domain experts' workshops, were conducted to establish a set of major-issues and related sub-issues that were confirmed as relevant to the study stakeholder groups. Ultimately, while findings are expected to be particularly valuable to organizations implementing ERP, an improved understanding of ERP life cycle implementation, management and support issues is expected also to benefit other types of systems and the complete range of consulting firms' and software vendors' services, as well as broader IS research.

ACKNOWLEDGMENTS

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Chapter XVIII

Relationship of Some Organizational Factors to Information Systems Effectiveness:
A Contingency Analysis of Egyptian Data

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ABSTRACT

Most of the empirical evidence on the effectiveness of information systems and their determinants is confined to the use of data from Western countries. Evidence from other environments, where the social, economic, and cultural characteristics vary, is needed before generalizations can be made. This chapter reports on an investigation designed to explore the relationship of three organizational factors—top management support, user involvement, and the maturity of the IS function—to systems effectiveness in an Egyptian setting. Data was collected from 214 managers, and the results indicate that the three organizational variables positively associate with systems effectiveness, measured by user information satisfaction and system use in improving decision

making. Also, user's tenure in the organization and ownership type were found to affect the relationships between the system's effectiveness measures and the three organizational variables. These findings are discussed and implications are offered. The findings of this study suggest that the positive relationships of top management support, user involvement, and IS maturity to systems effectiveness may transcend cultural differences.   This empirical evidence contributes to the external and international validity of the similar Western-based findings, which, in turn, add to the efforts toward building a general theory of trans-national global information systems (GISs).

INTRODUCTION

Evaluation of information systems effectiveness continues to be a major concern for both IS researchers and practitioners. Over the last 30 years, many factor and process studies have attempted to predict and explain the adoption and use of information technology (IT). Guided by a number of proposed models and frameworks, relevant research has focused on defining and measuring systems effectiveness and their major determinants, including individual, psychological, organizational, sociological, environmental, information-structural, managerial, and technical (e.g., Mason & Mitroff, 1973; Lucas, 1978; Ein-Dor & Segev, 1978; Mawhinney & Lederer, 1990; Raymond, 1990; Li, 1997; Khalil & Elkordy, 1999, 1997). Also, research findings show the primacy of the managerial and organizational issues, compared to the technological issues as major barriers to the effective implementation and use of systems (e.g., Lucas, 1975; Robey & Zeller, 1978; Cerveny & Clark, 1981; Markus & Robey 1983; Leifer, 1988; Mawhinney & Lederer, 1990).

However, consistent relationships between these managerial and organizational variables and systems effectiveness have yet to emerge. Further, most of IS effectiveness research has centered on data gathered in the Western culture. Yet, research findings obtained from organizations operating in a Western environment cannot be necessarily generalizable to other environments without further verification of their external validity (e.g., Dasgupta et al., 1999; Khalil & Elkordy, 1999, 1997; Aharoni & Burton, 1994). IS related problems are perhaps country-specific and are related to the country's unique political, legal, economic, cultural, and technological environments (e.g., Aharoni & Burton, 1994; Rosenzweig, 1994; Deans et al., 1991; Ein-Dor et al., 1993).

The investigation of IS issues in particular areas of the world emphasizes the possible impact of cultural differences on such issues (e.g., Straub et al., 2002; Dasgupta et al., 1999; Watson et al., 1997; Al-Khaldi & Wallace, 1999; Hassan, 1994; Wetherbe, Vitalari, & Milner, 1994). There is a need for IS research to broaden the focus beyond ethnocentric and regional studies in order to build a general theory of trans-national global information systems (GIS) (Palvia, 1993). More specifically, both country specific and cross-cultural research is imperative in order to strengthen the generalizability of the Western based evidence on the organizational determinants of systems effectiveness. In addition, effective management of systems in a particular culture requires identifying the issues that might be unique to that culture (e.g., Jain, 1997; Deans & Ricks, 1991; Palvia & Saraswat, 1992).

The purpose of this chapter is to report on the results of a study that used a contingency approach to investigate the relationships of three organizational variables—namely, top management support, user involvement, and IS maturity—to systems effectiveness in an Egyptian context. This single country investigation, which follows a series of IS related research in Egypt (e.g., Khalil & Elkordy, 1999, 1997; Noshy, 1984), attempts to fill a gap in the existing knowledge of systems effectiveness in developing countries in general and in Egypt in particular. Comparison of findings from single country studies, together with data on cultural variables and the calibration of the findings by cross-cultural studies, should enhance our understanding of global information systems (GISs) effectiveness (Ein-Dor et al., 1993). Besides, evidence on what may or may not affect systems effectiveness in the Egyptian companies, which are under pressure from global economic competitiveness and face problems of low productivity, should be of enormous interest to the Egyptian policy makers.

The chapter is organized accordingly. Systems effectiveness is discussed first, followed by the research model and hypotheses, research method, data analysis, discussion of results, conclusions and implications, and suggestions for future research.

SYSTEMS EFFECTIVENESS

The fundamental objective of investment in information systems is to improve individual and group decision making performance, and ultimately organizational effectiveness (Raymond, 1990). Management is naturally eager to determine how a given system performs, in order to then assess the degree to which investment in the system has paid off, to take action (if need be) to improve the system performance, and to learn from the past experience in planning for the future. The evaluation of IS practices, policies, and procedures requires an effectiveness measure against which various strategies can be tested.

Measurement of systems effectiveness is particularly important in Egyptian organizations where IT implementation level, managerial practices, organizational resources (e.g., financial, technical, and skilled human resources), and cultural characteristics appear to be different, compared to most of the developed countries (i.e., USA and West European countries) (e.g., Abdul-Gader, 1999, p. 45; Straub et al., 2001; Watson et al., 1997). Also, since 1991, the Egyptian government has undertaken a number of legislative initiatives and plans for privatization that will likely lead to an increasingly open and competitive environment (Dolezal Jr., 1999). In this emerging new economy, IT is expected to significantly contribute to the managerial modernization of the Egyptian companies, which are under increasing pressure from global economic competitiveness, and face problems of low productivity. Effective utilization of IT applications and systems is tentative when policy makers and IS managers have little knowledge of the factors and the managerial practices that affect systems effectiveness.

The issue of systems effectiveness has generated much debate and consequent research interest over the years. Different groups of variables (e.g., personal, organizational, technological, etc.) have been investigated in order to explore their relationship to systems success or effectiveness. IS literature suggests that systems effectiveness depends on the "fit" between systems development efforts and the organizational context of use (e.g., Lucas, 1975; Robey & Zeller, 1978; Lee & Kim, 1992; Cheney &

Dickson, 1982; Ein-Dor & Segev, 1982; Mawhinney & Lederer, 1990; Gremillion, 1984; Weill & Olson, 1989).

Organizational variables (e.g., organizational size, maturity, IS sophistication, management support, user involvement, culture) have been recognized to be important contributors to the successful planning and implementation of systems (e.g., Raymond, 1990; Ein-Dor & Segev, 1978). Nonetheless, consistent relationships among these variables and systems effectiveness have yet to emerge. This problem is further convoluted as developing countries attempt to adopt and manage IT systems that are designed and produced in developed countries. These systems are likely to be culturally biased in favor of the developed countries' social and cultural systems. This biasness possibly creates cultural and social obstacles for countries like Egypt to successfully transfer IT, and to develop and manage IT applications (e.g., Straub et al., 2002, 2001; Jayasuriya, 1999; Dasgupta et al., 1999; Hill et al., 1998).

