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Three Essays on Information Technology Sourcing: A Multi-Level Perspective

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Abstract

Despite the amount of literature on the antecedents and outcomes of IT outsourcing, the vast majority of this research has focused on factors at the firm level. Environmental factors such as industry and country characteristics have received little attention. Environmental factors should be taken into account in IT outsourcing research because firms are open systems and their behaviors are significantly influenced by material-resource and institutional environments. Moreover, previous research at the firm level has not evaluated the effectiveness of IT outsourcing and insourcing in terms of how they create value for firms. To address the paucity of macro-level research in IT outsourcing as well as to augment our knowledge at the firm level, this thesis investigates IT outsourcing issues at three levels, namely, at the firm, industry, and country level. More specifically, I expand firm-level research by jointly examining the impacts of IT outsourcing and insourcing on IT-enabled organizational capabilities and firm performance (Essay #1). I also investigate the roles of industry-level factors such as munificence, dynamism, concentration, and capital intensity (Essay #2) and country-level variables such as the maturity of the IT-related legal system, generalized trust, uncertainty avoidance, Internet penetration, and the maturity of the IT outsourcing market of a country (Essay #3) in the diffusion of IT outsourcing practice.

Résumé

Malgré la présence de nombreuses études portant sur les antécédents et les impacts de l'impartition des TI, la plupart de celles-ci ne se sont penchées que sur des facteurs de niveau organisationnel. Les facteurs de niveau environnemental, tels que le type d'industrie et les caractéristiques du pays dans lequel l'impartition s'effectue, ont toutefois reçu très peu d'attention dans la littérature sur l'impartition des TI. Il est important de tenir compte de tels facteurs puisque les organisations sont des systèmes ouverts qui sont souvent influencés par des ressources matérielles de même que par leur environnement institutionnel. De plus, les études antérieures traitant des facteurs de niveau organisationnel n'ont pas évalué l'efficacité de l'impartition et/ou de l'internalisation des TI ni la façon dont ces deux activités créent de la valeur pour les organisations. Afin de pallier au manque de recherche concernant les facteurs macro qui affectent le phénomène d'impartition TI, de même que pour étendre notre connaissance générale du sujet, la présente thèse étudie les enjeux de l'impartition TI à trois niveaux, soit ceux de la firme, ceux de l'industrie et ceux du pays. Plus spécifiquement, la thèse développe la recherche effectuée au niveau organisationnel en examinant conjointement les impacts de l'impartition et de l'internalisation des TI sur les capacités clés organisationnelles et la performance de la firme (essai n°1). La thèse étudie également les rôles des facteurs du niveau de l'industrie tels que la munificence, le dynamisme de l'industrie, sa concentration et l'intensité du capital (essai n°2). Enfin, la thèse se penche également sur le rôle des caractéristiques du pays telles que la maturité du système légal propre aux TI, la confiance générale, le niveau de tolérance à l'incertitude, la pénétration d'Internet et la maturité du marché d'impartition des TI, le tout en contexte de diffusion des pratiques d'impartition TI.

Chapter I: Introduction

1. Thesis Framework

Since the landmark decision by Eastman Kodak to hand over IT functions such as its data center, microcomputer operations, and telecommunications and data networks to IBM, Businessland, and DEC, the practice of outsourcing firms' IT facilities and services to outside vendors has become increasingly popular (Dibbern et al. 2004). According to a Gartner Group report (2005), worldwide expenditure in IT outsourcing is predicted to reach $260 billion in 2009. Willcocks et al. (2006) predicted that spending on IT outsourcing will rise by at least 7% per annum over the next five years, and a recent report by KPMG showed that 89% of the customer organizations say that they plan to maintain or increase their current level of outsourcing (Preston 2007). The contractual arrangements of IT services between client firms and vendors are generally termed "IT outsourcing," which can be defined as "a significant contribution by external vendors in the physical and/or human resources associated with the entire or specific components of the IT infrastructure in the user organization" (Loh and Venkatraman 1992a). In particular, IT outsourcing may involve IT functions such as data processing services, communication and network services, facilities management services, application development services, etc. (Cullen et al. 2005).

Since IT outsourcing was recognized as one of the most pervasive organizational practices, researchers have investigated a variety of IT sourcing issues, such as the antecedents, potential risks, relationship management, service level agreements, and outcomes of IT outsourcing or insourcing (Goo et al. 2008; Hirschheim and

Lacity 2000; Kern and Willcocks 2002; Lee et al. 2004; Loh and Venkatraman 1992a; Oh et al. 2006). Dibbern et al. (2004) provided a comprehensive review of IT outsourcing literature from 1992 to 2000 and discussed the all major issues in IT outsourcing, such as why and how firms outsource IT, which IT functions are outsourced, and how IT outsourcing affects performance. In particular, two issues - the business outcomes and the antecedents of IT outsourcing – have received considerable attention, and research has provided many insights on these two issues (Dibbern et al. 2004). For example, research on the business outcomes of IT outsourcing suggests that firms can benefit from IT outsourcing if they follow the "best practices" of outsourcing, e.g., choosing the right vendor relationships, contract types, contract duration, etc. (Lacity and Willcocks 1998; Lee et al. 2004). Research on the antecedents of IT outsourcing has showed that two groups of factors can be key antecedents of IT outsourcing adoption: the attributes of IS functions and the comparative advantages of IT outsourcing (Dibbern et al. 2004).

Although the existing literature has provided certain insights into the antecedents and outcomes of IT sourcing, the vast majority of research has focused on factors at the firm level, while environmental factors such as industry and country characteristics have received little attention (Dibbern et al. 2004). However, firms are open systems and their behaviors can be significantly influenced by material-resource environments as well as institutional environments (Dess and Beard 1984; DiMaggio and Powell 1983; Scott 2003). As such, firms' IS-related behaviors also need to be understood in the context of industry and country (Chiasson and Davidson 2005; Melville et al. 2004). In order to better understand

firms' decisions related to IT outsourcing adoption, we should take into account not only its internal conditions but also environmental factors such as industry and country characteristics.

In addition, the firm-level studies that have focused on the business outcomes of IT outsourcing have not compared the benefits of IT outsourcing with the benefits of IT insourcing in terms of value creation. Joint evaluation of IT outsourcing and IT insourcing is also relevant because firms need to choose between alternative IT outsourcing mechanisms. To address the paucity of macro-level research in IT outsourcing adoption as well as to augment our knowledge of the impacts of IT outsourcing at the firm level, this thesis investigates IT outsourcing issues at three levels, namely, at the firm, industry, and country levels. The three essays contribute to the IT outsourcing literature by jointly investigating the business impacts of IT outsourcing and IT insourcing through the lens of IT-enabled organizational capabilities (Essay #1) and by identifying the roles of industry-level variables such as munificence, dynamism, concentration, and capital intensity (Essay #2) and country-level variables such as the maturity of IT-related legal system, generalized trust, uncertainty avoidance, Internet penetration, and the maturity of the IT outsourcing market (Essay #3) in the adoption of IT outsourcing. Figure 1 provides a conceptual map of the three essays.

The structure of the thesis is as follows: First, I introduce the motivation for each essay of the thesis. Chapter II (Essay #1) evaluates the benefits of IT outsourcing in relation to those of IT insourcing in order to reveal the impact of IT sourcing mechanisms on IT-enabled organizational capabilities and firm performance.

Chapter III (Essay #2) studies the effects of industrial environments on the diffusion of IT outsourcing. Then chapter IV (Essay #3) assesses the effects of country-level factors on firms' decisions regarding IT outsourcing adoption. I conclude the thesis by discussing the key findings and potential extensions for future research in Chapter V.

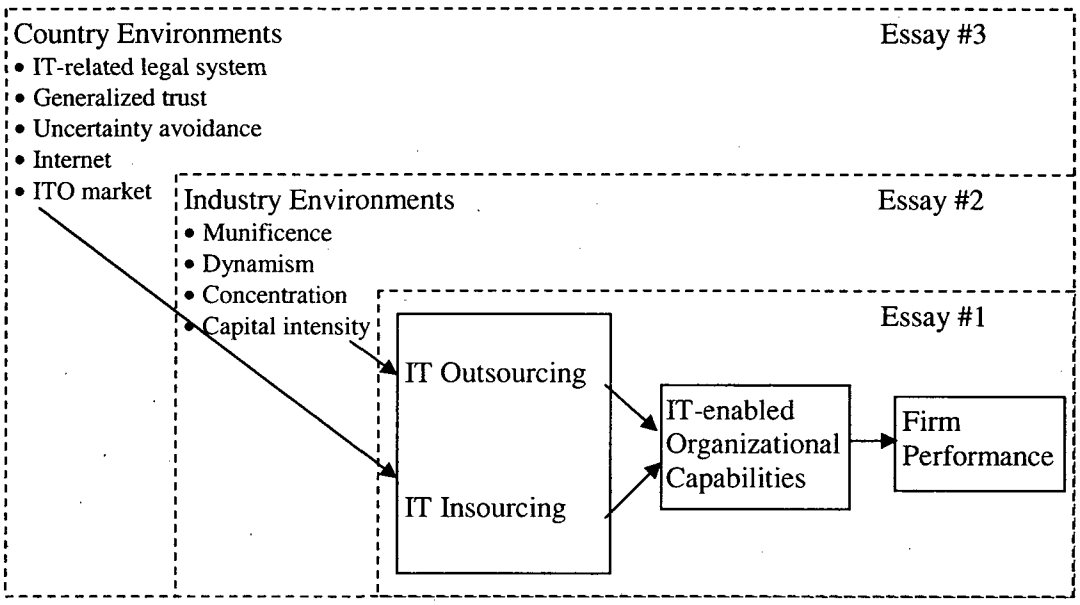


Figure 1: The Conceptual Map for the Three Essays

2. Motivations Behind the Three Essays

Essay #1: An Evaluation of IT Sourcing Mechanisms: An IT-Enabled Organizational Capability Perspective

To outsource IT or not to outsource IT? That is the question confronting today's managers. Finding an answer to this question is not easy, since counter-trends have appeared in IT outsourcing - while IT outsourcing is increasingly popular, more and more firms have brought their outsourced IT functions back in-house

(Whitten and Leidner 2006; Willcocks et al. 2006). A review of the literature on the business impacts of IT sourcing mechanisms reveals that we still lack an assessment of the effectiveness of IT insourcing and outsourcing with respect to their potentials to create firm value. Some studies have compared outsourcing and insourcing in terms of IT cost savings and found that IT insourcing can be as efficient as IT outsourcing (Hirschheim and Lacity 2000; Lacity and Hirschheim 1993; Lacity and Willcocks 1998). Though insightful, a comparison based solely on cost savings might reflect only the operational dimension of IT-related performance and provide limited implications for the strategic aspects of IT performance (Anderson et al. 2006; Bharadwaj et al. 1999).

Other studies that have investigated whether firms can benefit from IT outsourcing have found that IT outsourcing can offer various benefits if firms follow some "best practices," such as outsourcing only commoditized IT functions and partnering with IT vendors (e.g., Grover et al. 1996; Saunders et al. 1997). However, these studies typically examined outsourcing outcomes by comparing firm performance before the outsourcing with that after outsourcing, rather than comparing the performance of firms relying on IT outsourcing with that of firms relying on IT insourcing. As a result, even though these studies have shown that IT outsourcing can improve performance for some firms, we still do not know the relative advantages of IT outsourcing and IT insourcing. In order to help firms choose among alternative IT sourcing mechanisms, further research is needed to compare the benefits of IT outsourcing with those of IT insourcing.

In addition, previous studies have often suggested that IT outsourcing has advantages over insourcing in terms of IT costs and technical competence (e.g. Grover et al. 1996; Loh and Venkatraman 1995). Whereas IT costs and technological competence are important, they should not be the only considerations in decisions on IT sourcing mechanisms. Firms may have other important considerations, such as IT-enabled value creation. Recent research has revealed that IT-enabled organizational capabilities are the key element linking IT investments to business value (Barua et al. 2004; Melville et al. 2004; Rai et al. 2006). That is, the main role of IT is to create or enhance firms' organizational capabilities, which in turn improve firm performance. In this respect, the effectiveness of IT sourcing mechanisms should be understood in terms of how they can facilitate the development of IT-enabled organizational capabilities, rather than in terms of IT costs or technological competence. My study addresses the above issues. I compare IT outsourcing with IT insourcing in terms of how they facilitate the development of IT-enabled organizational capabilities and hence improve firm performance.

Essay #2: The Diffusion of IT Outsourcing: Does Industry Matter?

Research interested in the antecedents of IT outsourcing adoption typically has focused on factors internal to a firm (Dibbern et al. 2004), with only a few exceptions that have considered the effects of external factors on IT outsourcing adoption, such as industrial demand volatility (Aubert et al. 2006) and national institutions (Apte et al. 1997). Since both internal conditions and external environments can influence firms' decision-makings (Dess and Beard 1984;

Duncan 1972), more studies about the effects of external environments on IT outsourcing adoption decisions are needed in order to augment our knowledge.

My review of the literature revealed that findings on the effects of industrial characteristics (e.g., industrial product characteristics and IT intensity) on IT outsourcing adoption have been inconsistent (Han et al. 2006; Loh and Venkatraman 1992a; Oh 2005; Slaughter and Ang 1996). Two issues in the existing research may cause these conflicting results concerning the effects of industry on IT outsourcing adoption. The first is how industries are conceptualized. In previous research, industries have been conceptualized in terms of product characteristics (goods vs. services) and the intensity of IT use in an industry. However, this approach results in conflicting arguments and results across studies. For instance, while Slaughter and Ang (1996) suggested that firms in IT-intensive industries may outsource less than those in non IT-intensive industries because IS skills and IT resources are more important in the former firms, Han et al. (2006) have suggested that firms in IT-intensive industries may outsource more because they have superior capabilities for accessing and using outside IT-related resources. A better, more comprehensive and theoretically grounded approach needs to be developed to capture the essence of the influence of industry environments on IT outsourcing adoption.

The other issue is how the IT outsourcing level should be measured. The measurements of IT outsourcing level used in the literature basically fall into two categories: relative and absolute measurements. While relative measurements divide the outsourcing amount by the IT insourcing budget or the total IT budget,

absolute measurements do not (though they are typically controlled by total sales or total assets). Relative measurements can provide a radically different picture from absolute measurements. For instance, when a firm increases its IT outsourcing budget by 5% and increases its IT insourcing budget by 10%, under absolute measurements (e.g., outsourcing budge/total assets), an increase in outsourcing will be observed, but relative measurements (e.g., outsourcing budget/total IT budget) will indicate a decrease in outsourcing. So different measures may contribute to the inconsistencies observed in previous research findings.

Since the issues inherent in the conceptualization of industries and in the measurement of IT outsourcing level produce the inconsistencies in the effect of industry on IT outsourcing adoption, further studies should be based on a better conceptualization of industry and use measurements of IT outsourcing level appropriate to their goals. While relative measurements and absolute measurements can both be valid, depending on the situation, it is suggested that relative measurements be used if the research interest is to understand why firms choose IT outsourcing instead of insourcing (Oh 2005). Furthermore, instead of classifying industries into manufacturing vs. services or IT-intensive vs. non IT-intensive, a few studies have conceptualized industries by their specific characteristics based on theories such as Thompson's (1967) typology of technology and Williamson's (1985) transaction cost theory. These studies have provided evidence of the usefulness of this conceptualization approach (Aubert et al. 2006; Lee et al. 2004). Following the approach used in these studies, this study

identifies four relevant industrial characteristics (i.e., munificence, dynamism, concentration, and capital intensity) based on research from organization theory and industrial organization (Bain 1959; Dess and Beard 1984), and theoretically links these four industrial characteristics to the diffusion of IT outsourcing.

Essay #3: Country Environments and the Adoption of IT Outsourcing

To date, research on the adoption of IT outsourcing has mainly been confined to a single-country perspective (Dibbern et al. 2004), which prevents us from understanding how country-specific variables influence IT outsourcing adoption. Only a few studies have investigated the effects of country-level factors on the practices of IT outsourcing. My review of these studies has produced four observations. First, country-level factors may have significant effects on firms' decisions with respect to IT outsourcing adoption because differences in IT outsourcing practices exist between countries, such as the different outsourcing procedures, client types, and expertise levels observed between the UK and Germany (Grimshaw and Miozzo 2006). Second, adoptions of IT outsourcing can be influenced by a country's institutional environments, such as its national culture (Slaughter and Ang 1995: Dibbern 2004) and a common firm ownership structure (Apte et al. 1997; Barthelemy and Geyer 2005) as well as factor environments such as the IT labor market (Slaughter and Ang 1995) and the IT service demand market (Grimshaw and Miozzo 2006). Third, the literature has used a variety of forms of reasoning to explain the role of country in the adoption of IT outsourcing, e.g., transaction costs (Slaughter and Ang 1995; Barthelemy

and Geyer 2005) and cultural values (Dibbern 2004; Samaddar and Kadiyala 2006).

Finally and most importantly, the existing research usually compares IT outsourcing practices between two or three countries, which prevents us from verifying the effect of country-level factors on IT outsourcing adoption. For example, Barthelemy and Geyer (2005) have suggested that the difference in IT outsourcing practices between Germany and France may be due to the fact that Germany has larger industrial groups, greater employee power within firms, and stronger trade unions than France. However, based on data from two countries, it is not certain whether industrial groups, employee power, and trade unions truly play roles in firms' IT outsourcing adoption decisions. In order to verify these effects, data from more countries are needed.

The review of the literature has suggested a need for cross-country IT outsourcing adoption studies based on a relatively large number of countries so that we can verify the effect of country on the adoption of IT outsourcing. My study addresses this issue by using data from 18 countries. In addition, as did in Slaughter and Ang (1995) and Barthelemy and Geyer (2005), I employ a transaction cost-based reasoning to explain the role of country in IT outsourcing adoption. More specifically, I draw on new institutional economics and related research (Coase 1937; Langlois 1992; Malone et al. 1987; North 1990) and investigate how country-level factors influence the opportunism and coordination costs involved in IT outsourcing, hence affecting the adoption of IT outsourcing in a given country.

Chapter II (Essay #1): An Evaluation of IT Sourcing Mechanisms: An IT-Enabled Organizational Capability Perspective

Abstract: *Although IT outsourcing is increasingly popular, many firms have elected to bring their outsourced IT functions back in-house. This study aims to evaluate the effectiveness of IT outsourcing and IT insourcing from the perspective of IT-enabled organizational capabilities (IEOC). Drawing on IT business value research and IT assimilation research, this study proposes that when compared with IT outsourcing, IT insourcing is more likely to facilitate the development of IEOC and lead to superior firm performance. By analyzing data from InformationWeek and CompuStat, I find that IT insourcing is positively associated with IEOC. In contrast, the relationship between IT outsourcing and IEOC is not significant. I also find that IEOC are positively associated with firm performance as measured by profitability (ROA) and market value (Tobin's q). Finally, the advantages of IT insourcing over outsourcing are greater for Type III innovation-related IEOC (e.g., knowledge management) than Type I innovation-related IEOC (e.g., technical infrastructure). In addition, Type III innovations-related IEOC have stronger impacts on firm performance than their Type I counterparts. The results suggest that if firms want to use IT more strategically to improve business value, they should be proactively involved in the internal development of IT resources and consider IT an integral part of their core competences. I conclude with other managerial implications and potential avenues for future research.*

1. Introduction

With the slowdown in IT-related spending growth caused by a sluggish economy and environmental turmoil, IT outsourcing has become increasingly popular (Oh et al. 2006; Willcocks et al. 2006). A report by the Gartner Group (2005) indicated that worldwide spending on IT outsourcing will rise rapidly from $193 billion in 2004 to $260 billion in 2009. The emergence of new types of arrangements, such as offshoring, has accelerated this proliferation of IT outsourcing, both within firms (e.g., software development and knowledge management) and across firm boundaries (e.g., supply chain management).

Despite the much-publicized popularity of IT outsourcing, many firms continue to rely heavily on insourcing (i.e., the provision of IT services in-house) (Hirschheim and Lacity 2000). In addition, a considerable number of firms have decided to terminate their ongoing outsourcing contracts and bring their outsourced IT functions back in-house (Veltri and Saunders 2007; Whitten and Leidner 2006). For instance, JP Morgan Chase recently announced the early termination of its seven-year, $5 billion contract with IBM, which was made to improve the company's data center and distributed computing capabilities (Forelle 2004). Similarly, Sainsbury's, the second largest supermarket chain in the UK, ended its ten-year, £3 billion outsourcing contract with Accenture, three years early because the contract had failed to produce the anticipated productivity increase (Rohde 2004). Various reasons (e.g., poor service quality and high cost)

exist for early contract terminations,[1] and companies often elect to switch to IT insourcing and develop their own IT capabilities rather than seek another outsourcing arrangement with a different service provider.

Prior research has produced inconclusive results concerning the impact of IT outsourcing; while some studies suggest that IT outsourcing enables firms to gain numerous benefits, including cost savings and IT competence (DiRomualdo and Gurbaxani 1998; Grover et al. 1996), others indicate that the various risks inherent to IT outsourcing likely outweigh its potential benefits (Aubert et al. 1999; Earl 1996; Oh et al. 2006). Recently, several studies (e.g., Grover et al. 1996; Lee et al. 2004) have shown that firms can reap the benefits of IT outsourcing only when they follow "best" practices (e.g., outsourcing only commoditized IT functions).

The literature provides little empirical research that directly compares the business impact of the two mechanisms. One exception is the line of research evaluating the two mechanisms on the basis of cost savings (e.g., Hirschheim and Lacity 2000; Lacity and Willcocks 1998). Although appropriate and important, a comparison based solely on cost savings might reflect only the operational dimension of IT-related performance, while providing limited insights into the strategic aspects of IT performance (Anderson et al. 2006; Bharadwaj et al. 1999). This study seeks to fill this gap by evaluating the two mechanisms from a strategic point of view. More specifically, I explore the effectiveness of IT insourcing and IT outsourcing through the lens of IT-enabled organizational

[1] A list of back-sourcing cases can be found in Table 2.

capabilities (Melville et al. 2004; Rai et al. 2006), an approach which posits that IT creates business value mainly by renovating or enhancing firms' organizational capabilities. This emerging perspective focuses on "how and why IT shapes higher-order process capabilities that create performance gains for firms" (Rai et al. 2006, p.225). In line with this framework, I assess the extent to which each IT sourcing mechanism contributes to the development of IT-enabled organizational capabilities (hereafter, *IEOC*).

Recently, many organizations have relied on IT outsourcing in an effort to reduce IT costs, but it is unclear how outsourcing affects the development of *IEOC. If an organization's main priority for its IT strategy is to establish IEOC, which mechanism should be chosen? For what aspect of IEOC is IT insourcing or IT outsourcing particularly effective? Do IEOC improve performance?* This paper attempts to shed some light on these issues. In regard to the second issue raised above, I performed several analyses in order to understand the extent to which the types of IT-enabled innovations (e.g., knowledge management, e-business, technical infrastructure etc.) moderate the business impacts of IT sourcing mechanisms. Due to variations in their strategic importance, different types of IT-enabled innovations might have different impacts on the business outcomes of sourcing mechanisms.

The rest of the paper is organized as follows. In the next section, I discuss the literature on which this study is based, focusing on prior research on the impact of IT outsourcing and insourcing on firm performance. Next, drawing from the research on IT business value (Melville et al. 2004; Rai et al. 2006) and IT

assimilation (Armstrong and Sambamurthy 1999; Boynton et al. 1994), I develop a theoretical framework in which IT sourcing mechanisms influence firms' *IEOC*, which in turn have a significant bearing on firm performance. The research model is then tested using data from *InformationWeek* magazine and the *CompuStat* database. Finally, the paper concludes with a discussion of the implications of the results and suggests directions for future research.

2. Literature Review

Over the past two decades, IS researchers have tapped into a variety of IT sourcing issues, including the antecedents of sourcing (Ang and Straub 1998; Loh and Venkatraman 1992a; Oh 2005), various risks inherent to outsourcing (Aubert et al. 1999; Earl 1996; Oh et al. 2006), relational difficulties between outsourcing clients and suppliers (Kern and Willcocks 2002; Lee and Kim 1999), and the outcomes of outsourcing and insourcing (Grover et al. 1996; Lacity and Willcocks 1998). My review here focus on studies that have dealt with the impact of IT outsourcing on firm performance because of its relevance to the present study. I identify two streams of research: one that compares IT outsourcing benefits with those of insourcing, and another that focuses exclusively on IT outsourcing and investigates whether and how firms can benefit from such sourcing mechanisms (see Table 1).

Several studies have compared the effectiveness of IT outsourcing with that of IT insourcing in terms of cost savings. For example, Lacity and Hirschheim (1993) investigated the impact of IT sourcing decisions in fourteen firms (five firms

Table 1: Studies on the Business Impact of IT Sourcing Mechanisms

Authors	Methods	Outcome Variables	Main Findings
Studies that compared the impacts of IT outsourcing with insourcing			
Lacity & Hirschheim 1993	Case study (N=14)	Cost savings	Internal IS department can achieve similar efficiency results without vendor assistance.
Loh & Venkatraman 1995	Survey and archive data (N=114)	Market-book ratio, return on equity	Firms with high cost structures can improve their market value and return on equity by outsourcing IT.
Lacity & Willcocks 1998	Case study (N=61)	Cost savings	All IT sourcing mechanisms can be successful, but selective outsourcing outperforms total outsourcing and total insourcing.
Hirschheim & Lacity 2000	Case study (N=14)	Cost savings	1. Internal IT departments often can replicate a vendor's cost reduction tactics. 2. Different stakeholders hold different perceptions of IT sourcing success.
Studies that investigated whether/how firms can benefit from IT outsourcing			
Grover et al. 1996	Survey (N=188)	Perceived benefits	Firms are more likely to benefit from outsourcing when they outsource only commodity IT functions, have partnerships with IT vendors, etc.
Saunders et al. 1997	Case study (N=34)	Perceived benefits	Firms are more likely to benefit from outsourcing when a contract is well defined, when the outsourced function is a core function, and when a partnership exists.
Lee & Kim 1999	Survey (N=74)	Perceived benefits	Firms are more likely to benefit from outsourcing when they maintain high-quality partnership with IT vendors.
Koh et al. 2004	Survey (N=370)	Satisfaction	Client firms are more likely to be satisfied with outsourcing when IT vendors fulfill the obligations of psychological contract
Lee et al. 2004	Survey (N=311)	Perceived benefits	Firms are more likely to benefit from outsourcing when they have a consistent pattern among the decision scope, contract type, and length of contract in their IT outsourcing.
Seddon et al. 2007	Survey (N=85)	Satisfaction	Client firms are more likely to be satisfied with outsourcing when they pursue the benefits of specialization, market discipline, and flexibility inherent in IT outsourcing rather than cost savings.

chose IT insourcing and two firms decided to back-source IT services after terminating their outsourcing contracts earlier than planned). In contrast to the conventional view that IT outsourcing outperforms IT insourcing, this case study revealed that IT insourcing can be as effective when cost savings are used to evaluate performance. Hirschheim and Lacity (2000) validated the results of their earlier study by including more insourcing cases in the analysis. Based on a case study of 61 outsourcing and insourcing decisions, Lacity and Willcocks (1998) found that all types of IT sourcing mechanisms (i.e., total outsourcing, selective outsourcing, and total insourcing[2]) can be successful in terms of achieving cost savings. However, the same study indicated that in terms of success rates, selective IT outsourcing arrangements, among others, are the most effective mechanism in terms of achieving cost savings, followed by total insourcing and then total outsourcing.

Loh and Venkatraman (1995) investigated the effect of IT outsourcing on firm financial performance as measured by market value and return on equity. Their results suggest that firms with unfavorable operational cost structures could potentially benefit more from IT outsourcing than firms with favorable cost structures. This is because firms that are structurally inefficient in IT cost management can achieve greater cost reductions through IT outsourcing. By analyzing survey questionnaire and archival data, they discovered that the interaction between outsourcing intensity and cost structure is positively

2 Lacity and Willcocks (1998) defined selective outsourcing as the decision to source selected IT functions from external provider(s) while still providing between 20% and 80% of the IT budget internally. When the internal IT budget was less than 20%, it was considered total outsourcing, and when internal IT budget was larger than 80%, it was considered total insourcing.

associated with firm market-to-book value and return on equity; the higher the cost structure of a firm, the more effective the IT outsourcing in terms of market value and profitability.

