

**INFORMATION SYSTEMS INNOVATION ADOPTION
AMONG ORGANIZATIONS
—A MATCH-BASED FRAMEWORK AND EMPIRICAL
STUDIES**

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SUMMARY

This thesis focused on the issue of IS innovation adoption and provided one theoretical study in IS innovation adoption framework and two empirical studies of organization level Internet-based IS innovation adoption. In the theoretical research, we explored the key determinants of the firm's adoption decision of a specific IS innovation and developed a match-based framework for IS innovation adoption.

In this framework, a firm's adoption decision of a specific IS innovation is proposed to be affected by three levels of factors: 1) match-based factors, 2) match constituent factors, and 3) peripheral factors. The firm's adoption decision is directly determined by three kinds of match-based factors: the factors based on the performance-needs match assessment, the factors based on the innovation-needs match assessment, and the factors based on the resource-innovation match assessment. Meanwhile these three match assessments are directly affected by five match constituent factors: the firm's current resource performance, the firm's strategic needs, the firm's available resources for innovation, the perceived potential ability of the specific IS innovation, and the required resources for innovation. And for these five match constituent factors, they are directly subject to numerous peripheral factors.

As a whole, this framework provided a systematical explanation of why and how the commonly identified factors will influence a firm's adoption decisions of an IS innovation. With the causality consideration among the factors in the framework, this framework distinguished the immediate causal factors and numerous remote

determinants of IS innovation adoption. Through providing a core set of key determinant factors, this framework has its ability in helping IS researchers to build a parsimonious yet powerful model for IS innovation adoption.

After our theoretical study, this framework has been tested in two empirical studies both investigating organization level Internet-based IS innovation adoption. The first study focused on the issue of e-marketplace adoption intention for export companies. In this study, we investigated the major causal factors for e-marketplace adoption intention of SMEs in their international marketing practices. The second study spoke to the issue of why some firms build their strategies around e-commerce opportunities while others do not and why some are more adept than others at incorporating e-commerce-based opportunities into their over all competitive strategies. In this study, we are investigated the drivers for companies to apply and development e-commerce for strategic purpose.

In spite of some limitations in these two empirical studies, the results of both our empirical studies provided strong empirical evidences of the applicability of our match-based framework in IS innovation adoption. In these two empirical studies, the applications of our match-based framework were successful. It seems that our match-based framework offers an especially promising route for developing research models for IS innovation adoption.

Chapter 1: Introduction

1.1 Background

Firms face more challenging changes than ever in the way they compete in what is now a global and technology-flooded economy. There is an increasing digital dependence to stay competitive, given the evolution that Information and Communications Technologies have experienced in their application for businesses, migrating from a focus on efficiency to one on effectiveness, and then moving on to innovation. Information Systems (IS) innovation can be broadly defined as innovation in the organizational application of digital computer and communications technologies (Swanson 1994). With new information technologies and their new applications abounding in the information age, the widespread impacts of information systems on business operation and performance are increasingly acknowledged to be strategic. Now, information systems are widely adopted in organizations and have penetrated to almost all areas of the enterprise. By means of technology innovation, new information systems are effectively meshed with organization design, process, strategy and external relationships throughout the enterprise (Swanson 1994).

Since IS can be considered as a kind of technological innovation, in the former IS adoption research, researchers have been drawing functional parallels between IS adoption and technological innovation adoption and emphasizing the need for viewing IS adoption from the perspective of organizational introduction of technological innovation (McFarlan and McKenney 1982; Zmud 1984). Innovation adoption

literature (e.g. Rogers 1995; Tornatzky and Fleischer 1990) which studies the process of technology diffusion and the factors influencing technology adoption decisions has been, either explicitly or implicitly, used as a foundation for most IS adoption researches (e.g. Chau and Tam 1997; Cooper and Zmud 1990; Grover 1993; Iacovou et al 1995; Kuan and Chau 2001; Moore and Benbasat 1991; O'Callaghan et al. 1992; Palvia and Palvia 2001; Poon and Swatman 1998; Premkumar et al. 1997; Premkumar and Ramamurthy 1995; Scupola 2003; Thong 1999; Xu et al. 2004; Zhu et al. 2003).

Although there has been a great deal of research in the field of organization level innovation adoption, there is no unifying theory of innovation adoption (Wolfe 1994). Some researchers questioned the possibility of developing a unifying theory of innovation adoption and diffusion that can apply to all types of innovations (Downs and Mohr 1976; Fichman and Kemerer 1993; Kimberly and Evanisko 1981). They argued that a unifying theory might be inappropriate in view of the fundamental differences between types of innovations. Now some consensus has been reached that various innovations call for not a single theory, but several adequate and circumscribed theories (Wolfe 1994).

In prior adoption research, innovation characteristics research which describes the relationship between the attributes or characteristics of an innovation and the adoption or implementation of that innovation represents one of the classic issues in the innovation literature (Tornatzky and Klein 1982). In Rogers' (1995) classic diffusion model, he highlighted five innovation characteristics from the summary of previous research as the determinants of adoption rate of innovations, consisting of relative

advantage, compatibility, complexity, trialability, and observability. He suggested that those innovations perceived by adopters as having greater relative advantage, compatibility, trialability, observability will be adopted rapidly than other innovations. And innovations perceived as less complex will be adopted more rapidly than those perceived as more complex.

While the perceived characteristics of innovation are one most important explanation of innovation adoption, innovation adoption are affected by many factors beyond features of the innovation itself and their interaction with features of the adopting unit. Hence, various researchers have attempted to identify the factors from other perspectives. Organizational innovativeness research represents the other important research stream in organizational innovation adoption, which focused on the determinants of an organization's propensity to innovate (Wolfe 1994). Following the research works in organizational innovativeness by Baldrige and Burnham (1975), Kimberly and Evanisko (1981) proposed three clusters of predictors of adoption behavior on organization level—1) characteristics of individual people in positions of authority in the subject organization, 2) characteristics of organizations themselves, and 3) characteristics of the organization's environmental context for innovation.

Focusing on the technological innovation of organizations, Tornatzky and Fleischer (1990) recommended another perspective that views diffusion and adoption as occurring within contexts that constrain and mold choices. According to Tornatzky and Fleischer, there are three elements of a firm's context that influence the process by which it adopts and implements technological innovations: 1) organizational

context which is typically defined in terms of several descriptive measures including firm size; the centralization, formalization, and complexity of its managerial structure; the quality of its human resources; and the amount of slack resources available internally; 2) technological context which describes both the internal and external technologies relevant to the firm, including current practices and equipment internal to the firm, as well as the pool of available technologies external to the firm; and 3) environmental context—an area in which a firm conducts its business, such as its industry, competitors, access to resources supplied by others, and dealings with government.

1.2 Motivation

In previous IS adoption research, several frameworks have been proposed or used. In the early time of IS innovation adoption research, Rogers' innovation diffusion model was used as a theoretical framework by several IS researchers to investigate the IS innovation adoption. Although Rogers' innovation diffusion model has quite rightly had a profound role in shaping the basic concepts, terminology, and scope of the field, it does not – nor does it aim to – apply equally well to all kinds of innovations in all adoption contexts (Fichman 2000). This classical model was synthesized from a body of research that focused primarily on simpler innovations being adopted autonomously by individuals. It addresses more about individual perceptions of innovation attributes. It applies less well to more complex technologies, to

technologies for which multiple adoption decisions are linked in some important ways, and to technologies adopted in and by organizations (Fichman 2000).

In addition, the innovation attributes proposed by this model do not represent a broadly accepted typology of organizational innovation attributes. Much research has been done regarding other various innovation characteristics or perceived characteristics of innovation (e.g. Moore and Benbasat 1991; Taylor and Todd 1995; Tornatzky and Klein 1982). While several other typologies have been proposed (e.g. Daft and Becker 1978; Eveland et al. 1977; Zaltman et al. 1973), no broadly accepted typology or check-list of attributes has emerged (Wolfe 1994). The longer it takes for researchers to accept the challenge of innovation classification, the more difficult the challenge will become as innovation attributes are proliferating via discovery and/or renaming (Tornatzky and Klein 1982).

Because Rogers' innovation diffusion model lacks concern on organizational and inter-organizational perceptions of the diffusion process, IS researchers are more likely to consider Rogers' innovation characteristics as one important context and have combined them with other context factors to provide a richer and potentially more explanatory model. As a result, the multi-perspective frameworks are more popularly used in IS adoption research. For example, Grover (1993) combined Inter-organizational System (IOS) factors with organizational factors, policy factors, environmental factors, and support factors to explain firms' adoption decision of Customer-based IOS. Chau and Tam (1997) combined innovation characteristics with organizational characteristics and environmental characteristics to explain firms'

adoption of open systems. Premkumar et al. (1997) combined innovation characteristics with organizational characteristics and environmental characteristics to explain firms' adoption of electronic data interchange. Thong (1999) combined IS characteristics with decision-maker characteristics, organizational characteristics, and environmental characteristics to explain IS adoption in small businesses.

Among those multi-perspective frameworks, the most influential and representative framework used in the prior IS adoption research was Tornatzky and Fleischer's (1990) Technology-Organization-Environment (TOE) framework. It has been examined by numerous empirical studies on various information systems (e.g. Chau and Tam 1997; Iacovou et al. 1995; Kuan and Chau 2001; Scupola 2003; Seyal et al. 2004; Tan and Teo 1998; Zhu et al. 2003). It has been suggested to be a valuable framework to understand the adoption of a complex IS innovation (Chau and Tam 1997). Based on this framework, the potential determinant factors of a firm's adoption decision of a specific IS innovation have been considered from technological perspective, organizational perspective, and environmental perspective to provide a richer and potentially more explanatory model.

Though in the original TOE framework, technological context describes both the internal and external technologies relevant to the firm, in its applications in IS adoption research, IS researchers are more likely to define the technological perspective factors as the characteristics of the innovation (Chau and Tam 1997; Scupola 2003). Hence, Rogers' innovation diffusion theory is always subsumed in this framework as an important theoretical foundation for model building.

Other kinds of multiple perspective frameworks proposed in IS adoption research do not have essential differences from the TOE framework. For example, in Grover's (1993) five factor categories, policy factors and support factors can be considered as organizational context factors. Similarly, in Thong's (1999) four factor categories, decision-maker characteristics can be viewed as specific organizational context factors. The two frameworks can be regarded as variants of the TOE framework in which some dimensions of the TOE are further divided.

Compared to Rogers' (1995) innovation diffusion model, the TOE framework (or those TOE-like frameworks) overcomes the domination of the technical perspective and provides a useful analytical tool to distinguish between the inherent qualities of an innovation and the motivations, capabilities, and broader environmental context of the adopting organization. However, besides that, this framework as originally proposed and later adapted in IT adoption studies, offers little more than a taxonomy for categorizing variables, and does not represent an integrated conceptual framework or a well-developed theory (Dedrick and West 2003). Though TOE gives us a rather comprehensive list of factors and their individual contributions to technology adoption, the underlying decision process is unclear. No causality among the factors has been provided. Hence, this framework is limited in its ability to provide a core set of constructs for IS innovation adoption. It per se cannot help us to distinguish the immediate causal factors and numerous probably more remote determinants of IS innovation adoption. Simplistic enumeration of factors in this framework may bring in

methodological side-effect when there is multicollinearity problem among the factors, leading to inconsistent and inconclusive findings.

In sum, in the existing IS innovation research, though theories of organization level innovation adoption have been applied, the underlying causal mechanism remains elusive. Despite the volume of literature, deeper understanding of IS adoption behavior in organizations remains relatively underdeveloped. The existing frameworks in IS adoption research have been limited in its ability to provide a core set of constructs to help the IS researchers to build a parsimonious yet powerful model for IS innovation adoption. Hence, for IS innovation adoption, more research works need to be done to integrate various theoretical streams to develop a more powerful framework.

1.3 Objectives

In this dissertation, we attempt to develop a better framework for IS innovation adoption which outlines the major causal relationships in IS adoption. We also will verify the explanatory power of the framework with a revisit of prior empirical studies. Furthermore, we would like to examine the framework in empirical studies by applying it to the Internet-based IS innovation adoption area.

This dissertation is organized as follows: Chapter 2 presents the research work in framework development including the literature review of prior IS innovation adoption research, the theoretical foundations for our framework, the introduction of the framework, and the mapping of prior empirical findings in the new framework;

Chapter 3 presents the empirical study focusing on the determinants e-marketplace adoption in small and medium-sized enterprises' (SMEs') international marketing practices; Chapter 4 presents the empirical study focusing on the determinants of the firm's e-commerce strategic use intentions; and the Chapter 5 presents the conclusion of the whole dissertation.

Chapter 2: Literature Review and Theoretical Foundations

2.1 Literature Review

In an era of revolutionary developments in information technologies, information and information-based technologies increasingly play a pivotal role in shaping and influencing business success. As a result, the employment of IS among organizations is increasingly crucial to competitive survival and success of the organizations. With the widespread impacts of information systems on business operation and performance, IS innovation adoption research on organization level has attracted numerous studies. As shown in Table 2.1, a variety of IS innovations have been studied, ranging from IS work practices such as the use of database design tools and techniques (Nilakanta and Scamell 1990) to user-oriented industry-specific IS technologies such as electronic scanners for supermarkets (Levin et al. 1987, Zmud and Apple 1992), to inter-organizational information systems such as electronic data interchange (EDI) system (Iacovou et al 1995; Teo et al. 2003), and to Internet technology-based IS innovations such as Business-to-Consumer (B2C) and Business-to-Business (B2B) e-commerce (Ching and Ellis 2004; Scupola 2003, Zhu et al. 2003).

Table 2.1: Empirical research in organization level IS innovation adoption

Reference	Innovation	Major Findings
Ball et al. 1987/88	DBMS	Adoption is explained by general innovativeness of a firm.
Beatty et al. 2001	Website	Adoption is affected by perceived benefits,

		complexity, technical compatibility, organizational compatibility, and top management support.
Chau and Tam 1997	Open System	Adoption decision is affected by perceived barriers and satisfaction with existing systems.
Ching and Ellis 2004	E-Commerce	SME's e-commerce adoption decision is affected by the decision maker's characteristics such as age, education, cosmopolitan outlook, innovation characteristics such as compatibility, cost, relative advantage, and environmental factors such as customer pressure.
Chwelos et al. 2001	EDI	External pressure, readiness, and perceived benefits are significant predictors of adoption intention, with external pressure and readiness being considerably more important than perceived benefits.
Cooper and Zmud 1990	MRP	Adoption is explained by the match of innovation to a manufacturing environment.
Grover 1993	CIOS	Support factors (top management support and champion), IOS factors (compatibility and complexity), Organizational factor (size and IS infrastructure) exhibited a strong relationship with adoption decisions.
Hannan and McDowell 1984	ATMs	Adoption is explained by firm size and local market concentration.
Harrison et al. 1997	Information Technology	Small business executives' adoption decision is a function of attitude toward adoption, subjective norm about adoption, and perceived control over adoption.
Hart and Saunders 1997	EDI	Posted relative power and trust between trading partners as determinants of adoption decisions.
Hong and Zhu 2006	E-Commerce	Technology integration, web functionalities, and web spending were found to be three drivers for e-commerce adoption.
Iacovou et al. 1995	EDI	Adoption is explained by perceived benefits, resource readiness, and external pressure.
Kuan and Chau 2001	EDI	Perceived direct benefits distinguished adopters from non-adopters, while perceived indirect benefits did not. Perceived financial cost and perceived technical competence were more likely to be the obstacles for non-adopters than for adopter firms. Finally adopter firms perceived a higher government pressure and a lower industry pressure than non-adopters did.
Levin et al. 1987	Electronic Scanners	Early adopters are non-chain firms with large store size in non-concentrated markets.
Mehrtens et al. 2001	Website	Decision to adopt is affected by perceived benefits, organizational readiness, and external pressure.

Moch and Morse 1977	Administrative EDP	Adoption explained by size and functional differentiation.
Nilakantaand and Scamell 1990	Data Base Design Tools and Techniques	This study examines effects of information sources and communication channels on diffusion.
Perry and Danziger 1980	Computer Applications	Adoptability of innovation is explained by innovation visibility and staff competence
Premkumar and Ramamurthy 1995	EDI	Technological factor (internal need), organizational factor (top-management support), and interorganizational factors (competitive pressure and exercised power) influence a firm's EDI adoption decision
Premkumar et al. 1997	EDI	Firm size, top-management support, competitive pressure, and customer support were significant in predicting adoption of EDI.
Ramamurthy 1995	EDI	Technological factor (internal need), the organizational factor (top-management support), and the Intel-organizational factors (competitive pressure and exercised power) influence a firm's adoption decision.
Scupola 2003	E-Commerce	Government intervention, public administration and external pressure from customers, suppliers and competitors are very important in a small company's decisions to adopt e-commerce. The characteristics of organization and technology are necessary but not sufficient.
Teo et al. 1995	EDI	Adoption intention is dependent on technology complexity, operational risk, and strategic risk to a greater extent, and dependent on the relative advantage and observability to a lesser extent.
Teo et al. 2003	FEDI	Institutional pressures such as mimetic pressures, coercive pressures and normative pressures have a significant influence on organization's adoption intention
Thong 1999	IS	Small businesses with certain CEO characteristics (innovativeness and level of IS knowledge), innovation characteristics (relative advantage, compatibility, and complexity of IS), and organizational characteristics (business size and level of employees' IS knowledge) are more likely to adopt IS.
Zhu et al.2003	E-Commerce	Technology competence, firm scope and size, consumer readiness, and competitive pressure are significant adoption drivers, while lack of trading

		partner readiness is a significant adoption inhibitor.
Zmud 1982,1984	Modern Software Practices	Size and professionalism explain initiation of technical innovations.
Zmud and Apple 1992	Electronic Scanners	Early adoption is explained by chain size.

Because adoption of an innovation may refer to the point of purchase of the innovation or some form of authoritative commitment (Tornatzky and Fleischer 1990), in prior IS innovation adoption research, a firm's adoption decision of an innovation has been operationalized as either a dichotomy variable—whether the innovation is or is not adopted (e.g. Kuan and Chau 2001; Premkumar et al. 1997; Thong 1999; Zhu et al. 2003), or a trichotomy variable—whether the firm is non-adopter, potential adopter, or adopter (e.g. Grover 1993; Hong and Zhu 2006), or a continuous variable—the extent to which the firm intent to adopt the innovation (e.g. Chwelos et al. 2001; Teo et al. 1995; Teo et al. 2003). However, whether a firm's adoption decision has been operationalized as a dichotomy/trichotomy adoption decision or an intention to adopt, they all refer to the firm's decision from not having the innovation to having it. In this study, we defined the firm's adoption decision of an innovation as a commitment made by the firm's decision maker(s) to apply the innovation in the firm.