Further, prior research on systems effectiveness has traditionally focused on developing and testing frameworks and models in Western organizations, with little consideration given to the extension and application of these frameworks and models to IS management in developing countries (Dasgupta et al., 1999). The disparity in the IT development level between developed and developing countries may cause the large part of the literature on systems effectiveness, which is based on experiences from developed countries, to be of limited relevance to IS management in Egyptian organizations.

There is a need to analyze and understand organizational, environmental, and cultural issues in adopting models, processes, and procedures used elsewhere when managing IS in developing countries (e.g., Jayasuriya, 1999; Watson et al., 1997). Evidence from investigating IS effectiveness and its relevant factors in a developing country like Egypt, and from using generally acceptable measures of systems effectiveness, should advance our knowledge of systems effectiveness in a global environment, and is expected to provide Egyptian policy makers and IS managers with insights as to how they can effectively manage the inadequate IS resources in their organizations.

However, without well-defined dependent variables, much of the information systems effectiveness research becomes highly speculative (Delone & Mclean, 1992). The difficulty encountered in developing direct and objective measures to assess systems effectiveness has led researchers to adopt surrogate constructs that are more easily measurable. Different perspectives of systems effectiveness have been adopted, and varying definitions and measures have been proposed (e.g., Li, 1997; Srinvasan, 1985). Approaches that have been suggested and used to measure systems effectiveness include cost/benefit analysis, improvement in decision making, user information satisfaction, and systems usage (e.g., Garrity & Sanders, 1998).

Delone and McLean (1992) explain that using multiple measures for system effectiveness is understandable, considering information as the output of an information system or the message in a communication system. Since this expanded view of systems effectiveness was recognized, many measures have been proposed and used by IS researchers, depending on the objectives and focus of their research.

System usage and user satisfaction are the two surrogate measures of systems effectiveness that are most popular among IS researchers and practitioners. A number of investigations employed only user satisfaction as a measure of systems effectiveness (e.g., Raymond & Bergeron, 1992; Guirmaraes & Gupta, 1988; Doll & Torkzadeh, 1988;

Franz & Robey, 1986; Bailey & Pearson, 1983; Lucas, 1978; Tan & Lo, 1990). These investigations used different versions of user satisfaction measures, depending on the information systems type under investigation and the context of system use (e.g., office automation, end user computing, executive information systems, Internet-based systems).

A second group of investigations adopted only system usage to measure systems effectiveness (e.g., Igbaria, 1992; Mawhinney & Lederer, 1990; Delone, 1988; Swanson, 1987; Green & Hughes, 1986; Debrabander & Thiers, 1984; Gremillion, 1984; Raymond, 1984; Culnan, 1983; Ives, Olson, & Baroudi, 1983; Robey, 1979). A third group of investigations employed both user satisfaction and system usage as measures of systems effectiveness (e.g., Khalil & Elkordy, 1999, 1997; Raymond, 1990, 1985; Tait & Vessey, 1988; Nelson & Cheney, 1987; Ginzberg, 1981; Srinivasan, 1985; Alavi & Henderson, 1981).

Nonetheless, a number of researchers (e.g., Delone & McLean,1992; Godwin, 1992; Melone, 1990; Ginzberg, 1978) argue that user satisfaction is a preferable measure of system effectiveness, since it has a high degree of face validity, and reliable and valid instruments for its measurement do exist. System usage is only an appropriate measure of effectiveness when usage is voluntary (e.g., Ives, Olson, & Baroudi, 1983).

This investigation has adopted both user information satisfaction and perceived system usage in improving decision making as the two measures of systems effectiveness. The adoption of these two measures should enable the comparison between the findings of this study and those of prior investigations that employed similar measures. The accumulation and comparison of findings from domestic/single country studies should enhance our understanding of IS effectiveness issues in a global environment.

RESEARCH MODEL AND HYPOTHESES
The Research Model

Organizational factors are believed to affect systems effectiveness (Cheney & Dickson, 1982). IS literature documents a number of efforts to provide a general framework that describes the potential impact of organizational factors on systems effectiveness. Further, a number of empirical investigations have established the potential influence of organizational factors (e.g., organizational size, degree of centralization, formalization, sufficiency of financial resources, top management support, user involvement, user training, IS maturity) on systems effectiveness.

However, the empirical evidence of the impact of the organizational factors on systems effectiveness is inconclusive (Yadav, 1985). As mentioned earlier, empirical evidence obtained from Western settings cannot necessarily be generalized to other countries where the social, economical, and cultural characteristics can be fundamentally different (Aharoni & Burton, 1994; Rosenzweig, 1994; Deans et al., 1991; Khalil & Elkordy, 1999, 1997).

To strengthen the external validity of Western evidence, especially its international dimension (Aharoni & Burton, 1994), it is imperative to reinvestigate these relationships in a different socio-economic and managerial environment than that of the previous studies. In addition, the investigation of these relationships has a particular importance

in Egypt where the business environment is characterized by certain organizational practices and management style deficiencies such as centralization, bureaucracy, and limitations of financial resources. These organizational constraints might impede the appropriate climate to implement and use systems effectively.

Delone & Mclean (1989) recommend that the relevance of the variables to be included in a model depends on the objective of the study, the organizational context, and the aspect of IS addressed by the study. For the purpose of this study, three organizational factors—namely, top management support, user involvement, and IS maturity—and their possible influence on systems effectiveness are investigated. In addition, a number of situational and demographic characteristics of users are included in the research model as contingency variables. These factors and their hypothesized relationships to systems effectiveness are depicted in the research model (Figure 1).

The organizational variables of top management support, user involvement, and IS maturity are chosen in light of IS theoretical frameworks and prior research models and findings. Although these variables are believed to directly and/or indirectly influence systems effectiveness, the empirical evidence is either generally inconclusive or unavail- able from developing countries like Egypt. As such, future research models on systems effectiveness were recommended to further investigate these organizational factors (e.g., Millet & Mawhinney; 1992; Taylor & Todd; 1995; Igbaria et al., 1997).

The nine external/organizational, personal/situational, and system characteristics are included as contingency variables in the research model because IS literature

Figure 1: Research Model.
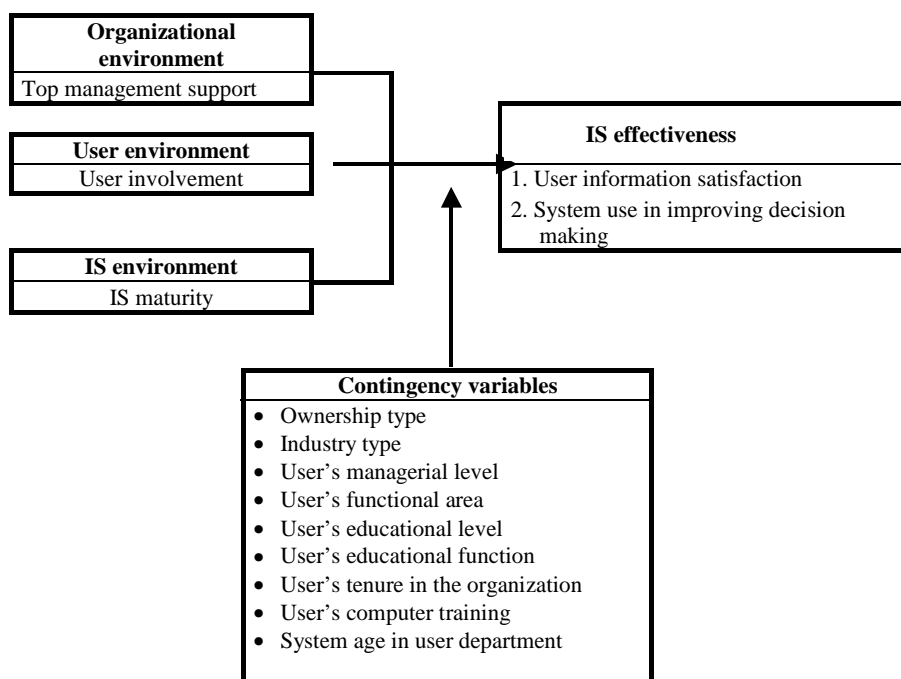
proposes they can possibly intervene in the relationship between the three organizational variables and systems effectiveness:

1. *External/organizational:* ownership type (private vs. public) (e.g., Raymond, 1990; Franz & Robey, 1986; Bretschneider, 1990; Robertson & Senevirante, 1995; Bretschneider & Wittmer, 1993) and industry type (e.g., Ives, Hamilton & Davis, 1981).
2. *Personal/situational:* user's managerial level, functional area, educational level, educational background, tenure in the organization, and computer training (e.g., Amoroso & Cheney, 1991; Igbaria et al., 1995; Cronan & Douglas, 1990; Sanders & Courtney, 1985; Fuerst & Cheney, 1982; Khalil & Elkordy, 1997).
3. *System:* system age in user department (Lee & Kim, 1992; Fuerst & Cheney, 1982).

RESEARCH HYPOTHESES
Top Management Support and Systems Effectiveness

There is a general agreement in IS literature that greater top management support for a system will lead to greater system effectiveness (Yap, Soh, & Roman, 1992; Lee & Kim, 1992; Magal & Carr, 1988; Markus, 1981). Top management support includes adoption of a broad IS vision and leadership, alignment of IS strategies with business strategies, allocation of organizational resources to support its IS vision and communication of its commitment to all members of the organization. Cultural acceptance of systems in an organization cannot be attained without the top management's political clout (Abdul-Gader, 1999, p. 100).

Top management support has been proposed as an important determinant of systems effectiveness in a number of studies (e.g., Furest & Cheney, 1982; Igbaria, 1992, 1993; Doll, 1985; Robey & Zeller, 1978; Ein-Dor & Segev, 1978; Lee & Kim, 1992; Rockart & Crescenzi, 1984). However, these studies exhibited mixed results. Some showed a positive relationship with systems effectiveness (e.g., Garrity, 1983; Igbaria, 1992, 1993; Yap, Soh, & Roman, 1992), while others indicated a negative relationship with systems effectiveness (e.g., Fuerst & Cheney, 1982).

Further, top managers in developing countries are expected to play a far more proactive and critical role than in a developed country in order to ensure a smooth and successful system implementation (Jain, 1995). Perez (1980) stresses the lack of top management awareness of systems impact on organizational processes as a barrier to systems diffusion in developing countries (p.69). In addition, the empirical evidence from Arab countries, i.e., Arab Gulf Countries (AGC), suggests that systems effectiveness is likely to depend on top management support (Abdul-Gader, 1990).

Further, compared to Westerners, Arabs, including Egyptians, demonstrate more power distance (reflected in high centralization and autocratic leadership) and more uncertainty avoidance (manifested in high formalization and low tolerance to ambiguity) (Hofstede, 1980; Kassem & Al-Modaifer, 1987; Bjerke & Al-Meer, 1993). Most Arab organizations (public or private) are highly centralized and adopt an authoritative structure, regardless of corporate strategy or technology (Ali, 1990). As such, one can expect top management support to be particularly important to systems effectiveness, since resources allocation decisions, including IT investment decisions, are very much

centralized in a culture that promotes uncertainty avoidance and obedience of rules.

The relationship between top management support and system effectiveness was investigated by testing the following two hypotheses:

H1: The higher the level of top management support, the higher the level of user information satisfaction.
H2: The higher the level of top management support, the higher the level of system use in improving decision making.

User Involvement

User involvement refers to the participation in the system development process by the representatives of the target user group (Ives & Olson, 1984). Barki and Hartwick (1994) argued for a distinction between user participation and user involvement. They defined user involvement as a psychological state, which refers to the importance and personal relevance of a system to its users (Barki & Hartwick, 1994) rather than a set of activities or operations users perform (user participation) in the system development process. This investigation views user involvement as a set of activities or operations users perform in different stages of systems development, the most commonly adopted view in prior IS empirical studies (e.g., Olson & Ives, 1981; Franz & Robey, 1986; Tait & Vessey, 1988; Gyampah & White, 1993; Torkzadeh & Doll, 1994).

User involvement is broadly accepted as one of the essential activities in the system development lifecycle (Gyampah & White, 1993), and participation may lead to user acceptance of the system (Torkzadeh & Doll, 1994). Models of user involvement and its impact on systems effectiveness hypothesize that user involvement leads to an increase in both user satisfaction and system usage (Baroudi, Olson & Ives, 1986). Presumably, involvement will help users develop better tailoring to their specific needs, therefore becoming more inclined to use the system, resulting in higher satisfaction with it.

However, the empirical evidence does not consistently support these general normative arguments (Franz & Robey, 1986). While a number of studies reported a significant positive relationship between user involvement and user information satisfaction (e.g., Robey & Rodriguez-Diaz; Gallagher, 1974; Maish, 1979; Swanson, 1974), others found only mixed evidence (e.g., Edstrom, 1977; Power & Dickson, 1973). Baroudi, Olson, and Ives (1986), in their review of studies on the effect of user involvement on system effectiveness, reported six studies investigating the link between user involvement and system usage. Three studies found no relationship, and three found mixed support. They reported also that the evidence is mixed regarding the relationship between user involvement and user information satisfaction.

On the other hand, lack of user involvement in systems development was found to be a major reason for user resistance in an Indian setting (Madon, 1992), and to be a reason for the unsuccessful implementation of a computer application in a multinational company in a Latin American country (Roby et al., 1990). Also, low top management involvement in systems development projects is reported as a barrier to systems diffusion in Arab Gulf Countries (Abdul-Gader, 1999, p. 66).

In an Egyptian culture where there is a tendency to centralization and autocratic leadership, a participative systems development approach such as has been practiced in the Western organizations may not be desirable. Users tend to expect an authoritative

management style from project developers (Kassem & Habib, 1989, p. 18). Users may even view systems developers' quest for users participation as signs of weakness. However, when asked by their authoritative senior managers to participate in systems development, users are expected to take participation seriously and get involved. Further research is needed to test the validity of involving users in systems development in such a culture (Abdul-Gader, 1999, p. 148).

The inconsistent empirical evidence available from Western settings and the inconclusive evidence available from developing countries on user involvement and systems effectiveness (e.g., Khalil & Elkordy, 1999, 1997) call for further investigation of the relationship between user involvement and systems effectiveness. Also, Taylor and Todd (1995) and Igbaria et al. (1997) recommended the inclusion of user involvement in future IT use models. Therefore, the relationship between user involvement and system effectiveness was investigated by testing the following two hypotheses:

H3: The higher the level of user involvement, the higher the level of user information satisfaction.
H4: The higher the level of user involvement, the higher the level of system use in improving decision making.

IS Maturity

IS maturity refers to the overall status of the IS function within its growth process (Li, Rogers & Chang, 1994). Since the IS function in an organization determines the strategies, policies, and technologies that basically condition the use of systems, one assumes that greater systems effectiveness will result from increasing the maturity of the IS function (Raymond, 1990; Mahmood & Backer, 1985). Historically, early discussion of IS maturity came from Nolan (1973, 1979), who proposed a stage model of the assimilation of IT in organizations (e.g., Hallady, 1981, p. 31-32).