The second stream of research focuses on how and under what conditions firms can derive benefit from IT outsourcing. Several studies have uncovered the perceived strategic, economic, and technological benefits that arise from IT outsourcing. For example, Grover et al. (1996) posited that IT outsourcing confers substantial benefits on firms only when strategic, economic, and technological considerations are fully taken into account in the outsourcing-related decisions. Based on survey data collected from 188 firms, they found that outsourcing highly commoditized and non-asset specific IT functions (e.g., systems operations and telecommunications management) is more likely to be successful than outsourcing IT functions that are difficult to commoditize. Similarly, Saunders et al. (1997) identified a number of factors that determine outsourcing success, including the firm's relationships with suppliers, the nature of outsourcing contracts and the importance of the IT function to be outsourced. Using case studies, they showed that outsourcing benefits occur only when contracts are well defined and well managed, when the outsourced function is a core business operation, and when the relationship between client and vendor is established and maintained through a strong partnership. With regard to the partnership issue, Lee and Kim (1999) assessed the impact of partnership quality on outsourcing outcomes based on several attributes (e.g., trust, business understanding, benefit and risk sharing, etc.) that shape the quality of

partnerships. Analyzing survey data on 74 outsourcing arrangements in Korea, they found that all components of partnership quality, with the exception of business understanding, are significantly associated with outsourcing outcomes. Lee et al. (2004) evaluated the three explanations of outsourcing success (universalistic, contingency and configurational) and found that the configurational explanation is superior to the other two in its ability to account for variations in outsourcing success. Based on data collected from 311 firms, the study revealed that arm's-length and embedded configurations in IT outsourcing yield the benefits of cost-efficiency and technology catalysis, respectively.

Finally, several studies explored the factors that lead to client satisfaction. For example, Koh et al. (2004) investigated IT outsourcing from a psychological contract perspective, positing that the fulfillment of mutual obligations between customers and suppliers can result in IT outsourcing success as measured by an intention to continue the outsourcing relationship. Using in-depth interviews, Koh et al. identified six customer and supplier responsibilities critical to outsourcing success, including effective knowledge transfer and sharing. Based on a field study of 370 managers, they revealed that fulfilling these obligations is necessary in order to achieve customer satisfaction and continue the outsourcing relationship. Recently, Seddon et al. (2007) found that firms pursuing the benefits of specialization, market discipline and flexibility from IT outsourcing are more likely to be satisfied with outsourcing outcomes than firms pursuing cost savings.

The above review suggests that the relative advantages of IT outsourcing and IT insourcing are still not clear. First, some studies compared IT outsourcing with

insourcing in terms of IT cost savings and revealed that IT insourcing can be as efficient as IT outsourcing (Hirschheim and Lacity 2000; Lacity and Hirschheim 1993; Lacity and Willcocks 1998). Although these studies have advanced our understandings of the effects of IT sourcing on costs, the literature is still not clear about how IT sourcing mechanisms affect IT-enabled value creation (e.g., the development of *IEOC*), which is of strategic important to firms[3] (Anderson et al. 2006; Bharadwaj et al. 1999).

Second, some studies found that firms can benefit from IT outsourcing when they follow "best practices" such as outsourcing only commoditized IT functions (e.g., Grover et al. 1996; Lee et al. 2004). However, other research has revealed that similar improvements in IT performance can also be achieved by using the insourcing mechanism (Hirschheim and Lacity 2000; Lacity and Hirschheim 1993). More importantly, these studies typically examined outsourcing benefits by comparing firm performance before outsourcing with that after the outsourcing,[4] rather than by comparing the performance of firms relying on IT outsourcing with the performance of other firms relying on IT insourcing. As a result, the literature is still not clear about whether firms that rely on outsourcing will post better performance than firms that rely on IT insourcing. In addition, despite the increasing popularity of IT outsourcing, many firms are observed to have

[3] One exception is Loh and Venkatraman's (1995) study, which investigated the effect of IT outsourcing on firm value. However, their results are only relevant to firms with high cost structures. Furthermore, their propositions are based on the assumption that IT is a cost burden for firms, which might be problematic.

[4] For instance, in Grover et al. (1996) and the studies that followed their method (e.g. Lee et al. 2004; Saunders et al. 1997), the impact of outsourcing was assessed by asking managers questions such as "whether firms have enhanced IT competence and have increased control of IT expenses with the adoption of IT outsourcing.".\

continued to rely heavily on IT insourcing or have elected to bring the outsourced IT functions back in-house (see Table 2 for a list of major IT back-sourcing cases), despite the much-publicized popularity of IT outsourcing (Hirschheim and Lacity 2000; Veltri and Saunders 2007; Whitten and Leidner 2006). In order to investigate the relative benefits of alternative IT sourcing mechanisms, research in needed to compare the benefits of IT outsourcing with those of IT insourcing.

Finally, prior studies have often focused on IT costs and technical competence. While firms need to be concerned with IT costs and technical competence, they should not be the only considerations when making decisions on IT sourcing mechanisms. Recent research has revealed that new IT-enabled organizational capabilities are key for linking IT investments to business value (Barua et al. 2004; Melville et al. 2004; Rai et al. 2006). That is, the main role of IT investments is to create or enhance firms' organizational capabilities, which in turn improve firm performance. In this respect, the effectiveness of IT sourcing mechanisms should also be evaluated based on how they facilitate the development of *IEOC*. This study addresses the above issues and compares IT outsourcing with insourcing in terms of how they facilitate the development of *IEOC*.

3. Theoretical Framework

Recent research has suggested that IT-enabled organizational capabilities (*IEOC*) are the key to understand the business value of IT investments (Barua et al. 2004; Melville et al. 2004; Rai et al. 2006). The basic principle of the theory asserts that the main role of IT is to create or enhance firms' organizational capabilities and

Table 2: Major Cases of IT Back-sourcing

Source	Client	Vendor	Size	IS Functions Back-sourced	Motivations of Back-sourcing	Status
IW*, 1997	MONY	CSC	7-year, $210M	Data center, all IT operations	Move quickly to change	Early termination
IW, 1997	LSI Logic	IBM	5-year, $50M	Whole IT department	Tight link between IT and business	Early termination
CIO, 2000	Farmers Group	IBM	10-year, $150M	Mainframe IT support, application development and maintenance	Cost savings never realized	Early termination
CIO, 2001	Bank of Scotland	IBM	10-year, £700M	Whole IT infrastructure	Requirement changed, merger	Early termination
CIO, 2001	MPEA in Chicago	RedSky Tech.	3-year	Network and Internet services	Inefficiency, inflexibility, and limited functionality	No renewal
Baseline, 2002	Bank One	AT&T; IBM	6-year, $1.8B	Network management and development, data center	High costs, not adaptive to changes	Early termination
CIO, 2002	Washington Mutual	IBM	10-year, $533M	Help desk, network management, architecture and strategy	Unsatisfied service level, to serve customers better	Re-negotiation
CIO, 2002	Suncorp Group	CSC	NA	Hardware management, IT helpdesk and data network	Benefits of synergies , acquisition	Early termination
CIO, 2002	Oxford Health Plans	CSC	5-year, $195M	Data center, help desk, desktop systems and network management	More flexible, timely, and cost-effective for business goals	Early termination
WSJ, 2004	JP Morgan Chase	IBM	10-year, $5B	Data center, help desks, distributed computing, data and voice networks	For long-term growth and success, benefits of synergies, merger	Early termination
CW 2005	Sainsbury	Accenture	10-year, $3.25B	Management of all IT systems and networks	IT focus changed	Early termination
IW 2006	Sprint Nextel	IBM	5-year, $400M	Application development, maintenance	Unsatisfied productivity improvement, merger	Early termination

**IW: InformationWeek; CIO: CIO Magazine; Baseline: Baseline Magazine; WSJ: Wall Street Journal; CW: ComputerWorld*

thus improve their business processes and performance (Melville et al. 2004). *IEOC* refer to IT-enabled "repeatable patterns of actions in the use of assets to create, produce, and/or offer products to a market" (Sanchez et al. 1996; Wade and Hulland 2004, p.109). It includes a wide range of organizational capabilities, such as IT-enabled customer service processes (Ray et al. 2005), knowledge management (Tanriverdi 2005), new product development (Pavlou and El Sawy 2006), and supply chain processes (Rai et al. 2006). Building on the traditional process view of IT business value (Barua et al. 1995; Soh and Markus 1995), the underpinnings of *IEOC* have been widely used as a conceptual lens to evaluate the business value of IT (e.g., Barua et al. 2004; Melville et al. 2004; Sambamurthy et al. 2003).

To develop *IEOC*, firms often need to combine IT resources with complementary organizational resources and align IT with their business practices (Brynjolfsson and Hitt 1998; Chan et al. 1997; Oh and Pinsonneault 2007). This makes the development of *IEOC* a reciprocal task between the IT unit and business units (Chatterjee et al. 2002; Mitchell and Zmud 1999). Given that aligning IT with business practices involves a high level of uncertainty, effective coordination between the IT unit and business units is of critical importance in order to successfully cope with the uncertainties present in reciprocal and interdependent tasks (Mitchell and Zmud 1999; Van de Ven et al. 1976).

Traditionally, a hierarchical mechanism is considered to have much greater capacity for coordinating interdependent activities than a market mechanism, since the former contains higher-order organizing principles - such as shared

knowledge and enhanced interaction and communication - that the latter cannot supply (Grant 1996; Gulati and Singh 1998; Kogut and Zander 1992). These organizing building blocks facilitate effective coordination between the IT unit and business units and therefore help nurture the development of *IEOC*. For instance, numerous formal coordinating mechanisms (e.g., rules and directions, routines, and group meetings) and informal instruments (e.g., personal communications and meetings) exist within a firm to promote interaction among organization members (Grant 1996; Gulati et al. 2005). Such interactive and communicative protocols are not readily available under the market mechanism. Since these coordination principles are embedded within a firm, the interaction between the internal IT unit and business units tends to be more successful than the interaction between outside IT vendors and business clients. For instance, routine meetings and the co-location of IT and business managers within firms are likely to encourage frequent and rich formal and informal communication between the parties. Consequently, close and frequent interaction between the internal IT unit and other business units provides firms with fruitful grounds on which to cultivate *IEOC*, which requires well orchestrated coordination between the IT unit and business units. Lind and Zmud (1991) have suggested that rich interactions between technical and managerial units are necessary elements to nurture *IEOC*, while Reich and Benbasat (2000) found that communication and interaction between IT and business managers increase the level of alignment between IT and business objectives.

Shared knowledge is another important variable that makes IT insourcing a more effective mechanism than IT outsourcing in terms of developing *IEOC*. This is because the development of *IEOC* requires the integration of both knowledge of business opportunities and knowledge of IT's potential (Armstrong and Sambamurthy 1999; Boynton et al. 1994). Prior research (e.g., Bassellier and Benbasat 2004; Bassellier et al. 2003) has revealed that shared knowledge between IT and business professionals can improve the IT-business partnership and increase business managers' motivation to champion IT projects and thus develop *IEOC*. In this respect, IT sourcing mechanisms can influence the level of shared knowledge between the IT unit and business units. For instance, Ray et al. (2005) have suggested that the shared knowledge between the IT unit and business units is typically developed over a long period of time, and is subject to path dependence that is difficult for competitors to imitate. Therefore, when firms rely on their internal IT units to acquire IT services, the shared knowledge and personal relationships between IT and other business units will continue to grow as a result of the collaborative relationship. In contrast, when firms rely only on outsourcing to obtain their IT resources, the path-dependent, shared knowledge between the IT unit and business units cannot be fully developed and utilized because the IT staffs at external vendors might not understand the specific details of the client firm's business operations as well as their internal counterparts. In a similar vein, business staffs at client firms do not fully understand the capacity and capabilities of IT supplied by an external vendor, which poses another challenge for their successful development of *IEOC*. As pointed out by Willcocks

et al. (2004), because of IT vendors' lack of knowledge about their clients' long-term strategic goals, most vendors find it difficult to deliver on their promises of innovation and value added. In summary, since IT insourcing offers structural advantages over IT outsourcing with respect to utilizing path-dependent shared knowledge and enhancing interaction and communication, the former is more effective at promoting *IEOC*. As a result, I propose:

Hypothesis 1a: IT insourcing is more effective than IT outsourcing for developing IEOC.

Although IT insourcing is generally more effective than IT outsourcing at developing *IEOC*, its advantages may vary for *IEOC* in different areas. To improve their business processes, firms typically use a wide range of IT applications that differ substantially in terms of their objectives. For example, firms use Computer Aided Software Engineering (CASE) tools to enhance software development, while leveraging Enterprise Resource Planning (ERP) more strategically in an effort to streamline their business operations. Swanson (1994) distinguishes "IT innovations" (i.e. organizational innovations enabled by different types of IT applications) into three broad types according to the magnitude of their impact on business performance: Type I innovations, which are confined to IT-related tasks (e.g., software development and IT operations); Type II innovations, which are concerned with general business administration; and Type III innovations, which refer to the use of more strategic business applications in core business processes.

More specifically, according to Swanson, Type I innovations include the use of object-oriented languages and CASE tools in software development, while Type II innovations including the deployment of IT applications related to accounting and human resource management systems. Finally, Type III innovations are those related to MRP systems (an earlier version of ERP) and inter-organizational systems that are generally much larger in scale and scope than Type I or Type II innovations. Prior research has provided some evidence that different types of IT innovations have different implications for firms; while Type I and Type II innovations are positively related to the operational orientation of the IT unit, Type III innovations are positively associated with the strategic importance of the IT unit to the host organization (Grover et al. 1997).

As mentioned above, IT insourcing is considered more effective than IT outsourcing with respect to the development of *IEOC* because of path-dependent shared knowledge and a more seamless integration between the IT unit and business units. I predict that the superiority of IT insourcing will be more apparent for Type III innovations than it is for Type I innovations[5]. Swanson (1994) has stated that Type III innovations integrate IT applications with firms' core business, affecting the entire business spectrum, while Type I innovations are restricted to the functional IT unit and focus on technical infrastructure. Consequently, the implementation of a Type III innovation requires greater coordination between the IT unit and business units than a Type I innovation. Moreover, path-dependent shared knowledge is more critical for the successful

[5] I focus only on Type I and Type III innovations in this paper because (1) the differences between Type I and Type III innovations are easily distinguishable and (2) the data is available for only these two types.

implementation of Type III innovations as compared with Type I innovations. In this respect, the advantages of IT insourcing over IT outsourcing should be more significant for the development of organizational capabilities related to Type III innovations than they are for those related to Type I innovations. Accordingly, I propose:

Hypothesis 1b: The advantages of IT insourcing over IT outsourcing are more significant for the development of IEOC related to Type III innovations than they are for those related to Type I innovations.

Prior research (e.g., Rai et al. 2006; Melville et al. 2004) suggests that *IEOC* provide firms with sustainable competitive advantages. Piccoli and Ives (2005) identified four types of barriers (i.e., IT resources, complementary resources, IT projects, and preemption barriers) that prevent rivals from imitating firms' *IEOC*. These scholars suggested that competitors cannot easily replicate the competitive advantages delivered by *IEOC* because a firm often has an idiosyncratic set of IT assets and a unique repertoire of organizational resources that are complementary to those assets. Many studies support the view that *IEOC* enhance firm performance in the form of increased profitability or market value. For example, Barua et al. (2004) found that the effectiveness of firms' day-to-day business activities, including electronic transactions and information exchanges with customers (e.g., sales, customer service, new-customer acquisition) and suppliers (e.g., procurement) is positively associated with financial performance. Ravichandran and Lertwongsatien (2005) revealed that IT support for core activities, such as market-access-related, integrity-related, and functionality-

related activities, improves operational and market-based performance. Similarly, Banker et al. (2006) have provided evidence that IT-enabled just-in-time (JIT) manufacturing and customer/supplier participation (CSP) programs can positively influence firm performance by improving product quality, production time to market, and operating efficiency. Finally, Rai et al. (2006) found that IT-enabled integration of supply chain processes, including physical flow, information flow, and financial flow integration, is significantly associated with firm performance as measured by operational excellence, customer relationships, and revenue growth. Accordingly, I propose:

Hypothesis 2a: IEOC are positively associated with firm performance.

Finally, the organizational capabilities enabled by different types of IT applications might influence firm performance differently. Since Type III IT innovations are likely to affect the entire business, their impact should be broader and more significant than that of Type I IT innovations, which are confined only to the IT unit or to technical infrastructure (Swanson 1994). Moreover, since Type III IT innovations usually require intensive involvement on the part of business units - making this type of innovation more complicated and more difficult for competitors to imitate (Piccoli and Ives 2005) - *IEOC* related to Type III innovations may contribute to firm performance in a more intensive and sustainable manner than *IEOC* related to Type I innovations. Accordingly, I propose:

Hypothesis 2b: IEOC derived from Type III innovations affect firm performance more significantly than do those derived from Type I innovations.

4. Research Method

4.1 Data

The primary source of IT-related data used in this study is from *InformationWeek*, a magazine that has, since the early 1990s, published a series of special reports on corporate IT performance. My study uses data from the 1997-2000 reports. The magazine ranks the 500 most innovative organizations on the basis of their use of IT and provides specific IT-related information, including the size of their IT budgets, the number of IT employees, and the proportion of the IT budget spent on outsourcing. The data from *InformationWeek* has been widely used in IS research, particularly in studies investigating the business impact of IT investments (e.g., Bharadwaj 2000; Bharadwaj et al. 1999; Santhanam and Hartono 2003).

My analysis initially included 169 of these 500 firms; more than 300 firms were excluded either because they were not publicly listed or their specific IT data was not available through *InformationWeek*. Of these 169 firms, some were removed from the final analysis due to the incomplete financial information available from CompuStat. The firms used in my sample had revenues of $10.4 billion and 53,000 employees, on average. IT budgets of these firms ranged from 3.8 million to $4.4 billion, with a mean of $273.6 million. The data covers 33 industries according to the two-digit Standard Industrial Classification (SIC) code.

4.2 Variable description

Some of the key variables in this study are IT outsourcing and insourcing investments, *IEOC*, and firm performance (e.g., return-on-assets (ROA) and Tobin's q). The IT outsourcing and insourcing investments were calculated on the basis of the 1997 *InformationWeek* Special Report. The report provides data on IT investment budgets and outsourcing ratios, from which the specific amounts that the firms allocated to IT insourcing and outsourcing were computed. The amount of these investments was then normalized using the firm's revenue to control for the effect of firm size (Bharadwaj et al. 1999).

To the best of my knowledge, the concept of "IT-enabled organizational capabilities" (IEOC) has only been mentioned once in the literature (i.e., Rai et al. 2006) and has never been measured. However, several studies have examined concepts similar to *IEOC* and typically focus on *IEOC* in a particular area (e.g., Barua et al. 2004; Rai et al. 2006). For instance, Barua et al. (2004) investigate firms' customer- and supplier-side digitalization levels, defined as the extent to which a firm accomplishes day-to-day business activities electronically including transactions and information exchange facing customers (e.g., sales, customer service, new customer acquisition) and suppliers (e.g., procurement). Tanriverdi (2005) studies the IT-enabled knowledge management capability, including the capability of managing product, customer, and managerial knowledge. Rai et al. (2006) examine IT-enabled supply chain process integration capability, defined as the degree to which a focal firm has integrated its physical, financial, and information flows with its supply chain partners. All these studies focus on

business processes that are enhanced by IT (i.e., *IEOC*), though under different names and with emphasis on different areas. In this study, I will focus on *IEOC* in four areas – knowledge management, electronic business, enterprise integration, and technical infrastructure, for research has shown that *IEOC* in these four areas can be strategically important to firms. For instance, studies have suggested that IT-enabled knowledge management capability is positively associated with firm market value and profitability (Tanriverdi 2005), electronic business capability contributes to firm financial performance (Barua et al. 2004), enterprise integration based on ERP systems improves firm effectiveness (Barki and Pinsonneault 2005; Ranganathan and Brown 2006), and technical infrastructure is one source of competitive advantages because the development of technical infrastructure takes time and effort (Bharadwaj 2000; Weill and Broadbent 1998).

Table 3: The Survey Questions from *InformationWeek*

IEOC Components	**Survey questions**
Knowledge management	*What percentage of knowledge workers in your company have desktop access via OLAP or data mining tools to data stored on your company's enterprise servers, mainframes or data warehouse systems? *Which of the following business applications are accessible over a browser on your corporate intranet (e.g., full text search engine, decision support, OLAP/ data mining, workflow processes etc.)? *Does your organization have an IP-based Virtual Private Network to support remote access by mobile workers or distributed servers?
Electronic business	*Is your company providing customer service, selling products, or selling services to other companies on the Web? *What percentage of your company's accounts payable or accounts receivable data is entered directly through business-to-business systems by your vendors, partners or suppliers? *Has your organization purchased one or more of the following products via the Web in the past 12 months (e.g., Internet Web

	browsers, client applications, desktop PCs, anti-virus software, development tools etc.)?
Enterprise integration	*Have multiple divisions in your company standardized on a single enterprise resource platform or supply chain product? *When does your company expect to achieve payback on its ERP investment?
Technical infrastructure	*What percentage of your organization's custom application portfolio is built with object technology? *What percentage of your organization's IT development staff is trained in object or component technology? *Does your organization spend more money annually creating new applications or maintaining old ones?

The data for measuring *IEOC* are from the *InformationWeek* special reports from 1998 to 2000. The same source of data has been used to measure IT-related capabilities in prior studies (e.g., Bharadwaj 2000; Santhanam and Hartono 2003). *InformationWeek* asks senior IT executives how their firms use IT to support knowledge management, electronic business, enterprise integration, and technical infrastructure, with multiple questions for each *IEOC* component (see Table 3 for the survey questions). Firms are evaluated based on the timing of the IT adoption and creative use of IT to support business operations in the four areas, and then an overall rank (the *InformationWeek* 500 ranking of innovative IT users) is given to each firm based on its scores on the four *IEOC* components (Weston 1998). Since the ranking of the firms may not accurately reflect actual differences in their *IEOC*, a procedure was undertaken to normalize the ranking data for statistical analysis (Cohen et al. 2003, p.247). Based on the normal distribution of *IEOC*

level among firms and the population size,[6] the ranking data was converted into z values corresponding to the level of firms' *IEOC* (Chambers et al. 1983; Cohen et al. 2003). These z values were then used in the final analysis. Many studies (e.g., Jones et al. 2004; Salmivalli et al. 2000) have utilized this z-value transformation of ranked data in statistical analyses.

Market value (Tobin's q) and ROA were used as proxies for firm performance. Both Tobin's q and ROA have frequently been used as performance measures in IT business value research; they reflect firm market value and profitability, respectively (e.g., Bharadwaj et al. 1999; Hitt and Brynjolfsson 1996). Following Hitt and Brynolfsson (1996) and Bharadwaj et al. (1999), four firm-specific variables (capital intensity, debt/equity ratio, market share, and sales growth) and two industry-specific variables (industry concentration and industry capital intensity) were included in the performance analysis as control variables. In addition, average industry performance was included to control for the effects of other unknown industry-specific characteristics (Bharadwaj et al. 1999). Industry concentration and capital intensity were also used as control variables in the analysis of *IEOC* because the level of competition in a given industry influences firms' IT capabilities (Zhu et al. 2006). Table 4 presents a detailed description of each variable included in the analysis. *CompuStat* was used to obtain the data on Tobin's q, ROA, capital intensity, debt/equity ratio, market share, sales growth, industry concentration, and industry capital intensity. As in Bharadwaj et al.

[6] The US Census reports that 1731 firms had revenues over $1billion in 1997. This served as the population for *InformationWeek* 500 firms.

(1999), Tobin's q was calculated using the following formula (Chung and Pruitt 1994):

Table 4: Variable Descriptions and Data Sources

Variable	Source	Description
IT outsourcing	IW*	IT outsourcing budget controlled by revenue
IT insourcing	IW	IT insourcing budget controlled by revenue
IEOC	IW	Z-value transformed from IW500 ranking
Knowledge management	IW	IT-enabled capabilities in knowledge management
Electronic business	IW	IT-enabled capabilities in electronic business
Enterprise integration	IW	IT-enabled capabilities in enterprise integration
Technical infrastructure	IW	IT-based capabilities in technical infrastructure
Tobin's q	CS*	Measures based on Bharadwaj et al. (1999)
ROA	CS	Net return to total assets ratio
Capital intensity	CS	Capital expense to total assets ratio
Debt/equity ratio	CS	Total debt to total equity ratio
Market share	CS	Sales divided by industry total sales (2-dig SIC)
Sales growth	CS	One-year change in sales
Concentration	CS	Industry concentration (HHI)
Industry capital intensity	CS	Industry capital intensity
Industry Tobin's q	CS	Industry average Tobin's q

** CS: CompuStat; IW: InformationWeek*

Tobin's q = (market value of shareholders' equity + liquidating value of the firm's outstanding preferred stock + book value of total debts)/ book value of total assets

4.3 Results

The descriptive statistics and correlation coefficients for the key variables are presented in Tables 5 and 6, respectively. Ordinary least squares (OLS) regression analysis was used as the main analytical tool to test the hypotheses on the impacts

of IT outsourcing and insourcing on *IEOC* and firm performance. Similar techniques were used to test the hypotheses on the effects of the different types of IT innovations. As shown in Table 5, the firms in the sample invest more in IT insourcing (1.84% of revenue) than in IT outsourcing (0.41% of revenue). The value of *IEOC* for firms varies from 0.54 to 2.92,[7] with as mean of 1.25.

The correlation coefficients in Table 6 show that IT outsourcing is not significantly associated with IT insourcing (r=0.18, p>0.05). Interestingly, the correlation analysis suggests that IT insourcing is significantly related only to knowledge management (r=0.408, p<0.01), while non-significant associations are found for other components of *IEOC*. In particular, the weakest relationship is that between IT insourcing and the technical infrastructure aspect of *IEOC* (r=0.015, p>0.05). Finally, a significant relationship is found between *IEOC* and Tobin's q (r=0.241, p<0.05), while no significance is observed for ROA (r=0.166, p >0.05).

Table 5: Descriptive Statistics of Variables

	Minimum	**Maximum**	**Mean**	**Std. Dev.**
IT outsourcing	0	0.0419	0.0041	0.0067
IT insourcing	0.0013	0.0787	0.0184	0.0142
IEOC	0.54	2.92	1.25	0.53
Knowledge management	1	3	2.1	.72
Electronic business	1	3	2.1	.77
Enterprise integration	1	3	2.0	.77
Technical infrastructure	1	3	1.9	.77

[7] These values correspond to the firms that ranked 3rd (2.92) and 499th (0.54) in the InformationWeek 500 ranking.

Tobin's q	0.03	10.17	1.71	1.47
ROA	-0.42	0.24	0.06	0.07
Capital intensity	0.00	0.19	0.06	0.04
Debt/equity ratio	0.33	34.16	3.06	4.33
Market share	0.00	0.57	0.04	0.07
Sales growth	-0.57	0.87	0.09	0.16
Concentration	0.01	0.38	0.06	0.05
Industry capital intensity	0.00	0.37	0.06	0.04
Industry Tobin's q	0.74	2.92	1.49	0.56

Table 6: Correlation Matrix

	1	2	3	4	5	6	7	8	9
1. IT outsourcing	1								
2. IT insourcing	.182	1							
3. IEOC	.063	.327**	1						
4. Knowledge management	.122	.408**	.610**	1					
5. Electronic business	.116	.188	.668**	.399**	1				
6. Enterprise integration	-.077	.086	.534**	.258**	.145	1			
7. Technical infrastructure	.063	.015	.427**	.163	.278**	.195	1		
8. Tobin's q	.033	.018	.241*	.007	.142	.088	.077	1	
9. ROA	-.070	-.172	.166	-.020	.001	.219*	-.031	.484**	1

*$p<0.05$; **$p<0.01$*

The regression results are presented in Tables 7 through 10. The regression models explain approximately 13% of the variance in $IEOC_t$ ($R^2 = 0.13$). As predicted in Hypothesis 1a, IT insourcing is positively associated with firms' *IEOC* (β=0.357; p<0.01). However, no significant association is found with IT outsourcing (β =0.033; p>0.1; see Table 7). This result suggests that IT insourcing is a more effective way to develop *IEOC* than outsourcing. However, prior research has suggested that there may be a time lag between IT investments and business impacts (Brynjolfsson and Hitt 1996; Brynjolfsson and Hitt 2000;

Kraemer and Dedrick 1994). To test the possible impact of lag effects, I use 1-year (t+1) and 2-year (t+2) lagged *IEOC* dependent variables ($IEOC_{t+1}$ and $IEOC_{t+1}$, respectively). The results are similar to those without lag effects. IT insourcing is found to be positively associated with $IEOC_{t+1}$ (β=0.330; p<0.01) and $IEOC_{t+2}$ (β=0.299; p<0.05), but the relationships between IT outsourcing and the lagged *IEOC* are not significant.