In prior adoption research, numerous variables have been identified as possible determinants of organizational adoption of an IS innovation. Generally speaking, the adoption determinant factors can be categorized into three categories as innovation characteristics, organizational characteristics, and environmental characteristics (Chau and Tam 1997; Kuan and Chau 2001; Premkuma and Ramamurthy 1995; Ramamurthy 1995; Scupola 2003; Zhu et al. 2003).

2.1.1 Innovation Characteristics

A central notion in the study of innovation is that technologies possess attributes or characteristics which have systematic effects on innovation adoption. The general idea is that innovations possessing favorable characteristics tend to be more attractive and easier to adopt and therefore tend to diffuse more rapidly than those with less favorable characteristics (Rogers 1995). Hence, innovation characteristics research which describes the relationship between the attributes or characteristics of an innovation and the adoption or implementation of it represents one of the classic issues in the IS innovation adoption research as well as in the general innovation adoption literature (Rogers 1995; Tornatzky and Klein 1982).

Unfortunately, no broadly accepted typology or check-list of innovation characteristics has emerged in organizational innovation adoption research because of inconsistent results (Wolfe 1994). In Tornatzky and Klein's (1982) meta-analysis of 25 innovation characteristics, only three innovation characteristics—relative advantage, complexity, and compatibility were suggested to be significantly related to adoption on a consistent basis. As a result, these three innovation characteristics have been most frequently used in the organization level IS innovation adoption research (e.g. Agarwal and Prasad 1997; Beatty et al. 2001; Grover 1993; Premkumar et al. 1997; Teo et al. 1995; Thong 1999). Besides these three innovation characteristics, subjectively-measured cost is another frequently used innovation characteristic in IS adoption research especially in IOS and EDI adoption research (e.g. Cragg and King

1993; Kuan and Chau 2001; Premkumar et al. 1997; Saunders and Clark 1992). Except these four innovation characteristics, numerous innovation characteristics have received less attention by IS researchers, such as observability, trialability, communicability, disvisibility etc (e.g. Grover 1993; Premkumar et al. 1997; Thong 1999).

One thing in common of these four characteristics—relative advantage, complexity, compatibility, and subjectively-measured cost—is that they all count as characteristics whose values are dependent on the circumstance of the organization. That means organizations' perceptions of these four characteristics will be quite different based on different conditions of the organizations. For example, when we say “technology X is highly complex”, it could mean the technology is perceived complex for some organizations (e.g. because they lack associated knowledge and skill) but not for others.

Since the values of these four factors are dependent on the circumstance of the organizations, by definitions, all these four factors measure some kinds of “fit” (having the qualities that are suitable for a particular job, occasion, purpose etc.) between some primary characteristics of an innovation and some features of the organization which are independent of the innovation (e.g. the organization's needs, resource conditions, and size).

By definition, relative advantage is the extent to which an innovation is perceived as being better than other alternatives (Rogers 1983; Tornatsky and Klein 1982; Zaltman

et al. 1973). When one innovation is said to be better than others, it means that this innovation meets more needs for a firm than other innovations do. Hence, relative advantage measures the extent of fit between the ability of an innovation and the needs of the firm.

Complexity is the extent to which an innovation is perceived as relatively difficult to understand and use (Rogers 1983; Tornatsky and Klein 1982; Zaltman et al. 1973). An innovation could be considered as complex by some firms who lack associated knowledge and skill, but not complex by some firms who have the necessary knowledge and skill. Hence, complexity is a fit-based concept between the technical skill required and skills firms possess.

Compatibility is the degree to which an innovation is consistent with firm's current conditions (Rogers 1983; Tornatsky and Klein 1982; Zaltman et al. 1973). It may refer to compatibility with the values or norms of potential adopters, which implies a kind of normative or cognitive compatibility (compatibility with what people feel or think about a technology), or may represent congruence with the existing practices of the adopters, which implies a more practical or operational compatibility (Tornatsky and Klein 1982). However, whether it is value compatibility or practical compatibility, compatibility is depend on both the current conditions of the firm and the primary features of the innovation. Hence, compatibility is also a fit-based concept.

Although an innovation may cost a fixed amount, subjectively-measured cost can be different for different firms. An innovation's cost may seem inexpensive to one, but

exorbitant to another. Hence, subjectively measured cost reflects a financial fit between the firm's available financial resource and the objective cost required for innovation adoption and implementation.

Generally speaking, these four innovation attribute factors are not characteristics of either innovation or organization per se but describe some particular fit between the features of the innovation and the adopting firm's needs, strategies, resources, or capabilities. Since innovations are most likely to be adopted by a firm when they fit well with the firm's needs, strategies, resources, or capabilities (Fichman 2000), innovation characteristics reflecting some kinds of organization-innovation fit rather than those primary innovation characteristics that directly affect a firm's adoption decision of the innovation.

2.1.2 Organizational Characteristics

Because a firm's structures and processes can constrain or facilitate the adoption and implementation of innovations (Tornatzky and Fleischer 1990), research in organizational characteristics represents another important stream in organizational innovation adoption research. In the context of IS innovation adoption, organizational factors—factors reflecting adopting firm's characteristics—play an important role in the adoption decision (Kwon and Zmud 1987).

In the early studies on the organizational adoption of innovation, many general organizational factors which describe the structural orientation of the firm have been identified as important determinants of adoption such as formalization, centralization,

and integration (Ettlie 1986; Hage and Aiken 1967; Moch and Morse 1977; Zmud 1982). But, in the recent IS innovation adoption research, not much support for these variables have been found (Grover 1993). The main criticism of these structural factors is that there is a tendency to treat organizational features as objective realities whose factual character is unchallenged (Slappendel 1996). It is suggested that simplistic operationalization of organizational structure variables is unable to capture adequately the organizational complexities and therefore does not explain adoption decisions (Premkumar et al. 1997).

Instead of those structural variables, in prior IS innovation adoption research, organizational factors reflecting the adopting firm's internal resources (e.g. financial resource, technological resources, human resources) for innovation have been most frequently used by IS researchers, such as IT competence, technical competence (e.g. Crook and Kumar 1998; Kuan and Chau 2001; Mehrtens et al. 2001; Zhu et al. 2003), IT/IS infrastructure, technological sources (e.g. Cash and Konsynskj 1985; Grover 1993; Premkumar and Ramamurth 1995; Scupola 2003; Zhu et al. 2003), employee's IS knowledge, IT expertise, the presence of technically-skilled human resources (e.g. Chau and Tam 1997; Cragg and King 1993; Crook and Kumar 1998; Scupola 2003; Thong 1999; Zhu et al. 2003), leader's knowledge, executive's know-how (e.g. Ettlie 1990; Harrison et al. 1997; Thong 1999; Zhu et al. 2003), and organization's size (Grover 1993; Kuan and Chau 2001; Premkumar et al. 1997; Thong 1999; Zhu et al. 2003). The general argument of these factors is that the availability of resources for innovation is a necessary condition for innovation adoption. Since an innovation only

acts in conjunction with adopting firm's resources to provide strategic benefits, a firm's available resources for innovation will facilitate or inhibit its adoption decision depending on whether the firm has sufficient or limited resources to adopt the innovation.

Such argument suggested that those factors that reflect the adopting firm's available resources for innovation take effects on the firm's adoption decision through affecting some kinds of fit between adopting firm's available resource for innovation and the required resources for the innovation. The reason is whether the firm's available resources for innovation are sufficient or limited depends not only on the adopting firm's available resources for innovation but also on the required resources for innovation. A representative factor reflecting such fit proposed before in IS innovation adoption research is "organizational readiness" by Iacovou et al. (1995). In their study, organizational readiness refers to the level of financial resources readiness and technological resources readiness. The financial readiness refers to financial resources available for the IS to pay for installation costs, implementation of any subsequent enhancements, and ongoing expenses during usage. The technological readiness is concerned with the level of sophistication of IT usage and IT management in a firm because sophisticated firms usually are less likely to feel intimidated by the technology, possess a superior corporate view of data as an integral part of overall information management, and have access to the required technological resources such as hardware, expertise, and a competent project leader (Iacovou et al. 1995).

Besides those factors reflecting the adopting firm's internal resources for adoption, IS researchers are also interested in those factors reflecting leader's support behavior such as top management support (e.g. Grover 1993; Premkumar and Ramamurth 1995; Premkumar et al. 1997). These factors are considered as important because it is the leader who becomes aware of new ideas and who then decides to introduce them to the organization (Slappendel 1996). Also, leaders can influence the innovation climate indirectly through the setting of goals, by encouraging innovation initiatives from subordinates, and through their decisions with respect to innovation adoption or rejection (Slappendel 1996).

In the recent IS research from the resource-based view of the firm, leader's support has been suggested to be a kind of complementary resources for IT (e.g. Powell and Dent-Micallef 1997; Ross et al. 1996). For example, in Powell and Dent-Micallef's research (1997) CEO's commitment was suggested to be one of six potential complementary resources for IT. Likewise, in Ross et al.'s research (1996), top management sponsorship was categorized as relationship assets—one of three kinds of IT assets contributing to IT business value. Since leader's support per se can be considered as a kind of resources of the adopting firm, leader's support can be considered as a factor reflecting the adopting firm's internal available resources for IS innovation adoption.

Actually, this conclusion has already been implicated by the former IS innovation adoption researchers. For example, in Iacovou et al.'s (1995) research, the concept of IT sophistication in technological readiness captures not only the level of

technological expertise within the organization but also assesses the level of management understanding of and support for using IT to achieve organizational objectives (Chwelos et al. 2001). Hence, like other factors which reflect the adopting firm's available resources for innovation, the effects of leader's support behavior can be explained by the factors reflecting some kinds of fit between adopting firm's available resources for innovation and the required resources for the innovation as well.

Other factors proposed by IS researchers related to leader's support behavior are some factors reflecting leader's personal attributes such as decision maker's age, level of education, degree of cosmopolitanism (Ching and Ellis 2004), and CEO's innovativeness (Thong 1999). However, there is no significant difference between the arguments about why these factors are important in adoption decision and why the leader's support behavior is important in adoption decision, because a leader's personal characteristics will affect a firm's adoption decision mainly through the leader's support behavior of the innovation.

Another organizational factor worth of mentioning here is "satisfaction with current systems" proposed by Chau and Tam (1997) because this factor reflects a very important but seldom used organizational factor—perceived performance gap—which is defined as the discrepancy between an organization's expectations and its actual performance (Rogers 1995; Downs 1966). In prior innovation adoption research, a firm's perceived performance gap is suggested to be a crucial factor in innovation adoption (Rogers 1995; Tornatzky and Fleicher 1990; Zaltman 1973). The reason is

when performance lags aspirations, a firm will be more likely to change its current state of affairs to find a remedy of its performance shortfall, then it will be more likely to try the innovation solution that may solve its problem (Rogers 1995; Zaltman et al. 1973). Although, except Chau and Tam's research, few IS innovation adoption researchers use factors reflecting adopting firm's perceived performance gap in their research model, this factor is a very important mediating factor of numerous environmental factors which are frequently used by IS researchers in their adoption model. Since those environmental factors mediated by perceived performance gap will be discussed in next section, we would like to emphasize this factor here first.

Generally speaking, in IS adoption research, important organizational factors can be finally explained through two perspectives to affect a firm's adoption decision. One is resource innovation fit perspective based on whether the factor affect/reflect some kinds of fit between the firm's available resources for innovation and required resources for the innovation such as organizational readiness (Iacovou et al. 1995). The other is performance-needs fit perspective based on whether they affect/reflect some kinds of fit between the firm's current performance and its expected performance/needs such as satisfaction with current systems (Chau and Tam 1997).

2.1.3 Environmental Characteristics

Environmental characteristics are another group of factors interested by IS researchers because organizations do not exist in a vacuum but operate in an environment that provides opportunities and imposes constraint. In the IS innovation adoption research,

the most frequently proposed environmental factors were those reflecting market volatility/uncertainty, such as competition intensity, competitive pressure, industry pressure, and market uncertainty (e.g. Bensaou and Venkatraman 1996; Chau and Tam 1997; Chwelos et al. 2001; Grover 1993; Iacovou et al. 1995; Kuan and Chau 2001; Premkumar and Ramamurth 1995; Premkumar et al. 1997; Reekers and Smithson 1994; Teo et al. 2003; Webster 1995; Zhu et al. 2003). The major argument for these factors was that in turbulent, fast changing environments, more assets and capabilities were required to achieve superior performance than those needed in more stable environments (Eisenhardt and Martin 2000; Teece et al. 1997; Volberda 1996) because a firm's performance is highly affected by the change in the firm's external environment (Zaltman et al. 1973). For example, if there is no longer a demand for the organization's output, the organization will definitely perceive a performance gap and will initiate a search for a new output to be developed. Hence, in turbulent, fast changing environments, firms will be more likely to perceive some performance gap of their current business practices, then they will be more likely to adopt some kinds of innovations to keep their competitive advantages. Such argument shows that the effects of those general market-related environmental factors on a firm's adoption decision are mediated by the firm's perceived performance gap.

Since the study of IOS adoptions in the 1990s, IS researchers have focused on the effects of inter-organizational relationship that is described as socio-political processes reflected by the transaction climate that exists in the relationship and by the power-dependence relationships in the dyad (Reve and Stern 1986). Characteristics of

inter-organizational relationship such as encouragement, commitment, support and coercion from customers and suppliers, and trust and interdependence between the firm and its suppliers and customers have been found to take effects on the firm's adoption decision (Benaou and Venkatraman 1996; Cavaye 1996; Chwelos et al. 2001; Clemons and Row 1993; Crook and Kumar 1998; Hart and Saunders 1998; Mehrens et al. 2001; Premkumar and Ramamurthy 1995; Reekers and Smithson 1996; Reich and Benbasat 1990).

The major argument is that the IOS implementation especially EDI implementation has historically followed a "hub" and "spoke" arrangement, where one firm (hub) initiates the implementation with its trading partners who form the spokes of the electronic linkages (Premkumar et al. 1997). The initiating firm may exploit either its power-dependence relationships with its trading partners or the conducive climate with its partners to establish electronic linkage with them. Hence, a firm who is the weaker partner in the inter-organizational relationships may face external pressure from initiating firms to adopt the IOS or lose business if it is not a part of the network.

Thus, for a firm who is required to adopt an IOS innovation initiated by its powerful trading partner(s), the adoption of the innovation helps the firm to keep the business with its trading partner(s), which can be considered as a kind of potential ability of that IOS innovation initiated by the firm's powerful trading partner(s). Therefore, the effects of those inter-organizational relationship-based factors on a firm's adoption decision can be explained by the firm's perceived potential benefit of the innovation which reflects some kinds of fit between the potential ability of the innovation and the

adopting firm's needs.

Generally speaking, research works in innovation characteristics, organizational characteristics, and environmental characteristics suggested that there are different levels among those possible determinant factors of the organization level innovation adoption because of causal relationships among those factors. Except those factors that reflect some kinds of fit between a firm's performance and its needs such as perceived performance gap, or fit between the innovation features and the adopting firm's needs, strategies, resources, or capabilities such as perceived benefits, complexity, compatibility, cost, and organizational readiness, numerous other factors only have indirect effects on a firm's adoption decision because their effects have been mediated by those fit-based factors. Hence, in the rest of this chapter, we would like to identify those key fit-based factors in order to build an effective and parsimonious framework for IS innovation adoption.

2.2 The Concept of Fit

Before we begin to identify those key fit-based factors, we would like to clarify the concept of fit which has served as an important building block of our framework, because there have been a lots of distinct definitions of fit in prior academic research. For example, Venkatraman (1989) developed a conceptual framework and mapped fit as 1) moderation, 2) mediation, 3) matching, 4) gestalts, 5) profile deviation, and 6) covariation. Each of these six perspectives of fit implied a distinct theoretical meaning and required the use of specific analytical schemes.

As we have shown in the literature review part, the fit-based factors we are interested in are those reflecting some kinds of fit between a firm's performance and its needs, or fit between the innovation features and the adopting firm's needs, strategies, resources, or capabilities. Therefore, according to Venkatraman's framework, they all belong to the match type of fit in which fit is a theoretically defined match between two related variables. For example, the fit between a firm's performance and its needs is only determined by the firm's performance and its needs. There is no need to use a third party reference variable to judge such fit. Similarly, the fit between a firm's available resources for innovation and required resources for innovation is only determined by the firm's available resources for innovation and required resources for innovation. Hence, to avoid the misunderstanding, in the rest of the thesis, we will use word "match" to represent fit concepts. In the next section, we will provide the theoretical foundations for our match-based framework for IS innovation adoption.

2.3 Theoretical Foundations

Since IS innovation may be broadly defined as innovation in the organizational application of digital computer and communications technologies, it is fundamentally organizational innovation (Swanson 1994). Hence, the organizational innovation theories can be potentially useful to our development of new framework of IS adoption. Also, because IS can be considered as a type of resource for companies (Wade and Hulland 2004), adoption decision of a specific IS innovation is a decision of resource replacement and/or acquisition. Hence, besides organizational innovation

theories, theory of resource based view of the firm, which take the resource of a firm as its central theme, also provide a strong theoretical foundation of our framework because it provides a valuable way for IS researchers to think about how information systems relate to firm's strategy and performance. We shall review theories in organizational innovation and resource based view of the firm in the following sections.

2.3.1 Organizational Innovation Theories

The study of innovation diffusion (e.g. Roger 1995; Tornatzky and Fleicher 1990; Zaltman 1973) has a long history as a multidisciplinary field with contributions from sociologists, communication researchers, economists, organizational researchers, IT researchers, and many others. While there is much diversity across these traditions, they are unified by their concern with three basic questions (Fichman 2000): What determines the rate, pattern, and extent of diffusion of an innovation across a population of potential adopters? What determines the general propensity of an organization to adopt and assimilate innovations over time? And what determines the propensity of an organization to adopt and assimilate a particular innovation? Studies on organizational innovation adoption have been an important subset of this broad stream of research (Damanpour 1991).