A number of investigations attempted to validate the stage model as a predictor of the level of IS maturity in a particular organization (e.g., Benbasat et al., 1984; Drury, 1983; Goldstein & McCririck , 1981; King & Kraemer, 1984; Lucas & Sutton, 1977). The findings of such investigations have led to some doubt about the validity of the stage hypothesis as an explanatory construct for the growth of computing in organizations. However, the available evidence does not entirely reject the stage hypothesis, due to the criticism that researchers have failed to properly operationalize the stage model. This issue was addressed by Li, Rogers and Chang (1994), who developed and tested an instrument that reliably and validly measures IS sophistication.

A few investigations, however, adopted the stage model and tested hypotheses that correlated IS maturity to systems effectiveness measures (e.g., Grover & Teng, 1992; King & Sabherwal, 1992; Raymond, 1990; Mahmood & Becker, 1985; Benbasat, Dexter, & Mantha, 1980; Cheney & Dickson, 1982). Since IS maturity is not a static concept in a young and dynamic field such as IS, researchers are expected to continue operationalizing the IS maturity construct and test its relationship to systems effectiveness. This is particularly important to the developing countries where IT diffusion lags and the adoption processes are more problematic, as compared to developed countries.

Empirical evidence from developing countries such as the Arab Gulf Countries suggests that lack of appropriate IS planning, low top management involvement in IS

projects, problems with formal budgeting process, insufficient IS management skills and experience, insufficient IT knowledge among top and middle management, and weak relationship between top management and IS management are important barriers to IT diffusion and systems use in these countries (Abdul-Gader, 1999, p. 84). The existence of these characteristics can also be considered a sign of relatively low levels of IS maturity in these countries, given the IS maturity dimensions used in its measuring instruments such as in that of King and Sabherwal (1992). Therefore, one can anticipate higher levels of IS maturity in countries like Egypt to signal less barriers to systems diffusion and to associate with higher levels of systems effectiveness.

Given that only few studies investigated IS maturity and its relationship with systems effectiveness, IS researchers (e.g., Igbaria et al., 1997; Taylor & Todd, 1995; Millet & Mawhinney; 1992) recommended that future studies should consider the influence of IS maturity on the individual use of IT. This investigation expands this line of research into Egypt as a developing country. Generally, IS functions in developing countries, like Egypt, possibly have reached a maturation level that is lower than the maturation level of their counterparts in the developed countries. This is simply because of the disparity in IT sophistication, skilled IT professionals, established IS policies and procedures, and accumulated experience with systems planning and implementations.

The relationship between IS maturity and system effectiveness was investigated by testing the following two hypotheses:

H5: The higher the level of IS maturity, the higher the level of user information satisfaction.
H6: The higher the level of IS maturity, the higher the level of system use in improving decision making.

No a-priori hypotheses were stated for the relationships involving the nine contingency variables in the research model.

METHODOLOGY
Research Variables Definitions and Measures
System Effectiveness (the Dependent Variables)

System effectiveness is defined as the extent to which the system supports the organization in achieving its goals. Two measures of systems effectiveness were adopted: user information satisfaction and system use in improving decision making.

1. *User information satisfaction:* Defined as the extent to which users believe that the system available to them meets their information requirements (Ives, Olson, & Barodui, 1983). To measure user information satisfaction, the short-form (13-item) measure of user satisfaction designed by Baroudi and Orlikwaski (1988) was used.
2. *System use in improving decision making:* Defined as the extent to which users believe the system available to them leads to improvement in decision making. System use in improving decision making was measured using the 7-item scale developed by Sanders and Courtney (1985).

The Organizational Variables (the Independent Variables)

The three independent variables included in this investigation are: top management support, user involvement, and IS maturity.

1. *Top management support:* Defined as the extent to which the upper managerial levels provide an appropriate amount of support for IS. This variable was measured using the 6-items scale of Lee and Kim (1992).
2. *User involvement:* Defined as the extent to which users (i.e., managers) participate in the design, development, implementation, and operation of the system. This variable was measured using the 7-item scale of Franz and Robey (1986).
3. *IS maturity:* defined as the overall status of the IS function within the organization. This variable was measured using the 10-item scale of King and Sabherwal (1992).

The Contingency Variables

The following nine variables are believed to affect the relationship between the three organizational variables and the two systems effectiveness variables (user information satisfaction and system use in improving decision making):

1. Ownership type (public vs. private)
2. Industry type (chemicals, textiles, electronics, etc.)
3. User's managerial level (top, middle, or lower manager)
4. User's functional area (accounting, finance, marketing, operations, etc.)
5. User's educational level (graduate, undergraduate, high school)
6. User's educational background (business, engineering, science, law, etc.)
7. User's tenure in the organization (years)
8. User's formal computer training (received or did not receive formal computer training)
9. System age in user department (years)

SAMPLING

This investigation focused on manufacturing companies as the primary population. Public and private manufacturing companies play a significant role in the Egyptian economy. The privatization and reform of the public sector in Egypt in 1991 has resulted in increased competition in the Egyptian market. Effective implementation of information systems should improve organizational productivity, since better information use is expected to lead to better decision making.

A preliminary investigation of manufacturing companies in Alexandria was conducted to gather information on the overall status of computer-based applications in these populations. The findings of the preliminary investigation indicated that most computer-based information systems applications were management information systems (MIS) that included transaction processing systems (TPS) and information reporting systems (IRS) capabilities. PC-based applications and Internet-based applications were sparsely used with different levels of coverage and sophistication across functional areas and companies and, therefore, were excluded from this investigation.

To achieve homogeneity in the sample, the systems under investigation had to be multi-user systems that were fully operational for at least two years. The sampling frame included all manufacturing companies in the public and private sectors located in the greater areas of Cairo and Alexandria. Companies included in the sampling frame consisted of textile, chemical, and electronic industries.

Selected respondents had to hold managerial positions for a minimum of two years to ensure they had enough experience with the systems that were evaluated. Departments included in the study represent a wide range of functional areas (e.g., finance, accounting, marketing, production, human resources). The sample contained data from 42 companies, and 214 user managers participated in the study. Table 1 presents the distribution of the sample according to manufacturing sector and ownership type.

DATA COLLECTION

A questionnaire was designed (in Arabic) to gather perceptual data on the study variables from the managers. Forty-three questions were used to gather data on top management support, IS maturity, user involvement, user information satisfaction, and system use in improving decision making. These five variables were measured using 5-point measuring scales. In addition, eleven questions were used to gather general information as well as data on the nine contingency variables. Overall, the instrument included 54 items arranged in six major sections. The questionnaire includes scales that were adopted in earlier studies and considered to have high content validity (Yap, Soh, & Raman, 1992). Earlier versions of the instrument were piloted, using a number of faculty members and MBA students at Alexandria University, Egypt, and revised before the final version was formulated.

Data was collected from the participating managers using the directed interview method. To maintain consistency, only one of the researchers took the responsibility of scheduling and conducting the interviews at the managers' sites. In each interview, the researcher helped clarify any misunderstandings that the manager had while responding to the questionnaire. Due to the data collection method employed in this study and the difficulties encountered in scheduling and rescheduling the interviews, the data collection phase lasted approximately 20 months and was completed late 1999.

The reliability of the multi-item scale in this questionnaire was determined by using the Cronbach alpha test, which measures internal consistency (Table 2). The overall

Table 1: Distribution of the Sampled Companies According to Industry Type and Ownership Type.