Table 7: The Effect of IT Sourcing on *IEOC* (Hypothesis 1)

	$IEOC_t$	$IEOC_{t+1}$	$IEOC_{t+2}$
IT outsourcing$_t$	.033	.122	.200
IT insourcing$_t$	.357**	.330**	.299*
Concentration	.203	.146	.166
Industry capital intensity	-.087	-.076	-.038
N	78	65	58
R^2	.134	.128	.133

** p<0.05;** p<0.01 (all p-values are for one-tailed tests when the coefficients have the predicted signs and for two-tailed tests otherwise).*

Table 8 shows that $IEOC_t$ are significantly associated with ROA_t (β_t=0.210; p<0.05), but not with Tobin's q_t (β_t=0.15; p>0.1), after controlling for firm- and industry-level factors. However, in the analysis of other years (t+1, t+2), *IEOC* are significantly associated with both measures (for Tobin's q: β_{t+1}=0.269, p<0.05; β_{t+2}=0.272, p<0.05; for ROA: β_{t+1}=0.240, p<0.05; β_{t+2}=0.362, p<0.05). Consequently, the result supports Hypothesis 2a; *IEOC* make a positively contribution to firm performance. I also investigated the lagged effects between $IEOC_t$ and firm performance (Tobin's q_{t+1}, ROA_{t+1}, Tobin's q_{t+2}, and ROA_{t+2}) and found significant associations between *IEOC* and lagged firm performance.

Table 8: Performance Impacts of *IEOC* (Hypothesis 2)

	Tobin's q_t	ROA_t	Tobin's q_{t+1}	ROA_{t+1}	Tobin's q_{t+2}	ROA_{t+2}
$IEOC_t$	.149	.210*				
$IEOC_{t+1}$			.269**	.240*		
$IEOC_{t+1}$					.272*	.362**
Capital intensity	.092	.060	.057	.018	.018	-.459*
Debt/equity ratio	-.225*	-.340**	-.094	-.222	-.144	-.412**
Market share	.069	-.049	.288	-.170	.335	.353
Sales growth	.166	.116	.098	-.071	.117	-.135
Concentration	.090	.145	-.090	.099	-.220	-.288
Ind. capital intensity	-.064	-.049	-.116	.043	-.153	.158
Industry performance	.395**	.263**	.467**	.381**	.404**	.233
N	90	92	61	62	56	57
R^2	.366	.308	.487	.303	.345	.339

** p<0.05;** p<0.01 (all p-values are for one-tailed tests when the coefficients have the predicted signs and for two-tailed tests otherwise).*

To test Hypotheses 1b and 2b, I used the four components of *IEOC* reported by *InformationWeek* (i.e., knowledge management, electronic business, enterprise integration, and technical infrastructure). Based on Swanson's (1994) typology, organizational capabilities related to knowledge management, electronic business, and enterprise integration were classified as Type III innovations, while organizational capabilities related to technical infrastructure were categorized as Type I innovations. I followed the same procedure used to analyze the overall *IEOC* except that the overall *IEOC* index was replaced with that of each individual component. Tables 9 and 10 present the regression results on the impacts of IT sourcing mechanisms on the four components of *IEOC* and their performance as measured by ROA and Tobin's q. Due to the lack of data on individual *IEOC* components for multiple years, the analysis is based on data of only one year.

The results in Table 9 show that IT insourcing is positively associated with *IEOC* related to knowledge management ($p<0.01$) and electronic business ($p<0.1$), but IT outsourcing is not associated with any of the four components of *IEOC*. Interestingly, IT insourcing is found to be particularly effective as a means for developing organizational capabilities related to knowledge management. However, neither IT insourcing nor outsourcing is found to be significantly associated with *IEOC* related to enterprise integration and technical infrastructure. Consequently, the data provide mixed support for Hypothesis 1b. It should be noted although I did not conduct the analysis of time lagged effect for individual *IEOC* components due to the lack of data, there is already one-year lag between IT investments and IEOC because data on IT budgets were collected in 1997 and data on IEOC were collected in 1998.

Table 9: The Effect of IT Sourcing on *IEOC* Components

	IEOC Components			
	Knowledge Management	Electronic Business	Enterprise Integration	Technical Infrastructure
IT outsourcing	.042	.129	-.085	.136
IT insourcing	.444**	.188†	.062	.033
Concentration	.154	.121	-.082	.226
Industry capital intensity	.021	-.107	-.021	-.202
N	78	78	78	78
R^2	.195	.059	.023	.061

†p<0.10; p<0.05;** p<0.01 (all p-values are for one-tailed tests when the coefficients have the predicted signs and for two-tailed tests otherwise).*

With regard to the performance impact of the four components of *IEOC*, *IEOC* related to electronic business and enterprise integration are found to be positively associated with Tobin's q ($p<0.1$) and ROA ($p<0.05$), respectively (see Table 10).

In contrast, *IEOC* related to knowledge management and technical infrastructure are not significantly associated with either ROA or Tobin's q. Consequently, only partial support is found for Hypothesis 2b.

Table 10: Performance Impacts of *IEOC* Components

	Tobin's q	ROA
Knowledge management	-.063	-.029
Electronic business	.168†	.024
Enterprise integration	.063	.204*
Technical infrastructure	-.048	-.119
Capital intensity	.016	-.242
Debt/equity ratio	-.304**	-.203
Market share	.050	.099
Sales growth	.072	.046
Concentration	.036	-.008
Industry capital intensity	-.055	.124
Industry average performance	.368**	.199
N	90	92
R^2	.227	.159

†*p<0.10;* p<0.05;** p<0.01 (all p-values are for one-tailed tests when the coefficients have the predicted signs and for two-tailed tests otherwise).*

The significant relationship between *IEOC* related to electronic business and Tobin's q is consistent with the findings of previous studies that have shown high returns on e-business initiatives (Barua et al. 2004; Subramani and Walden 2001). In addition, the positive association between *IEOC* related to enterprise integration and ROA is also in line with prior research that has suggested that one of major benefits of IT is its ability in facilitating firm integration through platforms such as ERP and inter-organizational systems (Banker et al. 2006; Barki and Pinsonneault 2005; Rai et al. 2006). However, the non-significant relationship between *IEOC* related to knowledge management and firm performance is

surprising. I speculate that this may be due to the fact that, when compared with other systems, knowledge management systems typically require longer periods of time to produce tangible benefits (Brydon and Vining 2006). In addition, while many intangible benefits might be accrued as a result of such systems, these benefits might not be easily captured by quantitative methods.

5. Discussion and Implications

Before discussing the findings of this study and making implications, one caveat should be noted. The results of this study are based on data from large public firms. In addition, these firms usually are considered as leaders in using innovative IT applications for business operation. Three aspects of my findings need to be discussed in greater detail. First, the results indicate that while no significant relationship is found between *IEOC* and IT outsourcing, IT insourcing, in contrast, is significantly associated with *IEOC*. These results are consistent with the knowledge-based view of the firm (Grant 1996; Gulati and Singh 1998; Kogut and Zander 1992), which posits that hierarchies contain higher-order organizing principles, such as shared knowledge and enhanced interaction, that markets cannot supply. These higher-order organizing principles are particularly important for the coordination of interdependent activities and the creation of innovative business capabilities (Conner 1991; Nahapiet and Ghoshal 1998). In the context of IT sourcing mechanisms, my results suggest that hierarchies (in the form of IT insourcing) have advantages over markets (in the form of IT outsourcing) in their ability to create innovative *IEOC*. My finding is also consistent with IT assimilation research, which suggests that the shared

knowledge and communication between the IT unit and business units are important for assimilating IT into business operations and building *IEOC* (Armstrong and Sambamurthy 1999; Boynton et al. 1994). By relying on internal IT departments to provide IT services, firms can cultivate shared knowledge and strong interactions between the IT unit and business units over an extended period of time (Ray et al. 2005). This argument is especially true for those firms that are leaders in using IT in business operations, since they usually have a long history of using IT and often have developed high-level of shared knowledge and smooth interactions between the IT unit and business units.

Second, I find that *IEOC* are positively associated with firm profitability (ROA) and market value (Tobin's q). While prior research has shown that investments in IT positively affect firm performance, many practitioners wonder why, and how, IT investments enhance firm performance (Bharadwaj et al. 1999; Melville et al. 2004). Recent studies posit that IT can improve firm performance by renovating or improving business processes, such as customer services, new product development and supply chain operations. These organizational capabilities in turn lead to process enhancement and, therefore, to better firm performance (Pavlou and El Sawy 2006; Rai et al. 2006; Ray et al. 2005). In this respect, IT-enabled enhanced or innovative business processes (i.e., *IEOC*) should be key for understanding the business value of IT. The results of my study support this idea. I find that IT investments, and IT insourcing in particular, facilitate the development of *IEOC*, which in turn improve firm performance as measured by profitability and market value.

Finally, my results offer support for Swanson's (1994) typology of IT innovations. I distinguish *IEOC* based on Type I innovations (for technical infrastructure-related tasks) from *IEOC* based on Type III innovations (for the core business) and find that the advantages of IT insourcing over IT outsourcing are stronger for Type III innovation-related *IEOC* than for Type I innovation-related *IEOC*. In addition, Type III innovation-related *IEOC* have stronger impacts on firm performance than do Type I innovation-related *IEOC*. This result suggests that Swanson's (1994) typology of IT innovations provides a theoretical basis for categorizing different types of *IEOC*.

Given these results, this study provides useful implications for research and practice. In terms of research, I have compared the business impacts of IT outsourcing and insourcing through the lens of *IEOC*. Prior studies have focused mainly on measuring the benefits and risks of IT outsourcing (e.g. Grover et al. 1996; Lee et al. 2004) and have compared the impact of IT outsourcing and insourcing on the basis of cost savings (e.g. Lacity and Hirschheim 1993; Lacity and Willcocks 1998). However, little research to date has compared IT outsourcing with IT insourcing in terms of their roles in value creation, such as in developing *IEOC*. Understanding the value-creation aspect of alternative IT sourcing mechanisms is of paramount importance to the development and implementation of effective IT strategies. My study contributes to the literature by providing grounds on which to associate alternative IT sourcing mechanisms with *IEOC* and firm performance.

My study also has implications for managers. The results indicate that managers should consider IT insourcing if their goal is to pursue IT-enabled strategic opportunities. According to a recent survey, the size of overall IT investments has remained unchanged over the past several years, but investment in IT outsourcing has increased substantially over the same period (Oh et al. 2006). One explanation for this increased propensity to outsource IT is that many firms do not make sufficient effort to identify and capture the strategic value of IT, but instead view IT-related resources as non-core activities or even cost burdens. This is in line with research findings that have demonstrated that achieving cost-saving is the main motivation behind IT outsourcing (Lacity and Willcocks 1998; Loh and Venkatraman 1992a). My study suggests that in order to create value and, more importantly, gain strategic advantages from their IT investments, firms should be proactive in adopting IT insourcing and consider it as a part of their core activities. This is especially true for large firms as they usually can afford IT insourcing and have better abilities in managing in-house IT functions. Particularly, IT should not be viewed as a peripheral tool that helps firms focus on other core activities; it should be considered as a core activity in and of itself.

In fact, as shown in Table 2, many firms have brought their outsourced IT back in-house as they have begun to recognize the strategic importance of in-house IT development. For instance, Austin Adams, J.P. Morgan's CIO, stated in a recent survey that "We believe that managing our own technology is best for the long-term growth and success of our company" (Ramsaran 2004). Similarly, Jerry Gross, the CIO of Washington Mutual, said in an interview, "It occurred to me

that in some cases it would be better to re-insource back into the Washington Mutual IT group because the functions involved such close interaction with customers" (Overby 2003). Vicky Kelly, Bendigo Bank's CIO, was even more straightforward: "In banking now, the lines between the business of banking and IT are becoming blurred. We need the IT knowledge within our organization so we can use it to help the business and we want immediate access so we can change direction at a moment's notice. Outsourcing doesn't provide that" (Zampatakis 1997). However, far more companies still rely heavily on external IT vendors and do not give sufficient strategic priority to the internal development of IT resources, even though many of their IT outsourcing initiatives have not lived up to expectations. Finally, managers who consider IT insourcing should understand that building or rebuilding IT operations in-house is difficult and costly and unlikely to be accomplished in a short period of time. For this reason, a well-defined plan that defines what should be developed internally needs to be clearly articulated before adopting or switching to IT insourcing.

This study has several limitations that could be addressed in future research. The companies in my samples were all large firms whose stocks are publicly traded on major exchanges, so the results may not be generalizable to small, private firms. Future research that replicates this study using data from small- and medium-sized firms would be beneficial. In addition, my study was based on IT investment data, which does not provide detailed information on how and where the investment was made. Also, it is difficult to assess how well the systems were implemented and used within the organizations in the sample. The majority of IT business

value studies (e.g., Bharadwaj et al. 1999; Brynjolfsson and Hitt 1998) that have used investment data suffer from this limitation. Future studies can compensate for this deficiency by investigating which IT functions are typically outsourced or insourced and how well the systems were used when different sourcing mechanisms were adopted. Moreover, the method used in this study cannot rule out the possibility of reverse causality, meaning that my results may be partially due to IT-capable firms investing more in IT insourcing. In order to mitigate this problem, a one-year lag was set between IT investment and *IEOC*. Also, although I have controlled the effects of several firm- and industry-level factors in the data analysis, there are more factors that need to be controlled, such as firm maturity, R&D, and advertising expenditure. Finally, my analysis could be replicated with more recent data, since the scope of IT outsourcing has rapidly expanded in recent years to include dynamic forms of outsourcing arrangements (e.g., offshoring, business process outsourcing, and utility-based outsourcing).

6. Conclusion

IT sourcing has become a two-way street; many organizations have switched to IT outsourcing, while still others have brought their outsourced IT functions in-house. The IT outsourcing literature indicates that there are many reasons to adopt IT outsourcing, including reduced IT costs, the ability to focus on core competences, and the acquisition of technological leadership. Despite these potential benefits, my results have shown that IT insourcing could be more effective at developing *IEOC* than IT outsourcing, and *IEOC* are positively associated with firm performance, based on data from InformationWeek500 firms.

It is possible that outsourcing IT enables firms to reduce their IT expenses and utilize advanced technologies. But perhaps the kinds of IT resources that can have a profoundly affect on firms' organizational capabilities cannot be easily "purchased" from the market, rather they should be developed in-house over a long period of time. Consequently, in order to improve organizational capabilities and achieve strategic advantages through IT investments, firms should be more proactive in developing IT resources in-house and should consider it an integral part of their core competences, especially when they have the ability to do it.

References: (see the end of the thesis)

Chapter III (Essay #2): The Diffusion of IT Outsourcing: Does Industry Matter?

Abstract: *Although there is evidence suggesting industrial environments can influence firms' decisions to adopt IT outsourcing, our knowledge about the role of industry in IT outsourcing adoption is still limited. Based on the research on organization theory and industrial organization, this study identifies four industrial characteristics (munificence, dynamism, concentration, and capital intensity) that can influence the adoption of IT outsourcing and develops a theoretical framework to link industrial environments to the IT outsourcing diffusion in a given industry. Analyzing data from the Bureau of Economic Analysis (BEA) and Compustat, I find that the diffusion of IT outsourcing is positively associated with industry munificence and dynamism, but negatively associated with industry concentration and capital intensity. I conclude with a discussion of the implications and possible extensions of the findings.*

1. Introduction

Since IT outsourcing was recognized as one of the most pervasive organizational practices, researchers have investigated a variety of IT outsourcing issues, such as the risks of outsourcing and the outcomes of outsourcing (Dibbern et al. 2004). One stream of research focuses on the antecedents of outsourcing and has investigated the effects of a number of factors on IT outsourcing adoption, such as firm strategy, firm size, financial situation, etc. (e.g., Ang and Straub 1998; Loh and Venkatraman 1992a). Two groups of factors have been identified as main

antecedents of IT outsourcing adoption: the attributes of IS functions and the comparative advantages of IT outsourcing (Dibbern et al. 2004). For instance, research has shown that IS functions with a high level of asset specificity are less likely to be outsourced (e.g., Ang and Cummings 1997; Aubert et al. 2004) and that firms are more likely to adopt IT outsourcing when outside vendors have comparative advantages over the internal IS department in terms of production costs (e.g., Ang and Straub 1998; Loh and Venkatraman 1992a).

However, most studies on the antecedents of IT outsourcing adoption focus on factors internal to a firm (Dibbern et al. 2004), with a few exceptions that have highlighted the effects of external factors on IT outsourcing adoption, such as industrial demand volatility (Aubert et al. 2006) and national institutions (Apte et al. 1997). Since both internal conditions and external environments can influence firms' decision-makings (Dess and Beard 1984; Duncan 1972), more studies are needed on the external antecedents of IT outsourcing adoption in order to augment our knowledge in this area. In addition, some IS scholars have recently called for "taking industry seriously in IS research" because the important role played by industry factors has been almost ignored in the existing IS research (Chiasson and Davidson 2005; Crowston and Myers 2004). In order to expand our knowledge about the external antecedents of IT outsourcing adoption and respond to this recent call from IS scholars, this study focuses on the role of industry in the diffusion of IT outsourcing.

I reviewed the limited number of studies that have investigated the role of industry in the adoption of IT outsourcing and found that overall the evidence is

mixed. For instance, research has shown that the effect of industrial IT intensity on the adoption of IT outsourcing can be positive, neutral, or negative (Han et al. 2006; Oh 2005; Slaughter and Ang 1996). Two issues in the existing research may contribute to these conflicting results on the industry effect on IT outsourcing adoption: the conceptualization of industries and the measurement of IT outsourcing level. Previous research has conceptualized industries in terms of product characteristics (goods vs. services) and industrial IT intensity. However, this approach has resulted in conflicting arguments and results across studies. For instance, while some scholars have suggested that firms in service industries outsource IT functions less than firms in manufacturing industries because IT is of strategic importance to service firms (e.g., Sobol and Apte 1995), others have provided evidence to the contrary (Loh and Venkatraman 1992a; Han et al. 2006). In addition, previous studies have used measurements of IT outsourcing level that are incompatible with each other. While some studies have controlled outsourcing level by total IT budget, others have not (Lee et al. 2004; Loh and Venkatraman 1992a). Since the value of IT outsourcing level can be entirely different when different measurements are used, these differences may have contributed to the inconsistencies across different studies.

While the literature has provided some insights into the effects of some characteristics of industries, more research is needed to provide a conceptualization of industrial environments that focuses on their fundamental dimensions. Drawing on research on organization theory and industrial organization (Bain 1959; Dess and Beard 1984), this study conceptualizes

industries using four well-recognized characteristics (i.e., munificence, dynamism, concentration, and capital intensity) and link these industrial characteristics to the adoption of IT outsourcing. Furthermore, I also choose the measurement of IT outsourcing level carefully, following the suggestions of prior studies (Oh, 2005). To the best of my knowledge, this is the first study that focuses on the role of industry in the adoption of IT outsourcing by using well-recognized dimensions of industrial environments based on organization theory and industrial organization research. In addition, by using data from the US Bureau of Economic Analysis (BEA) and Compustat, this study provides empirical evidence that industrial characteristics, such as industry munificence, dynamism, concentration and capital intensity, can significantly influence the diffusion of IT outsourcing. My study contributes to the literature by revealing the previously undetected role of industry in the adoption of IT outsourcing.

The paper is structured as follows: I first review the empirical studies that have investigated the effects of industrial environments on the adoption of IT outsourcing. Then, based on the research on organization theory and industrial organization, I identify four important aspects of industrial environments and build a theoretical framework that links industries to the diffusion of IT outsourcing through four propositions. This framework is then tested using data from BEA and Compustat. I conclude with a discussion of the implications of the results and potential expansions.

2. Literature Review

Table 1: Industrial Influence on the Adoption of IT Outsourcing

	Research	Methods	Measures of Industry	Measures of IT Outsourcing Level	Propositions/Explanations	Results
Manufacturing vs. Services	Loh and Venkatraman 1992a	Date archive: 55 major US firms	Industrial vs. service (Not specified)	Outsourcing expenditure/ total assets	Control variable	No difference between firms in manufacturing and service industries.
	Sobol and Apte 1995	Survey:48 firms *(Computer-world Premier 100)*	Not specified	Percentage of firms that outsource at least one of main IT-related functions	Firms in service industry outsource less IS functions than firms in manufacturing industries because IS is an integral part of their operation and strategically important	Not supported. No significant difference between firms in manufacturing and service industries.
	Han et al. 2006	Date archive: 61 industries (1998-2003)	Producing goods (NAICS 11,21, 23-33); Producing services (others)	Purchased IT services/ intermediate input	Control variable	Services-producing industries outsource more IT than goods-producing industries.
IT-intensive vs. Non IT-intensive	Slaughter and Ang 1996	Date archive: 1,560 IS job ads	Computing vs. non-computing (latent coding)	In-sourcing vs. outsourcing employment (latent coding)	Firms in computing industries outsource less IT than firms in non-computing industries because IS skills are a core competence	Supported.
	Oh 2005	Date archive: 169 firms *(Information-Week 100)*	High vs. low according to the ratio of IT budget to revenue	Outsourcing budget/total IT budget	IT intensive firms may outsource less because IT is a core competence	Not supported. Coefficient is not significant.
	Han et al. 2006	Date archive: 61 industries (1998-2003)	Level of IT intensity (IT capital/ total capital)	IT services/ intermediate input	Firms in IT intensive industries outsource more IT, for these firms have greater capabilities in accessing and using outside IT-related resources	Supported. Firms in IT intensive industries outsource more than their counterparts in non IT-intensive industries.

	Research	Methods	Measures of industry	Measures of IT outsourcing level	Propositions/Explanations	Results
Classification according Specific Industrial Characteristics	Lee et al. 2004	Survey: 311 Korean firms	Long-linked, mediating, and intensive technology (Chatman and Jehn 1994)	Outsourcing budget/ total IT budget	Firms in long-linked industries have higher success rates in comprehensive IT outsourcing than their counterparts in other industries.	Supported. Comprehensive and selective IT outsourcing is more successful in long-linked industries than in others.
	Aubert et al. 2006	Survey and data archive: 196 Canadian organizations	1. Level of demand volatility in industry output; 2. Level of knowledge intensity (Lee and Has 1996)	Survey of 16 IT activities, such as operation of applications, disk space management, hardware maintenance etc.	1. Firms in industries characterized by high demand volatility outsource more IT than firms in other industries because IT outsourcing can improve their flexibilities in meeting changing demand. 2. Firms in low knowledge-intensity industries outsource more IT than their counterparts in other industries because engaging in various IT activities requires a high level of knowledge and skills.	Supported. IT outsourcing level increases with demand volatility and decreases with knowledge intensity.

Although it has been suggested that industry can play an important role in IT-related issues such as outsourcing (Chiasson and Davidson 2005; Dibbern et al. 2004), only a few studies have examined the effect of industry on firms' adoptions of IT outsourcing (see Table 1 for a summary). The literature on IT outsourcing features different ways to conceptualize industry. Studies have emphasized different aspects of industry, such as product characteristics or the importance of IT in the industry (Loh and Venkatraman 1992a; Slaughter and Ang 1996). In order to facilitate comparisons across studies, I have organized existing empirical studies in terms of their approaches to conceptualizing industry. Accordingly, these studies can be broken down into three basic groups.[8]

The first group of studies conceptualizes industries in terms of the product characteristic, classifying them into goods-producing (manufacturing) industries and service-producing industries. One reason for classifying industries in this way is that firms in service industries may not be interested in outsourcing IS functions as much as firms in manufacturing industries because IT is often an integral part of service firms' operations and is thus strategically important to them (Sobol and Apte 1995). However, this view is not supported by the empirical evidence. For instance, Loh and Venkatraman (1992a) found no difference in IT outsourcing levels between firms in manufacturing and service industries. Sobol and Apte (1995) found that the difference between firms in manufacturing and service industries is not significant with respect to both domestic and global IT outsourcing levels. Furthermore, Han et al. (2006) even found that service-

[8] Some IT outsourcing studies distinguish private industries from public industries (e.g., Slaughter and Ang 1996). Since this paper focuses only on private industry, I do not consider this distinction as a group.

producing industries use IT outsourcing at a significantly higher rate than goods-producing industries, refuting Sobol and Apte's (1995) argument.

The second group of studies conceptualizes industry according to the importance of IT in an industry and classifies industries by whether they are IT-intensive or not (Han et al. 2006; Oh 2005; Slaughter and Ang 1996). These studies are usually interested in the effect of IT intensity in a given industry on the level of IT outsourcing adoption. However, their propositions about the effect of IT intensity on outsourcing are inconsistent. Slaughter and Ang (1996) and Oh (2005) suggested that firms in IT-intensive industries may outsource less than those in non IT-intensive industries because IS skills and IT resources are a core competence for the former. Empirically, Slaughter and Ang (1996) found that computing firms are more likely to use internal IT staff than non-computing firms. However, Oh (2005) found that the relationship between IT intensity and outsourcing is non-significant. In contrast with Slaughter and Ang (1996) and Oh (2005), Han et al. (2006) suggested that firms in IT-intensive industries may outsource more because they have superior capabilities in accessing and using outside IT-related resources. Based on industry-level data, Han et al. (2006) found that IT-intensive industries outsource IT to a greater degree than non IT-intensive industries.

The third group of studies uses other specific industrial characteristics to classify industries. For instance, Lee et al. (2004) classified industries into three types based on Thompson's (1967) typology of underlying technologies: long-linked, mediating, and intensive technologies. They suggested that industry type will

moderate the relationship between the degree of IT outsourcing and outsourcing success because outsourcing is better suited to long-linked industries. Their results showed that in industries characterized by long-linked technologies, comprehensive IT outsourcing and selective IT outsourcing are more effective than minimal outsourcing, while in industries with mediating and intensive technologies, no significant differences exist in outsourcing success across the degrees of outsourcing. Aubert et al. (2006) used demand volatility and knowledge intensity as criteria for classifying industries. They argued that firms in industries characterized by high demand volatility may rely more on outsourcing because outsourcing can make a firm more flexible and able to address changing demand. Also, industries characterized by low knowledge intensity will outsource more of their IT because managing a variety of IT activities requires a high level of knowledge and skills. The empirical evidence has supported the arguments made by Aubert et al. (2006) and showed the level of IT outsourcing increases with greater demand volatility but falls with greater knowledge intensity.

Overall, the role of industry in firms' IT outsourcing adoptions is mixed. There is no consensus on the influence of industrial product characteristics and IT intensity on IT outsourcing adoption (Han et al. 2006; Loh and Venkatraman 1992a; Oh 2005; Slaughter and Ang 1996). I believe that there are two issues in the existing research that may cause these conflicting results on the role that industry factors can play. The first is the way how industries are conceptualized. In previous research, industries have been conceptualized in terms of product characteristics

(goods vs. services) and the IT intensity in a given industry. However, the studies based on these conceptualizations often produce conflicting arguments or results. For instance, while Slaughter and Ang (1996) suggested that firms in IT-intensive industries may outsource less than those in non IT-intensive industries because IS skills and IT resources are more important for the former firms, Han et al. (2006) have suggested that firms in IT-intensive industries may outsource more because they have higher capabilities in terms of accessing and using outside IT-related resources. Similarly, while some scholars have suggested that firms in service industries may outsource IT functions less frequently than firms in manufacturing industries because IT is strategically important to service firms (e.g., Sobol and Apte 1995), others have provided evidence that is not consistent with this argument (Loh and Venkatraman 1992a; Han et al. 2006). I believe that inconsistencies among prior studies about the role of industry in IT outsourcing adoption are partially due to how they conceptualize industry, in as much as they may not have captured the fundamental essence of industrial environments.