Studies of innovation diffusion have focused on both individual and organization levels of analysis (Slappendel 1996). Much of the early literature in innovation diffusion before 1960 mainly focused on the adoption of new ideas and practices by

autonomous individuals (Rogers 1995). Since the late 1950's, there has been growing interest in organizational innovation, i.e. innovation within, and by, organizations (March and Simon 1958; Bums and Stalker 1961; Zaltman et al. 1973). After the early 1970's, research on innovations and organizations centered on investigations of a single innovation in an organization or organizations (Rogers 1995). Though an innovation by definition could be an idea practice or object that is perceived as new by an individual or other unit of adoption (Rogers 1995), often the innovation in those studies was a new communication technology like electronic messaging, a management information system, or some other computer-based technological innovation. The field of innovation in organizations has been invigorated in the 1980s by the study of new communication technologies (Van de Ven and Rogers 1988).

Since the process of diffusion of an innovation by organizations is very different from that by individuals, simplistic and inappropriate 'anthropomorphizing' of organizational characteristics (Yin 1978) in the early organization innovation studies contributed to the growth of the organizational innovativeness stream of research in the diffusion studies, which focuses on the determinants of an organization's propensity to innovate (Wolfe 1994). To understand why some organizations are more innovative than other, organizational innovativeness researchers have looked to the characteristics of those organizations, their leaders, and the environment in which they operate. Hence, three levels of the factors are investigated in organizational innovativeness studies: individual factors, organizational factors, and environmental factors (Baldrige and Burnham 1975). Of all potential influences, organizational

variables have been the most widely studied, and some authors have pointed to their primary importance as determinants of innovation (Damanpour 1987, 1991; Kimberly and Evanisko 1981).

An important turning point in the history of research on innovation in organizations occurred with publication of the book “Innovations and Organizations” by Zaltman in 1973. From that time, a different kind of diffusion research in organizations began, looking at the innovation process within the organization (Rogers 1995). Instead of determining the variables related to more-innovative and less-innovative organizations, the process of innovation was traced in a single organization over time. Typically, such research identified temporal stages in the innovation process. By decomposing organizational innovation to its component phases and focusing on the sequential nature of precursor events and on their determinants, innovation process research takes advantage of relative stability and simplicity at each process stage (Wolfe 1994).

Currently, organizational innovation adoption process is explained through a stage model. The assumption of a stage-model approach is there is a progression of identifiable phases or categories of behaviors which bring the adopting unit more or less closer to the ultimate decision (Rogers 1995; Zaltman et al. 1973). Although there are variations in the naming of stages among researchers, Generally speaking, most researchers agree that the process of the innovation adoption can be divided into two major stages—initiation and implementation (Rogers 1995; Zaltman et al. 1973). The initiation stage consists of all activities pertaining to problem perception, information

gathering, attitude formation and evaluation, and resource attainment leading to the decision to adopt, whereas the implementation stage consists of all events and actions pertaining to modifications in both an innovation and an organization, initial utilization, and continued use of the innovation when it becomes a routine feature of the organization. Typically, researchers focus on one or the other stage in their studies, primarily due to the long time duration for the initiation and implementation process and difficulty in collecting longitudinal data.

Innovation adoption decision occurs in the initiation stage. In this stage, the firm collects information, builds knowledge of the innovation, examines its relevance and appropriateness to the organization, and makes a decision whether to adopt the innovation. According to Rogers (1995), the initiation stage has two sub-stages—agenda-setting and matching.

Agenda-setting occurs in the innovation process when an organizational problem that needs a solution is defined. In this stage, the management needs to identify and prioritize needs and problems, as well as searching the organization's environment to locate potentially useful innovations to solve the organizations problems. At this stage, one or more individuals in an organization recognize the performance gap. When organizational decision makers perceive that there is a discrepancy between standard of satisfactory performance and the actual performance, search for alternative courses of action is likely to happen. This stage is of utmost importance to the ultimate attention paid to a particular problem because both individuals and institutions have limited capacities to deal with many tasks simultaneously (Simon 1978). While some

problems receive full attention, others are neglected. When a problem is neglected by an organization, even if there is an innovation to solve this problem, the innovation is overlooked by the organization.

In the ***matching*** stage, a problem in the organization's agenda is matched with innovations, and this match is planned and designed. At this stage, the problem is conceptually matched with the innovation to establish how well they fit. This is a land of reality testing in which the organization's members attempt to determine the feasibility of the innovation in solving the organization's problem. Such symbolic planning entails thinking about the anticipated problems that the innovation might encounter if it were implemented (Rogers 1995). If an organization's decision makers conclude a mismatch between the innovation and the problem, this innovation is likely to be rejected (Rogers 1995). Like what is argued by Fichman (2000), even though an organization may exhibit a generally high propensity to innovate, it may still lag in the adoption of innovations that do not fit well with its needs, strategies, resources, or capabilities. Likewise, a generally less innovative organization may still choose to be an early adopter of innovation that constitutes a good fit.

Although agenda-setting stage is suggested to happen before matching stage, we do not suggest any natural order of events in these two stages, because, most of times in reality, the decision making is a nonlinear process that is rich in feedback loops and highly sensitive to new information (Mintzberg et al. 1976). The reality of much decision making is that it approximates a garbage can process in which decision making appears to be a chaotic mix of problems and solutions (Tornatzky and

Fleischer 1990). Often, a choice is made and only then kicked back for further search and problem definition. There may be cycles upon cycles in several directions at once. Hence, innovation may be induced by either a performance gap or by recognizing a promising new technology (Zmud 1984). Various researchers have argued that judgments about the availability of solutions may trigger the detection of problems (March and Olsen 1976; Starbuck 1983). For example, March (1981) argued that innovation in organizations often seems to be driven less by problems than by solutions. Answers often precede questions. In these cases, the urgency of the problem will be assessed after the feasibility assessment of the solution. Hence, there could be loops between these two stages in adoption decision process. That means the firm's adoption decision could be affected by events occurring in either of these two stages.

Based on literature review, we identified three core events in these two stages that are important for the firm's adoption decision: 1) performance gap assessment in the agenda-setting stage and 2) innovation's potential utility assessment and 3) firm's adoption ability assessment in the matching stage. As we have mentioned above, we do not suggest a particular sequence of order among events in agenda setting stage and matching stage. Rather, we assume all these assessments are conducted and considered simultaneously for an adoption decision.

Performance Gap Assessment

A performance gap is the discrepancy between an organization's expectations and its actual performance (Rogers 1995; Downs 1966). From a rationalist or even bounded

rationalist perspective, the performance assessment results in a starting point for the agenda-setting process (Tornatzky and Fleischer 1990). The assessment of this gap gauges the importance of taking acting on an issue and induces stakeholders to apply pressure for actions. The impetus to innovation adoption will be boosted when organizational decision makers perceive that the organization's present course of action is unsatisfactory (Zaltman et al. 1973).

Actually, the notion that a meaningful relationship exists between performance gap and organizational change finds its precedent in the behavioural theory of a firm (Cyert and March 1963; March and Simon 1958; March and Shapira 1992). This body of work suggests that when performance lags aspirations, a firm engages in "problemistic search" (Cyert and March 1963) to identify a remedy to the performance shortfall. Change is often the logical outcome of this search behavior. In contrast, if a firm's performance is above its target, managers are more likely to take new actions that may produce below-target performance (March and Simon 1958; March and Shapira 1987). That is, for high performing managers, the dangers of falling below target performance dominate their attention, and the opportunities for future gains are less valued. They are risk averse who avoid innovation adoption. As what is argued by Tornatzky and Fleischer (1990), an organization that was performing up to expectation and had prospects to continue to do so for the foreseeable future would have no incentive to initiate change.

Potential Utility Assessment and Adoption Ability Assessment

The potential utility of an innovation is a measurement of the extent to which a firm's problem can be solved by abilities of the innovation without considering the constraint for adoption. Adoption ability of an organization is a measurement of the extent to which the organization is able to meet the requirements of innovation implementation. The assessment of innovation utility addresses the potential value of an innovation, while the assessment of adoption ability gauges the organization's ability to realize the value

Prior adoption research showed that how much an organization's problem can be solved by a specific innovation solution should be determined not only by the extent of potential utility assessment but also the organization's adoption ability assessment.

Van de Ven and Rogers (1988) suggested that an organization's condition can be considered as constraint or resistances to innovation adoption, at least to the extent that many problems are usually encountered in attempts to implement an innovation in an organization. Alternatively, these difficulties can be seen as evidence that a particular innovation may not fit well with the organization's perceived problem, or that the expected consequences of innovation adoption are perceived by the organizations members as more negative than positive (Van de Ven and Rogers 1988).

Likewise, Mohr (1969) pointed out that the willingness to innovate may lead to innovation not only when individuals involved are willing to innovate, but also when the resources for innovation are available. He concluded that it is necessary to consider the interaction between the variables of motivation to innovate and resources available in predicting innovation.

2.3.2 Resource-Based View of the Firm

Based on innovation diffusion theory, we proposed three assessments in IS innovation adoption. Surprisingly, resource-based view of the firm, a quite different theoretical perspective, implies the same set of assessments for IS innovation adoption decision.

The theory of resource-based view of the firm is a robust theory that has received wide acceptance in management fields. It started to appear in IS research in the mid-1990s (Wade and Hulland 2004). Now, it is increasingly being used by IS researchers, which reflects the actual utility of the theory to the IS research. It provides a valuable theoretical lens to study how information systems relate to firm strategy and performance. In particular, the theory provides a cogent framework to evaluate the strategic value of information systems resources (Wade and Hulland 2004).

The resource-based view of the firm views the firm as a bundle of resources (Barney 1991; Grant 1991; Penrose 1959; Wernerfelt 1984). It argues that ongoing performance differences among firms might be attributed to the fundamentally different “bundles” (Penrose 1959), or portfolios, of resources that firms use to implement their strategies. The composition of the firm’s resource bundle is a source of potentially sustainable competitive advantage (Barney 1991; Henderson and Cockburn 1994; Miller and Shamsie 1996). This theory suggests that firms seek to acquire or develop resources in the first place to amass the resources needed to implement their strategies and/or establish sustainable competitive advantage when

they find that the resource portfolio it currently possesses is not sufficient to implement its strategy, and/or is not capable of providing sustainable competitive advantage (Moliterno and Wiersema 2005). In the other word, it suggests that a strong motivator to make changes to the resource portfolio is the firm's estimation that the current asset structure is insufficient to achieve or sustain competitive advantage. Then, this expected competitive position might be a meaningful determinant of the decision to engage in resource replacement and acquisition (Moliterno and Wiersema 2005).

The "resource-for-sustainable competitive advantage" argument implies that an IT solution is perceived to have a positive impact on performance only when there is correspondence between its functionality and the needs of the organization (Cooper and Zmud 1990). However, according to "IT productivity paradox" studies, IT assets rarely directly lead to a sustained competitive advantage (Wade and Hulland 2004). Instead, they form part of a complex chain of assets and capabilities that may lead to sustained performance. IT can generate competitive value only when it leverages the pre-existing business and human resources in the organization (Benjamin and Levinson 1993; Clemons and Row 1991; Jarvenpaa and Leidner 1998; Powell and Dent-Micallef 1997; Wade and Hulland 2004). As information systems exert their influence on a firm through complementary relationships with other assets and capabilities of the firm, the value of an IT asset will be based on both how much its functions fit on a firm's needs and how much its requirements fit on a firm's current resource base.

In sum, resource-based view of the firm and resource based assessment of IT business value suggest that: 1) insufficiency of current resources to achieve or sustain competitive advantage will give a firm an motivation to engage in IT innovation adoption, 2) the adoption decision of an IT innovation will be affected by both its functional fit to the firm's needs and its requirement fit to the firm's current resource base. Overall, the implications from resource-based perspective are consistent with three assessments we proposed before based on innovation diffusion research.

Chapter 3: A Match-Based Framework for IS Innovation Adoption

3.1 Introduction

In our theoretical foundation part, we identified three core events that are important for the firm's adoption decision: 1) performance gap assessment 2) innovation's potential utility assessment and 3) firm's adoption ability assessment. The performance gap assessment assesses the extent to which the firm's actual performance meet its needs; the innovation's potential utility assessment assesses the extent to which the ability of the innovation meet the firm's needs; and the firm's adoption ability assessment assesses the extent to which the firm's resources meet the resource requirements for innovation adoption.

Hence, these three assessments are three match assessments: the match between the firm's current resource performance and its strategic needs, the match between the

potential ability of the innovation and the firm's strategic needs, and the match between the firm's available resources for innovation and the required resources for innovation. Each match is constituted by two match constituent factors. As "strategic needs" acts as a match constituent factor for both "performance-needs match" and "innovation-needs match", there are totally five match constituent factors: the firm's current resource performance, the firm's strategic needs, the firm's available resources for innovation, the perceived potential ability of the specific IS innovation, and the required resources for innovation.

Based on the literature review and our theoretical foundations, we proposed a framework in which a firm's adoption decision of a specific IS innovation is proposed to be affected by three levels of factors: 1) match-based factors, 2) match constituent factors, and 3) peripheral factors. According to our framework, the firm's adoption decision is directly determined by three kinds of match-based factors: the factors based on the match assessment between the firm's current resource performance and its strategic needs, the factors based on the match assessment between the potential ability of the innovation and the firm's strategic needs, and the factors based on the match assessment between the firm's available resources for innovation and the required resources for innovation. Meanwhile these three match assessments are directly affected by five match constituent factors: the firm's current resource performance, the firm's strategic needs, the firm's available resources for innovation, the perceived potential ability of the specific IS innovation, and the required resources for innovation. Concerning the five match constituent factors, they are also subject to

numerous peripheral factors. Figure 3.1 shows the relationships among these three levels of determinant factors and their relationships to a firm's adoption decision of a specific IS innovation.

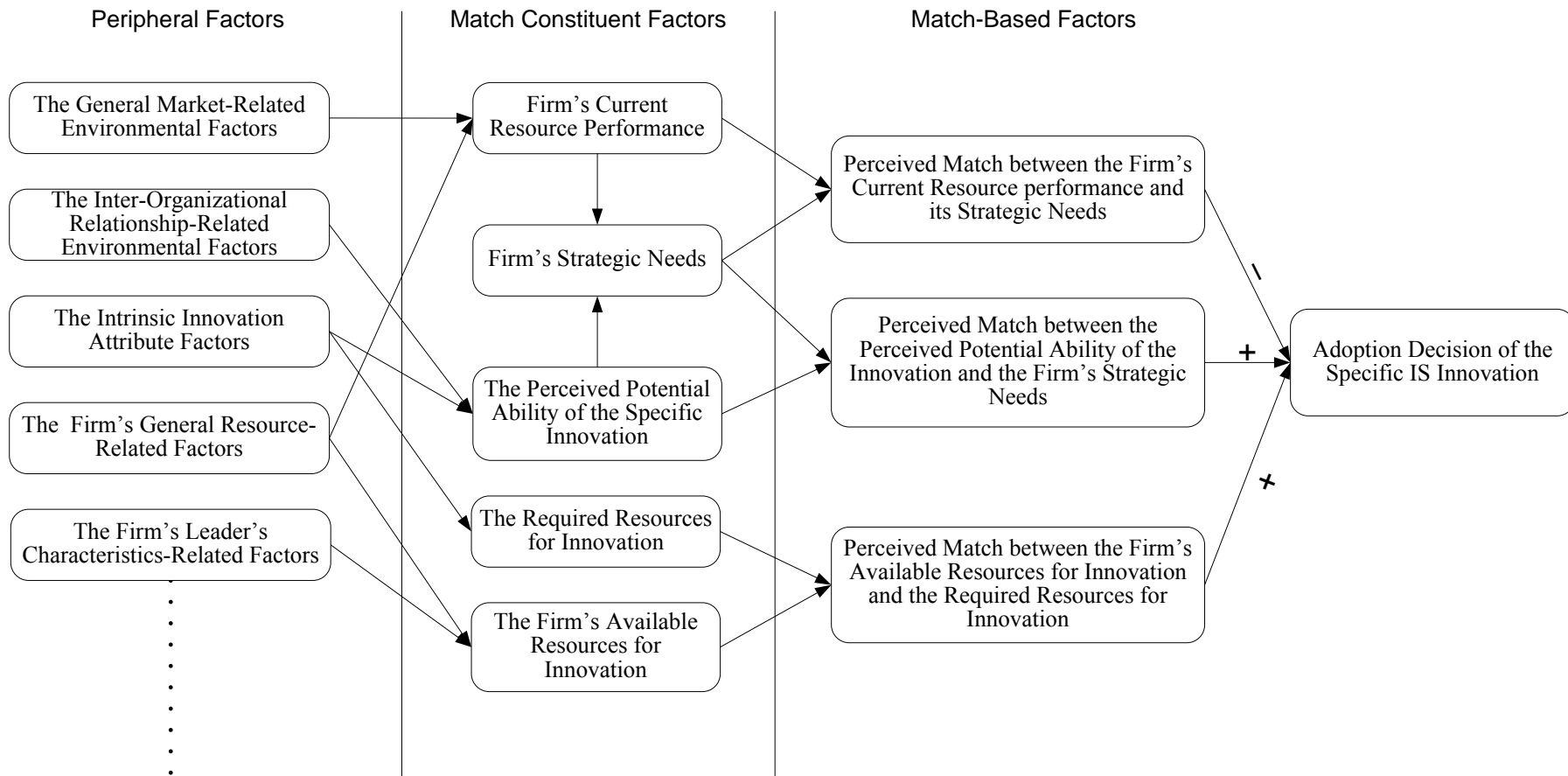


Figure 3.1: The Match-Based Framework for IS Innovation Adoption

3.2 Match-Based Factors

Based on innovation diffusion theory and resource-based view of the firm, we proposed that a firm's adoption decision of a specific IS innovation is directly determined by three kinds of match-based factors: *the factors based on the match assessment between the firm's current resource performance and its strategic needs, the factors based on the match assessment between the potential ability of the innovation and the firm's strategic needs, and the factors based on the match assessment between the firm's available resources for innovation and the required resources for innovation.*

The Match between the Firm's Current Resource Performance and its Strategic Needs

The **match** between *the firm's current resource performance* and *its strategic needs* is defined as the extent to which the performance of the firm's current resources is perceived to meet its strategic needs (in the rest of the dissertation, we will use term "performance-needs match" to refer this match). In this definition, the firm's strategic needs act as the firm's criteria or aspiration level of satisfactory performance. Hence, this match gauges the perceived performance gap level by the firm. As we showed in the previous theoretical foundation part, how much the firm's current resources are expected to perform up to its needs affects the firm's impetus to find new ways to improve performance (Rogers 1983; Zatman et al. 1973). Hence, the more a firm's resources perform up to its needs, the less the perceived need that the organization has

to change its status quo, and the less likely it will try an innovation that may be useful for its needs. Similarly, the more the gap is perceived by the firm, the more the urgency of taking actions to close the gap will be perceived, and the more likely the firm will try an innovation that may be useful for its needs (Dutton and Duncan 1987).