Manufacturing sector	Public sector		Private sector		Total	
	No. of firms	%	No. of firms	%	No. of firms	%
• Textiles	9	39.13	7	36.84	16	38.10
• Chemicals	8	34.78	5	26.32	13	30.95
• Electronics	6	26.09	7	36.84	13	30.95
Total	**23**	**100**	**19**	**100**	**42**	**100**

Table 2: Internal Reliability of the Questionnaire Items.

Variable name	Number of items	Alpha reliability
User information satisfaction	13	.93
System use in improving decision making	7	.90
Top management support	6	.88
IS maturity	10	.92
User involvement	7	.88
Overall	43	.95

alpha level for the instrument was 0.95, and it was higher than 0.80 for each variable, which is the recommended minimum acceptable level for reliability in basic research (Ives & Olson, 1984).

RESULTS

Descriptive Statistics

Frequencies and percentages were calculated to summarize the nine contingency variables, including the situational and demographic characteristics of the respondents (Table 3). While 115 (53.7%) of the 214 responding users were from the public sector, 99 (46.3%) were from the private sector. As to the manufacturing sector, 78 (36.4%) of the respondents were in textiles, 70 (32.7%) were in chemicals, and 66 (30.8%) were in the electronics and engineering industries. Ninety three (43.5%) of the respondents were top level manages, 105 (49.1%) were middle level managers, and the remaining 16 (1.5%) were lower level managers.

With regard to the respondents' functional areas, 63 (29.4%) were from finance, 57 (26.6%) were from production, 39 (18.2%) were from sales and marketing, 22 (10.3%) were from logistics, and 33 (15.4%) were from human resources. Eight (3.7%) reported some graduate education, 166 (77.6%) held college degrees, and 40 (18.7%) had a high school or equivalent degrees. One hundred thirty eight (64.5%) of the respondents had a business background, 44 (20.6%) had an engineering background, 17 (7.9%) had a science background, and the remaining 15 (7%) were from other educational back-grounds. More than 62% of the users had tenures of eleven years or more in the companies they were working with at the time of the study, and only 53.7% of them had formal computing training. Also, more than 90% of the systems investigated were in use for eleven years or less.

Table 4 represents a summary of descriptive statistics for the variables in the study. The respondents (managers) generally agreed upon the existence of a relatively high level of top management support for IS, and on the existence of an average to high level

Table 3: The Contingency Variables (user's situational and demographic characteristics).

Respondents' Characteristics	The Overall Sample	
	Freq.	%
Ownership Type:		
Public	115	53.7
Private	99	46.3
Total	**214**	**100**
Industry Type:		
Textiles	87	39.0
Chemical	70	31.4
Electronics & Engineering	66	29.6
Total	**223**	**100**
Managerial Level:		
Top management	93	43.4
Middle management	105	49.1
Lower management	16	7.5
Total	**214**	**100**
Functional Area:		
Finance	63	29.4
Production	57	26.6
Sales & marketing	39	18.2
Human resources	33	15.5
Logistics	22	10.3
Total	**214**	**100**
Educational Level:		
Graduate	8	3.7
Undergraduate	166	77.6
High school	40	18.7
Total	**214**	**100**
Educational Background:	138	64.5
Business	44	20.6
Engineering	17	7.9
Science	4	1.9
Law	5	2.3
Arts	6	2.8
Others		
Total	**214**	**100**

of both user involvement and systems maturity in their companies. Also, the respondents indicated a rather high level of information satisfaction and a high level of system use in improving decision making as the two measures of systems effectiveness.

Hypotheses Testing

The research hypotheses were tested using Pearson's correlation and simple regression analysis. Table 5 shows a summary of the hypotheses testing results. As to *H1*, the analysis revealed a significantly positive correlation between top management support and user information satisfaction ($r = .33$, $P < .001$). This finding supports the acceptance of *H1*, indicating that the greater the top management support, the greater the user information satisfaction. Top management support explained 11% of the variance in user information satisfaction ($F = 27.26$, $P < .001$).

With regard to *H2*, the analysis revealed a significant and positive correlation between top management support and system use in improving decision making ($r = .35$, $P < .001$). This finding supports the acceptance of *H2*, which means the greater the top management support, the greater the improvement in decision making through the use of information systems. Top management support explained 12% of the variance in system use in improving decision making ($F = 30.45$ and $P < .001$).

The testing of *H3* shows a significant and positive correlation between user involvement and user information satisfaction ($r = .37$ and $P < .001$). This finding supports the acceptance of *H3*, which

Table 3. Continued

Respondents' Characteristics	The Overall Sample	
	Freq.	%
Tenure in the Organization:		
1-5 years	36	16.8
6-10	44	20.6
11-15	25	11.7
16-20	17	7.9
21-25	21	9.8
26-30	22	10.3
31-35	44	20.6
36-40	5	2.3
Total	**214**	**100**
Computer Training:		
Yes	115	53.7
No	99	46.3
Total	**214**	**100**
System Age in User Departments:		
1-3 years	55	25.7
4-7	99	46.3
8-11	40	18.7
12-15	12	5.6
16-18	3	1.4
19-22	5	2.3
Total	**214**	**100**

means the greater the user involvement in the definition, design, and implementation of a system, the greater the user information satisfaction. User involvement explained 13% of the variance in user information satisfaction (F = 34.44 and *P < .001*).

Testing of H4 revealed a significant and positive correlation between user involvement in the definition, design, and implementation of a system, and system use in improving decision making (r = .34, *P < .001*). This finding supports the acceptance of *H4*. The greater the users' involvement in the definition, design, and implementation of a system, the greater the use of the system in improving decision making. User involvement explained 12% of the variance in systems use in improving decision making (F = 29.53, *P < .001*).

As for IS maturity, the testing of *H5* indicated a significant and positive correlation between IS maturity and user information satisfaction (r = .58, *P <.001*). This finding supports the acceptance of *H5*, which means the greater the maturity of IS, the greater the users' information satisfaction. IS maturity explained 33% of the variance in user information satisfaction (F = 107.57, *P < .001*).

The results of *H6* testing show a significant and positive correlation between IS maturity and system use in improving decision making (r = .44, *P <.001*). This finding supports the acceptance of *H6*, which means the greater the maturity of IS, the greater the use of systems in improving decision making. Also, IS maturity explained 19% of the variance in systems use in improving decision making (F = 51.05, *P < .001*).

To further examine the importance of the three independent variables as predictors of system effectiveness, a stepwise multiple regression analysis was performed. The stepwise multiple regress analysis was used because of the lack of a well-defined predictive model of systems effectiveness. The results of the final step of the analysis are shown in Table 6.

From Table 6, the variables in the regression equation (IS maturity and user involvement) cumulatively explained .35 and .22 of the variance in user information satisfaction and system use in improving decision making, respectively. The incremental

Table 4: Descriptive Statistics for the Research Variables.

Research Variables	Mean	Standard Deviation	Minimum	Maximum
Top management support	4.23	.62	1.67	5
IS maturity	3.62	.74	1.70	5
User involvement	3.60	.82	1.00	5
System use in improving decision making	4.04	.66	1.00	5
User information satisfaction	4.01	.60	1.31	5

contributions (r^2) of IS maturity in explaining the variance in user information satisfaction and system use in improving decision making are .33 and .19, respectively. However, only .02 of the variance in user information satisfaction and .03 of the variance in system use in improving decision making are explained respectively by user involvement.

The research model in Figure 1 implies that the effect of top management support, user involvement, and IS maturity on system effectiveness could be contingent upon factors such as system age in user department, user's functional area, user's tenure in

Table 5: Results of Hypotheses Testing Using Pearson's Correlation and Simple Regression Analysis.