The other issue is how the IT outsourcing level is measured. Roughly speaking, the measurements of IT outsourcing levels used in previous studies fall into two types: relative and absolute measurements. Relative measurements are those that control the outsourcing amount by the amount of IT insourcing or by total IT budget. For instance, Lee et al. (2004) and Oh (2005) measured the level of IT outsourcing by calculating the ratio of the outsourcing budget to the total IT budget, and Slaughter and Ang (1996) measured the level of IT outsourcing by calculating the proportion of outsourced jobs to total IS jobs. Absolute

measurements are those that do not control the outsourcing amount by the amount of IT insourcing or total IT (although they are usually controlled by other variables such as total sales or total assets). For instance, Loh and Venkatraman (1992a) measured the level of IT outsourcing by calculating the ratio of outsourcing expenditures to total assets, and Han et al. (2006) used the ratio of purchased IT services over intermediated input. The value of IT outsourcing level using relative measurements can be radically different from that by using absolute measurements. For instance, when a firm increases its IT outsourcing budget by 5% and increases its insourcing IT budget by 10%, an absolute measurement will show an increase in outsourcing (e.g., outsourcing budge/total assets), but relative measurements will show a decrease (e.g., outsourcing budget/total IT budget). These differences in measurements may have contributed to the inconsistencies seen in prior research findings. For instance, the conflicting results about the effect of industrial IT intensity on the adoption of IT outsourcing in Slaughter and Ang's (1996) and Han et al.'s (2006) studies might be due to the different types of measurements used. That is, while Slaughter and Ang (1996) used relative measurements, Han et al. (2006) used absolute measurements.

Since issues of how industry is conceptualized and how the IT outsourcing level is measured contribute to inconsistencies in the observed effects of industry on IT outsourcing adoption, further studies should seek to establish a better conceptualization of industry and choose measurements of IT outsourcing level appropriate to their studies. While both relative and absolute measurements can be valid in different situations, it is suggested that relative measurements should be

used if the research seeks to understand why firms choose IT outsourcing over IT insourcing (Oh 2005). Furthermore, instead of classifying industries into manufacturing vs. service industries or IT-intensive vs. non IT-intensive industries, a few studies have conceptualized industries by their specific characteristics and have provided evidence of the usefulness of this conceptualization approach (Aubert et al. 2006; Lee et al. 2004). For instance, Lee et al. (2004) have shown that the type of industrial technologies (long-linked, mediating, or intensive technologies) moderates the relationship between the degree of IT outsourcing and outsourcing success. Aubert et al. (2006) have conceptualized industries according to the demand volatility and knowledge intensity in an industry and showed that the IT outsourcing level increases with greater demand volatility but falls as knowledge intensity rises.

These studies indicate that it may be more useful to conceptualize industries according to their specific characteristics rather than according to their product types or IT intensity because the latter approach leads to conflicting results. Industrial characteristics identified in these studies are based on various theories, such as Thompson's (1967) typology of technology and Williamson's (1985) transaction cost theory. I believe that this can be a promising approach for identifying industrial characteristics that are relevant to the adoption of IT outsourcing. As such, this study will identify relevant industrial characteristics by drawing on theories in other fields, such as organization theory and industrial organization (Bain 1959; Dess and Beard 1984). Research from organization theory and industrial organization has long suggested that certain industrial

variables can significantly influence firms' decision-makings, including industry munificence, dynamism, and complexity (Child 1972; Dess and Beard 1984), as well as industry concentration and barriers to entry (Bain 1959; Spanos et al. 2004). Due to the important role played by industrial environments in firms' decision-makings, it would be worthwhile to investigate how these well-recognized industrial variables affect firms' decisions on IT outsourcing adoption. Accordingly, based on research from organization theory and industrial organization (Bain 1959; Dess and Beard 1984), this paper identifies four relevant industrial variables and links them to the adoption of IT outsourcing.

3. Industrial Environments and IT Outsourcing Adoption

3.1 Industrial environments

Environments have long been recognized as influential forces on organization (Bain 1959; Lawrence and Lorsch 1967). Research in the field of organization theory conceptualizes the environment either as a source of information or as a stock of resources (Aldrich and Mindlin 1978). Scholars emphasizing the informational aspects of environments primarily focus on the degree of uncertainty faced by the organizations; those stressing the resource aspect of environments focus on the degree to which the organization is dependent on others for vital resources (Scott 2003). The literature has suggested a variety of dimensions for conceptualizing environments (see Table 2). For instance, Duncan (1972) conceptualized environments along two dimensions: simple-complex and static-dynamic. Aldrich (1979) identified six environment dimensions that refer to

Table 2: Dimensions of Environments – Research on Organization Theory[9]

	Munificence/ Growth	**Dynamism**	**Complexity/ Concentration**	**Barriers to Entry/Exit**	**Others**
Emery&Trist (1965)	N/A	instability	complexity, routineity	N/A	N/A
Lawence& Lorsch (1967)	N/A	dynamic	diversity	N/A	N/A
Thompson (1967)	N/A	dynamism	heterogeneity	N/A	N/A
Child (1972)	illiberality	variability	complexity	N/A	N/A
Duncan (1972)	N/A	static-dynamic	simple-complex	N/A	N/A
Aldrich (1979)	capacity	stability-instability, turbulence	homogeneity-heterogeneity, concentration-dispersion	N/A	domain consensus-dissensus
Mintzberg (1979)	hostility	stability	complexity, market diversity	N/A	N/A
Miller&Friesen (1983)	hostility	dynamism	heterogeneity	N/A	N/A
Dess&Beard (1984)	munificence	dynamism	complexity	N/A	N/A
Sharfman& Dean (1991)	N/A	dynamism	complexity, competitive threat	N/A	N/A

[9] The lists of studies on organization theory (Table 2) and industrial organization (Table 3) are not comprehensive. So are sample studies (Table 4).

Table 3: Dimensions of Environments – Research on Industrial Organization

	Munificence/ Growth	**Dynamism**	**Complexity/ Concentration**	**Barriers to Entry/ Exit**	**Others**
Bain (1959)	N/A	N/A	seller concentration, buyer concentration	cost advantage, economies of scale, capital requirement, product differentiation	N/A
Mann (1966)	N/A	N/A	seller concentration	economies of scale, product differentiation, cost advantage, capital requirement	N/A
Caves (1977)	growth rate of market demand	N/A	seller concentration, buyer concentration	product differentiation, height of fixed costs, scale-economy, absolute cost	N/A
Porter (1980)	N/A	N/A	rivalry among firms	economies of scale, product differentiation, capital requirements, switching costs, cost advantages, government policy	bargaining power of supplier/buyer, threat of substitutes
Scherer&Ross (1990)	N/A	N/A	concentration	diversification	vertical integration
Hay&Morris (1991)	N/A	N/A	concentration	economies of scale, product differentiation	N/A

Table 4: Dimensions of Environments – Sample Studies Using the Four Dimensions

	Munificence/ Growth	**Dynamism**	**Complexity/ Concentration**	**Barriers to entry/ exit**	**Others**
Keats&Hitt (1988)	munificence	instability	complexity	N/A	N/A
Boyd (1990;1995)	munificence	dynamism	complexity	N/A	N/A
Rajagopalan& Datta (1996)	growth rate	demand instability	concentration	capital intensity, product differentiation	N/A
Robinson& McDougall (1998)	growth rate	N/A	concentration	product differentiation	stage of the life cycle
Bharadwaj et al. (1999)	N/A	N/A	concentration	capital intensity, regulation	industry average market value
Spanos&Lioukas (2001)	N/A	N/A	competitive rivalry	barriers to entry	partner power, substitutes threat
Castrogiovanni (2002)	munificence	dynamism	complexity	N/A	N/A
Spanos et al. (2004)	growth	N/A	concentration	product differentiation, capital requirements	N/A
Heeley et al. (2006)	munificence	dynamism	complexity	N/A	N/A
Misangyi et al. (2006)	munificence	dynamism	seller concentration	capital intensity	N/A
McNamara et al. (2008)	munificence	dynamism	N/A	N/A	N/A

the nature and distribution of resources, including capacity, homogeneity, stability, concentration, domain consensus, and turbulence. Among the many dimensions identified in the literature, three have been widely emphasized (Castrogiovanni 2002) (see Table 2). Although different scholars give these dimensions different names, they are conceptually similar. For instance, Randolph and Dess (1984) used the terms "munificence, dynamism, and complexity" and Child (1972) used "illiberality, variability, and complexity." Dess and Beard (1984) also verified these three dimensions empirically using data from the US Census Bureau and the Bureau of Economic Analysis. This paper borrows Randolph and Dess's (1984) environment dimensions: munificence, dynamism, and complexity.

Environmental munificence is the extent to which environments provide enough resources to support established organizations and new entrants and enable them to grow and prosper (Castrogiovanni 2002; Randolph and Dess 1984). Aldrich (1979) labeled this dimension "environment capacity," which refers to the relative level of environmental resources available to an organization. Theoretical and empirical research clearly suggests that environmental munificence has a pervasive influence on organizational processes, structures, and strategies (Goll and Rasheed 2005). In munificent environments it is relatively easy for firms to survive, and thus they are able to pursue goals other than survival (Castrogiovanni 1991). As a result, research has indicated that environmental munificence is positively associated with the range of strategies firms pursue (Keats and Hitt 1988). For example, the growth and prosperity potential in a munificent

environment allows the organization to invest in new business initiatives (Koka et al. 2006) and become more diversified (Keats and Hitt 1988). In addition, abundant resources enable firms to generate slack resources (Bourgeois 1981; Cyert and March 1963; Pinsonneault and Kraemer 2002). Slack resources may in turn provide a means for maintaining organizational coalitions, provide resources for organizational innovation, and serve as a means for conflict resolution (Dess and Beard 1984).

In contrast, resources are scarce in low-munificence environments. The competition between firms is greater, which tends to have an adverse effect on firm profitability and organizational slack and leads to changes in intra-organizational characteristics and the behaviors of organizational members (Castrogiovanni 1991). For instance, when firms face greater environmental pressures, they are more likely to undertake revolutionary changes (e.g., structural redesign) rather than make incremental changes (e.g., work redesign) (Pinsonneault and Kraemer 2002). Koberg (1987) found that declines in munificence in primary and secondary schools are associated with reduced expenditures on book repairs and the creation of school closure forces. Yasai-Ardekani (1989) showed that resource scarcity enables greater formalization of procedures and more centralization of strategic decision-makings.

Environmental dynamism is the degree of change in environmental activities relevant to an organization's operations (Randolph and Dess 1984). Child (1972) has suggested that this degree of change may be seen as a function of three variables: 1) the frequency of changes in relevant environmental activities, 2) the

degree of difference involved at each change, and 3) the degree of irregularity in the overall pattern of change (i.e., the variability of change). Put simply, environmental dynamism is the frequency, degree, and unpredictability of change in relevant aspects of the environment (Castrogiovanni 2002). This sub-categorization of environmental dynamism is consistent with the distinction made in the literature between the rate of environmental change and the unpredictability of environmental change (Dess and Beard 1984).

Since environmental dynamism is the major factor contributing to uncertainty among organizational decision-makers (Child 1972), dealing with environmental dynamism becomes the essence of the administrative process (Thompson 1967). Generally speaking, the more dynamic environments are, the greater the uncertainty faced by organizations, and the greater the amount of information that must be processed by decision makers in order to achieve a given level of performance (Galbraith 1973). It has been suggested that firms can reduce the negative effect of environmental uncertainty or create a more predictable environment by using certain organizational strategies and tactics such as buffering and collusion (Dess and Beard 1984). The literature also indicates that a highly dynamic environment warrants a flexible organization (Lawrence and Lorsch 1967). For instance, Volberda (1996) posited that in a static, simple, and predictable environment, the optimal organizational form employs limited operational, structural, and strategic flexibility, while in a dynamic and/or unpredictable environment, the optimal organizational form features considerable operational, structural, and strategic flexibility. Furthermore, there is empirical

evidence suggesting that the fit between a dynamic environment and organizational flexibility leads to high performance (e.g., Anand and Ward 2004).

Environmental complexity refers to the heterogeneity of and range of an organization's activities that are relevant to an organization's operations (Child 1972). Managers facing a more complex (i.e., heterogeneous) environment will have greater information-processing needs than managers facing a simple environment (Dess and Beard 1984). Environmental complexity also establishes a need for greater role specialization in those areas of organization dealing directly with the environment (Child 1972). Research has suggested that firms can face different types of environmental complexity, such as competitive complexity, market diversity, resource complexity, and process/facility complexity (Cannon and John 2007).

Environmental complexity can significantly influence firms' behaviors. For instance, Bobbitt and Ford (1980) suggested that organizational decision makers deal with environmental complexity through structural divisionalization because divisionalization allows the development of specialized knowledge to deal with specific environmental variables and creates decentralized decision-making authority to take needed actions. Keats and Hitt's (1988) research suggested that a high level of environmental complexity may prevent firms from growing. Boyd (1995) found that CEO duality in a firm (i.e., the chief executive also serves as chairman of the board of directors) can contribute to firm performance in complex environments, but not in simple environments, which is measured by concentration.

While industry munificence, dynamism, and complexity have been emphasized in the research on organization theory (Dess and Beard 1984; Keats and Hitt 1988), different dimensions of industrial environments have been proposed by another line of research - industrial organization economics (Bain 1959; Caves 1977) (see Table 3). The basic model in industrial organization follows from the structure-conduct-performance (SCP) paradigm (Spanos et al. 2004). It claims that industry structure, such as industry concentration and barriers to entry, affects firm conduct such as pricing policies and investment policies, which in turn affects firm performance. In particular, it has been suggested that concentration and barriers to entry are industry characteristics that serve to insulate some firms from excessive competition, ensuring them higher than normal profitability (Spanos et al. 2004).

Industry concentration is the most emphasized industry structural element in the field of industrial organization. Concentration in an industry is expected to facilitate collusion and monopoly pricing. This is because that concentration may increase cooperative behaviors as firms in the industry can more easily monitor each other's conduct, which in turn fosters implicit collusive behaviors (Scherer and Ross 1990). In contrast, firms in a non-concentrated industry will likely behave competitively, and this also drives down profitability (Spanos et al. 2004). Another reason that industry concentration can influence profitability is that firms with large market shares are able to control prices and gain monopoly-type rents (Leach 1997). Empirical studies have shown that highly concentrated industries are the most profitable (Robinson and McDougall 1998).

Besides its role on industry profitability, industry concentration also has other

effects. For example, highly concentrated industries usually feature lower cost efficiency because the absence of competition allows for slack and other inefficiencies that raise costs (Melville et al. 2007). Industry concentration also influences a firm's level of innovation. Although there are counterarguments on how concentration affects innovation activities, it has often been suggested that industry concentration is negatively associated with innovation because monopoly power may reduce the motivation to innovate (Blundell et al. 1999; Geroski 1990). In addition, the literature suggests that firms in concentrated industries compete less aggressively than firms in non-concentrated industries in areas such as pricing, marketing, and new product introduction (Ferrier 2001), while firms in competitive industries have a greater tendency to adopt new technologies and new organizational practices (Iacovou et al. 1995 ; Lesure et al. 2004; Zhu et al. 2006).

The industrial organization literature has identified several factors as *barriers to entry,* including capital intensity, economy of scale, and product differentiation (Robinson and McDougall 2001). New firms are discouraged from entering a capital intensive-industry because: 1) the higher the capital requirements, the more difficult it is to obtain the required capital (Koch 1974); 2) the higher the capital requirements, the riskier it is to enter the industry because capital investments are often product-specific sunk costs and their return cannot be guaranteed when there are uncertainties in market demand or underlying technologies (Hay and Morris 1991; McAfee et al. 2004). Economy of scale can be a barrier to entry because an entrant will have to produce at a higher cost than existing firms, unless large-scale entry is feasible (Spanos et al. 2004). Finally,

product differentiation through advertising and sale promotions can build customer loyalty, which make it more difficult for new entrants to sell their products in markets (Spanos et al. 2004). Hence, product differentiation can also discourage new entry.

A related concept to barriers to entry is barriers to exit, which are economic, strategic, and emotional factors that keep firms competing in businesses even though they may be earning low or even negative returns on investment (Porter 1980). More often than not, barriers to entry are closely connected to barriers to exit, because in order to repel a determined entrant, an incumbent must have some fixed commitments to a market (Caves 1977). The fixed commitments in resources then become the sources of barriers to exit. For example, firms in some industries must invest heavily in fixed plant and equipment in order to produce goods or services. These investments in fixed assets can be sunk costs because they may have little salvage value if the business fails. As a result, these fixed investments can serve as a barrier to entry because entry to the industry is risky. At the same time, these fixed investments also serve as a barrier to exit, because they will be worth little if the firm exits its industry.

Among the factors serving as barriers to entry, *capital intensity* not only serves as a barrier to entry, it also represents a barrier to exit (Caves 1977; Porter 1980). As a barrier to entry, and more importantly as a barrier to exit, capital intensity has a significant influence on firms' behaviors (Datta and Rajagopalan 1998; Han et al. 2001), including IT outsourcing adoption (see the detailed discussion in the Hypothesis section). For this reason, this paper focuses on *capital intensity* due to

its relevance to IT outsourcing adoption. The literature on industrial organization has long recognized capital intensity as a barrier to entry (Bain 1959; Porter 1980). The main reason that high capital intensity can impede entry is that it drives up the risks associated with entry into and exit from the industry (Miller and Bromiley 1990). High capital intensity increases firms' risks in two ways. First, since capital inputs are usually less variable than labor inputs in the short term, a firm choosing to produce a given output with large amounts of capital and low amounts of labor has higher fixed costs and lower variable costs. As a result, the firm will experience larger variations in profits if demand fluctuates. Second, a firm using large amounts of capital runs a high risk of capital obsolescence because technological changes might make its capital investment worth little or nothing (Miller and Bromiley 1990). Empirical studies have shown that high capital intensity has a delimiting effect on entry (Han et al. 2001; Porter 1980).

As a barrier to entry and to exit, capital intensity can also affect certain behaviors of firms in an industry (Caves 1977). For instance, firms in capital-intensive industries are generally committed to a certain course of action due to the high investment in fixed assets, which is usually not re-deployable. Novel strategies, which are characterized by greater experimentation and a higher risk of failure, are less likely to be valued in this situation (Datta and Rajagopalan 1998). Studies have shown that, as a result, capital intensity is negatively associated with firms' technological orientations, which can foster a strong organizational commitment to R&D and to proactive adoption of new technologies for new products and business operations (Han et al. 2001). Capital intensity is also positively

associated with the profitability of an industry (Capon et al. 1990). There are two reasons for this positive relationship. First, capital intensity, as a barrier to entry, is expected to insulate firms from excessive competition, thus ensuring them higher-than-normal profitability (Spanos et al. 2004). Second, as suggested above, capital intensity is also an indicator of the risk of doing business in the industry (Miller and Bromiley 1990). As a result, there may be excess returns associated with such risks because firms are often risk-avoiding and high returns are needed to motivate them to take risks (Brealey and Myers 1996).

3.2 Theoretical framework and hypotheses

Based on research on organization theory and industrial organization, I identified five aspects of industrial environments that have been emphasized in the literature - munificence, dynamism, complexity, concentration and capital intensity. It should be noted that there is an overlap between the constructs of complexity and concentration. Research has suggested that environmental complexity is a multi-dimensional construct. For example, Dess and Beard's (1984) construct of complexity included two of Aldrich's (1979) environmental dimensions: homogeneity-heterogeneity and concentration-dispersion. Cannon and John (2007) claimed that environmental complexity has four sub-dimensions: competitive complexity, market diversity, resource complexity, and process complexity. Among the four sub-dimensions, competitive complexity (i.e., concentration) reflects a long-standing depiction of complexity from the industrial organization perspective and has been emphasized by many researchers (Cannon and John 2007). Research has revealed that industries exhibiting high monopoly

power are less complex than those exhibiting low monopoly power, such as industries infused with entrepreneurial newcomers (Keats and Hitt 1988). Furthermore, according to Porter's (1980) framework, firms in industries featuring low concentration may mask their competitive moves and are likely to engage in vigorous infighting. In contrast, when an industry is highly concentrated, its leader can impose discipline and play a coordinating role, which makes the industrial environments easier to deal with.

Numerous studies have used industry concentration to measure environmental complexity, such as Keats and Hitt (1988), Boyd (1990), and Dean and Snell (1996). Accordingly, in this paper, I focus on industry concentration but not on environmental complexity, since concentration is also a key element of environmental complexity. That is to say, this paper investigates the effects of the four dimensions of industrial environments on the adoption of IT outsourcing (i.e., munificence, dynamism, concentration, and capital intensity) (see Fig. 1 for the research model). Research in strategy and other fields has also used these four dimensions to conceptualize industries (e.g., Misangyi et al. 2006; Rajagopolan and Datta 1996) (see Table 4).

Environmental munificence is the extent to which environments provide enough resources to support established organizations and new entrants and enable them to grow and prosper (Randolph and Dess 1984). When resources are abundant in environments, it is relatively easy for firms to survive and thus they are capable of pursuing goals beyond survival, such as growth or diversity (Castrogiovanni 1991; Keats and Hitt 1988). As a result, one strategic priority of firms in

munificent environments is to expand in scale or scope (Dess and Beard 1984). Park and Mezias (2005) showed that during a period of high munificence, e-commerce firms are likely to have growth strategies. In contrast, in environments of resource scarcity, survival is usually the priority because the pressures of environmental selection intensify (Hannan and Freeman 1977). Therefore, firms in munificent environments expect more business growth than those in non-munificent environments. Indeed, research typically measures environmental munificence by the extent of growth in an industry (Keats and Hitt 1988). For instance, Dess and Beard (1984) used growth in industry total sales, price-cost margin, total employment, value added, and the number of establishments as indicators of environmental munificence.

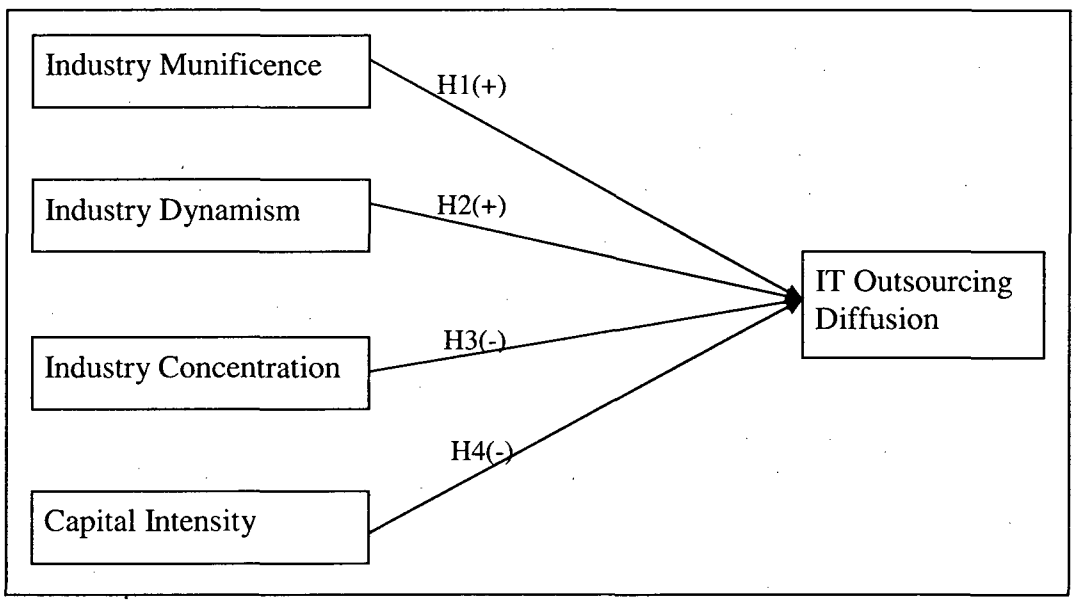


Figure 1: Research Model

IS scholars have suggested that the expectation of growth will lead firms to invest in IT, especially in IT infrastructure (e.g., Kraemer and Dedrick 2002, Mitra 2005). This is because that a superior IT infrastructure (e.g., standardized and

integrated) allows a firm to efficiently grow in scale and scope without an equivalent or greater increase in its cost of operations (Haddad and Ewing 2001; Ross 2003). For example, Amazon made significant investments in its distribution and IT infrastructures in anticipation of future growth (Shepard 2001), and Cisco invested heavily in IT in order to support its business expansion in response to growth in its industry (Kraemer and Dedrick 2002).

Firms in munificent environments are likely to confront fast growth and have an urgent need of an effective IT infrastructure to support their growth. However, building an effective IT infrastructure takes time (Bharadwaj 2000). Weill and Broadbent (1998) estimated a lead time of five to seven years to develop IT infrastructures. As a result, firms in munificent environments may be unwilling to wait for the development of their own IT infrastructure. Instead, they can acquire the IT infrastructure services they urgently need from outside IT vendors. Therefore, when firms grow fast in munificent environments, they may purchase more IT infrastructure services in markets in order to support their expansion in scale. In addition, a munificent environment will attract more firms to enter into the industry (Aldrich 1979). These firms are either derived from existing firms in related industries or are start-up. Oftentimes, they will lack the IT infrastructure resources required for business operations in the new industry because developing their own IT infrastructure takes time (Weill and Broadbent 1998). As a result, these firms are more likely to buy IT infrastructure services in markets. Since industry munificence enables existing firms to grow or encourages the entry of new firms, and the purchase of IT services in markets can facilitate the rapid

expansion in scale in existing firms or support the business operations of new firms, it is expected a higher level of IT outsourcing diffusion among firms in munificent environments. Accordingly, I propose:

Hypothesis 1: Industry munificence will be positively associated with IT outsourcing diffusion in an industry.

Environmental dynamism is the frequency, degree, and unpredictability of change among relevant environmental variables (Castrogiovanni 2002). As suggested by previous research, unpredictability is an essential characteristic of environmental dynamism, which makes environments the major factor contributing to uncertainty among organizational decision makers (Child 1972; Dess and Beard 1984; Thompson 1967). Making investments in IT resources can be a demanding task for managers in dynamic environments, not only because of the huge investment involved but also because of the irreversibility of IT investments (Weill and Broadbent 1998). This situation gets even worse when dynamic environments drive firms to change their business strategies, because changes in business strategies often necessitate changes in IT strategies and IT investment policies (Chan et al. 1997; Oh and Pinsonneault 2007). When business strategies become a moving target, it is very difficult, if not impossible, to make effective IT investment decisions. Weill et al. (2002) pointed out that decisions regarding what and how many IT resources to develop can be difficult in uncertain environments, since over-investing in IT leads to wasted resources that weigh heavily on the bottom line, and under-investing (or worse, developing the wrong IT) translates into delays and insufficient support for business operations.

Under uncertainty and irreversibility, "real options thinking" may become the appropriate way to guide investments (Fichman et al. 2005), in particular the defer option. An option to defer exists when a decision on whether or how to invest can be delayed for a certain period of time without significantly imperiling the potential benefits. This option is surprisingly valuable when uncertainty is high but resolvable over time (Fichman et al. 2005). Buying goods or services in markets (as compared with making large investments to produce goods or services in-house) provides firms with a defer option (Leiblein and Miller 2003). When in-house production entails greater sunk costs than purchasing through market contracting, in-house production will expose firms to the risk of owning assets that may turn out to have little value due to changes in either the underlying technology or product demand. Market contracting, in contrast, may involve greater short-term transaction costs but may also provide firms with the flexibility to acquire the right production technology and capacity when new information emerges (Leiblein 2003; Pindyck 1991). In sum, real option theory suggests that, when faced with uncertainty, it may be optimal for firms to defer irreversible in-house investments and utilize market mechanisms, which provide greater flexibility.

Therefore, when environments are dynamic (e.g., when market demand or IT itself is changing), firms should be cautious about making large IT investments in order to offer all IT services in-house. If there are large fluctuations in demand, firms may need to over-invest in IT and other necessary resources if they want to satisfy their peak demand, and this will probably increase costs on the bottom line

(Weill et al. 2002). In contrast, buying IT-services in markets using "unit priced contracts" (e.g., $12 per use,) can be a more flexible way to meet peak demand (Cullen et al. 2005). Willcocks et al. (2006) described how a large US financial services firm used global IT outsourcing to gain strategic agility in uncertain environments. During the refinancing boom, the financial firm was able to beat competitors by quickly meeting the immense surge in demand for IT services through its outsourcing, and when the refinancing boom burst, the firm was able to immediately scale back resources. Similarly, if the IT is itself in flux - e.g., a shift from a mainframe to a client-server platform - making a huge investment in mainframe IT assets could spell disaster. Rational firms will try to avoid such over-investment in in-house IT and turn to IT vendors to mitigate the risks associated with environmental dynamism (Leiblein 2003). As shown in Aubert et al. (2006), firms rely more on IT outsourcing when they face high uncertainty in demand. Similarly, Goo et al.(2007) found that in situations with a high degree of requirements uncertainty, a client firm has a tendency to choose more flexible approach such as short-term outsourcing contracts.