As we have mentioned in literature review part, in IS adoption research, factors reflecting the performance-needs match are seldom proposed except in Chau and Tam’s research (1997). In that research, Chau and Tam proposed “satisfaction with current systems” as an important organizational characteristic affecting the firm’s adoption decision. As shown in Table 3.1, this concept is measured as the extent to which the existing system serves the needs of the company with two items. Hence, their factor is consistent with our framework.

Table 3.1: Important factors proposed from performance-needs match perspective and their measures

Factors	Example Measurement Items
Satisfaction with current systems	Does your existing computing system serve the needs of the company? (Chau and Tam 1997) Are you satisfied with the price/performance of your systems? (Chau and Tam 1997)

The Match between the Perceived Potential Ability of the Specific IS Innovation and the Firm’s Strategic Needs

The **match** between *the perceived potential ability of the specific IS innovation* and *the firm’s strategic needs* is defined as the extent to which the potential abilities of the specific IS innovation are perceived to meet the firm’s strategic needs (in the rest of the dissertation, we will use term “innovation-needs match” to refer this match).

Like in the match between the firm's current resource performance and its strategic needs, the firm's strategic needs still act as the firm's criteria of satisfactory performance. Here, these criteria are used to judge the possible benefits if the innovation is adopted and used. How much the potential abilities of the IS innovation are perceived to meet the firm's strategic needs gauges the possible maximum benefits that may be realized by the firm through adoption and implementation (Cooper and Zmud 1990). That perceived potential benefits provide the firm the impetus to adopt the specific IS innovation.

It is worth of mentioning that the potential benefits from the innovation-needs match assessment of a specific IS innovation is the maximum benefit of the innovation to an adopting firm assuming the firm had sufficient resource for adoption and implementation. This unconstrained condition is very important and differentiate our notion of "potential benefit of the innovation" from the similar benefit concepts such as relative advantage, perceived benefits, and usefulness proposed in prior IS adoption research (e.g. Agarwal and Prasad 1997; Beatty et al. 2001; Chau and Tam 1997; Chwelos et al. 2001; Cragg and King 1993; Crook and Kumar 1998; Grover 1993; Iacovou et al. 1995; Kuan and Chau 2001; O'Callagan et al. 1992; Premkumar et al. 1997; Ramaurthy et al. 1999; Saunder and Clark 1992; Slyke et al. 2002; Tan and Teo 2002; Teo et al. 1995; Thong 1999). Through emphasizing "without the adopting firm's resource constraint for adoption", we have distinguished the potential benefit of an innovation from the potential benefit of an innovation that can be realized by the adopting firm.

According to Davern and Kauffman (2000), an investment decision must be based on a comparison of the potential value that management saw in the project with respect to the realized value following implementation, in the light of the value conversion contingencies that intervene. Here, the value conversion contingencies refer to the factors that are internal to the organization. For the practitioner, the potential value of IT projects should be the first piece of information that is of interest—not the realized values which are not yet available. Assessing potential value and then sorting out what kinds of complementary investments need to be made to ensure that potential value can be obtained is crucial. Once a project's potential value has been established, then an estimate of its costs and expected return can be made, with care given to incorporating the effects of value conversion contingencies in the projection. Hence, there are significant differences between potential benefit of an innovation and the realizable return of an innovation. The later concept has been affected by the adopting firm's resource constraint whereas the former concept has not.

In prior IS innovation adoption research, benefit factors have been considered from realizable return perspective. As shown in Table 3.2, factors such as relative advantage and perceived benefits have all been measured as realizable return for the adopting firms. These benefit factors are too broad and amorphous to be a good factors for adoption research, because they could be affected by numerous other factors that may relate to the adopting firm's value conversion contingencies, such as the cost of the innovation, the firm's resource readiness for adoption and implementation etc.

Table 3.2: Important benefit factors and their measures

Factors	Example Measurement Items
Relative Advantages	<p>Operationalized with four kinds of benefits of Internet adoption, e.g. the Internet allows us to cut costs in our operation, the adoption of Internet provides timely information for decision making (Ching and Ellis 2004).</p> <p>Operationalized with extent of expectation with fourteen kinds of benefits of CIOS adoption, e.g. lower inventory costs, extended market reach (Grover 1993).</p> <p>Operationalized as improvements to the cash receipt process, cash disbursement process, cash planning and forecasting process, capital investment decision process, use of excess cash, and financial image of the firm (Teo et al. 1995).</p>
Perceived Benefits	<p>Respondents were asked to give their level of agreement or disagreement of five potential benefits of adopting an open system, e.g. promote flexibility and integration, allow transparent data access (Chau and Tam 1997).</p> <p>Respondent were asked to rate the importance of achieving each of the seventeen benefits of EDI in terms of their organization's decision whether or not to adopt EDI, e.g. increased productivity, overhead cost reduction (Chwelos et al. 2001).</p>

For example, Tornatzky and Klein (1982) have criticized studies using relative advantage because of the “catch-all” nature of the variable. They argued that typically the relative advantage is the garbage pail characteristic in innovation characteristic studies into which any of a number of innovation characteristics can be dumped. When it is proposed with other factors, the results may be inconclusive and inconsistent because some multicollinearity effects among factors. Actually, in prior IS adoption research, several researchers have found insignificant relationships between relative advantage and firm’s adoption intentions (e.g. Chau and Tam 1997; Chwelos et al. 2001; Grover 1993; Premkumar et al. 1997; Saunder and Clark 1992).

Here, through distinguishing the potential benefit of an innovation from the expected return of an innovation that can be realized by the adoption firm, our potential benefit

concept is independent of the adopting firm's value conversion contingencies. Hence, we adjust the too broad and amorphous definition of the benefit factors in prior research to avoid some multicollinearity methodology side-effects in model testing.

The Match between the Firm's Available Resources for Innovation and the Required Resources for Innovation

The **match** between *the firm's available resources for innovation* and **the required resources for innovation** is defined as the extent to which the firm's available resources for innovation are perceived to meet the resources required for adoption and implementation of the specific IS innovation (in the rest of the dissertation, we will use term "resource-innovation match" to refer this match). How much the requirements of adopting and implementing of an the IS innovation can be met by the organization's available resources gauges the extent of the potential benefits can be realized by the firm under current resource conditions, because IT can generate competitive value only if it is accompanied with existing business and human resources in the firm via co-presence or complementarity (Benjamin and Levinson 1993; Clemons and Row 1991; Jarvenpaa and Leidner 1998; Powell and Dent-Micallef 1997; Wade and Hulland 2004). Hence, the more the firm's available resources for innovation are perceived to meet the adoption and implementation requirements, the more likely the firm will adopt that innovation.

As we have mentioned in literature review part, one important factor reflecting resource-innovation match proposed in prior IS adoption research is the

multidimensional factor “organizational readiness” proposed by Iacovou et al. (1995). That organizational readiness refers to both the adopting firm’s financial resource readiness for the required financial resources for innovation and the adopting firm’s technological resource readiness for the required technological resources for innovation.

Although that “organizational readiness” factor was conceptually proposed from resource-innovation match perspective, when other researchers used this factor in empirical studies, they tended to measure this concept with items reflecting the firm’s financial condition and IT infrastructure condition rather than from a resource-innovation match perspective. For example, when Chwelos et al. (2001) measured financial readiness they used items like “what was the total revenue of your organization last year?” This is not a measure from resource-innovation match perspective because the revenue of the organization has no direct connection with the required financial resources for innovation adoption. A small firm with limited financial resources could still establish financial readiness for some innovations requiring few financial resources. Similarly, a firm with simple IT infrastructure could still establish technological readiness for some innovations not requiring sophisticated IT infrastructure.

Table 3.3: Important factors proposed from resource-innovation match perspective and their measures

Factors	Example Measurement Items
Financial Resource Readiness (First item is a resource-innovation match)	In the context of your organization’s overall Information Systems budget, how significant would the financial cost of developing and implementing an EDI system be? (Chwelos et al. 2001) Approximately how many people are employed in your

perspective measure, whereas item 2 and 3 are not)	organization? (Chwelos et al. 2001) What was the (approximate) total revenue of your organization last year? (Chwelos et al. 2001)
Technological Resource Readiness (No items are resource-innovation match perspective measure)	Operationalized with the extent to which information technology is important for the fulfillment of seven objectives of the respondents' organization e.g. operational cost reduction, productivity improvements (Chwelos et al. 2001). Please rate the attitude of your top management toward the deployment of information technology in your organization (Chwelos et al. 2001).
Complexity	The skills required to use the Internet are too complex for our employee (Ching and Ellis 2004). It is difficult for us to integrate the Internet to our current business operations (Ching and Ellis 2004). We believe that a CIOS is complex to use (Grover 1993). We believe that CIOS development is a complex process (Grover 1993).
Compatibility (First 3 items are value compatibility perspective measures, which reflect some extent of innovation-needs match. Rest 4 items are operational compatibility measures, which mainly reflect resource-innovation match.)	Using the Internet is consistent with our firm's business values (Ching and Ellis 2004). A CIOS is consistent with our beliefs and values (Grover 1993) Attitudes towards a CIOS in our organization have always been favorable (Grover 1993) Using the Internet is compatible with our firm's computer systems (Ching and Ellis 2004). A CIOS is compatible with our telecommunication infrastructure (Grover 1993). A CIOS is compatible with our computerized data resources (Grover 1993). A CIOS is compatible with our experience with similar systems (Grover 1993).
Cost (Both items are subjectively measured cost. There is no significant difference between these items and the first measurement item of financial resource readiness above)	There is a high cost for migration of open systems (Chau and Tam 1997). The costs of maintaining and supporting the Internet are expensive for our business (Ching and Ellis 2004).

As shown in Table 3.3, in prior IS innovation adoption research, other important factors proposed from resource-innovation match perspective are perceived complexity (Agarwal and Prasad 1997; Beatty et al. 2001; Cooper and Zmud 1990;

Cragg and King 1993; Grover 1993; Premkumar et al. 1997; Slyke et al. 2002; Teo et al. 1995; Thong 1999), compatibility (e.g. Agarwal and Prasad 1997; Cooper and Zmud 1990; Cox and Ghoneim 1996; Grover 1993; Premkumar et al. 1997; Skyke et al. 2002; Thong 1999), and subjectively measured cost (e.g. Cavaye 1996; Chau and Tam 1997; Cox and Ghoneim 1996; Cragg and King 1993; Kuan and Chau 2001; Premkumar et al. 1997).

The complexity reflects a match between the technical skill required to use the innovation and skills the organization possessed. Since skills of the firm are a kind of resources possessed by the firm, the perceived complexity partially reflects a resource-innovation match from skill resource readiness perspective.

The compatibility reflects both a match between the innovation and the values or norms of the adopting firm (value compatibility) and a match between the innovation and the adopting firm's current practices and operations (operational compatibility).

While the value compatibility may reflect some innovation-needs match perspective, the operational compatibility mainly reflects a kind of match between the requirements of the innovation and firm's current resource conditions. For example, in Grover's (1993) research about CIOS adoption, practical compatibility was measured through whether the CIOS is compatible with the firm's telecommunication infrastructure, computerized data resource, and experience with similar systems.

The subjectively-measured "cost" reflects a match between the adopting firm's available financial resources and the actual cost price of the innovation. It reflects a

resource-innovation match from financial resource readiness perspective. From this perspective, there should be no significant difference between items measuring subjectively-measured cost and adopting firm's financial resource readiness.

Generally speaking, the performance-needs match determines the urgency of the firm to change its current state of affairs to solve the problem faced by the company, whereas the innovation-needs match and resource-innovation match jointly determine the extent to which a firm's problem can be solved by the very action of an innovation adoption. As a whole, these three matches can be used to explain the likelihood that a specific IS innovation to be adopted by the organizations.

3.3 Match Constituent Factors

While those three match-based factors directly affect the firm's adoption decision, they are directly affected by five match constituent factors: *the firm's current resource performance, the firm's strategic needs, the firm's available resources for innovation, the perceived potential ability of the specific IS innovation, and the required resources for innovation.*

The Firm's Strategic Needs

As shown in our framework, the firm's strategic needs act as the firm's criteria of satisfactory performance to judge the firm's current resource performance and the potential ability of the specific innovation. Because this factor affects both the match between *the firm's current resource performance* and *the firm's strategic needs* and the match between *the potential ability of the specific IS innovation* and *the firm's*

strategic needs, its effect on the firm's adoption decision may be quite elusive. When the conditions of firm's current resource performance and the perceived potential ability of the specific IS innovation are constants, an increase in the firm's strategic needs level will increase the perceived performance gap and decrease the perceived potential benefit of the innovation. Thus, it could have both positive and negative effects on the firm's adoption decision.

Moreover, criteria of satisfactory performance of a firm tend to adjust to the firm's level of performance achievement over time (March and Simon 1958). For example, the organization may have high expectations of what its share of the market should be. However, their continued performance may indicate these expectations are too high. As a result, the decision makers may readjust their expectations downward.

Not only affected by firm's current resource performance, firm's strategic needs could also be affected by the potential ability of a specific IS innovation, because the IS innovation may change the firm's criteria of performance satisfaction (Dwon 1966). The new ability of an innovation can be viewed as opportunities to improve performance, as opposed to alleviate problems that are currently causing pain.

Because a firm's aspiration level of strategic needs might take multiple routes to affect IS adoption, matches that take this factor as a comparison benchmark serve as more direct causes of IS adoption. Aspiration level of strategic need serves more as a conceptual device in this framework to explicate the effects of the matches. Factors reflecting the firm's strategic needs are seldom considered in adoption research except

in those with specific interest in the technology performance from task-technology fit perspective (e.g. Goodhue and Thompson 1995).

The Firm's Current Resource Performance

The firm's current resource performance reflects the performance status based on current resource, which is independent of the firm's criteria of good or bad performance. It needs to be judged with the firm's strategic needs as a benchmark to evaluate the firm. This factor has a positive effect on the firm's perceived performance-needs match. Assuming that the firm's strategic needs are constants, the increasing of the firm's performance will decrease perceived performance gap. Hence, it has a negative effect on the firm's adoption decision.

In prior adoption research, factors reflecting the firm's resource performance are seldom considered. Adoption researchers are more interested in factors affecting the firm's current resource performance. Numerous factors has been proposed as the determinants of IS innovation adoption while their direct effects are only on the firm's current resource performance. These factors will be discussed later in the next section about peripheral factors.

The Perceived Potential Ability of the Innovation

The perceived potential ability of the innovation indicates what can be done by the specific innovation assuming the resources needed are available. This factor is independent of the adopting firm's needs. Like the firm's current resource performance, this factor needs to be judged with the firm's strategic needs as a

benchmark to draw a conclusion for the firm about the potential benefit of the innovation. This factor has a positive effect on the firm's perceived innovation-needs match. Keeping the firm's strategic needs constant, the increase of the potential ability of the innovation will incur more perceived potential benefits. Hence, it has a positive effect on the firm's adoption decision.

The factors reflecting the potential ability of the innovation are seldom considered in prior innovation adoption research. Adoption researchers are more interested in factors affecting the potential ability of the innovation. Numerous factors have been proposed as the determinants of IS innovation adoption while their direct effects are only on the potential ability of the innovation. These factors will be discussed later in the next section about peripheral factors.

The Required Resources for Innovation

This factor is a measure of resources required for innovation adoption and implementation, which is independent of the adopting firm's current resource condition. It has a negative effect on the firm's perceived resource-innovation match. Keeping the firm's available resources for innovation constant, the increases of the required resources for innovation will incur less perceived resource readiness. Hence, it has a negative effect on the firm's adoption decision.

The actual cost price of an innovation could be a representing factor reflecting the required resources for innovation. In IS innovation adoption research, factors reflecting the required resources for innovation are seldom used. Researchers are

more interested in factors reflecting resource-innovation match such as complexity and subjectively-measured cost.

The Available Resources for Innovation

This factor shows the part of resources possessed by the firm that can be used for innovation purpose, which is independent of the required resources for innovation.

This factor has a positive effect on the firm's perceived resource-innovation match.

Assuming that the required resources for innovation are constant, the increases of the firm's available resources for innovation will incur more perceived resource readiness.

Hence, it has a positive effect on the firm's adoption decision.

Factors reflecting the firm's available resources for innovation are probably the most popularly proposed factors in IS innovation adoption research. Numerous factors reflecting one or several aspects of the firm's available resources for innovation have been proposed, such as IT competence, technical competence (e.g. Crook and Kumar 1998; Kuan and Chau 2001; Mehrtens et al. 2001; Zhu et al. 2003), IT/IS infrastructure, technological sources (e.g. Cash and Konsynskj 1985; Grover 1993; Premkumar and Ramamurth 1995; Scupola 2003; Zhu et al. 2003), employee's IS knowledge, IT expertise, the presence of technically-skilled human resources (e.g. Chau and Tam 1997; Cragg and King 1993; Crook and Kumar 1998; Scupola 2003; Slywotzky 2000; Thong 1999; Zhu et al. 2003) and leader's knowledge, executive's know-how (e.g. Ettlie 1990; Harrison et al. 1997; Thong 1999; Zhu et al. 2003).

Generally speaking, except the firm's available resources for innovation,

match-constituent factors are seldom considered in prior IS innovation adoption research. It suggests that match constituent factors need to be considered with the a benchmark to be more meaningful. However, these match-constituent factors are very important for us to explain how and why numerous peripheral factors affect an adopting firm's adoption decision of an innovation, because it is these match-constituent factors that mediate the peripheral factors and more immediate match-based factors.