Hypotheses	Independent Variable	Dependent Variable	R	R²	F
H1	Top management support	User information satisfaction	.33***	.11***	27.26
H2	Top management support	System use in improving decision making	.35***	.12***	30.45
H3	User involvement	User information satisfaction	.37***	.13***	34.44
H4	User involvement	System use in improving decision making	.34***	.12***	29.53
H5	IS maturity	User information satisfaction	.58***	.33***	107.57
H6	IS maturity	System use in improving decision making	.44***	.19***	51.07

Table 6: Stepwise Multiple Regression Analysis: The Predictors of System Effectiveness.

Dependent Variables	User Information Satisfaction		System Use in Improving Decision Making	
Predictor Variables	R	Δr^2	R	Δr^2
IS maturity	.58	.33***	.44	.19***
User involvement	.59	.02***	.47	.03***
r^2		.35***		.22***

*n = 214   *** P < .001*

the organization, user's organizational position, user's educational level, user's educational background, user's computer training, type of industry, and type of ownership.

To examine the impact of these contingency variables, an analysis of variance and covariance using the independent and contingency variables was performed (Table 7). The direct effects of the independent variables (top management support, user involvement, and IS maturity) on user information satisfaction and system use in improving decision making were significant (F = 11.369, P < .01 and F = 6.282, P < .01, respectively). However, the effect of the contingency variables was significant only on user information satisfaction. After taking these contingency variables into account, the explained variance in user information satisfaction increased by 5.751 (F = 3.002, P < .05).

User's tenure in the organization and ownership type (public vs. private) were the only two contingency variables that affected the explained variance in user information satisfaction. User's tenure in the organization explained the variance in user information satisfaction by 2.120 (F = 9.956, p < .05), and ownership type explained the variance in user information satisfaction by 1.800 (F = 8.456, p < .05). The effects of the other contingency variables on user information satisfaction were insignificant.

DISCUSSION

The hypotheses testing results suggest the acceptance of the six hypotheses proposed in this study. Top management support, user involvement, and IS maturity were found to influence system effectiveness, measured by user information satisfaction and system use in improving decision making. Although the Egyptian (Arab) cultural characteristics (i.e., power distance, uncertainty avoidance, time perspective) are likely to vary from those of most of the developed countries (i.e., USA and West European countries) (Hofstede, 1980; Kassem & Al-Modaifer, 1987; Ali, 1990; Bjerke and Al-Meer, 1993; Straub et al., 2001), our findings suggest that top management support, user involvement, and IS maturity may be universally relevant to system effectiveness.

These findings are not totally suprising, since some earlier studies reported similarities in a number of IS related issues across developed and developing countries (e.g., Dasgupta et al., 1999; Alkhatani & Meadows, 1999; Ein-Dor & Segev, 1992; Couger et al., 1990; Ropey & Rodriguez-Diaz, 1989). In a study using Indian data, Dasgupta et al. (1999) concluded, although there are differences between developed and developing

Table 7: Analysis of Variance of Independent Variables and Contingency Variables on Ssystems Effectiveness.

Source of variation	Dependent variables	Sums of squares	DF	Means squares	F
Main effects (top management support, user involvement, and IS maturity)	User information satisfaction	29.046	12	2.420	11.369***
Covariates (contingency variables):		5.751	9	.639	3.002.**
1. User's functional area		.050	1	.050	.233
2. Ownership type		1.800	1	1.800	8.456**
3. User's organizational position		.209	1	.209	.981
4. User's tenure in the organization		2.120	1	2.120	9.956**
5. System age in user department		.108	1	.108	.505
6. User's educational level		.472	1	.472	2.216
7. User's educational background		.282	1	.282	1.323
8. User's formal computer training		.034	1	.034	.158
9. Industry type		.118	1	.118	.553
Main effects (top management support, user involvement, and IS maturity)	System use in improving decision making	25.146	12	2.096	6.282***
Covariates (contingency variables):		2.962	9	.329	.987
1. User's functional areas		.105	1	.105	.316
2. Ownership type		.297	1	.297	.889
3. User's organizational position		.359	1	.359	1.075
4. User's tenure in the organization		.022	1	.022	.066
5. System age in user department		.173	1	.173	.517
6. User's educational level		.657	1	.657	1.969
7. User's educational background		.579	1	.579	1.736
8. User's formal computer training		.194	1	.194	.582
9. Industry type		.184	1	.184	.552

countries, the factors that influence IT adoption were found to be similar. Alkahtani and Meadows (1999) found similarities between computer-based activities in Saudi Arabia and the UK. Ein-Dor and Segev (1992) found motivation for end-user computing to be of the same magnitude and identically ranked in Israel and the USA. Also, Couger et al. (1990) found motivation factors for programmers and systems analysts to be ranked similarly in Australia, Israel, Singapore, and the USA.

Further, our findings echo one of the generalizations made by Ein-Dor et al. (1993) upon review of the literature on national culture and its implications for international information systems. They concluded, cultural differences seem to have "…a greater impact on the technical and procedural aspects of IS while the behavioral aspects exhibiting greater similarity" (p. 41). Since the findings of this investigation associate with behavioral variables (top management support, user involvement, perceived IS maturity, user satisfaction, and systems use in improving decision making), they appear to transcend the cultural differences between Egypt and the other environments.

The top management support average score is relatively high (4.23), which suggests a high level of support for IS in the sampled Egyptian companies (Table 4). This finding, however, should be carefully interpreted, since top management representation in the sample is approximately 44%. Our sample drew heavily from the top management population, compared to the middle and lower management populations (Table 3). Consequently, the sample may have predisposed the findings for top management support.

Top management support was found to positively associate with the two systems effectiveness measures (user information satisfaction and system use in improving decision making), although it was excluded as a predictor for systems effectiveness in the stepwise regression analysis (Table 6). Since the variance in user information satisfaction and in system use in improving decision making is completely explained by only IS maturity and user involvement, top management support became redundant as a predictor of systems effectiveness.

This redundancy is caused by the multicollinearity that exists among the three independent variables. Top management support has significant relationships with IS maturity ($r = .61$, $p < .01$) and with user involvement ($r = .26$, $p < .01$), and IS maturity has a significant relationship with user involvement ($r = .46$, $p < .01$). As Hair et al. (1998, p.161) explains, regression results must be interpreted carefully since relationships among independent variables "mask" relationships that are not needed for predictive purposes but nevertheless present key findings (i.e., the strong relationships found between top management support and the two measures of systems effectiveness).

The importance of top management support as a determinant of systems effectiveness in the Egyptian companies has been confirmed. The perception of top management support for IS creates user interest and facilitates systems use by indicating 'goal congruence' between organizational tasks and systems use. The results are in agreement with those of many other Western-based studies such as Lucas (1978), Maish (1979), Sanders and Courtney (1985), Jobber and Watts (1981), Raymond (1984), Yap, Soh, and Roman (1992), and Igbaria (1992). However, this finding is in disagreement with those of Fuerst and Cheney (1982), who found top management support to be negatively associated with system success. The users in Fuerst and Cheney's (1982) study, however, were from lower and operational control positions, who rated accuracy and training to be more important than attention and contact with top management.

In particular, the findings of this investigation confirm similar findings from prior research in other developing countries such as Taiwan (e.g., Igbaria, 1992) and South Korea (Lee & Kim, 1992) where top management support was found to positively associate with systems adoption and use. Hence, this study provides additional evidence on the importance of top management support to systems effectiveness in developing countries like Egypt. As such, top management support is influential in helping users utilize information systems and develop a wider selection of the different types of software tools potentially useful in their jobs.