Another reason that firms may increase IT outsourcing in dynamic environments is that firms in such environments are more likely to expand their repertoires of competitive strategies (Miller et al. 1996), such as including both IT outsourcing and insourcing in their strategic repertoires rather than only focusing on IT insourcing. Miller (1993) suggested that the degree of simplicity (or complexity) of a strategic repertoire is an critical factor, because it can affect firm performance. A firm's strategic repertoire may include many activities or

categories of activities (e.g., cutting prices, introducing new products, outsourcing, etc.), or it may be dominated by a few, or even a single category of activity. Miller et al. (1996) found that in a stable industry, firms tend to simplify their strategic repertoires by focusing on only a few activities, while in a dynamic industry, firms are more likely to expand their strategic repertoires by engaging in a wide range of activities. As such, firms in dynamic environments may expand their strategic repertoires in IT management by using both IT outsourcing and IT insourcing, instead of only focusing on IT insourcing, to gain IT-enabled advantages. Based on the above discussion, I suggest that the level of IT outsourcing will increase with the degree of environmental dynamism, and thus propose:

Hypothesis 2: Industry dynamism will be positively associated with the diffusion of IT outsourcing in an industry.

Firms have a tendency to imitate the behaviors of other firms, especially when facing competitive and institutional or peer pressures (DiMaggio and Powell 1983; Guillen 2002). Competitive mimicry exists because a failure to follow competitors' behaviors may lead to competitive disadvantages, especially when competition is intense (Guillen 2002). For instance, studies have shown that high competition causes firms to aggressively adopt new organizational practices, such as business process reengineering (BPR) (Drew 1994) and supplier development programs (Krause 1999). Loh and Venkatraman (1992b) noted that although the performance effects of specific innovations in organizational practices are never perfectly known, imitation nevertheless could occur, possibly as an insurance

against being locked out of access to new resources or new sources of competitive advantage in the marketplace. Institutional mimicry occurs because mimicking peers' actions can save managers time and effort when they are trying to find a solution to an ambiguous and uncertain problem. As DiMaggio and Powell (1983, p.151) stated: "When organizational technologies are poorly understood, when goals are ambiguous, or when the environment creates symbolic uncertainty, organizations may model themselves on other organizations." Consequently, the more uncertainty a firm faces in a problem, the more likely it will mimic other firms' solutions to this problem.

IT management can be considered one of these ambiguous and uncertain problems. How to evaluate IT management has long been a problem for managers, and firms are usually uncertain about whether or how IT generates business value (Fichman 2004; Melville et al. 2004). The management of IT infrastructures has been made particularly complex by the uncertainties surrounding the proliferation of competing standards, fluctuations in cost-performance trends, the introduction of new systemic functionalities and the risk of technological obsolescence (Loh and Venkatraman 1992b). Given the high uncertainty associated with IT management, firms have a tendency to follow the successful IT management practices of other firms (e.g., the widely published IT outsourcing by Kodak) when faced with a high level of competition (DiMaggio and Powell 1983; Loh and Venkatraman 1992b). In fact, some studies have attributed the diffusion of IT outsourcing to firms' mimicry behaviors (Dibbern et al. 2004). For instance, based on the innovation diffusion perspective, Loh and

Venkatraman (1992b) and Hu et al. (1997) have suggested that the diffusion of IT outsourcing is a process by which the practice of IT outsourcing is communicated and copied through certain channels over time among the members of a social system. Lacity and Hirschheim (1993) noted that the IT outsourcing decisions of many firms are prompted by a few widely published success stories without due consideration having been given to the potential consequences, i.e., there has been a bandwagon effect in the adoption of IT outsourcing.

These are two reasons why industry concentration can have an impact on the diffusion of IT outsourcing. First, industry concentration often serves as an indicator of the competitiveness of an industry – the less concentrated, the more competitive it is (Scherer and Ross 1990). This is because concentration in an industry probably increases cooperative behaviors among rivals. In concentrated industries with a small number of major players, firms can monitor each other's conduct more easily, which in turn fosters implicit collusive behaviors (Spanos et al. 2004). In contrast, in non-concentrated industries with a large number of players, it becomes difficult to coordinate firms' actions, and aggressive competition may result (Scherer and Ross 1990). As suggested above, intensive competition will lead firms to mimic the actions of other firms, especially those with alleged best practices (Guillen 2002; Loh and Venkatraman 1992b). IT outsourcing has been suggested as a promising business practice in the academic and practice press, one that can deliver strategic, economic, and technological benefits (Grover et al. 1996; Loh and Venkatraman 1992b). Consequently, firms in non-concentrated industries may adopt IT outsourcing more aggressively than

those in concentrated industries due to the intense competitive pressures experienced in non-concentrated industries.

In addition, industry concentration also influences the discretion exercised by firms when adopting IT outsourcing to confront peer pressures. As suggested above, firms have the tendency to mimic other firms' IT outsourcing behaviors because IT management presents managers with ambiguous and uncertain problems (DiMaggio and Powell 1983; Loh and Venkatraman 1992b). Nevertheless, firms with strong power and substantial resources may not simply conform to peer pressures but rather make a strategic response, because they have the discretion and can proactively shape institutional norms (Oliver 1991). For example, Ang and Cummings (1997) found that large banks do not just follow peer pressures but make more strategic responses in their adoption of IT outsourcing, as compared with small banks. Main players in concentrated industries usually have high market and bargaining power (Porter 1980), which can help them resist mimetic pressures from peers. In contrast, the majority of firms in highly competitive industries, may merely adhere to peer norms due to their powerlessness (Ang and Cummings 1997; Oliver 1991). As a result, firms in highly concentrated industries are less likely to mimic the practice of IT outsourcing than firms in non-concentrated industries. In short, since firms in industries with a low level of concentration face greater competitive and peer pressures in the decision to adopt IT outsourcing, they are more likely to adopt than firms in highly concentrated industries. Accordingly, I propose:

Hypothesis 3: Industry concentration will be negatively associated with the diffusion of IT outsourcing in an industry.

Since entry into a capital-intensive industry requires huge investments in fixed assets that will be worth much less if the firms has to exit the industry, capital intensity tends to constrain firms' behaviors in several ways (Datta and Rajagopalan 1998). First, firms in capital intensive industries are generally committed to a course of action, which in turn leads to a high degree of continuity with past practices. Second, the efficient management of assets is critical in such environments, and novel strategies (characterized by greater experimentation and a higher risk of failure) are less likely to be valued. Finally, knowledge of what worked and what did not work in the past is crucial to avoid costly mistakes. IT outsourcing is a novel practice and may involve a high level of risk (Earl 1996; Oh et al. 2006). For instance, Aubert et al. (2005) revealed eight undesirable outcomes of IT outsourcing, including service debasement, cost escalation, and loss of organizational competencies. Bahli and Rivard (2003) identified four scenarios in which IT outsourcing can be risky for client firms: lock-in, contractual amendments, unexpected transition and management, and disputes and litigation. Since firms in capital intensive industries usually demonstrate greater continuity of past practices and value less novel and risky practices (Datta and Rajagopalan, 1998), they should be less likely to adopt IT outsourcing than firms in industries where capital intensity is low.

Furthermore, since the cost of exit is so high in capital intensive industries, firms in such industries are expected to have a long-term plan for their businesses (Datta

and Rajagopalan 1998). IS research shows that investments in in-house IT resources can have long-term positive effects on firm performance (Bharadwaj 2000; Santhanam and Hartono 2003). Accordingly, firms with a long-term orientation may be more willing to invest in in-house IT resources. In contrast, low capital intensity industries have a lower barrier for entry and exit (Scherer and Ross 1990). Ease of entry and exit will encourage firms to use temporary approaches to acquire the IT services they need. Compared with in-house development of IT services, outsourcing (short-term contracts in particular[10]) is often considered a more convenient alternative to obtaining needed IT services, especially when the need is urgent (Lacity et al. 1995; Lee et al. 2004). As suggested by Lacity and Willcocks (2001), one of main benefits of IT outsourcing is that it enhances flexibility in the provision of technology services. As a result, the adoption of IT outsourcing should be more likely in low capital intensity industries. In sum, the above discussion suggests that there may be a negative relationship between industry capital intensity and a firm's tendencies to adopt IT outsourcing. So I propose:

Hypothesis 4: Industry capital intensity will be negatively associated with the diffusion of IT outsourcing in an industry.

4. Research Method

[10] Researchers usually refer to contracts of less than 4 years as short-term contracts. These are the most popular type of IT outsourcing contracts (e.g., 55% in Lacity and Willcocks (1998) and 79% in Cullen et al.Cullen, S.K., Seddon, P., and Willcocks, L. *Information Technology Outsourcing Practices in Australia* Deloitte Touche Tohmatsu, Sydney, 2001.).

4.1 Data and variables

Two data sources were used in this study: the US Bureau of Economic Analysis (BEA) and Compustat. I used BEA's Use Tables (Input-Output Account) and Fixed Assets Tables to measure IT outsourcing level, industry munificence, dynamism and capital intensity. The Use Tables report the amount of goods or services produced by one industry and serving as an input for another industry as well as data on the gross output of each industry. There are total of 61 private industries in the sample (see Appendix A) and the data cover the period from 1998 to 2004 (a total of 427 observations[11]). The Fixed Assets Tables include investment and stock data on 46 different types of non-residential capital in 63 industries.[12] For this study, I used the data from 1998 to 2004. Sales data from Compustat for all firms in each of the 61 industries were used to calculate industry concentration.

The IT outsourcing diffusion level was operationalized as an industry's outsourcing expenditure controlled by its stock of IT assets, where IT outsourcing expenditure is the industry's IT services input[13]. The data on IT services input

[11] Because of missing data, the sample size for the final analysis is 420.

[12]There are 63 industries in the Fixed Assets Tables and 61 industries in the Use Tables, but these 63 industries are converted into the 61 industries in the Use Tables.

[13]This study focuses on the diffusion of IT outsourcing at the industry level. IT outsourcing is essentially a firm-level decision and may call for a firm-level of analysis. However, this might not be a major concern. While firm-level data are appropriate for research involving inter-firm heterogeneity, industry-level data are appropriate in research involving industry-level variation Nachum, L., and Zaheer, S. "The Persistence of Distance? The Impact of Technology on MNE Motivations for Foreign Investment," *Strategic Management Journal* (26:8), 2005, pp. 747-768.. For instance, numerous studies on industrial organization have used industry-level data Scherer, F.M., and Ross, D. *Industrial Market Structure and Economic Performance*, (3rd ed.) Houghton Mifflin, Boston, MA., 1990.. In fact, industry-level data even enable us to focus on the effects of industrial environments by isolating the effects of firm-specific characteristics Nachum, L., and Zaheer, S. "The Persistence of Distance? The Impact of Technology on MNE Motivations for Foreign Investment," *Strategic Management Journal* (26:8), 2005, pp. 747-768.. Essentially, by using industry data I assume that the industry averages correspond to a 'representative' firm in the industry.

were taken from the Use Tables. There are two IT services industries (see Appendix B): Information and Data Processing Services (NAICS 514) and Computer Systems Design and Related Services (NAICS 5415).[14] IT services input for an industry was calculated as the sum of the outputs produced by these two IT services industries that serve as inputs for the focal industry. IT assets are an industry's stock in information technology assets (computer hardware, software, and telecommunication equipment). It has been suggested that the sum of these three IT assets is a good approximate measure for IT stock level (Oliner and Sichel 2000; Stiroh 2002). The data on IT assets (computer hardware, software, and communications equipment) come from BEA's Fixed Assets Table.

Table 5: Variable Descriptions and Data Sources

Variable	Data Source	Measurement
IT outsourcing diffusion	Use Tables, Fixed Assets Tables	Ratio of an industry's IT outsourcing expenditure to its total IT stocks
Industry munificence	Use Tables	The slope coefficient of the regression of an industry's previous 5 years of output on time
Industry dynamism	Use Tables	Standard error of the above slope coefficient
Industry concentration	Compustat	Herfindahl-Hirschman Index
Capital intensity	Use Tables, Fixed Assets Tables	The fixed assets of an industry over its gross output

The data on gross output was used to calculate an industry's munificence and dynamism. As in Keats and Hitt (1988), I regressed log-transformed gross output

[14]Some industries within Information and Data Processing Services are not directly relevant to IT outsourcing (e.g., news syndicates and libraries and archives). However, as pointed out by Han et al. Han, K., Kauffman, R.J., and Nault, B.R. "Economic Contributions of IT outsourcing: An Industry-Level Analysis," in: *Working paper, Carlson School of Management, University of Minnesota*, , 2006., the proportion of these industries is small enough that the effect could be ignored.

for the previous 5 years on time. The antilog of the regression slope coefficient and its standard error was used as the indicator of munificence and dynamism, respectively. As in previous studies (Scherer and Ross 1990), I measured industry concentration using the Herfindahl-Hirschman Index, or HHI. The formula for HHI is $\sum_{i=1}^{N} S_i^2$, where S_i is the market share of the ith firm. I used sales data from Compustat to calculate the HHI, like previous research (Hou and Robinson 2006; Kobelsky et al. 2008). For each of the 61 industries in the Use Tables, I collected sales data for all the firms in that industry.

Capital intensity was operationalized as an industry's capital of fixed assets, controlled by the industry's gross output, following previous research (Hay and Morris 1991; Misangyi et al. 2006). Data for fixed assets come from the Fixed Assets Tables. As mentioned above, the Fixed Assets Tables include investment and stock data on 46 different types of non-residential capital in 63 industries. Non-residential capital includes equipment capital (e.g., IT hardware and software, general industrial equipment, autos, etc.) and structure capital (e.g., office, manufacturing structure, etc.). I calculated the sum of all 46 types of non-residential capital for each industry in order to obtain each industry's fixed assets, while controlling it by the industry's gross output.

IS research suggests that business conditions in previous years can have a significant influence on firms' decisions regarding IT budget (Hu and Quan 2006; Kobelsky et al. 2008; Weill 1992). Following this line of reasoning, I used previous years' industry characteristics as independent variables. As shown

above, the measurements for industry munificence and dynamism came from the regressions of the previous five years of data (Keats and Hitt 1988). For industry concentration and capital intensity, I used data for the previous year, as did in Kobelsky et al. (2008) and Weill (1992) to investigate IT investments. All these variables are summarized in Table 5.

4.2 Results

The descriptive statistics and correlation matrix for all the variables used in the analysis are presented in Tables 6 and 7. With respect to the IT outsourcing level, the water transportation industry produces the lowest value (0.003) and the oil and gas extraction industry gives the highest (0.828). Industry munificence ranges from 0.865 (apparel and leather and allied products industry) to 1.237 (computer systems design and related services industry). The mean for industry munificence is 1.051, indicating that, on average, gross output increases 5.1% per year in these industries. The minimum for dynamism in industry gross output is around 1 (transit and ground passenger transportation), which means that the industry was experiencing an almost constant growth in output. The oil and gas extraction industry has the highest dynamism value, at 1.093. Capital intensity also varies significantly from industry to industry, ranging from 0.098 (legal services industry) to 6.254 (railway transportation industry), with a mean of 0.909.

The average HHI is 0.121, with a minimum of 0.009 (utilities industry) and a maximum of 0.779 (warehousing and storage industry), with one caveat: the measure for HHI is based solely on data from public firms, which are usually

large, rather than from all firms in an industry. As a result, the HHI values are probably inflated. The HHI values are often used as a criterion for monopoly in antitrust cases. Usually, a market is considered to be highly competitive if its HHI is less than 0.1. Markets with an HHI of between 0.1 to 0.18 have a moderate level of competition. Competition in a market is considered low if its HHI exceeds 0.18, which is roughly approximated by a top-4-firm share of around 50% (Mueller 1995). The mean of HHI in this study is 0.125, which is considered to be moderately competitive.

Table 6: Descriptive Statistics

	Minimum	**Maximum**	**Mean**	**Std. Dev.**
IT outsourcing diffusion	0.003 water transportation	0.828 oil and gas extraction	0.223	0.150
Industry munificence	0.865 apparel	1.237 computer services	1.051	0.049
Industry dynamism	1.000 transit transportation	1.093 oil and gas extraction	1.011	0.013
Industry concentration	0.009 utilities	0.779 warehousing and storage	0.121	0.133
Capital intensity	0.098 legal services	6.254 railway transportation	0.906	1.018

Table 7: Correlation Matrix

	1	**2**	**3**	**4**	**5**
1. IT outsourcing diffusion	1				
2. Industry munificence	.058	1			

3. Industry dynamism	.018	.070	1		
4. Industry concentration	-.098*	-.063	-.107*	1	
5. Capital intensity	-.087	-.106*	.242**	-.047	1

** Correlation is significant at the 0.05 level (2-tailed).*

*** Correlation is significant at the 0.01 level (2-tailed).*

Since my sample contains panel data on 61 industries from 1998 to 2004, the ordinary least squares (OLS) approach is not appropriate because OLS residuals across time for the same industry are likely to be correlated, and this violates the assumption of OLS (Greene 2000). Panel models represent an alternative and preferred way to more efficiently estimate the parameters. I used the following equation for the panel models.

$$Outsourcing_{it} = \beta_0 + \beta_1 Munificece_{it} + \beta_2 Dynamism_{it} + \beta_3 Concentration_{it} + \beta_4 Cap\_Int_{it} + a_i + \varepsilon_{it}$$

where $Outsourcing_{it}$ is the IT outsourcing diffusion level for industry i at year t. Independent variables include munificence, dynamism, concentration, and capital intensity for industry i at year t. a_i represents unobserved time-invariant fixed factors associated with an industry i, such as the level of regulation in the industry. ε_{it} is the error term associated with each observation. Because of the presence of a_i in the composite error term r_{it} ($= a_i + \varepsilon_{it}$), r_{it} is likely to be serially correlated across time for the same industry, which makes the OLS approach inappropriate. One way to get rid of the a_i is to use panel models such as the fixed effects model.

The fixed effects approach subtracts the time averages for each variable, which removes a_i from the model, and then estimates all βs (Wooldridge 2002) [15].

The fixed effects model, rather than the random effects model, was adopted for data analysis in this study for two reasons: 1) a Hausman test ($chi^2(4) = 39.5$, $p<0.001$) rejected the assumption of a random effects model that unit effects would be uncorrelated with other regressors (Greene 2000); and 2) the 61 industries may not be viewed as a random sample of a population, since they are all the industries in the US (Wooldridge 2002). I used the *xtreg* command in STATA 8.0 to estimate the fixed effects model, where IT outsourcing level was regressed on industry munificence, dynamism, concentration and capital intensity.

Table 8: The Analysis Results of the Fixed Effects Model

	Coef.	Hypothesis	Result
Industry munificence	0.090**	H1	Supported
Industry dynamism	0.127**	H3	Supported
Industry concentration	-0.082 †	H4	Weakly supported
Capital intensity	-0.893**	H2	Supported

*** (*, †) Correlation is significant at the 0.01(0.05, 0.1) level (2-tailed).*

Table 8 provides a summary of the results from the analysis. Hypothesis 1 is supported because I find a significant positive relationship between industry munificence and IT outsourcing diffusion ($\beta=0.090$; $p<0.01$). Hypothesis 2 is also supported, as there is a positive relationship between industry dynamism and IT outsourcing diffusion, with $\beta=0.127$ and p-value <0.01. The coefficient of

[15]It should be noted that the approach of least square dummy variable (LSDV) is equivalent to the fixed effects model Wooldridge, J.M. *Econometric Analysis of Cross Section and Panel Data* MIT Press, Cambridge, MA., 2002..

industry concentration is negative (β=-0.082; $p<0.10$), which is consistent with Hypothesis 3 - IT outsourcing diffusion is negatively associated with industry concentration. Finally, Hypothesis 4 is also supported, as there is a significant negative relationship between industry capital intensity and IT outsourcing diffusion (β=-0.893; $p<0.01$).

5. Discussion

The results suggest that industrial environments have significant influence on IT outsourcing diffusion. First, I find that industry munificence is positively associated with IT outsourcing diffusion. The literature suggests that firms in munificent environments are likely to pursue growth (Castrogiovanni 1991; Dess and Beard 1984) and firm growth needs the support of a well-developed IT infrastructure (e.g., Kraemer and Dedrick 2002, Mitra 2005). The results indicate that firms are likely to purchase IT infrastructure services in markets in order to support their expansion in scale in munificent environments, probably because it takes time to develop in-house IT infrastructures (Weill and Broadbent 1998). Second, I find that industry dynamism is also positively associated with IT outsourcing diffusion. This is consistent with the real option view of governance choices, which posit that buying goods or services in markets provides firms with a defer option (compared with making large investments to produce goods or services in-house) (Leiblein and Miller 2003). This finding suggests that in dynamic environments, firms prefer to purchase IT services in markets rather than

develop them in-house because the former give them more flexibility when market demand or IT itself is in flux (Aubert et al. 2006; Willcocks et al. 2006).

Third, the results indicate a negative relationship between industry concentration and IT outsourcing diffusion. Prior studies have attributed the diffusion of IT outsourcing to firms' mimicry behaviors (Hu et al. 1997; Lacity and Hirschheim 1993; Loh and Venkatraman 1992b). This result suggests that firms in low-concentrated industries are more likely to adopt IT outsourcing because the intensive competition in these industries drives firms to mimic others in actions such as IT outsourcing. The relative powerlessness of firms in low-concentrated industries also makes it difficult for them to resist peer pressures with respect to IT outsourcing. Finally, I find that industry capital intensity is negatively associated with the diffusion of IT outsourcing. This finding supports the idea that firms in capital-intensive industries usually value less novel and risky practices, such as IT outsourcing (Datta and Rajagopalan, 1998).

Although the influence of industry variables on IS activities is growing, recent research suggests that industry-level factors have received little attention in IS research (Chiasson and Davidson 2005). For instance, Crowston and Myers (2004) reviewed papers published in major IS journals and conferences and found that only 4% of the IS studies in their sample are conducted at the industry level of analysis. Accordingly, Chiasson and Davidson (2005) called for "taking industry seriously in IS research," and suggested it is time to explicitly consider the role of industry in IS research because industry provides an important contextual space to build new IS theory and evaluate the boundaries of existing IS

theory. The literature review also suggests that although much of the research has investigated the antecedents of IT outsourcing adoption, only a few studies have investigated the role of industry in the adoption of IT outsourcing, so our knowledge of this area is still limited. More research is needed on how industrial environments affect firms' decisions on IT outsourcing adoption. In this paper, I have responded to the call for "taking industry seriously in IS research" and built a theoretical framework to link industrial environments to the diffusion of IT outsourcing.

This study contributes to the literature by identifying four fundamental dimensions of industrial environments based on research on organization theory and industrial organization, and it theoretically links these dimensions to the diffusion of IT outsourcing. To the best of my knowledge, this is the first study that conceptualizes industrial environments using these well-developed and fundamental dimensions of environments in the IT outsourcing literature. In addition, I have empirically verified the effects of industrial environments on the diffusion of IT outsourcing based on data from the US Bureau of Economic Analysis (BEA) and Compustat.

Another goal of this study is to raise interest in the effects of environments on IT outsourcing adoption and other IT-related issues. As pointed out by IT scholars, environmental factors such as industry and country characteristics have been almost ignored in IT research, even though there is evidence that these factors can play a crucial role in IT-related issues (Chiasson and Davidson 2005; Melville et al. 2004). For example, a number of studies have investigated the business value

of IT, whereas we still know little about how industry characteristics can influence IT business value (Melville et al. 2004). While this study has shown the significant effects of industrial characteristics on IT outsourcing diffusion, researchers may find it worthwhile to investigate how these industrial characteristics as well as other environmental variables influence other IT-related issues such as IT productivity and business value (Melville et al. 2007).

This study also provides some implications for managers. Mimicry behavior among peer firms has long been recognized in the research (DiMaggio and Powell 1983; Guillen 2002). IT outsourcing is one of those practices that firms tend to mimic due to the uncertainty and complexity involved in IT management (Lacity and Hirschheim 1993; Loh and Venkatraman 1992b). This study suggests that managers should be careful about imitating peers' behaviors in IT outsourcing because firms in different industries may adopt IT outsourcing for different reasons. While firms in some industries adopt IT outsourcing in order to support fast growth (in munificent industries) or avoid risks (in dynamic industries), firms in other industries adopt IT outsourcing due to competitive and institutional pressures (in competitive industries) or in order to achieve a certain flexibility (in low capital intensity industries). Rather than assuming that there is universal rationality underlying the adoption of IT outsourcing that will fit their own situations, firms should take these considerations into account before mimicking other firms' behaviors.

Finally, this study has four limitations that might be overcome in future studies. One is that I use industry-level data to study IT outsourcing, which is essentially a

firm-level phenomenon. Although industry-level data are appropriate for research involving industry-level variations (which is the case in the present study), and it also enables us to focus on the industry effect by isolating the effects of firm specific characteristics (Nachum and Zaheer 2005), future research could re-test the model of this study using firm-level data. In that way, the industry effect and the firm effect could be examined simultaneously. In addition, the IT outsourcing expenditures used in this study are aggregate data, which include a variety of IT services, such as data processing and system design services. Future research investigating the effect of industry on different types of IT services outsourcing could further advance our knowledge in this area.

Moreover, the industrial variables used in this study are identified based on studies from organization theory and industrial organization. Future research may identify other important industrial variables based on different theories, such as institutional theory. Also, firms adopt IT outsourcing with different reasons. This paper has considered reasons such as the need for IT infrastructure service, flexibility and mimicry. There are other important drivers of IT outsourcing, such as cost saving and technical competence (Dibbern et al. 2004; Lacity and Willcocks 1998). Future research may identify other industry-level factors that relevant cost saving and technical competence, such as the financial situation and technical advance of an industry. Finally, I have suggested above that industrial complexity is multi-dimension concept, which includes sub-dimensions such as competitive complexity, market diversity, resource complexity, and process complexity (Cannon and John 2007). In this study, only the dimension of

competitive complexity (i.e. concentration) has been examined for its role in IT outsourcing diffusion. Future research may further investigate the role of other dimensions of industrial complexity in IT outsourcing diffusion. For instance, the level of market diversity of a given industry may influence IT outsourcing because diversified market requires lots of managers' attention and outsourcing IT can let managers focus on core business (Dibbern et al. 2004; Jacquemin and Berry 1979).

6. Conclusion

The results of this study suggest that industry matters in the diffusion of IT outsourcing. While high industry munificence and dynamism can facilitate the diffusion of IT outsourcing, high industry concentration and capital intensity inhibit IT outsourcing diffusion. In order to better understand firms' decisions with respect to IT outsourcing adoption, researchers need to look at not only factors specific to the firm, such as IT cost structure and financial situations, but also contextual factors in environments, such as industry munificence and dynamism. The literature has long suggested that both internal conditions and external environments can influence a firm's decision-makings. By focusing on the role played by industry factors, this study balances the literature on IT outsourcing adoption with a perspective based on external environments.