3.4 Peripheral Factors

Factors taking effects on firm's adoption decision through affecting the five match constituent factors are considered as peripheral factors. In prior IS innovation adoption research, numerous determinant factors proposed were actually peripheral factors. Here, a discussion of these peripheral factors will help explicate the central role of those match-based factors and show the explanatory power of our match-based framework for IS innovation adoption. Based on our literature review, we identified five major groups of peripheral factors which are important in IS adoption research. In this part, these five major groups of peripheral factors have been discussed.

The General Market-Related Environmental Factors

Factors reflecting market volatility/uncertainty have been the most frequently proposed environmental factors by IS researchers, such as competition intensity, competitive pressure, industry pressure, and market uncertainty (e.g. Bensaou and Venkatraman 1996; Chau and Tam 1997; Chwelos et al. 2001; Grover 1993; Iacovou

et al. 1995; Kuan and Chau 2001; Premkumar and Ramamurth 1995; Premkumar et al. 1997; Reekers and Smithson 1994; Teo et al. 2003; Webster 1995; Xu et al. 2004; Zhu et al. 2003). As we have mentioned above in the literature review part, those general market-related environmental factors are important for adoption research because a firm's performance is highly affected by the change in the firm's external environment (Zaltman et al. 1973). Hence, through affecting an adopting firm's resource performance, this group of factors will affect the firm's perceived performance-needs match, which in turn will affect the firm's adoption decision. Generally speaking, the effects of this group of factors on a firm's adoption decision will be mediated by the firm's perceived performance-needs match.

The Inter-Organizational Relationship-Related Environmental Factors

Since the study of IOS adoptions in the 1990s, there has been a change of the focus of environmental factors from those general market-related factors to those factors reflecting inter-organizational relationship. Lots of inter-organizational relationship-based factors have been proposed and found to influence a firm's adoption decision, such as encouragement, commitment, support and coercion from customers and suppliers, and trust and interdependence between the firm and its suppliers and customers (Benaou and Venkatraman 1996; Cavaye 1996; Chwelos et al. 2001; Clemons and Row 1993; Crook and Kumar 1998; Hart and Saunders 1998; Mehrens et al. 2001; Premkumar and Ramamurthy 1995; Reekers and Smithson 1996; Reich and Benbasat 1990).

As we have mentioned in literature review part, those inter-organizational relationship-based factors are important for adoption research because the potential ability of IOS has been influenced by the adopting firm's powerful trading partners/customers who initiate the system. Hence, through affecting the potential ability of the innovation, this group of factors will affect the firm's perceived innovation-needs match, which in turn will affect the firm's adoption decision. Generally speaking, the effects of this group of factors on a firm's adoption decision will be mediated by the firm's perceived innovation-needs match.

It is worth of mentioning that factors in this group are highly innovation specific. For different kinds of innovations the important factors may differ. For example, as a proprietary and closed network, EDI is typically initiated by a powerful buyer or supplier and only open to pre-selected business partners. Hence, in EDI adoption research, a firm's relationship with its trading partners is always considered the most important determinant factor (Chwelos et al. 2001; Iacovou et al. 1995). However, it is not the case in B2B e-marketplace adoption as B2B e-marketplace is built on an open network which is not confined to pre-selected business partners (Dai and Kauffman 2002). For a seller (buyer) who may adopt a B2B e-marketplace for marketing (purchasing) purpose, he will be more concern about how many potential buyers (sellers) who also use this e-marketplace for purchasing (marketing) purpose, because the potential ability of the e-marketplace is highly depended on the numbers of participants of the marketplace.

The Intrinsic Innovation Attribute Factors

For any kinds of innovations, they may have some intrinsic attributes which are inherent to the innovations and invariant across settings and organizations. In organizational innovation adoption research, these intrinsic attributes are also called as primary attributes (Downs and Mohr 1976). These intrinsic attributes determine what functions can be provided by the innovation and what will be required to fulfill these functions. They will act as some objective reference parameters for the adopting firms to judge the potential ability of the specific innovation and the required resources to adopt and implement the innovation.

These intrinsic attributes are innovation specific. For different innovation, different intrinsic attributes will be expected. In prior IS adoption research, factors in this group are seldom considered because they lack some common intrinsic attributes for different innovation,. Researchers are more interested in those secondary attribute factors which can be used repeatedly in adoption model for different IS innovations, such as benefits, complexity, compatibility etc. However, for adoption research on a specific innovation, an investigation of the factors in this group could be of some interest because these factors will provide us some specific features owned by the innovation and give us some deeper understanding of the firm's adoption decision of that kind of innovation.

The Firm's General Resource Condition-Related Factors

According the theory of resource-based view, firms possess resources, a subset of which enables them to achieve competitive advantage, and a further subset which

leads to superior long-term performance (Barney 1991; Grant 1991; Penrose 1959; Wernerfelt 1984). Since the effects of individual, firm-specific resources on performance can be significant (Mahoney and Pandian 1992), a firm's general resource condition-related organizational factors will definitely affect the firm's current resource performance. Hence, the greater the supply of the firm resources, the better performance of the firm's current resources, the less the perception of performance gap, and the less the momentum for the firm to change current status of affairs and adopt the innovation.

However, factors in this group could also affect the firm's available resources for innovation, because organizational resources are fungible, in that they can be taken from one area and move to another (Tornatzky and Fleischer 1990). Thus, a firm may decide to reorient its priorities, taking resources away from an existing activity and applying it to an innovative one. A restricted resource supply restrains the level of knowledge, expertise, and/or financial resources which can be devoted to innovation adoption. Consequently, the perceived feasibility of change is further constrained through a restriction in the level of resource readiness. Hence, the more resources the firm possessed, the more resources the firm may have for innovation purpose, the more perceived readiness for innovation adoption and implementation, and the more likely the firm to adoption the innovation.

Generally speaking, the effects of the firm's general resource condition-related factors on the firm's adoption decision will be mediated by both the firm's perceived performance-needs match and perceived resource-innovation match. Since the firm's

perceived performance-need match and its perceived resource-innovation match have contradict effects on the firm's adoption decision, sometimes, the effects of the firm's general resource condition-related factors are quite elusive. The representative factor here is "size", which is always considered as an important positive effect factor on the firm's adoption decision in prior IS adoption research because large firms possess more available resources for innovation (e.g. Grover 1993; Kuan and Chau 2001; Premkumar et al. 1997; Thong 1999; Zhu et al. 2003). However, we cannot just say that large company are more/or less likely adopters. Although large organizations have a greater ability to mobilise the resources required for adopting innovations, small organization may be more open to new innovative ideas that can be stifled in large organizations.

Hence, the effect of size on a firm's adoption decision should be considered from beating perspective between resource-innovation match and performance-needs match. For some innovations which may require large investments such as EDI, size may have a positive effect on firm's adoption decision because the resource-innovation match effect may beat the performance-needs match effect. But for some innovations with small investment requirement such as Internet based applications, size may have a negative effect on firm's adoption decision because low cost reduced the importance of the resource-innovation match effect. For example, in their survey of Internet adoption in Chinese companies, Guo and Chen (2005) found that Internet adoption in China is not positively related to company size. Bigger companies are not more likely

to adopt the Internet earlier than their smaller counterparts. Instead, some smaller companies have adopted the technology earlier than their larger counterparts.

The Firm's Leader's Characteristics-Related Factors

In the organizational innovation literature, one way of looking at innovation is to concentrate on personal characteristics of key organizational actors because the innovation adoption was most strongly influenced by those with power, communication linkages, and with the ability to impose sanctions (Mohr 1969; Tornatzky and Fleicher 1990). In the research work in IS innovation adoption, individual characteristics are more concentrated on the characteristics of organization leaders, especially in SMEs' adoption context (Ching and Ellis 2004; Thong 1999). That is because in small companies, the decision making is mostly centralized in a few key persons in the organization. The leader is usually the owner-manager. Hence, his/her characteristics are important in determining the innovative attitude of SMEs.

As we have mentioned in literature review part, the characteristics of the leader affect the innovation adoption mainly through the leader's support of the adoption of the innovation. Because leader's support can be considered as a factor reflecting the adopting firm's internal available resources for innovation, the effects of this group of factors on a firm's adoption decision will be mediated by the firm's perceived resource-innovation match. In prior IS adoption research, factors proposed in this group include decision maker's age, level of education, degree of cosmopolitanism (Ching and Ellis 2004), and CEO's innovativeness (Thong 1999).

3.5 Conclusion

In this chapter, a match-based framework was proposed based on the innovation diffusion theories, resource based view of the firm, and former studies in the IS adoption research area. In this framework, the firm's adoption decision of a specific IS innovation was proposed to be affected by three levels of factors: 1) match-based factors, 2) match constituent factors, and 3) peripheral factors.

According to our framework, a firm's adoption decision is directly determined by three kinds of match-based factors: *the factors based on the performance-needs match assessment, the factors based on the innovation-needs match assessment, and the factors based on the resource-innovation match assessment.* Meanwhile these three match assessments are directly affected by five match constituent factors: *the firm's current resource performance, the firm's strategic needs, the firm's available resources for innovation, the perceived potential ability of the specific IS innovation, and the required resources for innovation.* And for these five match constituent factors, they are directly subject to numerous peripheral factors.

This framework integrated multiple theoretical research streams in organizational innovation adoption research and provided a much clearer classification of crucial factors affecting IS innovation adoption. As a whole, this framework well explained the effects of the important factors found in the former adoption research works. It gave a deeper insight into the adoption decision process and provided a systematical explanation of why and how the commonly identified factors influence a firm's

adoption decisions of an IS innovation. It offered an answer to the call for integrated research model (Fichman 2000).

In the next two chapters of the dissertation, this framework was applied in two empirical studies to investigate Internet-based IS innovation adoption on organization level and test the applicability and generalizability of our framework in networking technology-based IS innovation adoption. The Study 1 focused on the issue of e-marketplace adoption intention for export companies. In this study, we were trying to investigate the drivers for the adoption of B2B e-marketplaces among SMEs in their international marketing practices. We would like to discover what forces “drive” SMEs to adopt Internet-based B2B e-marketplaces and uncover key factors affecting such adoption decision.

The Study 2 spoke to the issue of why some firms built their strategies around e-commerce opportunities while others did not and why some were more adept than others at incorporating e-commerce-based opportunities into their over all competitive strategies. In this study, we were trying to investigate the drivers for companies to apply and develop e-commerce for strategic purpose. We would like to discover what forces “drive” companies to put e-commerce development as a strategic weapon of the company for its competitive advantage and uncover key factors affecting such adoption intention. We sought to provide a more fine-grained understanding of what motivates firms to make strategic use decision of e-commerce applications.

Generally speaking, we chose these two topics for empirical studies for two reasons:

Firstly, since our framework well explained the effects of the important factors found in the former adoption research, testing the framework in different settings would allow us to identify necessary modifications to the framework to enlarge its generalizability in the adoption research of IS innovations. That will give more contributions in IS innovation adoption research. As the empirical studies in e-marketplace adoption intention and e-commerce strategic use intention are scant in prior adoption research, these two topics provide new research areas to test the applicability of our research framework.

Secondly, adoption research in the networking technologies-based IS innovations, especially the Internet-based IS innovations, is a new trend in IS adoption research. Along with the rapid development of networking technologies, the impacts of information systems are no longer confined to an organization, but extend to an organization network (such as those connected through Electronic Data Interchange) and the whole industry (such as electronic marketplace). Currently, Internet-based IS innovation such as B2C and B2B systems, and B2C and B2B e-commerce, are the popular forms of IS innovations adopted by organizations. The effective adoption and diffusion of these IS innovations in organizations has therefore, become an important managerial concern and attracted interest from many IS researchers in this research area.

Specifically, we chose these two topics for empirical studies for three reasons: Firstly, the first study focused on a specific e-commerce application—B2B e-marketplace, whereas the second study focused e-commerce as a business channel opposite to the

traditional business channel. In the second study, e-commerce could be any application of web technologies that enable revenue-generating business activities. Hence, in these two studies, we made a distinction between adopting a specific e-commerce application and conducting e-commerce. By focusing on firms strategic use intention, the second study helped us to observe the extent to which firms want to migrate from traditional channels to the Internet.

Secondly, the two kinds of innovations have different levels of resource requirements and involve in different levels of decision making process. Adoption of simple internet technologies is relatively inexpensive and easy, which makes adoption decision less controversial. But, for advanced e-commerce technologies, especially those involving online transactions and integrated with internal business processes, the adoption process is complicated and costly. For companies, e-marketplace provides an additional marketing approach which has low level resource requirement for adoption and implementation. The decision making is relatively simple and easy. However, e-commerce strategic use involves a consistent integration and implementation of all kinds of e-commerce technologies into existing business processes. That will require a high level resources to be invested and involve a more complicated decision making process.

Finally, the first study focused on small and medium sized enterprises whereas the second study focused on organizations with all sizes. Generally speaking, small businesses tend to have highly centralized structures, with one or two decision makers making most of the critical decision. They have limited IS related resources because

there are limited career paths to attract and retain skilled IS staff. And most of the time, they lack financial resources and are highly susceptible to short-range planning in response to their highly competitive environment. Hence, SMEs' management issues, problems and opportunities are very different from those of large corporations. Hence, the two studies provided a quite different context for adoption decision.

In sum, due to significant differences in the settings of these two topics, applying our framework in these two studies could provide a better understanding of its applicability in IS innovation adoption.

Chapter 4: Determinants of E-Marketplace Adoption in SMEs' International Marketing Practices

4.1 Introduction

4.1.1 Background

The advent of Internet is revolutionizing international marketing practices and has made it easier to market products and services around the globe for small and medium-sized enterprises (SMEs) (Chaffey et al. 2000; Hamill 1997; Poon and Swatman 1997; Quelch and Klein 1996). Internet provides a low-cost gateway to global markets for SMEs by helping them to overcome many of the barriers for internationalization commonly experienced by small companies (Chaffey et al. 2000; Hamill 1997) and has been pushed as an enabler of globalization, allowing some SMEs to achieve rapid growth (Ellsworth and Ellsworth 1997). It has been touted as a means to reduce global advertising costs whilst increasing advertising efficiency, eroding the competitive advantages of scale economies, decreasing information dissemination and communication costs by overcoming geographical and temporal barriers, and facilitating SMEs to reach a critical mass of customers (Bunker and MacGregor 2002). Therefore, small companies offering specialized niche products will be able to find the critical mass of customers necessary to succeed through the worldwide reach of the Internet (Quenlch and Klein 1996). Thus, though small

companies traditionally tended to focus on one product or service for the local market, now they can target at the international market for the same market segment.

Though traditional physical markets are often brokered by intermediaries (also called a middleman or broker, which helps to facilitate transactions between buyers and sellers by providing value-added services, such as aggregation and distribution of products and product information, quality checks, and warranties.) or parties that facilitate market transactions by providing intermediation services, intermediaries are especially critical in export transactions which are characterized by geographical and cultural separation between buyers and sellers (Perry 1992). Since the information infrastructures may make it so easy to match customers and suppliers, some researchers suggested that the role of traditional intermediaries may be reduced or even eliminated which is termed as disintermediation (Gellman 1996).

However, despite the prediction of widespread demise of intermediaries, some of the most rapidly growing Internet businesses are essentially middlemen. Researchers found that the markets do not become disintermediated when information technology is used as a transaction facilitator (Baily and Bakos 1997). That is because a major problem with marketing through the Internet is that (normally) customers look for suppliers, rather than the other way round (Bennett 1997). Displaying advertising on web pages other than the firm's own is possible, but might not be well-received (Bennett 1997). Moreover, as more and more businesses establish WWW presences, searching for potential suppliers is inefficient without the aid of high-quality directories to guide people towards relevant sites (Bennett 1997). Hence, while some

roles of traditional intermediaries may be diminished, the development of Internet-based e-commerce offers numerous opportunities for new intermediation.

Bakos (1991) hypothesized that large-scale, globally-distributed intermediaries, formed by industry participants in collaboration with IT companies, will emerge in the marketplace. Either by capturing dominant market share in a single industry or by becoming electronic market makers across numerous industries, such intermediaries can sustain a competitive advantage by economies of scale and scope. Bailey and Bakos (1997) emphasize the need for intermediation in electronic markets. Based on their analysis of thirteen business-to-business and business-to-consumer firms, they report that IT-mediated markets still need aggregators for one-stop shopping, trust providers, information exchange facilitators and information filtering brokers. They posit that the need for matching, and therefore intermediary roles, will be more severe in markets with numerous, infrequently purchased products. In such markets, the electronic communication effect as described by Malone (1987) reduces the cost of IT-supported communication. Meanwhile, it also increases the quantity of information. Likewise, Hamill (1997) argued that “the Internet, by connecting end-users and producers directly, will reduce the importance of traditional intermediaries in international marketing. To survive, such intermediaries will need to begin offering a different range of services. Their value added will no longer be principally in the physical distribution of goods but rather in the collection, collation, interpretation and dissemination of vast amounts of information. The critical resource possessed by this new breed of ‘cybermediary’ will be information rather than inventory (p.305).”

Similarly, Hagel and Singer (1999) posit that new roles exist in electronic markets for information-collecting agents. These trusted information middlemen, whom they call informediaries, can act on behalf of buyers in their interaction with sellers, leading to greater buyer power through the aggregation and consolidation of demand.

Thus, with the exponential growth of worldwide Internet adoption and the rapidly increasing use of the World Wide Web as a platform for e-commerce, wholly new markets for electronic intermediaries, or cybermediaries (Sarkar et al. 1995), have emerged, especially in the international trading area which is traditionally characterized by a high share of intermediated rather than directly exchange (Perry 1992). Through an online global market, electronic intermediaries can provide new value-added services such as information brokering, trust provision and search capabilities to help connect buyers and suppliers (King 1999).

4.1.2 Internet-Based B2B E-Marketplace Adoption

Internet-based B2B e-marketplaces are a kind of inter-organizational information system in the online environment, in which multiple buyers and sellers come together to gather information and exchange goods and services (Bakos 1991, 1997, 1998; Graham et al. 1996; Malone et al. 1987; Senn 1996). They are built on open network infrastructures and connect firms that employ different information systems for their procurement/distribution activities. A key attribute of an electronic market is that it is a single inter-organizational information system (IOIS) that links multiple buyers and sellers (Choudhury 1997). As a result, what a buyer (seller) needs is just a single link

to the electronic market to exchange information and/or transact with the large, potentially unlimited number of sellers (buyers) who also subscribe to the system. Furthermore, in an electronic market, individual buyers (sellers) cannot determine which other sellers (buyers) could have access to the system. This is done by the market maker.