Likewise in Western companies, top management support in Egyptian companies appears to be essential for establishing appropriate IS goals, identifying critical business information needs and allocating sufficient financial resources to achieve such goals (Yap, Soh, & Roman, 1992). Top management buy-in and championship is essential to successful introduction and utilization of new IT in a patriarchal, tribal, and communal society like the Arab (Egyptian) culture (Straub et al., 2001). The guidance provided by top level management plays an important role in improving IS management because top-level management possesses a clear understanding of the organization's mission and goals. In addition, top management support is particularly important in Egyptian companies, where resources—including IS resources—allocation decisions are centrally made, and where lower level managers often look for top managers' directions and approval.

Also, the findings of this investigation confirm the importance of user (manager) involvement in systems development as a determinant of systems effectiveness in Egyptian companies. A significant positive relationship between user involvement and system effectiveness as measured by user information satisfaction and system use in improving decision making was found. They are consistent with those of the Western-based studies of Swanson (1974), Gyampah and White (1993), Tait and Vessey (1988), Baroudi, Olson, and Ives (1986), Guirmaraes, Igbaria, and Lu (1992), and Franz and Robey (1986). Also, our findings are in agreement with those of Robey and Rodriguez-Diaz's (1989) study of Latin America and Sircar and Rao's (1986) study of Singapore. However, our findings are in disagreement with those of Lucas (1975), which showed no significant relationship between user involvement and systems effectiveness, as well as those of Fuerst and Cheney (1982), which indicated that user involvement had a negative correlation with systems use.

Although the respondents in the present study and the previous studies were employed in a variety of manufacturing organizations and held managerial positions in a wide range of functional areas, the primary difference between the present study and most of the previous ones is that user involvement was often referred to as a strict dichotomy between involvement and non-involvement (e.g., Maish, 1979; Tait & Vessey, 1988). In this investigation, user involvement was treated as a multi-dimensional construct, since the frequent use of a single item measurement approach seriously hinders the utilization of user involvement as a plausible construct for explaining systems effectiveness variance. Single item scales do not provide for sufficient content domain sampling of complex construct and are generally unreliable due to the difficulty with their internal consistency coefficients calculations (Klenke, 1992).

The results suggest that users who got involved in the development activities of a system seemed to exhibit greater positive behavior toward the system, which, in turn, increased their information satisfaction. It may be implied that users who held more

beliefs concerning systems importance and relevance to their work were likely to have higher perceptions of the usefulness of using the systems in performing their jobs. Further, active participation by Egyptian managers in systems development is likely to develop beliefs that the systems are important and relevant, which, in turn, would influence their use of the systems in improving decision making and increase their level of information satisfaction. Their participation in systems development provides them with an accurate assessment of their information needs and helps them avoid the development of unnecessary features and, thus, creates higher perception of the systems' quality, which in turn promotes higher levels of systems utilization and users' satisfaction.

As to IS maturity, the results of this investigation suggest IS maturity as a strong determinant of systems effectiveness in Egyptian companies. IS maturity was found to have a positive relationship with systems effectiveness, measured by user information satisfaction and system use in improving decision making. Our findings are consistent with the findings of a few prior studies which investigated the relationship between IS maturity and systems effectiveness in Western settings, including Cheney and Dickson's (1982), King and Sabherwal's (1992), Mahmood and Becker's (1985), and Raymond's (1990). The scarcity of empirical evidence related to such relationships and the strong influence of IS maturity on systems effectiveness in the investigated Egyptian companies detected in this study, emphasizes the importance of taking into consideration the organizational context in which systems are introduced and adopted.

As measured in this investigation, IS maturity illustrates the overall status of the IS functions within the sampled companies. Since the IS function in an organization determines the strategies, policies, and technologies that basically condition the use of IT applications, one expects greater systems effectiveness to result from increasing IS maturity (Raymond, 1990). The findings of this investigation suggest that an IS function's ability to design and develop increasingly effective systems depends on its organizational maturity within the investigated Egyptian companies.

IS maturity was also found to be a strong predictor of systems effectiveness in the investigated Egyptian companies. It was found to have a mean of 3.62 and a standard deviation of .74 on a 5-point scale, which reflects an intermediate degree of maturity (Table 4). Further, IS maturity explained 33% of the variance in user information satisfaction and 19% of the variance in systems use in improving decision making (Table 6). These findings should contribute to our understanding of the impact of IS maturity on the individual utilization of IT applications in Egypt.

On the other hand, the contingency analysis suggests IS maturity to have a stronger relationship with user information satisfaction in the public sector ($r = .59$, $p < .001$) than with user information satisfaction in the private sector ($r = .57$, $p < .001$). In Egypt, IS functions in the public sector companies are generally more mature than their counterparts in the private sector. Organizational literature suggests a relationship between organizational size and administration innovation, and IS maturity is a subset of such innovation (Lehman, 1985). Compared to private companies, Egyptian public companies are larger, adopted IT applications earlier, and have had more experience with information systems practices and procedures. In fact, the Egyptian private sector has only started to grow and play a serious role in the Egyptian economy after the privatization initiative that started in 1991.

Further, IS organizational units in the Egyptian public sector were found to be generally located at a relatively higher level in the organization, of bigger size, more resourceful, and to use more formal planning and control processes and procedures, compared to their counterparts in the private sector. Therefore, companies in the public sector appear to provide a more compatible environment for effective development and utilization of information systems, and their IS functions appear to attain a higher level of maturity and effectiveness, compared to the private companies.

Finally, the effects of the contingency variables in this study were significant only for user's tenure in the organization and ownership type (public or private). User's tenure in the organization and type of company ownership were found to affect the explained variance in only user information satisfaction as a measure of systems effectiveness. These findings are logical.

Turnover rates among Egyptian managers are relatively low, especially among those who work for the government and the public sector. User's tenure in an organization is expected to help improve their perceptions of the impact of a system on their jobs and responsibilities as well as on their beliefs about management efforts to support the system, to involve users in different phases of systems development, and to make IS mature enough to meet the business needs. The greater the user's tenure, the greater his/her understanding of the critical factors that affect system effectiveness.

The other contingency variable that was found to be significant is ownership type (private or public). The nature of ownership plays a significant role as a contingency variable in explaining systems effectiveness, measured by user information satisfaction, in the Egyptian companies. This is due to the managerial practices, managerial climate, and management systems that are different in the private sector and the public sector (e.g., Bretschneider & Wittmer, 1993; Margetts & Willcocks, 1994). Also, public and private organizations differ in their propensity towards IT assimilation (Aggarwal & Mirani, 1999; Bretschneider & Wittmer, 1993), in their respective capacity to manage IT effectively, and in their IS characteristics (e.g., Thong & Yap, 200; Bretschneider, 1990).

CONCLUSIONS AND IMPLICATIONS

The hypothesized relationships between the organizational variables and systems effectiveness in the research model of the study have been empirically supported. The findings of this study substantiate the existence of relationships between the three organizational variables, namely top management support, user involvement, and IS maturity, and systems effectiveness in Egypt as a developing country.

The evidence provided by this study came from an environment that is socially, economically, and culturally different from the Western environment where most of the prior systems effectiveness research evidence came from. The findings of this investigation suggest that the effects of top management support, user involvement in systems development, and the maturity of the IS function appear to transcend the cultural, social, and economical differences between Egypt and the Western countries. In other words, the three variables investigated in this study appear to be universally relevant to systems effectiveness.

The relevancy of top management support, involvement, and IS maturity to systems effectiveness in Egyptian companies was found to be particularly strong. These findings

have implications for global information systems (GIS) theory and practice. They provide some empirical evidence on the external and international validity of the findings of the similar Western-based studies, which, in turn, add to the efforts toward building a general theory of GIS.