References: (see the end of the thesis)

Appendix A: Description of United States Private Industries

Industry Title	1997 NAICS Code
Agriculture, forestry, fishing, and hunting	**11**
Farms	111, 112
Forestry, fishing, and related activities	113, 114, 115
Mining	**21**
Oil and gas extraction	211
Mining, except oil and gas	212
Support activities for mining	213
Utilities	**22**
Construction	**23**
Manufacturing	**31, 32, 33**
Durable goods	33, 321, 327
Wood products	321
Nonmetallic mineral products	327
Primary metals	331
Fabricated metal products	332
Machinery	333
Computer and electronic products	334
Electrical equipment, appliances, and components	335
Motor vehicle, bodies and trailers, and parts	3361, 3362, 3363
Other transportation equipment	3364, 3365, 3366, 3369
Furniture and related products	337
Miscellaneous manufacturing	339
Nondurable goods	31, 32 (except 321,327)
Food and beverage and tobacco products	311, 312
Textile mills and textile product mills	313, 314
Apparel and leather and allied products	315, 316
Paper products	322
Printing and related support activities	323
Petroleum and coal products	324
Chemical products	325
Plastics and rubber products	326
Wholesale trade	**42**
Retail trade	**44, 45**
Transportation and warehousing	**48, 49**
Air transportation	481
Rail transportation	482
Water transportation	483
Truck transportation	484
Transit and ground passenger transportation	485
Pipeline transportation	486
Other transportation and support activities	487, 488, 492
Warehousing and storage	493
Information	**51**

Publishing industries (includes software)	511
Motion picture and sound recording industries	512
Broadcasting and telecommunications	513
Information and data processing services	514
Finance and insurance	**52**
Federal Reserve banks, credit intermediation, and related activities	521, 522
Securities, commodity contracts, and investments	523
Insurance carriers and related activities	524
Funds, trusts, and other financial vehicles	525
Real estate and rental and leasing	**53**
Real estate	531
Rental and leasing services and lessors of intangible assets	532, 533
Professional, scientific, and technical services	**54**
Legal services	5411
Computer systems design and related services	5415
Miscellaneous professional, scientific, and technical services	5412-5414, 5416-5419
Management of companies and enterprises	**55**
Administrative and waste management services	**56**
Administrative and support services	561
Waste management and remediation services	562
Educational services	**61**
Health care and social assistance	**62**
Ambulatory health care services	621
Hospitals and nursing and residential care facilities	622, 623
Social assistance	624
Arts, entertainment, and recreation	**71**
Performing arts, spectator sports, museums, and related activities	711, 712
Amusements, gambling, and recreation industries	713
Accommodation and food services	**72**
Accommodation	721
Food services and drinking places	722
Other services, except government	**81**

Appendix B: Detailed Information on IT Service Industries

514 Information Services and Data Processing Services		**5415 Computer Systems Design and Related Services**	
5141	Information Services	54151	Computer Systems Design and Related Services
51411	News Syndicates		
51412	Libraries and Archives	541511	Custom Computer Programming Services
51419	Other Information Services		
514191	On-Line Information Services	541512	Computer Systems Design Services
514199	All Other Information Services	541513	Computer Facilities Management Services
5142	Data Processing Services		
51421	Data Processing Services	541519	Other Computer Related Services

Chapter IV (Essay #3): Country Environments and the Adoption of IT Outsourcing

Abstract: *To date, the research on IT outsourcing adoption has mainly been confined to a single-country perspective, which prevents us from understanding how country-specific variables influence the adoption of IT outsourcing. This study draws on new institutional economics and related research and builds a framework to link country environments to the adoption of IT outsourcing. More specifically, I suggest that country-level factors, such as the maturity of the IT-related legal system, generalized trust, uncertainty avoidance, Internet penetration, and the maturity of the IT outsourcing market will influence adoptions of IT outsourcing in a given country by affecting the related transaction costs. The results of an analysis of data from several sources support most of my propositions. I conclude the paper with a discussion of the study's implications for future research and practice.*

1. Introduction

Research on the adoption of IT outsourcing has been mainly limited to a single-country perspective, which prevents us from understanding how country-specific variables influence IT outsourcing adoption. For instance, after reviewing 84 papers on IT outsourcing from 1992 to 2000, Dibbern et al. (2004 p. 90) concluded: "research to date has mainly been confined to a single-country perspective and this neglects the insight to be gained from multinational or cross-cultural research." Gonzalez et al. (2006) extended Dibbern et al.'s work by

reviewing research related to IT outsourcing until 2005. They found that only 1.9% of the studies have attempted either to define national difference or analyze outsourcing in developing countries in terms of topics. Similarly, Samaddar and Kadiyala (2006) observed that most of the research on IT outsourcing has been carried out in the US and the UK, and thus in a Western cultural context. They suggested that the lack of culture-specific studies of the IS outsourcing decision-making process raises questions about the validity of Western approaches to IS outsourcing decision-making in the context of non-Western cultures.

Only a limited number of studies have discussed the country-level difference in IT outsourcing adoption. These studies have revealed that a country's institutional environments (e.g., employee power, norms and common beliefs) and factor environments (e.g., IT supply and demand markets) may have an effect on the diffusion of IT outsourcing in that country. For instance, research has indicated that IT outsourcing practices can be facilitated by a national culture of individualism and the presence of large industrial groups (Barthelemy and Geyer 2005; Dibbern 2004) as well as the development of the IT labor market and IT service market (Slaughter and Ang 1995; Grimshaw and Miozzo 2006). In addition, scholars have applied various explanations for a country's effects on the adoption of IT outsourcing, including explanations based on transaction costs (Slaughter and Ang 1995; Barthelemy and Geyer 2005), cultural values (Dibbern 2004; Samaddar and Kadiyala 2006) and employee power (Barthelemy and Geyer 2005).

However, the cross-country studies have typically compared the IT outsourcing practices of only two or three counties, which prevents us from verifying the effect of country-level factors on the diffusion of IT outsourcing. Observations based on two or three countries cannot effectively examine the effect of country-level factors on the adoption of IT outsourcing because the differences in IT outsourcing practices between two or three countries may be due to factors other than those investigated by the researchers. In order to verify the effects of country environments on the adoption of IT outsourcing, data from more countries are needed. In addition, although the literature has applied the perspective of transaction costs to explain the role of country environments in the diffusion of IT outsourcing (e.g., Barthelemy and Geyer 2005), no research has tried to identify important dimensions of country environments that may affect the transaction costs involved in IT outsourcing. This study addresses the above paucities in the existing literature by identifying important and relevant dimensions of country environments based on new institutional economics and related research (Coase 1937; Knack and Keefer 1997; North 1990) and by developing a theoretical framework to link country environments to the diffusion of IT outsourcing. I then test the framework using data from 18 countries.

The paper is structured as follows: I begin with review of the empirical studies that have investigated the effects of country-level factors on the adoption of IT outsourcing. Then, based on new institutional economics and related research, I build a theoretical framework to understand how country-level variables (e.g., the maturity of the IT-related legal system, generalized trust, uncertainty avoidance,

Internet penetration, and the maturity of the IT outsourcing market) affect firms' decisions on IT outsourcing adoption by influencing the opportunism costs and coordination costs involved in IT outsourcing. The framework is then tested on data from several sources, including eBusiness Watch, the Global Competitiveness Report, and the World Value Survey. I conclude the paper with a discussion of the implications of the findings and potential future research.

2. Literature Review

Only a few studies have investigated the effects of country-specific factors on the adoption of IT outsourcing (see Table 1). Slaughter and Ang (1995) found that firms in the US rely more on external IT workers than firms in Singapore. They suggested that societal values of individualism and free enterprise in the USA favor externalized IS employment because an independent IS workers can function profitably as an economic unit. Furthermore, the higher level of entrepreneurial skills among workers in the USA may enable more independent contracting. In contrast, the strength of cultural values such as belongingness and loyalty in Singapore may favor working as a group as well as long-term employment relationships with a firm. In addition, due to the shortage of IS workers in Singapore, firms often offer attractive compensation packages to induce IS workers to remain full-time employees. The national savings scheme for all employees in Singapore may also provide IS workers with incentives to prefer traditional permanent employment over independent work. Moreover, since they are uncertainty avoiders, workers in Singapore may be attracted to the greater

Table 1: Cross-country Studies on the Adoption of IT Outsourcing

Research	Countries	Findings	Explanations
Slaughter and Ang (1995)	US and Singapore	The US has more externalized forms of IS employment structures than Singapore.	1. US: entrepreneurship and individualism. 2. Singapore: cultural values of belongingness, loyalty and uncertainty avoidance; shortage of IS workers; compensation packages; etc.
Apte et al. (1997)	US, Japan, and Finland	1. Similar regarding domestic and global outsourcing, but more US firms have considered global outsourcing. 2. Japanese firms primarily outsource to subsidiaries; US firms typically outsource to independent vendors. 3. Finnish Firms seek greater savings through outsourcing	1. The Keiretsu system in Japan facilitates IT outsourcing to a subsidiary. 2. The history of unsuccessful outsourcing may make Finland firms seek greater savings to compensate for the risks of outsourcing.
Lacity and Willcocks (2000)	US and UK	Similar in IT outsourcing practices except: 1. UK firms more frequently insource IT; 2. US firms more frequently use a single supplier; 3. UK firms more frequently use only one stakeholder in negotiate/define contracts; etc.	1. The similarity may be due to the institutional isomorphic effect, whereby outside experts seed client organizations with similar standards and methods. 2. The differences may be explained by a more mature approach to outsourcing in the US together with a preponderance of larger deals and larger firms studied.
Dibbern (2004)	Germany and US	In Germany, the perceived in-house advantages in the systemic impact of an IS function reduce IS outsourcing level and the attitude toward outsourcing, but not in the US.	German firms have an integrative view of IS (i.e., the positive effects of IS depend on the smooth interplay between different IS components), while US firms do not have such a view.
Barthelemy and Geyer (2005)	France and Germany	German firms more frequently outsource IT to their subsidiaries than French firms.	1. The presence of large industrial groups in Germany. 2. German co-management system (i.e., employee representatives in the board of directors). 3. Unions have much more power in Germany.
Grimshaw and Miozzo (2006)	Germany and UK	1. UK clients are mainly from the public sector while Germany clients are from the private sector. 2. More negotiations with work councils before contracts signed in Germany. 3. Greater expertise in German client firms.	1. UK emphasizes public-private partnerships. 2. Germany has deliberative institutions. 3. German large industrial groups and service-intensive hi-tech manufacturing facilitate the diffusion of IT outsourcing.
Samaddar and Kadiyala (2006)	Korean vs. Western	Differences as well as similarities are found in IT outsourcing practices between Korea and Western countries.	The differences in IT outsourcing practices *may be due* to the cultural differences in Hofstede's five dimensions as well as familism and patriarchal hierarchy.

Security provided in a long-term employment relationship with a firm rather than opting for a series of short-term contractual relations with many firms.

Based on survey of firms in the US, Japan and Finland, Apte et al. (1997) showed that the overall level of domestic and global IT outsourcing is not significantly different among these three countries. However, they found that the proportion of firms that have considered global outsourcing in the US is significantly higher than in Japan. In addition, Japanese firms primarily outsource to their subsidiaries, while US firms typically outsource to independent vendors. Firms in Finland seek greater cost savings from their outsourcing than firms in the US and Japan. Apte et al. (1997) attributed these differences in IT outsourcing levels to the unique institutions or histories in the US, Japan and Finland. For instance, the use of the Keiretsu system in Japan encourages firms to outsource IT to their subsidiaries, and a history of unsuccessful IT outsourcing makes Finnish firms seek higher cost savings in their outsourcing to compensate for the perceived risks.

Lacity and Willcocks (2000) found that the practices and outcomes of IT outsourcing in the UK and the US are similar, with a few exceptions, such as UK firms insourcing IT more frequently, using a single supplier less frequently, and more often using only one stakeholder to negotiate and define contracts than US firms. The authors attributed the similarities in the US and UK findings to the institutional isomorphic effect, wherein outside experts seed client organizations with similar standards and methods. For instance, service providers such as Technology Partners (an outsourcing consulting firm), Shaw & Pittman or Millbank & Tweed (IT outsourcing legal firms) participated in 3 out of 4 of the

US and UK billion-dollar contracts studied. In this way, organizational learning is transferred across organizations and practices are quickly disseminated among US and UK organizations. In addition, Lacity and Willcocks (2000) suggested that the differences between the US and UK organizations in these a few cases may have been due to a more mature approach to outsourcing in the US and the preponderance of larger deals and firms in the US data.

Dibbern (2004) found that German and US organizations differ in the extent to which the systemic impact of an IS function will influence the sourcing decision. While in Germany the perceived in-house advantages of the systemic impact of an IS function appear to reduce both the extent to which IS is outsourced and the attitude towards outsourcing, in the US the relationship is not found to be significant and is even in the opposite direction. Dibbern (2004) explained these findings by pointing out that firms in Germany and the US have different views of IT function within a firm; while firms in Germany have an integrative view of IT functions (i.e., German firms believe that the positive effects of IS depend on a smooth interplay between different IS components), US firms typically do not hold such a view. Since German managers have a more integrative view of their organization, in Germany a firm is viewed as a group of related persons working together and a combination of activities interacting with each other. As a result, IT insourcing is believed to have more advantages over outsourcing in Germany, because German managers believe that insourcing can facilitate coordination between various interdependent IS functions and enhance the systemic impact of their IT functions. In contrast, since US firms appear to favor an analytic view

(i.e., the interplay between components is not as important), in the US a firm is viewed as a collection of tasks, functions, people, and machines that can be changed and exchanged more freely. Therefore, from the viewpoint of US managers, the comparative advantages of IT insourcing over outsourcing in terms of systemic impacts may not matter as much.

Barthelemy and Geyer (2005) found that firms in Germany are more likely to use quasi-outsourcing (the IT services unit is partially owned by the client firm, but independently managed) than firms in France. They suggested that three factors may help explain this finding: the presence of large industrial groups, the original system of co-management, and the power of unions in Germany. The German economy is characterized by the presence of large industrial groups (e.g., *Konzerns*) and interlocking ownerships across a large number of German firms. This situation has a huge impact on the method of IT outsourcing used because in Germany IT departments that have been quasi-outsourced can easily find customers among firms that belong to the same industrial group. In addition, unlike firms in other European countries, a large part of the board of directors in a German firm is composed of employee representatives (i.e., the co-management system). This co-management system makes German firms maintain a more cooperative relationships between the employer and employees than firms in other countries such as France. As a result, German firms often prefer IT quasi-outsourcing to regular outsourcing to independent vendors, since the former can protect IT employees' benefits. Finally, Barthelemy and Geyer (2005) suggested that the greater power of German trade unions also makes it easier for unions to

convince firms to choose quasi-outsourcing, since it is less detrimental to employees.

Grimshaw and Miozzo (2006) compared the status of the IT outsourcing market in Germany with that in the UK and found that both countries enjoyed remarkably high growth during the late 1990s and early 2000s. However, the conditions underpinning the growth of these two markets are country-specific. In the UK, the government's emphasis on public-private partnerships fuelled market growth by developing strong public-sector demand for IT services. In Germany, market growth has been due to the fact that captive markets established a stable market platform on which German IT firms can sell IT services, and there is strong demand from manufacturing industries. In addition, Grimshaw and Miozzo (2006) found that German firms engage in more negotiations with work councils before signing contracts as compared to firms in the UK, probably due to the relatively strong deliberative institutions in Germany. They also found that German managers tend to have greater technical and contractual expertise in IT outsourcing than UK clients, probably because UK clients are mainly in the public sector.

Samaddar and Kadiyala (2006) compared IT outsourcing practices in Korea with those in Western cultures (i.e., the US and the UK) and found differences as well as similarities between these two cultures. More specifically, the two cultures are found to differ in how they pursue contractual completeness, whether the in-house department competes or not, whether the design of the contract includes partnership measures, criticality of the tasks outsourced, familiarity with the

outsourced task, postponing of outsourcing decisions, and whether client firms withhold a piece of a contract as bait. In addition, they found that in the Korean organizations, "trust" and "task partitioning to gain advantage of varied expertise" are more important for achieving outsourcing success than in the Western organizations. Furthermore, in the Korean context, IT outsourcing success is achieved by maximizing reliability and relationships, while in the Western context success is achieved by maximizing flexibility and control. Based on Hofstede's (1991) five dimensions of culture as well as Korean-specific cultural features such as familism and a patriarchal hierarchy, Samaddar and Kadiyala (2006) attributed these differences in IT outsourcing practices to differences in culture.

Four observations can be made based on these cross-country studies of IT outsourcing. First, the research indicates that country environments may have a significant effect on the decision of a firm regarding IT outsourcing adoption because there are differences in IT outsourcing practices across countries, such as the different views on IT functions between Germany and the US (Dibbern 2004) and the different outsourcing procedures, client types, and expertise levels between the UK and Germany (Grimshaw and Miozzo 2006). Second, the literature review suggests that firms' adoptions of IT outsourcing can be influenced by a country's institutional environments (e.g., formal rules and informal values) as well as factor environments (e.g., the IT labor markets). For instance, research has shown that a national culture of individualism (Slaughter and Ang 1995; Dibbern 2004) and an interlinked ownership structure of firms (Apte et al. 1997; Barthelemy and Geyer 2005) can make firms more likely to

adopt IT outsourcing. A developed IT labor market (Slaughter and Ang 1995) and IT service market (Grimshaw and Miozzo 2006) also have positive effects on the diffusion of IT outsourcing in a country. Third, a variety of perspectives has been used in the literature to explain the role of country in the adoption of IT outsourcing. These include transaction costs (Slaughter and Ang 1995; Barthelemy and Geyer 2005), cultural values (Dibbern 2004; Samaddar and Kadiyala 2006) and power (Barthelemy and Geyer 2005). However, the existing literature has not developed these perspectives to explain the role of country in the diffusion of IT outsourcing because no studies have tried to identify the dimensions of country environments relevant to transaction costs, cultural values, or power. More studies are needed to identify these important dimensions and link them to the decision to adopt IT outsourcing.

Finally and most importantly, existing studies usually compare IT outsourcing practices between two or three countries,[16] which prevents us from verifying the effect of country-level factors on the diffusion of IT outsourcing. For example, the suggestion by Barthelemy and Geyer (2005) that the differences observed in IT outsourcing practices between Germany and France may be due to the fact that Germany has larger industrial groups, higher employee power within firms, and stronger trade unions than France. However, based on data from just two countries, one cannot say whether industrial groups, employee power, and trade unions really matter in firms' IT outsourcing adoption decisions. In order to verify these effects, data from more countries are needed.

[16] Only Apte et al. (1997) studied three countries (US, Japan and Finland). All the other studies I reviewed focused on two countries or cultures (see Table 1 for more detailed information).

In summary, the literature review suggests that there is a need for cross-country IT outsourcing studies based on a relatively large number of countries in order to verify country effects on the adoption of IT outsourcing. Furthermore, the dimensions of country environments that are relevant to IT outsourcing adoption need to be identified. This study contributes to the literature by addressing these two issues. More specifically, I take inspiration from previous studies (Slaughter and Ang 1995; Barthelemy and Geyer 2005) that used a transaction cost perspective to explain the role of country variables in IT outsourcing adoptions. The transaction cost perspective is used because the literature has shown that IT outsourcing involves high transaction costs, including opportunistic costs and coordination costs (e.g., Aubert et al. 2005; Earl 1996; Oh et al. 2006), and studies on new institutional economics and related research (Coase 1937; Langlois 1992; Malone et al. 1987; North 1990) have suggested that a country's institutional and factor environments can significantly influence the transaction costs involved in exchanges. Based on prior research, this study identifies five dimensions of country environments that are relevant to transaction costs and develops a theoretical framework to explain how country environments affect the diffusion of IT outsourcing by influencing the opportunistic and coordination costs involved in IT outsourcing. The framework is then tested based using data from 18 countries.

3. Theoretical Framework

3.1 New institutional economics

The field of new institutional economics examines how institutions interact with organizational arrangements (Menard and Shirley 2005). Institutions are defined as the written and unwritten rules, norms, and constraints that humans devise to reduce uncertainty and control their environments, including formal rules (e.g., laws, regulations, and contracts) and their enforcement mechanisms as well as informal constraints such as customs, norms, and values (North 1990; Williamson 2000). New institutional economics uses the transaction as the primary unit of analysis. It abandons the standard neoclassical assumptions that individuals have perfect information and unbounded rationality and that transactions are costless and instantaneous. Instead, it suggests that individuals have incomplete information and limited mental capacity, and because of this they face uncertainty over unforeseen events and outcomes and incur transaction costs to acquire information on exchanges (North 1990). To reduce risks and transaction costs and to facilitate private exchanges and cooperative behavior in their exchanges, humans create institutions, such as laws, contracts, norms, and beliefs on behavior (Menard and Shirley 2005). While formal rules such as contract laws and property rights play an important role in ordering the exchanges in an economy, North (1990) suggested that our daily interactions are overwhelmingly governed by informal constraints such as codes of conduct and norms of behavior. By structuring political, social, or economic incentives in human exchanges, institutions shape the way societies evolve through time (North 1991).

As the new institutional economics makes the transaction as the primary unit of analysis, transaction costs are central to this line of research. Transaction costs can be defined as the costs of running the economic system and are the economic equivalent of friction in physical systems (Williamson 1985). Transaction costs consist of all costs that are necessary for transactions to be conducted smoothly, including ex ante transaction costs (e.g., search and contracting costs) as well as ex post contracting costs (e.g., monitoring and enforcement costs) (Hyer and Chu 2003). Since Coase published *The Nature of the Firm* (1937), transaction costs have been widely studied in a variety of fields. In general, two types of transaction costs have been identified: opportunism costs and coordination costs (e.g., Williamson 1985; Gulati and Singh 1998).

Williamson (1985) emphasized opportunism costs and focused on the lock-in problem that results from the asset specificity in a transaction. Asset specificity refers to the degree to which the assets used to support a transaction can be redeployed to alternative uses and by alternative users without sacrificing their productive value. As asset specificity increases, redeployability decreases, the party that has made relationship-specific investments will become more dependent on the other party. Since the other party could be demonstrating "self-interest seeking with guile" (Williamson 1985), this dependence may create an opportunity for exploitation, hence the lock-in problem and the related opportunism costs (Klein et al. 1978). For instance, the other party may use this dependence as a source of bargaining power in further negotiations.

Transaction costs are not only influenced by transaction-specific characteristics such as asset specificity and the uncertainty involved in a transaction, but also can be affected by factors at a higher level (e.g., at the culture or country level). As pointed out by Williamson (2000), factors at the social-embeddedness level (e.g., norms, customs, and religion), at the institutional environment level (e.g., constitution, laws, and regulations), as well as at the transaction level (e.g., asset specificity and measurability of a transaction) can all affect transaction costs. For instance, a well-established legal system or cooperative norms in a society should mitigate the potential for opportunism in a transaction, and hence reduce the transaction costs involved (North 1990).

While the opportunism costs derived from the incentive problem in a transaction have been widely recognized in the literature, the coordination costs (e.g., costs in searching suppliers and contracting) derived from the interdependence problem involved in a transaction, although of equal importance, have been paid far less attention (Gulati and Singh 1998; Langlois 2006). For instance, Gulati and Singh (1998, p.784) pointed out that "while the importance of behavioral uncertainty and appropriation concerns as a rationale for hierarchical controls is well understood, the role of anticipated coordination costs and the uncertainty associated with them as a basis for hierarchical controls has been less developed and may be equally important." Similarly, Langlois (2006, p.1389) claimed that coordination costs are "at least as important as, and quite probably far more important than, the more glamorous costs of asset specificity in explaining the partition between firm and market." Interestingly, the literature has emphasized

the importance of coordination costs as a basis for hierarchical controls in the organization of activities within firms (Lawrence and Lorsch 1967; Thompson 1967). Coordination costs have also been discussed by IS researchers (e.g., Malone et al. 1987).

Besides regular coordination costs such as costs related to searching for suppliers, contracting, arranging delivery and so on, a special type of coordination costs has been identified in the literature: dynamic transaction costs (Langlois 1992). This type of costs is the cost of informing outsiders and persuading them to cooperate in production (i.e., do what the buyer asks them to do). Dynamic transaction costs can be much higher in external markets than within the firm because it is more difficult to inform outsiders and persuade them do what buyers want (Langlois 1992). Moreover, these costs are much more salient when the goods or services in transactions are in flux, because changes in the goods and services necessitate more informing and persuading activities.

While the new institutional economics emphasizes the importance of institutions, it also acknowledges the important roles played by factor environments, such as infrastructure and technology, in transactions. For instance, North (1994) emphasized the roles of both institutions and technology in determining transaction and transformation costs. This is because the factor environments in a country can also facilitate or impede private transactions by influencing the coordination costs involved in transactions. For example, the development of transportation facilities and Internet use in a country can reduce the coordination costs required for transactions and thus facilitate exchanges (Langlois 2003;

Malone et al. 1987). Since transaction costs comprise both opportunism costs and coordination costs, in this paper I examine both the institutional environments that influence opportunism costs and the factor environments that influence coordination costs.

3.2 Transaction costs in IT outsourcing

The opportunism costs involved in IT outsourcing have been widely discussed in IS research. This includes costs related to lock-in, moral hazard, and adverse selection (Aubert et al. 2005; Bahli and Rivard 2003; Oh et al. 2006). For instance, Bahli and Rivard (2003) identified lock-in as one of four scenarios for IT outsourcing risks. Lock-in occurs when a client cannot get out of a relationship except by incurring a loss or sacrificing part or all of its assets to the supplier (Aubert et al. 1998). Lock-in is more likely to occur when a client has made relationship-specific investments in a given contract, when it is difficult for a client to find alternative suppliers, and when a client lacks expertise in outsourcing contracts (e.g., allowing a long initial term without adequate provisions for termination due to poor performance) (Bahli and Rivard 2003). When lock-in occurs, a client firm become more dependent on the IT service supplier. As a result, cost escalation and service debasement may result if the supplier behaves opportunistically. Aubert et al. (2003) have shown that moral hazard and adverse selection exist in IT outsourcing contracts. For example, they discussed a case of moral hazard in which the IT service supplier made little effort to attain the agreed-upon service level and deliver the promised software functionalities, and a case of adverse selection in which the IT service supplier

misrepresented its true capacity in terms of both its ability to deliver the promised system and its intention to establish a solid knowledge base about the client's business. There have also been cases where IT suppliers seek to obscure the true cost savings achieved by rationalizing IT services. As one manager in an IT supplier pointed out: "From the point of view of doing things without the customer seeing, you can sometimes move things from one box to another; as far as they are concerned, you are still running six UNIX boxes but in effect we are running all six applications off one UNIX box" (Miozzo and Grimshaw 2005, p.1432). In addition, some IT suppliers use knowledge learned from one client firm to attract new clients or serve other clients in the same industry. For instance, a manager from a client firm stated: "You pay for them to learn your business, then they move those people to court other companies in your industry" (Lacity and Hirschheim 1993, p.78).

Several empirical studies based on large-scale data also support the view that IT outsourcing can involve considerable opportunism costs. For instance, Oh et al. (2006) showed that stock markets react to an IT outsourcing announcements as if the adoption of IT outsourcing is a risky investment. As a result, a larger contract size, more difficult monitoring conditions, and higher asset specificity - all of which indicate a higher level of opportunism costs - are associated with lower market evaluations of IT outsourcing (Oh et al. 2006). Similarly, Ang and Cummings (1997) and Ang and Straub (1998) found that opportunism-related factors such as transaction risks and asset specificity can prevent firms from outsourcing IT.

Besides opportunism costs, the coordination costs involved in IT outsourcing have also been emphasized by several IT researchers. For instance, Earl (1996) noted that companies often underestimate setup and management costs, such as redeployment costs, relocation costs, and longer-than-expected handoff or parallel running costs. Barthelemy (2001) listed a range of hidden costs associated with IT outsourcing, including costs related to vendor search and contracting, transitioning to the vendor, ongoing management, as well as switching vendors or reintegrating of IT activities internally. As pointed out by these researchers, coordination costs include not only the costs incurred to set up the IT outsourcing arrangement, but also costs related to keeping the outsourced IT functions running for business operations. The coordination costs for keeping IT functions running may depend on the interdependence between the outsourced IT functions and the business functions they support, the interdependence between the outsourced IT functions and the remaining in-house IT functions, and the interdependence between IT functions that are outsourced to different vendors (Aubert et al. 2005; Bahli and Rivard 2003). The more intensive these interdependencies, the higher the coordination costs, since coordinating the interface, timing and data structures will become difficult due to the separate facilities and the companies' different agendas (Bahli and Rivard 2003).

Coordination costs may also be tied to expected or unexpected changes in the environment or in requirements. For instance, changes in the market or the technology environment may cause a firm to amend its IT outsourcing contract to reflect the new circumstances. In this case, coordination costs result, since

contractual amendments lead to the costs associated with communicating new information, renegotiating agreements or re-coordinating operations (Bahli and Rivard 2003). Moreover, if the client firm lacks expertise in the outsourced activity or in the outsourcing process, more coordination costs may occur in the form of unexpected transition and management costs during the IT outsourcing process. For instance, Klepper and Jones (1998) suggested that a client without relevant expertise in outsourcing may expect to incur more costs transferring and relocating people and transferring equipment and related activities.

Concerns over the high opportunism and coordination costs in IT outsourcing may discourage firms from adopting IT outsourcing and hence may impede its diffusion (Aubert et al. 2004; Loh 1994). But more importantly, firms' decisions regarding IT outsourcing can vary from country to country because, based on insights from the new institutional economics and related research, the institutional and factor environments in a country can have a significant effect on such decisions by influencing the related opportunism costs and coordination costs, (Langlois 2003; Malone et al. 1987; North 1990). More specifically, I suggest that a country's institutional environments (the maturity of the IT-related legal system, generalized trust, and uncertainty avoidance) and factor environments (Internet penetration and the maturity of the IT-outsourcing market) will affect the opportunism and/or coordination costs involved in IT outsourcing, thereby affecting firms' decisions with respect to IT outsourcing adoption (see Fig. 1).