B2B e-marketplace differs from the traditional marketplace because it offers increased personalization and customization of product offerings, and aggregation and disaggregation of information-based product components to match customers' need. It overcomes some of the problems related to traditional tradeoff between richness and reach of information because it can achieve them simultaneously. It also enables new types of price discovery to be employed in different markets. They serve as electronic intermediaries to facilitate the exchange of information about products and/or support business transactions between participating buyers and sellers (Sarka 1995, Bakos 1998). With the advances in information and communication technologies, it is possible for those new intermediaries to aggregate a very large amount of information of the buyers and sellers of an industry, and to bring a larger number of potential buyers and suppliers together—a task that was not feasible or too costly for its offline counterpart because of the temporal and spatial separation between sellers and buyers (Dai and Kuuffman 2002).

For buyers, with electronic catalogs, electronic auctions, and other capabilities supported by the e-marketplaces, they can screen out obviously inappropriate suppliers, and compare the offerings of many different potential suppliers quickly,

conveniently, and inexpensively. Thus, it is possible for them to do one-stop comparison shopping for thousands of suppliers and select the best source in real time with a low cost. And for suppliers, through the e-marketplaces, they are able to expand their markets, and acquire new customers at a very low cost. It is also possible for them to aggregate smaller orders into larger bundles, and service customers at a lower cost, when the scale of economy expands. Hence, through a B2B e-marketplace, SMEs can gain access to international markets without incurring nontrivial up-front costs associated with searching for new market, negotiating contracts, and monitoring those contracts to ensure performance.

SMEs face greater pressure of efficiency and effectiveness in an ever changing knowledge economy. In order to gain low-cost access to global markets and global customers, they could take the advantage of B2B e-marketplaces. Some researchers have indicated that, with the companies' acceptance of the Internet in the new economy, business transactions will be increasingly done over Internet-based B2B e-marketplaces (Forrester Research 2000; Scully and Woods 2001).

While it is claimed that the evolvement of B2B e-marketplaces in the international market provides many new opportunities for SMEs, not all SMEs are eager to adopt this new technology. Although the Internet-based B2B e-marketplaces are becoming more and more accessible to SMEs, their adoption is gradual. The Internet-based B2B e-marketplace experienced a dramatic change, from the emerging phase, through the peak of market interest in mid-1999 to today's shakeout. During the shakeout period starting at the end of 2000, many e-marketplaces ceased their operations whilst others

encountered tremendous challenges in their attempts to survive (Day et al. 2003). The failure of these e-marketplaces was attributed to the inadequate participation by SMEs (Bannan 2001; Bloch and Catfolis 2001; Joachim 2002; Mello 2002). Therefore, given the theoretical importance of B2B e-marketplaces for SMEs' internationalization and the trend of the globalization, for both researchers and practitioners, e-marketplace adoption among SMEs in the international trading context remains a topic under-investigated.

4.1.3 Significant Prior Research and Problem Statement

The proliferation of Internet-based B2B e-marketplaces in recent years has attracted a growing number of academic studies. Previous research has mainly focused on the governing structure of e-marketplaces and their recommended business model (e.g. Bloch and Catfolis 2001; Dai and Kauffman 2002; Tomak and Xia 2002); the impacts of e-marketplaces on industry structure and supply chain performance (e.g. Bailey and Bakos 1997; Lee 1998); and corporations' ability to gain a competitive advantage by either initiating or joining e-marketplace (e.g. Choudhury et al 1998; Kaplan and Sawhney 2000; Tumolo 2001). Most of these studies are conceptual (e.g. Chircu and Kauffman 2000; Dai and Kauffman 2000, 2002; Malone et al. 1987; Memishi 2001; Senn 1996; Tumolo 2001); few are empirical (e.g. Bailey and Bakos 1997; Choudhury et al 1998; Grewal et al. 2001). And they examine e-markets more from the operators' standpoint than from the users' perspective (e.g. Bailey and Bakos 1997; Bloch and Catfolis 2001; Dai and Kauffman 2002; Malone 1987; Memishi 2001; Tumolo 2001).

Although most of the previous research did not empirically examine the e-marketplace adoption from the user's perspective, they provided lots of related information. Senn (1996) has done work in evaluation of B2B e-marketplaces, which indicated the business potential of electronic markets for business managers. Bailey and Bakos (1997) investigated the emerging role of electronic intermediaries, and indicated how intermediaries benefit participants in electronic markets by reducing transaction and coordination cost. Chircu and Kauffman (2000) investigated the reintermediation strategies in B2B e-commerce, and indicated the reasons for the evolvement of electronic markets. Dai and Kauffman (2002) investigated business models of B2B e-marketplaces and the dynamics of organizational adoption of electronic markets; they suggested what should be done for an e-marketplace to attract participant users. Rask and Kragh (2004) investigated the differences and similarities of motives between buyers and suppliers for e-marketplace adoption.

From different perspectives, these studies provided some reasons for companies' adoption and/or non-adoption of e-marketplaces. But these studies are not enough for us to understand e-marketplace adoption among SMEs, because most of them did not take adoption as their central theme. They only provided some reasons indirectly or partially related to adoption. Thus, we need more empirical studies in e-marketplace adoption from user's perspective.

Among a few empirical studies in e-marketplace adoption which adopt a user perspective, Choudhury et al. (1998) investigated when buyers would use electronic markets in the aircraft parts industry. However, as mentioned by many researchers,

buyers and suppliers have different motives when getting involved in the electronic market (Malone et al. 1987; Rask and Kragh 2004; Tumolo 2001). Although suppliers can gain access to new customers and reduce transaction costs after participating in the e-marketplace, they are forced to compete on price, which puts intense pressure on their margin. Also, sharing their product and marketing information with the intermediary can be harmful to their competition position as doing so may reveal sensitive or proprietary information to their competitors. However, buyers do not have such concerns. Because buyers' and sellers' adoption decisions are different, knowledge of buyers' adoption behaviors (e.g. Choudhury et al. 1998) is not enough for us to understand suppliers' adoption behavior.

Grewal et al. (2001) investigated the factors that affect the participating organization's participation level of an e-marketplace for jewelry and jewelry-related products. However, their study only focused on firms' implementation of e-marketplace. Although an adoption process includes activities that lead to a decision to adopt as well as activities that facilitate putting an innovation into use, process research in the study of innovation reveals that predictor variables may relate differently to the adoption decision stage and implementation stage (Rogers 1995; Zaltman et al. 1973; Zmud 1982). For example, Tornatzky and Klein (1982) suggested that the correlations (between innovation attributes and adoption) of a given magnitude and sign may reverse in sign and change in magnitude when computed relative to implementation. Since a firm's adoption decisions and its usage behaviors may depend on different factors, research work in the firm's participation level (e.g. Grewal et al. 2001) is not

enough for us to understand the drivers for the firms' adoption decisions of B2B e-marketplaces in an international trading context.

In sum, though there is a growing number of academic studies on B2B e-marketplaces, empirical studies of e-marketplace adoption from user's perspective are scant. No empirical studies focused particularly on sellers' adoption decision of B2B e-marketplaces. Thus, the drivers for the seller's adoption of B2B e-marketplaces are not clear, let alone SMEs' e-marketplace adoption in the international marketing context.

Some researchers in Electronic Data Interchange (EDI) adoption suggested that research works in EDI adoption can also serve as a theoretical and empirical basis for research on other forms of IOS such as B2B e-marketplaces (Chwelos et al. 2001). Although EDI was considered as ancestor of e-marketplace, there are fundamental differences between EDI and Internet-based B2B e-marketplace. As a proprietary and closed network, EDI is typically initiated by a powerful buyer or supplier and only open to pre-selected business partners; whereas B2B e-marketplace is built on an open network which is not confined to pre-selected business partners (Dai and Kauffman 2002). As a result, a firm's relationship with its trading partners, which is always considered the most important factor for EDI adoption among SMEs (Iacovou et al. 1995; Chwelos et al. 2001), may not be significant for B2B e-marketplace adoption, especially in the international marketing context where the major purpose of e-marketplace adoption is to expand new market. Thus, though there are lots of empirical studies in EDI adoption, they are not enough for us to understand the firm's

adoption decisions especially of B2B e-marketplaces either.

4.1.4 Objective and Research Question

Since there is a lack of understanding of SMEs' adoption of Internet-based B2B e-marketplace in the international marketing context, the purpose of this study is to investigate the drivers for the adoption of B2B e-marketplaces among SMEs in their international marketing practices. In this study, an integrated e-marketplace adoption model of SMEs in their international marketing practices will be empirically assessed.

Our research question is:

What are the key factors that affect SMEs' intention to adopt the Internet-based B2B e-marketplaces in their international marketing practices?

4.2 Theoretical Foundations and Research Framework

Since B2B e-market is essentially a multilateral inter-organizational information system built on open network technologies (Choudhury et al. 1998; Dai and Kauffman 2002), it can be fruitful to refer to the theoretical foundations of former IS adoption literature to construct the theoretical foundations of this study. In Chapter 3, we proposed a new framework for IS innovation adoption, in which a firm's adoption decision is directly determined by three kinds of match-based factors from its three match assessments: performance-needs match assessment, innovation-needs match assessment, and resources-innovation match assessment. As a generic theory of IS innovation adoption, this framework can be used for studying the Internet-based

e-marketplace adoption.

In this study, an exploratory case research was done before a confirmative survey research. The purpose of the exploratory case research is to provide some preliminary evidences to justify the applicability of our three-match based framework in e-marketplace adoption.

4.3 Exploratory Research

4.3.1 Introduction

This part presents the findings of an exploratory research carried out in six export companies. These exploratory case studies aim to increase our understanding of e-marketplace adoption decision making among SMEs in their international marketing practices and justify the applicability of the three-match based framework in e-marketplace adoption.

4.3.2 Exploratory Case Study

Case study method was chosen to make investigations because it allows a strong potential for discovery, exploration, and development of hypotheses, which is particularly appropriate for areas where the research is still in its infancy, formative stages or there are no solid theoretical foundations. It is preferred when “how” or “why” questions are being posed (Yin 1994). In this explorative study, multiple cases strategy is used as it can enhance generalbility of our findings and deepen our understanding of the phenomenon of e-marketplace adoption.

4.3.2.1 Site Selection

In this study, we focus on Chinese SMEs for two reasons. Firstly, China is heavily engaged in the international business. Many businesses in China are export-oriented because the domestic market is still fairly limited,. According to “Report on China Foreign Trade (2005 Autumn)” by Ministry of Commerce of the People’s Republic of China, the Chinese foreign trade has maintained a momentum of fairly rapid growth since 2005. The total imports and exports have increased by 23.7% to 1024.51 billion US dollars as compared to the same period of last year in the first three quarters of this year. Among them, the export value grew by 31.3% to 546.42 billion US dollars and import rose by 16.0% to 478.08 billion US dollars. The aggregate foreign trade surplus reached 68.34 billion US dollars. At a rough estimate, the net export of the first three quarters contributed to the Chinese economic growth by 3.5% or so.

Secondly, e-commerce expands market boundaries that are especially beneficial to developing countries (Raisinghani et al. 2002). China, like many other developing countries, has recognized the potential value of the Internet and e-commerce and is encouraging the use of the Internet. With the reintermediation processes in the international market, numerous Internet-based B2B e-marketplaces have been established especially for Chinese exporters, such as alibaba.com, EChinaChem.com, globalmarket.com, globalsource.com etc. Although B2B e-marketplaces experienced the shakeout when the dotcom bubble burst since late 2000, which resulted in a significant loss of the investments (Day et al. 2003), in China, many e-marketplaces

have continued to thrive and are conducting ever greater volumes of transactions in the international trading area. Hence, China provides a good place for us to investigate SMEs' e-marketplace adoption behavior in their international marketing practices.

Since our goal was to understand the SME's adoption decision of Internet-based e-marketplace in their international marketing practices, the companies were chosen according to following criteria:

- 1) They should be registered companies and could be classified as SME according to the "Interim Provisions on the Standards for Medium and Small Enterprises (2003)" by State Economic and Trade Commission of China (SETC). According to this standard, manufactures with employees less than 2000, or annual sales less than 0.3 billion Yuan (RMB), or total assets below 0.4 billion Yuan (RMB) and traders with employees less than 200 or annual sales less than 0.3 billion Yuan (RMB) can be considered as SMEs.
- 2) Whether they are manufacture or trading companies, they must have had export business in the international market.
- 3) They should know about some e-marketplaces in their industry and have faced the decision about e-marketplace adoption before.

Due to the difficulty of "getting into" organizations to collect data, we used the same selection criteria as Reich and Benbasat (1990)—a convenience sample generated from industry contacts. Convenience sampling means that there can be no guarantees

that participants in the study are representative of the population at large, and a convenience sample is selected on the basis of availability to the researcher or happenstance (Neuman 1997). Clearly, in studies requiring statistical analyses, this approach would be inadequate, but given the exploratory nature of the research and the interest of us in getting a “feel” for SMEs’ international marketing practices with respect to e-marketplace participation, it seemed adequate for our purposes. Furthermore, as no attempt was planned to make statistically-based deductions from the data collected, a convenience sample is adequate for the purposes of this study.

Six companies in China were selected, including four adopters and two non-adopters. They are different in ownership, size, age, and industry. The background of these companies were briefly described below, and summarized in Table 4.1.

Company 1 (**C1**) is a manufacturer of garments and garment accessories, established in 1999. There are about 200 employees in this company. The products of the C1 mainly focus on the international market. 90% of its products are exported to the international market. At the same time, the company also does some international business of other products which are not produced by its own factories. At the beginning of 2004, the company participated in two Internet-based B2B e-marketplaces as a fee-paying member.

Company 2 (**C2**) is a manufacturer of network products with about 300 employees, established in 1994. Initially, this company mainly focused on the domestic market, but in recent years, it began to develop its international business. Until now, it has gained two-year experience in international market. At the beginning of 2004, the

company participated in one Internet-based B2B e-marketplace as a fee-paying member.

Company 3 (**C3**) is an international trading company of pet toys and stone material, established in 2001. The company has 4 employees. All of its businesses are toward the international market. The company began to participate in the Internet-based B2B e-marketplaces in 2002. Until now, it has gotten involved in three B2B e-marketplaces. It has been a fee-paying member of the third cooperated Internet-based B2B e-marketplace for more than half year.

Company 4 (**C4**) is an international trading company of chemical products, established in 2004. It is a small company with only two employees. Although formally established in this year, it has already done the international business since 1999. The company has had the experience of using several e-marketplaces since 2000. Now, it is a free member of two Internet-based B2B e-marketplaces.

Company 5 (**C5**) is an international trading company of hand-made glass products, established for more than 10 years. Less than 5 employees are in this company and all of its business is toward the international market. The company did not have the first-hand experience of using B2B e-marketplace. But there is an agent for it who deals with the international business through a B2B e-marketplace.

Company 6 (**C6**) is an international trading company of glass products, established for more than 10 years. It employs about 60 people and does business only in international market. The company has no experience of participation of any kinds of

e-marketplace. It can be considered as a non-adopter of the Internet-based B2B e-marketplace.

Table 4.1: Major Characteristics of Case Companies

	Company Type	Export Proportion	Employees	Export Experience	E-market Experience
C1	Manufacturer	90%	200	5 years	Adopter
C2	Manufacturer	5%	300	2 years	Adopter
C3	Trading Company	100%	4	3 years	Adopter
C4	Trading Company	100%	2	5 years	Adopter
C5	Trading Company	100%	5	10 years more	None adopter
C6	Trading Company	100%	60	10 years more	None adopter

4.3.2.2 Data Collection

The data for the cases was collected from various sources in order to provide for “triangulation” of data (Stake 1994) and to provide multiple sources of evidence for the analysis. The major source of data for the six cases was semi-structured, face-to-face interviews, lasting for 60 minutes on average. Interviews were conducted in July 2004 with the individuals in each company who are directly involved in the e-marketplace participation, including CEO and managers of export or sales department. We are trying to interview more people in one company for “triangulation”, but because of unavailability of other appropriate interviewees or no other suitable persons at that time, some companies only have one interviewee.

Two people were interviewed in **C1**: one is the manager in charge of the whole international trading business and e-commerce development of the company. He is the major decision maker of e-marketplace adoption in the company. The other one is a manager of the export department in charge of the sale of promotion products through

e-marketplace.

Two people were interviewed in **C2**: one is the manager in charge of the international business of the company. She is the major decision maker of the e-marketplace adoption in the company. The other one is the manager in charge of the sales department.

The general manager of **C3** was interviewed. He is the major decision maker of e-marketplace adoption and also the owner of the company.

The export manager of **C4** was interviewed. He is one of two co-founders of the company.

The CEO who is also the owner of **C5** was interviewed. He is in charge of whole international business and responsible for the whole marketing work of this company

The senior manager of **C6** in charge of the export department of the company was interviewed. She has already been working in this company for more than 9 years and is one of major decision makers in its international marketing business.

Interview questions, based on the researchers understanding of the major issues identified in the relevant literature and from personal experience, were developed to guide, but not restrict, the interviews. They are open-ended to provide ample scope for participants to express their ideas. They served to shape and direct the conversation with SME owner/managers and to support analysis of their business experiences of Internet-based B2B e-marketplaces, but were never intended to “straitjacket” the participants nor to totally prescribe the topics discussed. All interviews were

tape-recorded with the organization's and participants' permission in consideration of the reporting media (Walsham 1995) and the taped interviews were transcribed as soon as possible and coded to maintain consistency and to enrich the interviews with information from observations during interviews (Yin 1994). Notes were also taken during the interviews.