Yet, the relative magnitudes of the effects of variables like those investigated in this study may vary in different cultures (e.g., Ein-Dor et al., 1993). Research on GIS that aims at determining the relative importance of top management, involvement, and IS maturity to systems effectiveness in different cultures should be fruitful and add to our understanding of the universality of systems effectiveness determinants. Cross-cultural research will not only substantiate the findings of our study but also will help answer important questions as to whether top management support, user involvement, and IS maturity are equally important in all cultures, the factors that condition the effect of these variables on systems effectiveness in different cultures, and the managerial actions that are likely to induce positive influence of these variables on systems effectiveness.

In addition, our findings suggest that future Egyptian-based research models should include other contingency variables such as financial resources, in an attempt to increase the explained variance in systems effectiveness in Egyptian companies. Egyptian companies, especially in the public sector, have long had financial problems and continue to have difficulties getting financial loans from banks (Hasabou et al., 1993, p.16). This financial predicament places unnecessary constraints on systems development and implementation efforts and may preclude better information systems solutions.

To further improve the explained variance in systems effectiveness in Egyptian companies, other variables may be added to the research model used in this study (Figure 1) as possible determinants of systems effectiveness, including managers' technological culturation (Straub et al., 2001), user training (Guirmaraes, Igbaria, & Lu, 1992) and the number of administrative applications (Yap, Soh, & Raman, 1992). Technological culturation is the influential experience that Egyptian managers may have had with IT advanced culture as a result of studying, working, or traveling to a technically advanced society. Such a culturation may affect managers' attitudes and beliefs toward IT benefits and adoption (Straub et al., 2001).

Also, formal computer training among Egyptian managers is relatively low, and computer-based applications are mostly transaction processing and inflexible management information systems (Khalil & Elkordy, 1997). Trained managers are expected to have a better attitude towards the systems and to have a higher usage level. Top and middle managers are also expected to have higher levels of satisfaction with systems that address a greater number of their problems.

Since systems use by managers has a positive impact on decision making (e.g., Leidner & Elam, 1994, 1995) and on organizational performance (Leidner, 1996), the results of this investigation provide global and Egyptian IS managers and systems developers with a better understanding of key factors that were found to influence systems effectiveness in Egyptian companies. Systems effectiveness in Egyptian companies can be improved by promoting top management support, improving user involvement, and enhancing IS maturity.

Top managers in developing countries, like Egypt, should play a far more proactive and critical role than in a developed country in order to ensure a smooth and successful systems implementation (Jain, 1995). The top management's leadership role in support of IS in Egyptian organizations is particularly important because of the barriers (e.g.,

organizational bureaucracy, organizational conflict, limited financial resources, lack of organizational visions, and the weakness of the management systems) surrounding the managerial practices.

The findings highlighted the importance of user involvement to systems effectiveness. Top management in Egyptian companies are required to adopt systems development policies that mandate and encourage appropriate levels of user involvement. It should also provide effective procedures (e.g., simple feedback, user liaison, representative mechanism, consensus mechanism) for users to be involved in the definition, design, and implementation phases of systems. This is important since information systems initiatives in Egyptian public companies are mostly originated at superior levels such as ministers, holding companies, or other external governmental agencies. Users need to get involved in systems development and take the initiative to explain or clarify their information needs, as well as to guide, direct, and lead the process of specifying the input and output requirements for the systems being developed or purchased.

As in other developing countries, lack of knowledge on the potential uses of new IT tools and shortage for highly skilled IT professionals are two concerns for IS management in Egypt. IS functions commonly have a shortage in skilled IS professionals and are improperly positioned in the Egyptian companies. They use centralized rather than decentralized data processing facilities, antiquated rather than up-to-date applications, and batch rather than on-line data entry. Therefore, Egyptian companies must grow beyond the early stages of computing and take advantage of the advanced IT applications. Top management should institute formal systems; promote communications among management, implementers, and users; encourage all user departments to use the existing systems; and provide for stable funding for systems development and operation activities.

In addition, national IT development initiatives are considered critical to successful IT transfer and adoption (Straub et al., 2001). Plans should be adopted and extra resources should be committed in order to grow IS maturity and capability in Egyptian companies. Policies must be formulated to influence those changeable cultural factors (e.g., GNP, national technological infrastructure, IT literacy level, employee morale, and average education level) in order to positively affect systems development and use, and enhance IS maturity in Egyptian organizations.

The Egyptian government has recently adopted a number of IT development initiatives, including increasing awareness of the importance of IT and information for social and economic development, development of skilled IT professionals, enhancing IT infrastructure, deregulation of the telecommunications industry, and the establishment of the Ministry of Communications and Information Technology (MCIT). Soon after, MCIT has started to sponsor programs to attract investments into IT related industries, encourage e-commerce and e-business initiatives, and to establish technology incubators for IT starting businesses. These IT development efforts are likely to directly and indirectly boost the Egyptian companies' capabilities to effectively adopt and utilize IT applications.

FUTURE RESEARCH

Because of the non-random sample used in this investigation, generalization of its findings to other Egyptian companies and beyond can only be cautiously made. Replication of this study that includes, measures, and investigates cultural variables— i.e., power distance (Hofstede, 1980), uncertainty avoidance distance (Hofstede, 1980), time perspective (Trompenaars, 1993), activity orientation (Kluckholn & Strodbeck, 1961)--relational orientation (Kluckholn et al., 1961) in Egypt and in other countries is needed. This is particularly important in order to provide a culturally based confirmation to the aforementioned results and to verify the universality of the variables that influence systems effectiveness.

Replication of this research could also be useful, particularly if researchers attempt to investigate the hypothesized relationships by collecting and analyzing data across functional areas, systems types, managerial levels, end users vs. IS staff, and end users vs. users' managers. Such replications would allow comparisons within and among groups as well as across the public and private sectors in Egypt and in other similar settings.

Future research models could also focus on the question of whether there are constructs, or variables, other than those studied here that affect systems effectiveness in developing countries like Egypt. The three organizational variables of this study cumulatively explained only 35% of the variance in user information satisfaction and 22% of the variance in systems use in improving decision making. Additional variables that may influence systems effectiveness should be identified, measured, and investigated in order to explain more variance in systems effectiveness in Egypt and other countries.

Also, a logical extension of this study is to focus on specific types of user involvement to determine which types and under what conditions they have the greatest influence on systems effectiveness, especially in developing countries. A contingency approach could be very useful in understanding the true nature of user involvement and systems effectiveness in Egypt and in other similar settings.

Effectiveness of e-commerce systems was not part of this study because e-commerce systems in Egypt were rather primitive and limited in scope at the time of this investigation. Since an increasing number of Egyptian companies, especially in the private and investment sectors, started to invest in Internet applications and e-commerce systems, future research may use research models similar to the one used in this study (e.g., Molla & Licker, 2001) in order to explore the possible impact of environmental, organizational, psychological, technical, and other contingency variables on the effectiveness of these Internet-based systems.

Finally, as Ein-Dor et al. (1993, p. 40) suggest, "[i]t would be necessary to make thorough comparison of findings from single country studies together with data on cultural variables and to calibrate the findings by cross-cultural studies involving several countries, including those in which the single culture studies were performed." Additional studies of systems effectiveness and its determinants in different cultures and countries are indispensable. The accumulation of such studies enables IS researchers to make comparisons and to integrate findings into existing or new frameworks that enhance our understanding of global information systems effectiveness.

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Index

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