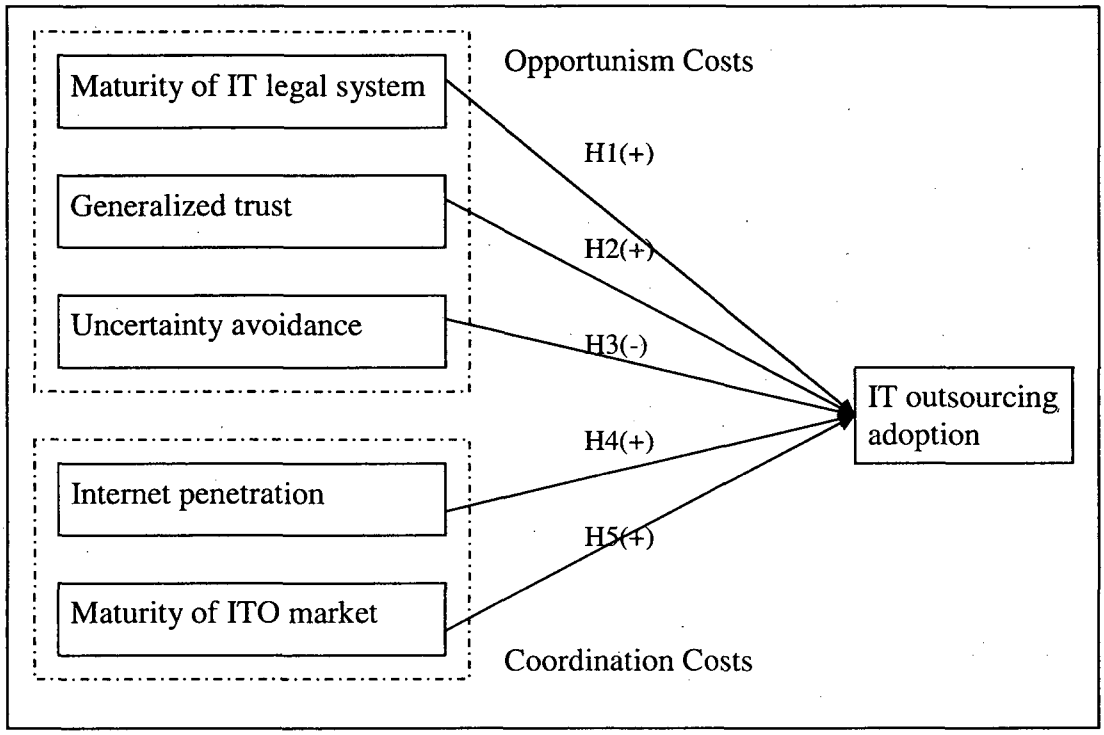


Figure 1: Research Model

3.3 Country environments and IT outsourcing

Research in new institutional economics suggests that a country's legal system (including its formal laws and related enforcement mechanisms) can either facilitate or prohibit exchanges between economic entities (North 1990). The hierarchy of such rules - from constitutions to statute and common laws to specific bylaws and, finally, to individual contracts - defines the constraints in such exchanges. In a country where the legal system is well-developed and enforcement mechanisms are efficient, firms are more willing to enter into exchanges with each other because their exchange are protected and facilitated by the legal system (North 1990). For instance, Luo (2005) suggested that the efficiency with which the host country's legal system protects intellectual property rights and ownership benefits will have an impact on the costs of

transactions, information scanning, and operations monitoring in the formation and operation of international joint ventures. As a result, joint ventures are facilitated in countries with established laws in intellectual property rights and ownership benefits. In contrast, inter-firm exchanges may involve a high level of transaction costs and may be discouraged in a country where the legal system is underdeveloped, because the absence of an efficient legal system is likely to foster more opportunism (North 1990).

The purchase of IT services in markets can involve a high level of transaction risk due to opportunism. This is one reason why firms often hesitate to adopt IT outsourcing (Aubert et al. 2004; Bahli and Rivard 2001). A well-developed and efficient legal system, in particular the legal system governing IT-related activities, is expected to mitigate these transaction risks and hence facilitate the diffusion of IT outsourcing. For example, the risks related to data security and the violation of IT intellectual property rights are often of concern to firms adopting IT outsourcing (Apte et al. 1997; Currie and Seltsikas 2001). In countries where there are well-established laws and regulations governing IT-related activities, such as those governing data security and IT-related property rights, firms may have fewer concerns about such issues and, hence, will be more likely to adopt IT outsourcing because their data security and IT property rights will be protected by the legal system. I therefore propose that firms in a country with a well-developed IT-related legal system may be more willing to adopt IT outsourcing than their counterparts in other countries.

Hypothesis 1: The maturity of the IT-related legal system in a country is positively associated with firms' IT outsourcing adoptions.

Inter-firm transactions can also be influenced by a country's informal institutions, such as its norms and common beliefs (North 1990). Generalized trust, or individuals' trust in people in general in a given country, is one such informal institution (Fukuyama 1995; Putnam 1995; Zak and Knack 2001). This type of trust is not the trust specific to any one person, such as a friend or a family member, but the trust generalized to a social unit as a whole, such as all the people in a local community or in a given country (Knack and Keefer 1997). Fukuyama (1995) suggested that generalized trust arises when a community shares a set of moral values in such a way as to create expectations of regular and honest behavior. Since virtually every commercial transaction implicitly carries a certain degree of trust (Arrow 1972), the level of generalized trust in a country can influence transaction costs and facilitate or prohibit impersonal exchanges (Fukuyama 1995; Knack and Keefer 1997).

In countries where the level of generalized trust is low, individuals can face high opportunism costs when conducting transactions with strangers (Fukuyama 1995). For instance, one party in a transaction may need to invest considerable money and effort to verify the information given by the other party because of the low level of generalized trust in the country. As a result, people in low-trust countries may transact more with close friends and relatives than with strangers due to the high transaction costs in dealing with strangers, compared with people in high-trust countries (Knack and Keefer 1997). Greif's (1993) study found that societies

with a higher level of trust feature enhanced impersonal business transactions. Knack and Keefer (1997) showed that generalized trust in a country is positively associated with economic performance, probably because a high level of trust reduces unnecessary transaction costs, facilitates impersonal transactions, and encourages innovation and investments.

IS research has examined the role of generalized trust in reducing transaction costs in another IT-related activity - online transactions. For instance, Pavlou and Gefen (2004) found that trust in the community of online sellers will raise buyers' intentions in online transactions with sellers they have never met in the real world. In other words, trust reduces the transaction risks or costs involved in online transactions and makes online transactions feasible. Mahmood et al. (2004) posited that the generalized trust in a country expands consumers' online shopping behavior because trust makes consumers who are unfamiliar with online shopping perceive it as less risky. Similarly, Huang et al. (2003) suggested that generalized trust in a country can increase Internet adoption for online business because generalized trust facilitates web-based transactions.

For IT outsourcing - which is similar to online transactions in terms of the related opportunism risks from sellers- firms in low-trust countries may be unwilling to buy IT services from external IT vendors, since transactions with vendors they do not trust can involve high transaction costs (Fukuyama 1995; Knack and Keefer 1997). Instead, they may choose to obtain IT services from internal IS departments, which they perceive to be more familiar and trustworthy than external IT suppliers. In contrast, in high-trust countries, a client firm may

consider outside IT suppliers as trustworthy and therefore perceive a low level of potential opportunism in IT outsourcing. As a result, firms in high-trust countries may be more willing to adopt IT outsourcing than their counterparts in low-trust countries. Accordingly, I propose:

Hypothesis 2: The generalized trust in a country is positively associated with firms' IT outsourcing adoptions.

People's uncertainty avoidance orientation in a country represents another type of informal institutions that can affect transactions. Uncertainty avoidance is one dimension of value orientation in a culture. It indicates the extent to which people feel either uncomfortable or comfortable in novel, unknown, surprising, and unusual situations (Hofstede 1991; Leidner and Kayworth 2006). People in countries with an uncertainty avoidance orientation try to minimize the possibility of such situations by enacting strict laws and rules and safety and security measures (Hofstede 1991). People in these countries typically seek to avoid uncertainty, because they usually feel great nervous stress and anxiety when facing uncertainty. In contrast, people in countries with an uncertainty-accepting orientation are more tolerant of opinions that are different from what they usually hear.

The uncertainty avoidance dimension of culture has been applied in IS research. For example, in a survey of 153 businesses across 23 countries, Png et al. (2001) showed that countries with a high level of uncertainty avoidance are less likely to adopt new technologies. Similarly, Thatcher et al. (2003) demonstrated that

students from countries with high uncertainty avoidance are less willing to experiment with new information technology. To the best of my knowledge, IT outsourcing research has not examined the role of an uncertainty avoidance orientation in firms' IT outsourcing decisions.[17] Nevertheless, the management literature on the relationship between uncertainty avoidance and firms' choices with respect to governance mechanisms has provided some insights into the role of uncertainty avoidance in firms' IT outsourcing decisions. For instance, Kogut and Singh (1988) revealed that firms in an uncertainty-avoiding culture are more likely to choose a joint venture or a wholly-owned green-field over an acquisition when entering a foreign market because acquisitions present firms with greater uncertainties with respect to the management of foreign operations. Steensma et al. (2000) showed that the positive relationship between the technological uncertainty faced by firms and the pursuit of technology alliances is moderated by the extent of the uncertainty avoidance orientation in a country. More specifically, firms in countries with high uncertainty avoidance are more likely to pursue technology alliances to cope with the technological uncertainties they face.

In general, this stream of management research suggests that firms in countries with high uncertainty avoidance are more likely to choose the governance mechanism that will reduce uncertainties (Kogut and Singh 1988; Steensma et al. 2000), an insight that can be applied when choosing between IT outsourcing and

[17] Slaughter and Ang (1995) suggested that the uncertainty avoidance orientation in Singapore may make IS workers prefer the greater security provided by a long-term employment relationship with a firm rather than a series of short-term contractual relationships with many firms. But their focus is the effect of uncertainty avoidance on IT outsourcing suppliers (IS workers) rather than its effect on outsourcing clients - the focus of this study.

insourcing. The practice of IT outsourcing is usually new to firms that are accustomed to an in-house provision of IT services, and it also involves a high level of behavioral uncertainty and opportunism risks (Aubert et al. 2005; Oh et al. 2006). As a result, when compared with firms in uncertainty-accepting countries, firms in countries with a strong uncertainty avoidance orientation may be more likely to avoid the uncertainties inherent in IT outsourcing. In other words, IT outsourcing may be less popular in uncertainty-avoiding countries than in uncertainty-accepting countries. Accordingly, I propose:

Hypothesis 3: The uncertainty avoidance orientation in a country is negatively associated with firms' IT outsourcing adoptions.

Country environments affect not only opportunism costs, but also coordination costs in IT outsourcing. In this paper, I identify two aspects of a country's factor environments that can influence coordination costs - Internet penetration and the maturity of the IT outsourcing market. The literature has examined the important role played by infrastructure technologies such as railway and telegraph in the development of markets (Lamoreaux et al. 2003; Langlois 2004). With the advances made in infrastructure technologies, the transportation and communication costs associated with transactions have been reduced and market transactions have been significantly facilitated. For instance, the technological changes in transportation and communications in the 19th century brought about an all-American version of 'globalization,' i.e., the arrival of nation-wide, large and integrated markets (Langlois 2003). IT and, in particular, the Internet, represents such an infrastructure technology. In fact, the role of IT in reducing

transaction costs - and coordination costs in particular - has often been long mentioned in the IT literature. For example, Malone et al.'s (1987) "electronic markets hypothesis" is based on the observation that the use of IT dramatically reduces coordination costs in transactions for activities such as searching for suppliers, establishing contracts, and scheduling activities. Several empirical studies have also provided evidence for the "electronic markets hypothesis" (e.g., Brynjolfsson et al. 1994; Hitt 1999). The Internet has reduced coordination costs for market transactions even more and the final result may well be a friction-free market (Bakos 1998).

As discussed above, IT outsourcing can involve considerable coordination costs, such as the costs associated with vendor search and contracting, transitioning to the vendor, and ongoing management (Bahli and Rivard 2003; Barthelemy 2001). These coordination costs have probably been reduced by the use of the Internet since it can facilitate the communication and collaboration between client firms and IT vendors (Clemons and Row 1992; Malone 1987). In addition, since IT services often involve considerable data exchange (e.g., information goods) that is facilitated by Internet use, the effect of Internet use on coordination costs should be even more significant in IT outsourcing transactions than in transactions involving traditional goods.

The impact of the Internet on coordination costs is especially significant in international IT outsourcing due to the high coordination costs involved in international trade. For example, Freund and Weinhold (2002) found that, with the aid of the Internet, U.S. exports of "computer and data processing" services

grew 71 percent between 1995 and 1999, while U.S. imports grew 243 percent. Furthermore, the Internet enables new forms of IT outsourcing, such as application service provider (ASP) and software as a service (SaaS) (Choudhary 2007; Currie and Seltsikas 2001; Susarla et al. 2003). With ASP or SaaS, client firms can access IT vendors' applications through a web browser, greatly reducing the costs incurred by client firms to acquire application services. As a result, more firms - especially those with tight cash flows - may adopt such types of IT outsourcing. In summary, since the Internet can reduce the coordination costs involved in IT outsourcing, I expect that firms in a country with high Internet penetration may be more willing to adopt IT outsourcing, due to Internet-enabled reductions in coordination costs. Accordingly, I propose:

Hypothesis 4: The Internet penetration in a country is positively associated with firms' IT outsourcing adoptions.

Another important factor that influences the adoption of IT outsourcing is the maturity of the IT outsourcing market (i.e., the pool of IT service suppliers) in a country. Langlois (1992) has suggested that sometimes firms vertically integrate certain activities because they cannot find suppliers in markets that have the capabilities to carry out these activities and because it is too costly to inform and persuade suppliers to build these capabilities. Informing and persuading suppliers can be costly, because different firms usually have separate authority structures and different frames of reference (Conner and Prahalad 1996; Demsetz 1988; Kogut and Zander 1996). With vertical integration, however, a firm can build capabilities for these activities in-house by using its authority to effectively

coordinate sub-units. This is particularly true when these activities are innovative and their requirements are still in flux (Langlois 1992). Langlois called the costs of informing and persuading suppliers to build capabilities for the innovative activities needed by the client firms "dynamic transaction costs," which essentially are a type of coordination costs. Overtime, increasing depth of outsourcing markets and the expertise gained by suppliers may lead to markets that can provide the kind of capabilities needed by a client firm for its activities (Langlois 2003).

In this regard, the maturity of the IT outsourcing market in a country may affect IT outsourcing decisions due to the related dynamic transaction costs. When firms are unable to find the exact IT expertise and functions they need in markets, which can happen when an country's IT outsourcing market is underdeveloped, and informing and persuading IT vendors to provide them proves too costly (Langlois 2003), they may choose to develop the needed IT expertise and functions in-house. In contrast, when the IT outsourcing market in a country is well developed, firms will probably be able to find the IT expertise and functions they need in markets. In this case, a client firm does not need to inform and convince IT vendors to provide what it needs, and hence the dynamic transaction costs almost disappear. As suggested by Nam et al. (1996), the more IT service vendors there are in a market, the more standardized IT services available, and the easier it is for firms to acquire IT services in markets.

Similarly, Slaughter and Ang (1995) posited that one of the reasons that the US has more externalized forms of IS employment structures than Singapore is that

the US has a more developed market of externalized IS workers (e.g. IS consultants from consulting firms and independent contract IT workers). Ang and Cummings (1997) also found that the presence of capable and trustworthy IT service suppliers facilitates IT outsourcing adoption by US banks. In short, since firms in a country with a less developed IT outsourcing market face higher dynamic transaction costs in IT outsourcing adoption, they may use IT outsourcing less than their counterparts in a country where the IT outsourcing market is well developed. As a result, I propose:

Hypothesis 5: The maturity of the IT outsourcing market in a country is positively associated with firms' IT outsourcing adoptions.

4. Method

4.1 Data and variables

The data for this study come from several sources, including e-Business Watch (ebusiness-watch.org), the Global Competitiveness Report from the World Economic Forum (weforum.org), the World Values Survey (worldvaluessurvey .org), Hofstede's scores for national culture (geert-hofstede.com), the World Development Indicators (WDI) from the World Bank (worldbank.org) and Eurostat (europa.eu). The countries in the current sample are all European. In 2003, their populations ranged from 397,296 to 82,536,680 inhabitants, with GDP at purchasing power parity (PPP) per capita ranging from US$10,027 to US$35,406. The Internet user numbers of these countries (per 1,000 inhabitants) ranged from 177 to 756.

The data on *IT outsourcing adoption* are from e-Business Watch, a website developed and managed by the European Commission that aims at disseminating information on all EU policies, actions and initiatives that promote the growth and development of EU enterprises. In 2003, e-Business Watch interviewed 7302 firms in 10 sectors[18] across 25 European countries[19] about their use of e-business and related issues. It should be noted that only data from 18 countries are included in the final analysis due to missing data on some variables. One question in the survey was "Has the company outsourced some of its IT activities?" to which the firms could answer yes (1) or no (0). I take this data as a measure of the level of IT outsourcing adoption.

As for the independent variables, data on *the maturity of the IT-related legal system* are from the Global Competitiveness Report, a World Economic Forum report published annually since 1979 that assesses the ability of countries to provide high levels of prosperity to their citizens. The report uses a set of global competitiveness indexes on the institutions, policies, and factors influencing economic prosperity. This study uses the index of "laws relating to ICT" from the 2003 report to measure the variable "the maturity of the IT-related legal system." The survey question asked in determining this index was "To what extent laws

[18] The sectors include Textiles and leather, Chemicals, Electrical machinery and electronics, Transport equipment, Crafts and trade, Retail, Tourism, Business services, Telecommunications and computer-related services, and Health and social services.

[19] Including Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, Slovenia, Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain, Sweden, the United Kingdom and Norway.

relating to information and communication technologies are well developed and enforced?" Respondents answered on a scale of 1 to 7[20].

Data on *generalized trust* are from the World Values Survey (Wave 4, 1999-2004). The World Values Survey is the most comprehensive and wide-ranging survey of human values ever undertaken. It is an ongoing academic project conducted by social scientists to assess the state of the sociocultural, moral, religious and political values of different cultures around the world. One question in this survey was "Generally speaking, would you say that most people can be trusted, or that you can't be too careful in dealing with people?" The generalized trust indicator is the percentage of respondents in each country replying "most people can be trusted" (after deleting the "don't know" responses). The same measure has been widely used in the literature as the generalized trust in a country (Knack and Keefer 1997; Paxton 2007).

The *uncertainty avoidance* index is from Hofstede's website. Hofstede's website reports scores for five dimensions of culture from a wide range of countries, including power distance, individualism, masculinity, uncertainty avoidance and long-term orientation (Hofstede 1991). Although the validity, reliability, and time effect of Hofstede's culture dimensions have been criticized by some scholars (e.g., Roberts and Boyacigiller 1984; Spector et al. 2001), Hofstede (2002) has suggested that their validity can be shown by correlating test results with outside criteria that are expected to correlate according to some kind of theory or logic. In

[20] Although this index emphasizes on laws related to electronic business, it may also reflect the development of IT-related laws in general.

the most recent 2001 edition of *Culture's Consequences*, Hofstede (2001) described and analyzed almost all cross-national studies (up until the late 1990s) published in a variety of disciplines for which the results were significantly and meaningfully correlated with the scores on his dimensions, and suggested that these results continue to validating of the dimensions and reliability of the instrument that led to their identification. Besides, Hofstede's study has certain appealing attributes, such as the large sample size, its codification of cultural traits along a numerical index, and its emphasis on attitudes in the workplace (Kogut and Singh 1988). The use of the uncertainty avoidance index in this study is conservative, since if it proves to be a poor construct, I will be less likely to find its predicted association with IT outsourcing adoption.

The *Internet penetration* measure also comes from the 2003 e-Business Watch survey of e-business use and related issues in Europe (7,302 firms in 10 sectors across 25 European countries). One question in the survey was "Does your company have access to the Internet?," and firms could choose to respond "yes" or "no" or "don't know". The indicator for Internet penetration is the percentage of respondents in each country who replied "yes" to this question (after deleting the "don't know" responses).

The data used to measure *the maturity of the IT outsourcing market* in a country are from Eurostat, the statistical office of the European Community. It is charged with providing the European Union with statistics on all member states. The statistics are made comparable by harmonizing them from the European statistical system (ESS) to a single methodology. I gathered statistics on the production

value of the IT services industry (NACE 72) as well as national GDP statistics from Eurostat for all the counties in this study. Finally, the maturity of the IT outsourcing market is measured as the production value of the IT service industry, controlled by national GDP.

Table 2: Variable Descriptions and Data Sources

Variables	Data Sources	Measurement
IT outsourcing	e-Business Watch	Whether a firm has outsourced some of its IT activities.
Maturity of IT legal system	Global Competitiveness Report	The extent to which the IT-related legal system is well developed and enforced.
Generalized trust	World Values Survey	The extent of individuals' trust in people in general
Uncertainty avoidance	geert-hofstede.com	Hofstede's index of uncertainty avoidance
Internet penetration	e-Business Watch	The percentage of firms in a given country that have access to the Internet.
Maturity of ITO market	Eurostat	The production value of the IT service industry, divided by national GDP
Control variables	WDI-World Bank; e-Business Watch;	GDP per capita, industry, firm size, IT recruiting, sales growth, Internet use, and IT application use.

Similar to other studies that have investigated the effects of country-level factors on IT-related phenomena (Chinn and Fairlie 2007; Dewan et al. 2005), this study controlled for the effect of GDP at purchasing power parity (PPP) per capita, data are from the World Bank. I also controlled some firm-specific characteristics that may influence the adoption of IT outsourcing, including whether firms have recently recruited or tried to recruit staff with special IT skills (Rec), whether sales have increased (Sale_Inc), whether a firm uses Internet (Internet), and whether a firm uses IT applications such as ERP, SCM, CRM, knowledge

management and e-learning systems (IT_App), since the literature has suggested that firm-specific characteristics matter in IT outsourcing adoption (Dibbern et al. 2004). I also controlled for the effect of industry and firm size using dummy variables (9 dummy variables for industries and 3 dummy variables for firm size). Data for industry and firm-level control variables are from e-Business Watch. All main variables are summarized in Table 2.

Table 3: Country Characteristics

Country	IT Outsourcing	Maturity of IT Legal System	Generalized Trust	Uncertainty Avoidance	Internet Penetration	Maturity of ITO Market (%)
Austria	0.26	5.2	0.33	70	0.97	2.13
Belgium	0.45	4.5	0.29	94	0.92	2.97
Czech	0.31	4.1	0.25	74	0.98	3.03
Denmark	0.48	5.8	0.67	23	0.95	3.55
Estonia	0.71	5.6	0.23	60	0.96	1.64
Finland	0.39	5.7	0.57	59	0.96	2.99
France	0.17	5.3	0.21	86	0.78	2.58
Germany	0.20	5.6	0.38	65	0.94	2.42
Hungary	0.33	4.4	0.22	82	0.90	2.52
Ireland	0.28	5.4	0.36	35	0.96	4.63
Italy	0.18	4.2	0.33	75	0.90	3.08
Netherlands	0.36	5.2	0.60	53	0.96	3.29
Poland	0.26	3.9	0.18	93	0.81	1.42
Portugal	0.25	4.7	0.12	104	0.93	1.28
Slovakia	0.14	4.2	0.16	51	0.75	1.47
Spain	0.38	4.8	0.39	86	0.88	2.05
Sweden	0.50	5.1	0.66	29	0.97	4.47
UK	0.27	5.7	0.29	35	0.85	4.47

The characteristics of the countries in the sample are shown in Table 3. The descriptive statistics and correlation matrix for the main variables are presented in Tables 4 and 5, respectively. All the variables in these two tables are at the country level (including IT outsourcing adoption which is expressed as a country average). However, it should be noted that it is the final analysis used firm-level, rather than country-level, IT outsourcing data. Tables 3 and 4 reveal considerable

variability across countries in terms of their levels of IT outsourcing adoption. In Slovakia and France, only 14% and 17% of firms, respectively, reported that they have outsourced some IT activities, while in Estonia, 71% of firms reported that they have outsourced some IT functions. This variability indicates that country-level factors may play a role in the diffusion of IT outsourcing. Similar variability is found in many other country-level factors. For example, while the output of the IT service sector accounted for only 1.28% of the national GDP in Portugal, it accounted for 4.63% of the national GDP in Ireland. With respect to generalized trust, Denmark had a score of 0.67 and Portugal is only 0.12.

Table 4: Descriptive Statistics of Country-level Variables

Variable	Minimum	Maximum	Mean	Std. Dev.
IT outsourcing	0.14	0.71	0.33	0.14
Maturity of IT legal system	3.90	5.80	4.97	0.63
Generalized trust	0.12	0.67	0.35	0.17
Uncertainty avoidance	23	104	65	24
Internet penetration	0.75	0.98	0.91	0.07
Maturity of ITO market	1.28%	4.63%	2.78%	1.04%

Table 5: Correlation Matrix of Country-level Variables

	1	2	3	4	5	6
1.IT outsourcing	1					
2.Maturity of IT legal system	.355	1				
3.Generalized trust	.410	.531*	1			
4.Uncertainty avoidance	-.264	-.581*	-.643**	1		
5.Internet penetration	.547*	.362	.530*	-.246	1	
6. Maturity of ITO market	.139	.413	.594**	-.694**	.371	1

*$p<0.05$; ** $p<0.01$*

4.2 A multi-level model

To test the hypotheses, I used a multi-level model that simultaneously estimates firm and country-level effects (Raudenbush and Bryk 2002). The data of this study are hierarchically organized, with firms nested within countries, and information at both the firm level and the country level was used to determine the adoption of IT outsourcing. As IT outsourcing adoption is a dichotomous variable, I used a Bernoulli distribution with a logit link function for the analysis. The level-1 (firm level) model for IT outsourcing adoption is:

$$\text{Log}[P_{ij}/(1-P_{ij})] = \beta_{0j} + \beta_1 \text{Rec}_{ij} + \beta_2 \text{Sale\_Inc}_{ij} + \beta_3 \text{Internet}_{ij} + \beta_4 \text{IT\_App}_{ij} + \beta_x \text{Dummy\_Variables}_{ij}\text{(sizes \& industries)} + r_{ij}$$

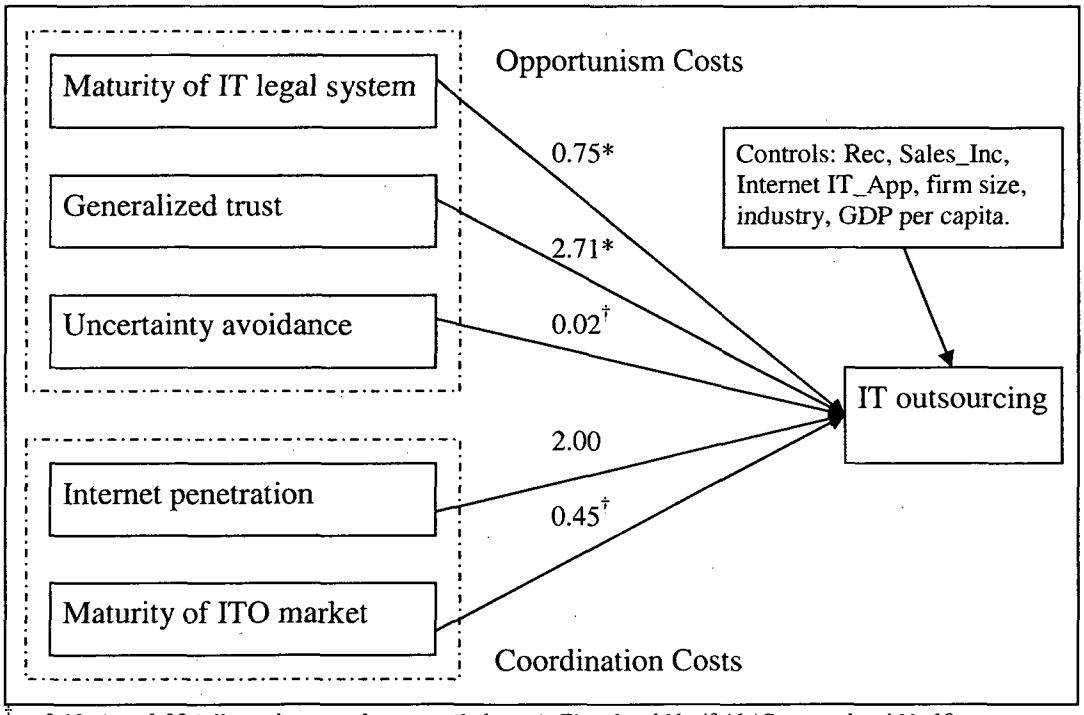
where P_{ij} is the probability that firm i in country j had outsourced some IT activities. The model controlled for firm-specific characteristics such as Rec_{ij} (whether firms have recruited IT staff recently), Sale_Inc_{ij} (whether sales have increased), Internet_{ij} (whether firms use Internet), IT_App_{ij} (whether firms use various IT applications) and firm size as well as industry effects are controlled in the model. β_{0j} is the intercept, which is allowed to vary across j counties and which will be predicted by country-level explanatory variables. $\beta_1 \ldots \beta_x$ are regression coefficients for firm-level and industry-level control variables, which do not change from country to country. Finally, r_{ij} is the firm-level error term.