All interviews followed the same protocol, proceeding from an unstructured to a structured format allowing for greater reliability of the data collected. When participants expressed a viewpoint, they were prompted for specific supporting evidence. Questions about the organizations' background information were initially sought. Participants discussed their organizational structure, major products and services, international business experience, and for adopters, their experience of e-marketplace participation and current conditions of e-marketplace usage. They also provided descriptions of their business processes pertaining to e-marketplace participation. For these adopters, questions were mainly about why they had an idea of e-marketplace participation and how they determined which e-marketplace to participate, while for these non-adopters, questions mainly focused on their attitudes towards the B2B e-marketplace and the reasons for their non-adoption decisions. We did not provide a factor list to let the interviewees to select which factors are important or not important to affect their adoption decision, but let the interviewees to propose the important factors themselves.

Other sources of data were documentation, direct observations, and physical artifacts (Yin 1994). The documents have been collected including manuals, forms, company

reports, articles appearing in the mass media and so forth. On-site observations were also made during site visits. Physical artifacts such as the types of office equipments, computers and the interaction patterns among the employees of various levels in their social settings were noted.

4.3.3 Analysis and Results

A cross-case analysis was conducted in search of common patterns and unique features. A case-oriented approach is adopted, which considers the case as a whole entity, looking at configurations, associations, causes, and effects within the case—and only then turns to comparative analysis of a number of cases (Ragin 1987). This approach is good at finding specific, concrete, historically-grounded patterns common to small sets of cases (Miles and Huberman 1994). Although this approach has some minuses in that its findings often remain particularistic (Miles and Huberman 1994), given the exploratory nature of the research and the interest of us in getting a “feel” for SMEs’ international marketing practices with respect to e-marketplace participation, it seemed adequate for our purposes.

In the analysis process, the data was scanned to identify similarities and differences, thereby paving the way for identifying consistent patterns and developing plausible explanations. At first, a master chart assembling descriptive data from each of the cases had been build in form of a juxtaposition—a stacking-up—of all of the single-case displays on one very large sheet. The basic principle is to include all relevant data. Then, we moved to partition the data further and cluster data that fell

together so that contrast between sets of cases on variables of interest can come clearer. These partitioned and clustered meta-matrices were progressively more refined through further transformations of case-level data into short quotes, summarizing phrases, ratings, and symbols. At last, categories were selected for identifying potential dimensions affecting the SMEs' adoption decision of Internet-based B2B e-marketplace in their international marketing practices. After that, cases were compared in pairs to identify the subtle similarities and differences between them.

Generally speaking, our finding suggested three key match-based factors that may affect the SMEs' e-marketplace adoption decision in their international marketing practices: perceived performance gap of their current international marketing practices, perceived potential benefit of e-marketplace adoption, and perceived resource readiness for e-marketplace adoption and implementation. Besides these three match-based factors, some peripheral factors were been identified. These factors and some quotations are summarized in Table 4.2.

Table 4.2: Some quotations and factors affecting a firm's adoption of e-marketplace

Match Perspectives	Match-Based Factors	Peripheral Factors
<p><i>Performance-Needs Match</i></p>	<p><u>Perceived performance gap of current international marketing practices:</u></p> <p>For Adopter: current marketing approaches cannot perform up to the company's needs (C2, C3, C4); pure web site based marketing approach did not perform well (C2, C3)</p> <p>For Non-Adopter: current marketing approaches perform well for the company's needs (C5, C6)</p>	<p><u>Resources condition of the company for export business:</u></p> <p>For Adopter: limited financial resources and human resources in the international marketing practices because of the small size of the company (C3, C4); limited financial resources in international marketing practices because of the company's policy in international market development (C2); attendance of traditional trading fairs is too expensive (C2, C3, C4); attendance of traditional trading fairs is too energy consuming (C3)</p> <p><u>Pressure of new international market development:</u></p> <p>For Adopter: company faces high pressure of new market development because of low publicity in target market (C2, C3, C4);</p> <p>For Non-Adopter: company faces low pressure of new market development because of good reputation and large number of old customers in target market (C6)</p>
<p>“We are a company that just begins the international business in recent years. Due to the limited international trading experience, the investment in the international business is very cautious. The company is reluctant to put much money into this segment in its early stage. The international business strategy is to make investment gradually, and use the profit earned to reinvest in the international business. Therefore, I could not afford to take part in traditional trading fairs around the world at the beginning. I have to leverage the Internet for marketing practices. Firstly, we developed a web site in English. But we found that it does not work well. As a window to the outside, our website seems too small. If a customer cannot find it first, it is impossible for him/her to know our company.” C2</p> <p>“[At that time], we were a small company and just in the development stage. I could not afford the fees of attending the traditional trading fairs around the world like those big companies.”C3</p>		

	<p>“As a new company at that time, we faced high pressure of new customer development. However, it is impossible to attend all important exhibitions for a small company like us. It is too expensive and energy consuming. Thus, we tried to use any kinds of free/low cost resources as the supplement for our traditional marketing approaches.” C4</p> <p>“The major international marketing approach of our company was to attend the Guangdong International Trading Fair. We are satisfied with this approach. Every year we got enough orders from this trading fair. Finding customers from the Internet is dispensable for us.”</p> <p>“Our company has more than 10-year experience in international trading. Now the company has a good relationship with many old customers, some of which are famous big companies in the world. Considering the potential of the company, doing business with these old customers is already enough. Development of new market is not urgent to our company.The current marketing approaches already satisfied our needs. Thus, there is no need for us to develop other marketing approaches.” C6</p>	
<p><i>Innovation-Needs Match</i></p>	<p><u>Perceived potential benefit of e-marketplace adoption:</u></p> <p>For Adopter: e-marketplace can increase the company’s publicity in foreign market (C1, C2, C3, C4); e-marketplace can provide useful customer and market information for the company (C1, C2, C3, C4); e-marketplace can increase the utility of the company’s website through attracting more potential customers to the company’s website (C1, C2, C3)</p> <p>For Non-Adopter: e-marketplace is not useful for the company to gain customers (C5, C6); e-marketplace is not useful for the company to increase its publicity in target market (C6)</p>	<p><u>The feature of the e-marketplace:</u></p> <p>For Adopter: good publicity of the e-marketplace (C1, C2, C3, C4); high seller promoting capability of market makers (C1, C2, C3); good feedback from other companies in same industry (C1, C2, C3)</p> <p>For Non-Adopter: bad feedback from other companies in same industry (C5)</p>
	<p>“I think, with the development of the Internet, leveraging Internet-based B2B e-marketplace could be an effective approach to introducing our company to potential customers.” C1</p> <p>“Marketing through e-marketplace would be more effective than our current marketing approaches.” C2</p> <p>“The unbalance of the information in different places in the world requires the role of intermediaries to provide the information to</p>	

	<p>companies. Previously, the major international marketing approach is to attending different kinds of trading fairs around the world. But with the development of e-commerce in the international trading area, the cooperation with the online e-marketplaces becomes another useful approach in the international marketing practice.” C3</p> <p>“At that time, it is difficult to search the information of a company by internet ourselves.....Since we found there are some e-marketplaces providing customer information in our industry, we began to leverage these e-marketplaces to collect the information.” C4</p> <p>“Our company focuses on the export of hand-made glass products. As there is no generally accepted criteria of the quality of the hand-made glass products, customers need to come and see the real products personally to place an order. Hence, the real customers of the company would like to come personally to the trading fairs in China rather than search through e-marketplaces. Therefore, B2B e-marketplace is not very useful for us.” C5</p> <p>“The B2B e-marketplace is a useful approach in international marketing mainly for a new company without a proper customer base. But for our company who has already had good reputation in our target market, e-marketplace seems not so useful.” C6</p> <p>“Our company emphasizes high success ratio in new customer development, which can be achieved by the frequent face-to-face interactions with the customers. Obviously, the e-marketplace does not match our needs because of the non-face-to-face interaction feature.” C6</p>	
<p><i>Resource-Innovation Match</i></p>	<p><u>Perceived resource readiness for e-marketplace adoption:</u></p> <p>For Adopter: the financial cost for e-marketplace adoption is cheap/affordable (C1, C2, C3, C4); the executive has relative knowledge about e-marketplace marketing (C1, C2, C3)</p> <p>For Non-Adopter: the company does not have relative human resources for e-marketplace marketing approach (C5, C6)</p>	<p><u>Leader’s characteristics:</u></p> <p>For Adopter: CEO of the company is very innovative about IT innovation (C1)</p> <p>For Non-Adopter: CEO of the company is conservative in marketing approaches (C5)</p>
	<p>“Personally, I am very interested in the business model of B2B e-marketplace. I have already concerned about such kind of platform for a long period of times. Therefore after I took over the e-commerce development of the company, I adopted this approach.” C1</p>	

“I am very familiar with business model of B2B e-marketplace.” C1

“The boss of the company is very supportive to the investments in IT. In our company, lots of financial resources and manpower have been used to improve IT infrastructures and develop e-commerce. We have our own web server and an well-designed website in eight languages.” C1

“Compared with other investment, the cost for e-marketplace adoption is quite cheap.” C1

“After I accumulated some profits earned from international business, I invested them in the search engines and e-marketplaces.” C2

“I have experiences of using e-marketplace in my previous company.” C2

“Compared with traditional marketing approaches, e-marketplace is cheap and affordable.” C3

“The most important reason for us to adopt e-marketplace approach is the free-entry of the most of e-marketplaces at that time.” C4

“I am not used to the Internet marketing approaches. Neither my subordinates can leverage any e-marketplace as a marketing approach.” C5

“I do not consider e-marketplace not good. I am just not used to it. Compared to this approach, I like the traditional face-to-face marketing approach more. So I did not put any effort into it.” C5

“All people in my company were very busy. We did not have extra manpower for the e-marketplace implementation.” C6

Performance-Needs Match

From this match perspective, perceived performance gap of current international marketing practices was found to be a key match-based factor affecting a firm's adoption (C2, C3, and C4) and non-adoption intention (C5 and C6) of Internet-based B2B e-marketplaces. In Case 2, company C2 is a manufacturer of data network products. Its main market is in China. Before it adopted B2B e-marketplace as an international marketing approach, it just started international business for one year. As the company did not have much experience in doing international business, a few resources, especially finance resource, were invested into the newly-organized international business department which could not meet its requirement. Since traditional marketing approaches were too expensive for the manager, she chose to develop a web site in English to introduce the company to its potential customers. But the performance of the website was not satisfactory. As mentioned by the manager: "As a window to the outside, our website seems too small to attract customers." Thus, the manager began to use the profits earned from the international business to invest in more effective marketing approaches. That was indicated as one of major reasons for their e-marketplace adoption intention. Such findings show that resource insufficiency and poor performance of a firm's current marketing approaches will give the firm an incentive to adopt a new marketing approach, such as Internet-based B2B e-marketplaces.

A similar conclusion can also be drawn from Case 3 and Case 4. In these cases, company C3 and company C4 were both small and newly established trading

companies before they adopted B2B e-marketplaces. In its early stage, company C3 only put limited resources into traditional marketing approaches, including both human and financial resources. As reported by the general manager of the company C3: “[At that time], we were a small company and just in the development stage. I could not afford the fees of attending the traditional trading fairs around the world like those big companies.” Thus, he had to try other more feasible marketing approaches. Likewise, the company C4 also faced the same problem in developing its international market. Though the company had attended some traditional trading fairs, it was not enough. Therefore, the firm tended to adopt other new marketing approaches. For example, the manager of the company said: “[At that time], it is impossible to attend all important exhibitions for a small company like us. It is too expensive and energy consuming. Thus, we tried to use any kinds of free/low cost resources as the supplement for our traditional marketing approaches.”

While findings from Case 2 to 4 showed that a mismatch assessment between the performance of a firm’s current resources and its expectations/needs will have a positive effect on the firm’s adoption of an IS innovation, findings from Case 5 and 6 justify such a conclusion from another perspective.

Company C5 was a trading company. Its main international marketing approach was to attending the GuangDong International Trading Fair in China held two times a year. The company was satisfied with the outcome of that approach, as they received enough orders from the trading fair every year. Consequently searching customers through the Internet was argued to be “dispensable” by the general manager. Hence

we can conclude that when the current marketing approaches perform up to a firm's expectations/needs, there will be low incentives for the company to adopt new marketing approaches, such as e-marketplaces.

A similar conclusion also can be drawn from Case 6, in which perceived low performance gap gave the firm no incentives to adopt e-marketplace. As reported by the manager of export department: "Our company has more than 10-year experience in international trading. Now the company has a good relationship with many old customers, some of which are famous big companies in the world. Considering the potential of the company, doing business with these old customers is already enough. Development of new market is not urgent to our company.The current marketing approaches already satisfied our needs. Thus, there is no need for us to develop other marketing approaches."

Innovation-Needs Match

From this match perspective, perceived potential benefit of e-marketplace adoption was found to be a key match-based factor affecting a firm's adoption (C1, C2, C3, and C4) and non-adoption (C5 and C6) of Internet-based B2B e-marketplaces. In Cases 1 to 4, all companies recognized some potential benefits of e-marketplace adoption. In Case 1, the manager in charge of international business and e-business development believed that the publicity of the e-marketplace can help the company increase its reputation in foreign market. Thus, with the development of the Internet, leveraging Internet-based B2B e-marketplace will be an effective approach to introducing the company to potential customers. Similarly, in Case 2, the manager thought

e-marketplace adoption would be a more effective way than the firm's current marketing approaches. Likewise, in Case 3, the general manager regarded the role of e-marketplace highly in International marketing practices. He thought, with the development of e-commerce in the international trading area, the cooperation with the online e-marketplaces would be a very useful approach in the international marketing practice. Though in Case 4, the manager did not give high evaluation to e-marketplace adoption, he admitted that his company decided to use some e-marketplaces because these e-marketplaces collected customer information which was easy to search. These findings show that a match assessment between the ability of e-marketplaces and a firm's needs has a positive effect on the firm's adoption of e-marketplaces.

In contrast, perceived low level benefits from e-marketplace adoption were posted as one of the major reasons for non-adoption in Case 5 and 6. The general manager of the company C5 thought that their real customers would like to come personally to the trading fairs in China rather than search through e-marketplaces because its main product, the hand-made glass art products, required the customers to come and see the samples personally. Hence utility of e-marketplace participation for the company was quite limited.

Likewise, the manager of the company C6 thought e-marketplace was of little use because her company already had a very good reputation in the target market. In addition, she considered the non-face-to-face feature of e-marketplace approach did not appeal to them due to its low success ratio. But this ratio was regarded as an important criterion to measure employers' performance in developing new customers.

Also she worried that their competitors might take advantage of e-marketplace to obtain some commercial secrets e.g. the design, style and figure of their products, eroding her company's profits finally. These findings show that a mismatch assessment between the ability of e-marketplaces and a firm's needs has a negative effect on the firm's adoption decision of e-marketplaces.

Resource-Innovation Match

From this match perspective, perceived resource readiness was found to be a key match-based factor affecting a firm's adoption (C1, C2, C3, and C4) and non-adoption (C5 and C6) of Internet-based B2B e-marketplaces as well. In Cases 1 to 4, all companies indicated that financial readiness affected their adoption decision of Internet-based B2B e-marketplaces. In Case 1, the manager argued that: "Compared with other investment, the cost for e-marketplace adoption is quite cheap." Similarly, in Case 2, the manager indicated that available profits accumulated from their international business contributed to their adopting e-marketplace. Likewise, in Case3, the general manager argued that it was low resources required that drove them to adopt e-marketplaces. Particularly, in Case 4, the manager of company 4 said that: "The most important reason for us to adopt e-marketplace approach is the free-entry of the most of e-marketplaces at that time."

Besides financial readiness, the manager of company C1 also proposed that support from his director and plentiful knowledge he owned in the business model of B2B e-marketplaces were other two major reasons for e-marketplace adoption. The top

management's support shows that resource allocation for e-marketplace adoption and implementation will be smooth. From the resource-based view theory, top management support per se can be seen as a kind of resources readiness of the firm (Powell and Dent-Micallef 1997). And the manager's knowledge of the e-marketplace shows that his knowledge resources are ready for e-marketplace adoption and implementation.

From the non-adopter's perspective in Case 5 and 6, both company C5 and C6 indicated that lack of necessary human resources for e-marketplace implementation was a reason for their non-adoption. The general manager of the company 5 argued that: "I am not used to the Internet marketing approaches. Neither my subordinates can leverage any e-marketplace as a marketing approach." Likewise, the manager of the company 6 said: "All people in my company were very busy. We did not have extra manpower for the e-marketplace implementation." All these findings show that human resource readiness affects a firm's adoption of e-marketplace approach.

4.3.4 Discussion and Conclusion

This exploratory research analyzed the major reasons for e-marketplace adoption/non-adoption among SMEs in their international marketing practices. Empirical results suggested that key factors affecting SMEs' adoption decision of Internet-based B2B e-marketplace in their international marketing practices were 1) perceived performance gap of their international marketing practices, 2) perceived potential benefit of e-marketplace adoption, and 3) perceived resource readiness for

adoption and implementation. The perceived performance gap gives a firm incentive to try and adopt new marketing approaches, whereas the perceived potential utilities and the perceived resource readiness show how well the e-marketplace solution fit with the firm's situation. Jointly, these three factors explained a SME's adoption decision for e-marketplace initiatives.

Comparing findings from cases C2, C3, and C4 with C5 and C6, it seems that e-marketplace solution more appeal to newer and smaller companies or companies just entering the international business because these companies are less well-known in the target market and do not have enough (or do not want to put many) resources for international marketing practices. Low publicity in the international market indicates a relatively higher need of these companies to increase their reputation in their target market, whereas limited resources for new market development confines the performance of their current marketing approaches. These may incur a higher perceived performance gap of their international marketing practices which in turn gives these firms incentives to adopt e-marketplaces. Thus, market makers should focus more on these companies as they are more likely to adopt the e-marketplace approach in their international marketing practices.

Comparing findings from case C1 with C5 and C6 whose traditional marketing approaches are already major approaches in their international marketing practices and perform up to their expectations/needs, it seems that they usually set a higher threshold to accept a new marketing approach. In another word, the utility of e-marketplace itself and its match with companies' resources are assessed more

strictly. However, once these companies perceive high value from e-marketplace adoption for their company, they will be more likely to try the e-marketplace solution even if there is no pressure for them to develop a new marketing approach. One thing to be emphasized here is that the expected value is determined not only by the perceived potential utilities but also by the perceived resource readiness. Thus, market makers should not only improve e-marketplaces to facilitate users in their international marketing practices but also reduce the resource requirements for e-marketplace adoption and implementation. Here, human resource requirements are as important as financial resource requirements. Therefore, it should be better for market makers to make their web site be used easily and provide training/consultant services to the participant firms to reduce expertise required.