The level-2 (country level) model is the main interest of this study, since I focus the effects of country environments on the adoption of IT outsourcing. It is specified as follows:

$$\beta_{0j} = \gamma_{00} + \gamma_{01}\ \text{IT\_Legal}_j + \gamma_{02}\ \text{Trust}_j + \gamma_{03}\ \text{UA}_j + \gamma_{04}\ \text{Internet}_j + \gamma_{05}\ \text{ITO\_Market}_j + \gamma_{06}\ \text{GDP}_j + u_{0j}$$

where β_{0j} is the intercept of the level-1 model. Independent variables include the maturity of the IT-related legal system, generalized trust, uncertainty avoidance, Internet penetration, the maturity of the IT outsourcing market as well as the GDP per capita of country *j*. u_{0j} represents the country-level error term.

4.3 Results



*†p<0.10; * p<0.05 (all p-values are for one tailed tests). Firm-level N=4346; Country-level N=18.*

Figure 2: Regression Results

The statistical package HLM 6 was used to analyze the multi-level model. All country-level independent variables and all non-dummy firm-level independent variables were grand-mean centered in order to simplify the interpretation of the results (Raudenbush and Bryk 2002). The main result is shown in Figure 2, based

on sample sizes of 4,346 at the firm level and 18 at the country level. For hypotheses related to opportunism costs, I find a positive relationship between the maturity of the IT-related legal system and IT outsourcing adoption (β=0.75; p<0.05). This result supports Hypothesis 1, suggesting that the level of IT outsourcing adoption in a country increases as the country's IT-related legal system becomes more advanced. Hypothesis 2 is also supported because the relationship between generalized trust and IT outsourcing adoption is positive (β=2.71; p<0.05). This implies that generalized trust in a country reduces the transaction costs in IT outsourcing and hence encourages firms to adopt IT outsourcing. However, the positive relationship found between uncertainty avoidance and IT outsourcing adoption (β=0.02; p<0.10) is a little surprising, since Hypothesis 3 stated the opposite. I will provide an explanation for this inconsistency in the Discussion section.

For the hypotheses related to coordination costs, I find that the relationship between Internet penetration and IT outsourcing adoption is not significant, inconsistent with Hypothesis 4. Hypothesis 5 is supported because there is a positive relationship between the maturity of the IT outsourcing market and IT outsourcing adoption (β=0.45; p<0.10). This suggests that having a well-developed IT outsourcing market in a country facilitates IT outsourcing adoption. In addition, for the control variables, I find a negative relationship between GDP and IT outsourcing adoption (p<0.05), suggesting that more developed countries have lower levels of IT outsourcing adoption. Variables on firm-specific characteristics, such as Rec, Sales_Inc, Internet and IT_App, are all positively

associated with IT outsourcing adoption, indicating that firms are more likely to outsource some IT activities when they have recently recruited or tried to recruit staff with special IT skills (Rec), when their sales increase (Sale_Inc), when they use the Internet (Internet), and when they use various IT applications such as ERP, SCM and CRM systems. The effect of firm size on IT outsourcing adoption is also significant, and the result implies that the larger the firm, the more likely it is to outsource IT activities. Out of 9 dummy variables for industries, only two (business services and tourism industries) are positively associated with IT outsourcing adoption.

5. Discussion

Overall, the results suggest that country-level factors have significant effects on the adoption of IT outsourcing. As expected, I find that the maturity of the IT-related legal system is positively associated with IT outsourcing adoption. This is consistent with the idea from new institutional economics that a well-functioning legal system can facilitate impersonal exchanges between firms by protecting trading parties from opportunistic behaviors (North 1990). In the context of IT outsourcing, the maturity of the legal system governing IT-related activities mitigates the opportunistic risks involved in IT outsourcing and thus encourages firms to adopt IT outsourcing.

The results also show that the tendency of a firm to adopt IT outsourcing increases with the level of generalized trust in a country. This suggests that as a form of social capital (Knack and Keefer 1997; Putnam 1993), generalized trust

can facilitate exchanges between a firm and outsiders in markets by mitigating the firm's concerns over potential opportunism from strangers. As a result, firms in a country with high generalized trust are more likely to buy IT services from outside vendors than firms in a low-trust country.

It is surprising to discover that the uncertainty avoidance orientation in a country has a positive effect on IT outsourcing adoption. This is contrary to what were proposed in Hypothesis 3. One explanation for this inconsistency is that while IT outsourcing is more uncertain than IT insourcing in terms of behavioral uncertainty (i.e., IT service suppliers will engage in more potential opportunism from than internal IT departments) (Aubert et al. 2005; Bahli and Rivard 2003), IT insourcing could be considered more uncertain than outsourcing in terms of technological uncertainty (Clark et al. 1995; Grover et al. 1994). In fact, one reason that firms outsource IT is that technology changes so fast that firms try to reduce the risk of technological obsolescence by outsourcing their IT (Grover et al. 1994). Consequently, as an uncertainty avoidance orientation is an attitude toward uncertainty in general, it may have a positive effect on the diffusion of IT outsourcing if the majority of firms consider insourcing more uncertain than outsourcing in terms of the risks inherent in technological change.

I also find that the relationship between Internet penetration and the adoption of IT outsourcing is not significant. Prior research has suggested that use of the Internet not only dramatically reduces the coordination costs involved in transactions such as the purchase of IT services (Bakos 1998; Malone et al. 1987), it also enables new forms of IT outsourcing such as global outsourcing and SAP

(Currie and Seltsikas 2001; Freund and Weinhold 2002). However, I fail to find evidence to support these propositions. One explanation for this result is that there may not have enough variation in the Internet penetration variable. As shown in Table 4, the mean for Internet penetration is 0.91 and the standard deviation is 0.07, indicating that almost every country exhibits a high level of Internet penetration. Since the sample in this study provides so little variance in Internet penetration, its effect on IT outsourcing adoption may not have emerged even if Hypothesis 4 still holds.

Finally, the results indicate that the maturity of the IT outsourcing market in a country has an effect on firms' decisions to adopt IT outsourcing. This result is consistent with Langlois' (1992) idea of dynamic transaction costs and suggests that, without a well-developed IT outsourcing market, it can be more difficult for firms to find the IT services they need in markets, and this can impede the diffusion of IT outsourcing.

This study has contributed to the literature in two main ways. Although a few studies have studied the effects of country-level factors on firms' decisions regarding the adoption of IT outsourcing, these effects have not been formally tested though statistical analysis. More specifically, prior studies typically compared IT outsourcing practices in 2 or 3 countries, which is not enough to verify the effects of country-level factors on IT outsourcing adoption. This study use data from many countries and statistically test the effects of country environments on the diffusion of IT outsourcing. To the best of my knowledge,

this is the first study to have used data from many countries to investigate the country effect on IT outsourcing adoption.

In addition, although the transaction cost perspective has been used by some scholars to understand the role of country in the diffusion of IT outsourcing (e.g., Barthelemy and Geyer 2005), no study has yet proposed a list of important dimensions of country environments that can affect the transaction costs involved in IT outsourcing. This study addresses this paucity in the literature by drawing on new institutional economics and related research to identify five important dimensions of country environments relevant to IT outsourcing adoption. Moreover, this study suggests that new institutional economics (Coase 1937; North 1990) can be used as a theoretical basis to better understand the effect of country-level factors on IT outsourcing adoption since country environments can influence the opportunism and coordination costs involved in IT outsourcing.

This study follows a tradition in IS research of focusing on the cross-country differences in IS issues, such as IT diffusion, IT spending and IT productivity (Dewan and Kraemer 2000; Gibbs et al. 2003; Shih et al. 2007). A main insight from this line of research is that the country-level variables can play a significant role in IT phenomena. For instance, Shih et al. (2007) found that country-level IT investment increases with openness to trade rises and telecommunication infrastructure advances, but decreases with interest rates rise. Dewan and Kraemer (2000) showed that the returns on IT capital investments are significantly positive for developed countries, but are not significant for developing countries.

Following this stream of research, the IT outsourcing phenomenon should be investigated across countries as well, as I did in this study.

This research offers some implications for policy makers. If policy makers in a country want to promote the diffusion of IT outsourcing, they may need to consider their country's institutional and factor environments. For instance, when firms in a country do not have a high level of generalized trust, the promotion of IT outsourcing adoption can be a difficult job. In this situation, policy makers may take some specific actions to mitigate the negative effect of low generalized trust. For instance, they may focus on improving IT service vendors' reputations. The good reputations for IT vendors may mitigate the negative effect of low generalized trust and increase firms' trust on IT vendors, which can in turn facilitate the adoption of IT outsourcing. This study has lessons for IT vendors with global operations as well. When deciding whether or not to enter a new country, IT vendors should take the country environments into account. For instance, countries without a legal system that supports impersonal economic exchanges in general and IT outsourcing in particular may not be good target markets for entry.

This study has two limitations that future research may address. First, IT outsourcing involves a variety of services, such as data processing, hardware maintenance, application development etc. However, the current data do not include information on these detailed IT services. Since different types of IT services may be influenced differently by country environments (Apte et al. 1997), future research may further investigate the effects of country-level factors on

different types of IT services. In addition, various reasoning has been proposed to explain the cross-country differences in IT outsourcing practices, such as those based on institutions, culture, and power. In this study, I have only drawn on new institutional economics and focused on factors that are relevant to the transaction in IT outsourcing adoption. However, there should be a wide range of country-level factors that may influence the adoption of IT outsourcing. For instance, firms' IT productivity and the development of IT education in a country may influence the IT outsourcing decision. Future research may draw on different theories to generate further explanations for the role of country.

6. Conclusion

Most of existing research on IT outsourcing has been confined to a single-country perspective, which prevents us from understanding the effects of country-specific factors on the adoption of IT outsourcing. This study contributes to the literature by identifying five dimensions of country environments relevant to IT outsourcing adoption and by testing their effects using data from a number of countries. The results indicate that country-level factors have significant effects on the adoption of IT outsourcing. More specifically, I find that the maturity of the IT-related legal system, generalized trust, and the maturity of the IT outsourcing market are positively associated with IT outsourcing adoption. The results imply that researchers may need to pay more attention to the influence of country-level factors such as institutional and factor environments when investigating cross-country IT outsourcing phenomena. One country's IT outsourcing practices may

be totally different from those in another country, due to the differences in institutional and factor environments.

References: (see the end of the thesis)

Chapter V: Conclusion

The issue of IT insourcing vs. IT outsourcing corresponds to the traditional "make vs. buy" problem in the literature (Aubert et al. 2004). Many aspects of the "make vs. buy" problem have been investigated in prior research. For instance, some studies have proposed hat transaction cost reduction may not be main reason that firms choose hierarchical governance; rather, it is the value created through the higher-order organizing principals in hierarchies (Grant 1996; Kogut and Zander 1992). Other studies have shown that environmental factors may play important roles in firms' decisions in the "make vs. buy" choice, including industrial characteristics such as technological uncertainty and competition (Steensma et al. 2000; Walker and Weber 1987) and country characteristics such as national institutions and culture (Dyer 1997; Kogut and Singh 1988). This thesis has taken these insights and applied them to IT sourcing.

1. Key Findings

My thesis has addressed two issues: 1) the evaluation of IT outsourcing and IT insourcing in terms of value creation, and 2) the macro-level antecedents of IT outsourcing diffusion (i.e., at the industry and country level). Previous studies that have focused on the business outcomes of IT outsourcing have not compared IT outsourcing benefits with IT insourcing benefits in terms of how they create value for firms. In order to provide guidance to firms in their selection of alternative IT outsourcing mechanisms, the benefits of outsourcing should be compared with

those of insourcing. Essay #1 compares IT outsourcing with insourcing in terms of how they facilitate the development of IT-enabled organizational capabilities (*IEOC*) and improve firm performance. The results, based on data from *InformationWeek* and *CompuStat*, indicate that IT insourcing provides firms with better *IEOC* than IT outsourcing, and better *IEOC* in turn leads to higher firm market value and profitability. In addition, I find mixed support for the hypothesis that the advantages of IT insourcing over IT outsourcing in facilitating *IEOC* are more significant for developing Type III innovation-related organizational capabilities than Type I innovation-related capabilities.

Given that in recent years firms have tended to rely heavily on IT outsourcing while cutting budgets for internal development of IT resources, this study has important practical implications. The results suggest that firms investing heavily in in-house IT can develop more *IEOC* in areas such as e-business and knowledge management, as compared with firms that invest little in in-house IT. In contrast, investing heavily in IT outsourcing does not help firms develop *IEOC*. Due to the crucial role of *IEOC* in enhancing firm performance (Melville et al. 2004; Rai et al. 2006), firms should consider increasing their investments in IT insourcing, not only to ease the difficulties that arise from managing contract-based relationships with vendors (Kern and Willcocks 2002), but also to actively pursue strategic opportunities that will eventually lead to a more effectiveness firm.

Moreover, I find that the vast majority of the existing research on the antecedents of IT outsourcing adoption has focused on factors at the firm level, while environmental factors such as industry and country characteristics receive little

attention in the literature (Dibbern et al. 2004). Since firms are open systems and their behaviors can be significantly influenced by their environments (Dess and Beard 1984; Scott 2003), a firm's IS-related behaviors should also be understood in the context of its industry or country (Chiasson and Davidson 2005; Melville et al. 2004). In this light, Essay #2 identifies four industrial characteristics (i.e., industry munificence, dynamism, concentration, and capital intensity) based on research from organization theory and industrial organization (Bain 1959; Dess and Beard 1984), and theoretically links them to IT outsourcing diffusion. Using data from the US Bureau of Economic Analysis (BEA) and Compustat, the results suggest that IT outsourcing adoption is positively associated with industry munificence and dynamism and negatively associated with industry concentration and capital intensity. Essay #3 draws on advances in new institutional economics and related research (Coase 1937; Langlois 1992; Malone et al. 1987; North 1990) and investigates how country-level factors influence the diffusion of IT outsourcing in a country by influencing the opportunism and coordination costs involved in IT outsourcing. The model is then tested by data from several sources, including e-Business Watch, the Global Competitiveness Report, and the World Value Survey. As expected, I find that the maturity of the IT-related legal system, generalized trust, and the maturity of the IT outsourcing market are positively associated with IT outsourcing adoption. A country's uncertainty avoidance orientation also has a significant positive effect on IT outsourcing adoption, though the direction of this influence is not what I expected.

Essays #2 and #3 contribute to the literature by taking the important dimensions of industry and country into account to study the antecedents of IT outsourcing diffusion (Chiasson and Davidson 2005). Previous studies have not investigated the role of industry in the diffusion of IT outsourcing by using these well-known dimensions of industrial environments from organization and economics research. Based on data from BEA and Compustat, Essay #2 also provides empirical evidence that several dimensions of industrial environments (e.g., munificence and dynamism) can significantly influence the diffusion of IT outsourcing. Furthermore, unlike previous studies that investigated IT outsourcing practices in only two or three countries, Essay #3 uses data from 18 countries to examine the effect of country on firms' IT outsourcing adoptions. To the best of my knowledge, this is the first study to verify the role of country in IT outsourcing adoption based on data from many countries. With the growing popularity of global IT outsourcing, this study has made an important contribution to the literature by highlighting the fact that one country's IT outsourcing practices can be totally different from those in another country due to the differences in the institutional environments and factor environments of the two counties. Researchers should pay attention to the influence of institutional and factor environments when they investigate cross-country IT outsourcing phenomena.

2. Future Research

I have discussed the potential research expansions in each essay above. Further expansions are possible if we integrate the ideas of the three essays. In fact, while

this thesis as a whole investigates IT outsourcing from a multi-level perspective, the first and second essay focus only on one specific level (i.e., firm and industry level respectively). Only the third essay assesses cross-level effects by using multi-level modeling; that is, how country environments affect firms' decisions on IT outsourcing adoption. In order to further our knowledge on the cross-level effects in IT outsourcing, more multi-level frameworks and multi-level data are needed. In the following section, I will discuss three potential avenues for expanding the current thesis study, by focusing on how factors at a higher level influence the associations at a lower level.

The first avenue is to investigate whether the industry- and country-level factors identified in Essays #2 and #3 can influence the firm-level findings of Essay #1.

Example: How do industry concentration and the generalized trust in a country influence the results of Essay #1?

Essays #2 and #3 show that industry characteristics such as concentration and country characteristics such as generalized trust have direct impacts on firms' IT outsourcing adoptions. These industry- and country-level factors at same time may also have influence on other IT issues at the firm level. For instance, Essay #1 suggests that the effective coordination between the IT unit and business units facilitated by IT insourcing leads to the development of *IEOC*, which in turn results in high firm performance, while IT outsourcing does not have this effect. At the same time, Essay #2 suggests that the intensive competition (low concentration) in an industry likely leads firms to choose IT outsourcing due to

competitive and institutional pressures. Therefore, firms in competitive industries should be especially careful when they confront the pressure of IT outsourcing adoption. In addition, it may be more beneficial for firms in competitive industries to stick with IT insourcing than firms in non-competitive industries. Under IT insourcing, the IT unit and business units can work together to develop *IEOC* over time through a learning-by-doing process (Fichman and Kemerer 1999; Zhu et al. 2006). However, in competitive industries, only a few firms may sustain this learning-by-doing process and develop *IEOC* because firms in such industries are more likely to jump into the trend of IT outsourcing (Loh and Venkatraman 1992b). As a result, while all firms sticking with IT insourcing may develop their *IEOC*, the *IEOC* developed by firms in competitive industries are rarer and more valuable than those developed by firms in non-competitive industries because there are less firms with such *IEOC* in the former industries (Barney 1991; Melville et al. 2004). In other words, the competition (concentration) level of industries may moderate the association between *IEOC* and firm performance as found in Essay #1.

Similarly, country-level factors such as generalized trust (see Essay #3 for details) may affect the associations between IT sourcing mechanisms and *IEOC* as found in Essay #1. Essay #1 suggests that the main difference between IT insourcing and IT outsourcing is that IT insourcing can facilitate the smooth coordination between the IT unit and business units, which is a precondition for developing *IEOC*. One key problem of IT outsourcing is that client firms and IT vendors usually have different goals due to the separate ownerships. Even worse, under

the outsourcing mechanism, a self-interested economic entity may behave opportunistically to maximize its own interest at the expense of others (Williamson 1985). For instance, there are cases where IT vendors seek to obscure the true cost savings achieved from the rationalization of IT services or use knowledge learned from one client firm to serve the client's rivals (Miozzo and Grimshaw 2005). As a result, a real partnership between a client firm and its IT vendor is rare because in general there is no shared risk or reward in an IT outsourcing relationship (Lacity and Willcocks 1998). The lack of a partnership between client firms and IT vendors can prevent the two parties from communicating smoothly and sharing knowledge with each other (Grover et al. 1996; Lee and Kim 1999), which in turn impedes the development of *IEOC* (Armstrong and Sambamurthy 1999; Boynton et al. 1994).

One key component of partnership is the mutual trust between two parties involved (Dyer and Singh 1998; Henderson 1990). Research has suggested that firms in different countries may have different levels of trust on their counterparts in a transaction because every country has unique institutions that determine the generalized trust level in a society (Fukuyama 1995; Putnam 1995). Accordingly, the relationship between a client firm and its IT vendor may be affected by the generalized trust level in a country. In countries with a high level of generalized trust, people are more likely to trust others, including those with whom they are not familiar (Knack and Keefer 1997). In contrast, in low-trust countries, people usually trust only those they know well, such as friends and family members (Fukuyama 1995; Putnam 1995). To a client firm, the outside IT vendor is not as

familiar as its internal IT department. As a result, client firms in countries with low generalized trust may be less likely to trust their IT vendors. In contrast, it may be relatively easy to have mutual trust between a client firm and its IT vendor in countries with high generalized trust. Accordingly, it may be easier to build a partnership in IT outsourcing in high-trust counties than in low-trust countries. In other words, the difference between IT insourcing and IT outsourcing in terms of facilitating IT-business partnership can be smaller in high-trust countries than in low trust countries. Further research may test the ideas above and investigate the role of other industry- and country-level factors identified in Essays #2 and #3.

The second avenue is to identify new industry- and country-level factors that influence the findings of Essay #1 and other firm-level IT outsourcing issues.

Example: How do IT-enabled transformations in an industry influence the relative advantages of IT insourcing and outsourcing?

Essay #1 shows that IT insourcing has advantages over IT outsourcing with respect to the development of firms' *IEOC*. However, the advantages of IT insourcing may vary from industry to industry. IT research has noted that the extent of IT-enabled transformations in business practices varies across industries (Armstrong and Sambamurthy 1999; Schein 1992). Three key roles of IT have been identified in the literature: automate (replace human labor by automating business processes), informate (provide data/information to empower management and employees), and transform (fundamentally alter traditional ways of doing business by redefining business processes and relationships) (Chatterjee

et al. 2001). While automate represents little IT-enabled transformation efforts, informate and transform imply an intermediate level and a high level of IT-enabled transformation, respectively.

The different roles that IT plays in an industry can have important implications for firms. For instance, in an industry where IT only plays a automate role, firms should not expect a large increase in firm performance after investing in IT because investing in automate IT is easily imitable to competitors. In contrast, investing in transform IT may introduce radical business models that disrupt industry practices and market structure and give firms a more favorable position in the industry (Dehning et al. 2003). Prior studies have suggested that the value of IT to firms will be more significant in industries where IT mainly plays a transformational role than in industries where IT mainly plays a non-transformational role. For example, Chatterjee et al. (2001) found that only for firms competing in industries undergoing IT-driven transformation, announcements of newly created CIO positions provoke positive reactions from the stock market. Dehning et al. (2003) found positive, abnormal returns only to announcements of IT investments by firms making transformative IT investments, and by firms with membership in industries where IT plays a transformational role. Similarly, Anderson et al. (2006) showed that higher firm value and subsequent earnings are associated with Y2K spending for firms in industries where IT plays a transformational role.

In a similar vein, the different roles IT plays in industries may also affect the relative advantages of IT insourcing and outsourcing. That is, the advantages of

IT insourcing over outsourcing may be more significant in industries where IT mainly plays a transformational role than in other industries because there are more opportunities for developing *IEOC* in the former industries. As discussed above, in order to develop *IEOC*, the effective coordination between the IT unit and business units enabled by IT insourcing is usually necessary (Armstrong and Sambamurthy 1999; Boynton et al. 1994; Henderson 1990). In industries where IT mainly plays a transformational role and there are numerous opportunities for developing various *IEOC*, the effective coordination between the IT unit and business units becomes more important. For instance, Armstrong and Sambamurthy (1999) found that the interaction and shared knowledge between CIO and other top managers are more important for assimilating IT applications with a transform effect into business practices. Since IT insourcing has advantages over IT outsourcing in terms of the coordination between the IT unit and business units, its advantages may be more significant in industries where IT mainly plays a transformational role. Further research may collect data to test the idea above as well as identify other industry- and country-factors that matter for IT outsourcing issues at the firm level.

The third avenue is to identify country-level factors that influence the findings of Essay #2 and other industry-level IT outsourcing issues.

Example: How does the economic status of a country (developed vs. developing) influence the relationships between industry characteristics and IT outsourcing diffusion?

Essay #2 shows that industry characteristics can significantly influence the diffusion of IT outsourcing in an industry. More specifically, the diffusion of IT outsourcing is positively associated with industry munificence and industry dynamism, but negatively associated with industry concentration and capital intensity. These relationships, however, might be moderated by the specialties of a country. Research has shown that there is a difference between developed and developing countries in terms of IT-related issues (Zhu and Kraemer 2005). For example, Dewan and Kraemer (2000) found significant differences between developed and developing countries with respect to their structure of returns from capital investments. For developed countries, returns from IT capital investments are estimated to be positive and significant, while returns from non-IT capital investments are not commensurate with relative factor shares. The situation is reversed for developing countries, where returns from non-IT capital are quite substantial, but those from IT capital investments are not statistically significant. Similarly, Shih et al. (2007) found that the factors in shaping IT investment decisions are different between developed and developing countries. While the impacts of interest rates, size of the financial sector, teledensity, and intellectual property rights are strongest in shaping IT investment for developed countries, the impacts of openness to trade, the size of government, and education levels are greater for developing countries.

These studies suggest that a key difference between developed and developing countries is that firms in developed countries usually have more experience with IT than firms in developing countries because the former have longer histories of

using IT (Dewan and Kraemer 2000). This difference may also influence the effects of industry characteristics on IT outsourcing diffusion. For example, while industry munificence can influence firm decisions in outsourcing IT, the significance of this influence may be different between developed and developing counties. Essay #2 suggests that in order to support their fast growth, firms in munificent industries may purchase IT infrastructure services in markets due to their lack of internal IT infrastructure capacities. This argument may be more appropriate for firms in developing counties because that firms in developing counties are less likely to have adequate IT infrastructure capacity than firms in developed counties as the former have less history and experience of IT (Dewan and Kraemer 2000) and the development of IT infrastructure takes time (Bharadwaj 2000; Weil and Broadbent 1998). Accordingly, while confronting growth in munificent environments, firms in developing counties should be more likely to seek IT infrastructure services in markets because they do not have enough internal IT infrastructure capacity. In contrast, firms in developed countries have practiced IT for some time and they may have developed enough internal IT infrastructure capacity to support firm growth. In other words, the positive association between industry munificence and IT outsourcing diffusion will be stronger in developing counties.

Similarly, the influence of industry dynamism on IT outsourcing diffusion may also be moderated by country economic status. Essay #2 suggests that firms in dynamic environments may choose more IT outsourcing because IT outsourcing is a flexible approach to meet firms' changing needs in IT resources during

dynamic situations. Taking the "real options" perspective, Essay #2 assumes that firms treat IT investments as an uncertain and risky activity. While IT investments can be considered uncertain and risky in general (Dewan et al. 2007; Fichman 2004), firms in different counties may view IT investments differently. In particular, firms in developed countries may perceive IT investments as being less uncertain than firms in developing countries. The reason is that firms in developed countries usually have some experience and knowledge of IT (Dewan and Kraemer 2000) and thus should be more familiar with IT and will perceive IT investments as being less uncertain and risky than firms in developing countries. As a result, the idea of using IT outsourcing as a real option to deal with environmental dynamism may be less appealing to firms in developed countries because real options are less attractive in low-uncertainty situations. That is, while confronting environmental dynamism, firms in developed countries may not outsource IT as much as firms in developing countries. In other words, the positive association between industry dynamism and IT outsourcing diffusion will be weaker in developed countries.

Finally, the negative effect of industry concentration on IT outsourcing diffusion may also be moderated by the economic status of countries. Essay #2 suggests that firms may adopt more IT outsourcing while confronting intensive competition (low concentration) because the competitive and institutional pressures will drive firms to imitate other firms' IT outsourcing behaviors. However, not every firm has the same tendency to imitate IT outsourcing. As pointed out by DiMaggio and Powell (1983), firms are more likely to mimic other

actions when they do not have related experience and knowledge for that action. For firms in developed countries, they often have some IT experience and IT knowledge. As a result, they should understand IT better and are less likely to imitate other firms' behaviors in IT management than firms in developing countries. In other words, the negative effect of industry concentration on IT outsourcing diffusion should be weaker in developed countries than in developing countries. All together, the associations between industry characteristics and IT outsourcing diffusion may be moderated by the economic status of countries. Further research may address this issue and identify the roles of other country-level factors in industry-level IT outsourcing issues.

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