On the framework level, our empirical findings showed that the application of our framework in e-marketplace adoption was successful, as the framework was quite complete in considering the major determinants of the e-marketplace adoption. According to our framework, there are three kinds of match-based factors: factors based on the performance-needs match assessment, factors based on the innovation-needs match assessment, and factors based on the resource-innovation match assessment. By definition, performance-needs match assesses the firm's perceived performance gap, innovation-needs match assesses the firm's perceived potential benefit of the innovation, and resource-innovation match assesses the firm's perceived resource readiness.

Hence the finding that performance gap, potential benefit, and perceived resource readiness were the three key determinants in e-marketplace adoption demonstrated the usefulness of this three-match based framework for identifying key determinant factors of e-marketplace adoption and suggested the comprehensiveness of the framework in e-marketplace adoption research. Such results were consistent with our theoretical arguments. Besides that, our empirical findings also enforced our framework through showing how the effects of those peripheral factors can be explained by those match-based factors.

The main limitations of the research consist in the limited geographical area where it was conducted and the small number of companies interviewed. It might be therefore difficult to generalize from these results to whole areas of China or other regions of the world. Therefore, though our case-based investigation of the model of e-marketplace adoption provided preliminary findings on the e-marketplace adoption among SMEs, further research is needed to complete our understanding of this subject. Large-scale, longitudinal surveys can be especially appropriate for addressing this issue, which will allow researchers to investigate these three explanatory factors in firms before they adopt of e-marketplace. We believe that our framework and findings can form the basis of larger scale studies to examine the validity and applicability of the model and to improve and refine it. Also they might be useful as a basis for others to derive their research models.

4.4 Research Model and Hypotheses

According to our framework and case study results, three match-based factors have been proposed corresponding to three match assessments. As illustrated in Figure 4.1, our conceptual model posits three match-based predictors for SMEs' e-marketplace adoption intentions—the perceived potential benefit of e-marketplace adoption, the perceived performance gap of current international marketing practices, and the perceived resource readiness for e-marketplace adoption.

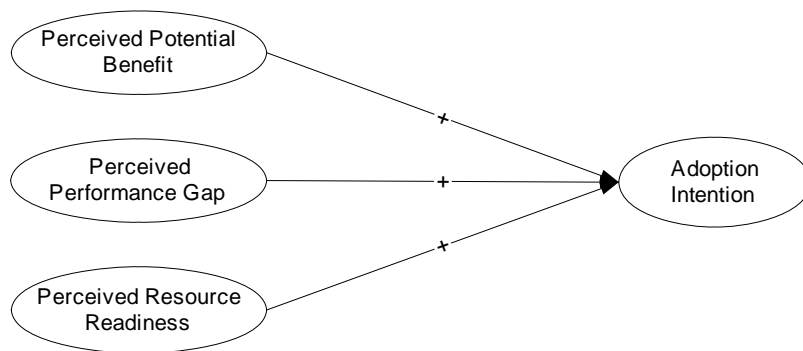


Figure 4.1: Research Model of E-marketplace Adoption of Export Companies
Perceived Potential Benefit of E-marketplace Adoption

The perceived potential benefit of e-marketplace adoption is defined as the extent to which the e-marketplace adoption is perceived to be a useful approach to meeting a firm's strategic needs in its international marketing practices without considering the adoption and implementation constraint. Because an IT solution will have a positive impact on firm's performance only when there is correspondence between its functionality and the needs of the organization (Cooper and Zmud 1990), for export companies, potential benefit of e-marketplace adoption represent the possible maximum benefit that may be realized by the firm through e-marketplace adoption.

Therefore, from the innovation-needs match perspective, the perceived potential benefit of e-marketplace adoption is considered as a major factor affecting a firm's e-marketplace adoption intention in its international marketing practices. The more possible the e-marketplace solution is perceived in meeting a firm's needs for international market development, the more likely the firm will participate in the e-marketplace. Here, we proposed that:

H1: The perceived potential benefit of e-marketplace adoption has a positive effect on the export firm's adoption intention of the Internet-based B2B e-marketplace in its international marketing practices.

Perceived Performance Gap of Current International Marketing Practices

The perceived performance gap of current international marketing practices is defined as the extent to which a firm's current resource performance is perceived to be insufficient for its needs in international marketing practices. As performance gap can result in a low satisfaction level with existing systems, which, in turn, will provide the impetus to find new ways to improve performance (Rogers 1983; Zaltman et al. 1973), for export companies, if their needs in international market development can be fulfilled by their own marketing forces, there will be little incentive for the firms to adopt an e-marketplace solution. Therefore, from the performance-needs match perspective, perceived performance gap of current international marketing practices is considered as a major factor affecting a firm's e-marketplace adoption intention in its international marketing practices. The more a firm's current marketing forces perform up to its needs, the less likely the firm will participate in the e-marketplace. Here, we

proposed that:

H2: The perceived performance gap of current international marketing practices has a positive effect on the export firm's adoption intention of the Internet-based B2B e-marketplace in its international marketing practices.

Perceived Resource Readiness for E-marketplace Adoption and Implementation

The perceived resource readiness for e-marketplace adoption and implementation is defined as the extent to which a firm's current resources are perceived to be ready for the requirements from the e-marketplace adoption and implementation. The availability of resources for adoption is often presumed to be important in understanding technological innovation (Tornatzky and Fleischer 1990). If a company lacks the basis resources required for an innovation, it is less possible for the company to adopt that innovation. Although the low-cost connectivity of the Internet lowered the bar for both small and large firms to join (Harting 2000), electronic market systems still require sizable investments from their participants through subscription fees, hardware, software, employee training, and organizational transformations. Though, these costs are much lower compared with the traditional approaches, for the SMEs who are always limited in resources and computer sophistication (Swatman and Swatman 1992), these cost may not be omitted. Therefore, from resource-innovation match perspective, the perceived resource readiness for e-marketplace adoption and implementation is considered as a major factor affecting a firm's e-marketplace adoption intention in its international marketing practices. The more a firm's current resources are perceived to be ready for the requirements from the e-marketplace

adoption and implementation, the more likely the firm will participate in the e-marketplace. Here, we proposed that:

H3: The perceived resource readiness for e-marketplace adoption and implementation has a positive effect on the export firm's intention decisions of the Internet-based B2B e-marketplace in its international marketing practices.

4.5 Research Method

4.5.1 Instrument Development

A survey study was carried out to test the proposed theoretical model because it provides a basis for establishing generalizability, allows replicability, and has statistical power. While available, measurement instruments were directly adapted from the existing validated items in previous research. Since we are focusing on the match-based measurements, many items were self-developed for more accurate fit between the instrument and the context of our study. Because many items were developed by us, they were reviewed by a panel of experts for face validity. Then, the original instruments were translated from English to Chinese. Translation accuracy was verified by a MIS professor and one Ph.D. student. After that, a pretest was conducted to determine whether the respondents had any difficulty in understanding the survey questions and whether further revision was needed to improve the clarity of wording. The questionnaire used the seven-point Likert scales anchored at 'strongly disagree' at (1), 'strongly agree' at (7), and 'neither agree nor disagree' at (4),

neutral point. All items are listed in Appendix A.

Perceived Performance Gap of Current International Marketing Practices

Perceived performance gap of current business practices was operationalized with two items adapted from “satisfaction with current systems” proposed by Chau and Tam (1997). Respondents were asked to indicate the extent to which they agreed with statements that: 1) the current international marketing approaches can fulfill their companies’ strategic needs; and 2) they are satisfied with the outcomes of their current international marketing practices.

Perceived Potential Benefit of E-marketplace Adoption

Perceived potential benefit of e-marketplace adoption was operationalized with three items adapted from “potential benefits for sellers from e-marketplace adoption” proposed by Rask and Kragh (2004). Focusing on one Internet-based B2B e-marketplace they do not adopted, respondents were asked to indicate the extent to which they agreed with statements that: without considering the company’s internal resource constraint, 1) the adoption of that e-marketplace can help their companies to save the resources invested in their international marketing practices; 2) the adoption of that e-marketplace can be very helpful for their companies to gain large number of valuable information of foreign customers; and 3) the adoption of that e-marketplace can effectively help their companies to develop their international market.

Perceived Resource Readiness for E-marketplace Adoption

Perceived resource readiness for e-marketplace adoption was operationalized with

four items self-developed by us. Focusing on the same Internet-based B2B e-marketplace they do not adopted, respondents were asked to indicate the extent to which they agreed with statements that: 1) their companies have enough relative knowledge to use that e-marketplace for the international marketing practices; 2) for existent employees, using that e-marketplace for the international marketing practices is not very difficult; 3) their companies have sufficient resources for the adoption and implementation of that e-marketplace; and 4) base on their companies' ability there are no big difficulties for them to adopt and implement that e-marketplace.

E-marketplace Adoption Intention

E-marketplace adoption intention was operationalized with three items. Focusing on the same Internet-based B2B e-marketplace they do not adopted, respondents were asked to indicate the extent to which they agreed with statements that: 1) their companies want to collect more information about that e-marketplace; 2) their company want to try that e-marketplace in their international marketing practices; and 3) their companies have the clear plan to adopt that e-marketplace in the near future.

4.5.2 Data Collection

Self-administered questionnaires were used to gather the data for this study. This method could offer three advantages to respondents (Singleton and Straits 1999): (1) respondents are free to select a convenient time to respond; (2) respondents can spend sufficient time to think about each answer; and (3) the absence of an interviewer also protects privacy.

The survey has been done among Chinese SMEs with export business in the international market. The questionnaire was targeted at the key executives responsible for export business, such as CEOs or managers of export department because they are more likely to have cognizance of their organizations as key decision makers in e-marketplace adoption in their international marketing practices. Sample frame was drawn from the “Directory of Chinese Export Company 2003”. 11500 firms in the directory were considered small and medium-sized firms, which were our target population. “Small and medium-sized firm” was based on the “Interim Provisions on the Standards for Medium and Small Enterprises (2003)” by State Economic and Trade Commission of China (SETC). According to this standard, manufactures with employees less than 2000, or annual sales less than 0.3 billion Yuan (RMB, or total assets below 0.4 billion Yuan (RMB) and traders with employees less than 200 or annual sales less than 0.3 billion Yuan (RMB) can be considered as SMEs. Through systematic sampling method, we selected every tenth company of the 11500 to get a sample of 1150 after a random starting point.

A modified version of Dillman’s Total Design Method (1978) was used to assure the highest possible response rate. The mailing to each firm included a cover letter explaining the purpose of the study, the questionnaire and self-addressed stamped return envelope. The definition and description of Internet-based B2B e-marketplace were included in the survey instrument to improve the validity of the response. As we let the subjects to focus on one Internet-based B2B e-marketplace they do not adopt currently to complete the questionnaires, we did not prepare two versions of

questionnaire depending on whether their companies currently use some kind of e-marketplace or not in their international marketing practices in order to collect more useful data.

The mailings were mailed to all firms in May 2005. Three weeks after mailing the questionnaires, we called the non-respondents one by one to ensure they have received our package and seek their cooperation. For those who would like to cooperate with us but did not receive our package, we sent the package again. Two weeks later, we made another reminding call to those companies who would like to cooperate with us but have not yet returned completed questionnaires. Though almost 200 companies agreed to cooperate with us, through the procedure described above, only 72 surveys were returned and 70 had complete data for analysis.

Considering the difficulty to collect the data from the companies through the mailing method in China, we changed our data collection method. Through convenience sampling method we targeted at the export companies in one city. Then, we visited these companies one by one in person to seek their cooperation. Through this procedure, we got another 142 surveys in which 126 had complete data for analysis. Here, convenience sampling bring great limitation to our study as convenience sampling means that there can be no guarantees that participants in the study are representative of the population at large. Through these two procedures, we got 196 surveys with complete data for analysis.

The dataset had been further screened based on the respondents' formal job title. Only the surveys with the respondents at the level of company-level decision makers such

as president/CEO, vice-president, and director/manager of export department were kept for testing. Finally, 100 records had been kept for testing. The demographics of the organizations responded to our survey are presented in Table 4.3.

Table 4.3: Descriptive Statistics of Respondents

Characteristics of Respondents	Category	Effective	Percentage
		Data	(%)
Respondent's Formal Job Title	President/CEO	13	13.00%
	Vice-President	13	13.00%
	Director/Manager	74	74.00%
Respondent's Gender	Male	73	73.00%
	Female	25	25.00%
	Missing value	2	2.00%
Type of the Respondent's Company	Manufacture	56	56.00%
	Trader	44	44.00%
	Missing value	0	0%
Annual Export Volume of the Respondent's Company (Million US\$)	Below 1	20	20.00%
	1 to 1.5	11	11.00%
	1.5 to 2.5	10	10.00%
	2.5 to 5	23	23.00%
	5 to 10	4	4.00%
	More than 10	7	7.00%
	Missing value	25	25.00%
Number of Employees of the Respondent's Company	1 to 10	5	5.00%
	11 to 50	18	18.00%
	51 to 100	23	23.00%
	101 to 200	14	14.00%
	201 to 500	13	13.00%
	501 to 1000	12	12.00%
	More than 1000	4	4.00%
	Missing value	11	11.00%
E-Marketplace Adoption Experience of the Respondent's Company	Yes	29	29.00%
	No	59	59.00%
	Missing value	12	12.00%

4.6 Analysis and Results

Structural equation modeling has been adopted for data analysis because 1) it allows a

more complete modeling of theoretical relationships compared to traditional analyses of merely associating among measures (Bagozzi and Yi 1989); 2) it provides a straightforward method of dealing with multiple relationships simultaneously while providing statistical efficiency; and 3) it has the ability to test the structural model (i.e. the relationship between an independent variable and the dependent variable) and the psychometric properties of the constructs (i.e. the relationship between a latent variable and its indicators). Following Anderson and Gerbing (1988), we adopted two-step approach in which first a valid and reliable measurement was established, and subsequently the structural model was tested in order to avoid misinterpretation of structural relationships.

3.6.1 Measurement Model

The objective of measurement model testing is to ensure the measurements are of high quality, i.e., to establish the construct (convergent and discriminant) validity. The measurement model was tested using confirmatory factor analysis (CFA) on the data collected from the study in LISREL. Here, using LISREL for confirmatory factor analyses provides a more rigorous assessment of the fit between the collected data and the theoretical factor structure, and satisfies the minimum requirements of assessing the measurement properties of reliability, convergent validity, and discriminant validity. Table 4.4 shows the descriptive statistics of the study constructs respectively.

Table 4.4: Descriptive Statistics of Constructs

Study Constructs	Mean	Std Dev
Perceived Performance Gap of Current International Marketing Practices (PG)	5.06	1.57

Perceived Potential Benefits of E-marketplace Adoption (PB)	4.55	1.31
Perceived Resource Readiness for E-marketplace Adoption (RR)	4.90	1.34
E-marketplace Adoption Intention (INT)	4.68	1.46

4.6.1.1 Model Fit

Model fit is assessed in terms of following indices and standards: goodness-of-fit index (GFI) and normed fit index (NFI) greater than 0.90, adjusted goodness-of-fit index (AGFI) greater than 0.80 (Gefen et al. 2000), comparative fit index (CFI) greater than 0.90 (Jiang and Klein 1999/2000), and root mean square of approximation (RMSEA) lower than 0.08 for a good fit and lower than 0.05 for an excellent fit (Browne and Cudeck 1992). A significant chi-square for a model typically means a poor fit. However, given the large sample size, a significant chi-square is likely. Thus, we did not use chi-square as a criterion for determining goodness of fit.

The result of CFA indicated that the model fit of the measurement model was good with χ^2 (48) =57.05, GFI=0.91, AGFI=0.86, NFI=0.90, CFI=0.97, RMSEA=0.044.

Table 4.5 reports the overall fit indices of the model.

Table 4.5: Overall Measurement Model Fit

Goodness of Fit Indices	Measurement Model	Desired Levels
Degree of Freedom	48	-
χ^2	57.05	Smaller
Root Mean Square Error of Approximation (RMSEA)	0.044	<0.05
Normed Fit Index (NFI)	0.90	>0.90
Comparative Fit Index (CFI)	0.97	>0.90
Goodness of Fit Index (GFI)	0.91	>0.90
Adjusted Goodness of Fit Index (AGFI)	0.86	>0.80

4.6.1.2 Reliability

Reliability measures the extent to which indicators used to measure a construct reflect a true common score for the construct (Kerlinger 1986). It shows the degree to which the items are free from random error, and therefore yield consistent results. Cronbach's α is the most widely used measure for assessing reliability of the measures (Chau 1999). A value of more than 0.7 is deemed to provide satisfactory reliability (Nunnally 1978). The α values in Table 4.6 range from 0.79 to 0.88, indicating adequate reliability.

In addition, reliability was examined based on Composite Reliability (CR) and Average Variance Extracted (AVE). Composite reliability test is a test superior to Cronbach's alpha test because this test is not affected by the number of items in the scale and unidimensionality. The average variance extracted measures the overall amount of variance in the indicators accounted for by the latent construct. A scale is said to be reliable if $CR > 0.70$ and $AVE > 0.50$ (Bagozzi and Yi 1988). As shown in Table 4.6, the CRs range from 0.80 to 0.87, and the AVEs range from 0.58 to 0.68, which are above recommended cut-off values, indicating adequate reliability.

Table 4.6: Construct Reliability

Constructs	α	CR	AVE
Perceived Performance Gap of Current International Marketing Practices (PG)	0.79	0.81	0.68
Perceived Potential Benefits of E-marketplace Adoption (PB)	0.81	0.80	0.58
Perceived Resource Readiness for E-marketplace Adoption (RR)	0.88	0.87	0.65
E-marketplace Adoption Intention (INT)	0.84	0.86	0.67

Note: α = Cronbach's α ; CR = Composite Reliability; AVE = Average Variance Extracted

4.6.1.3 Convergent Validity and Discriminant Validity

Convergent validity is the degree with which the items of a given construct are measuring the same underlying latent variable. Convergent validity was assessed using three criteria. First, the standardized factor loadings, which are indicators of the degree of association between the latent factor and each item, should be larger than 0.60 (Chin et al. 1997). Second, the standardized factor loadings must be statistically significant (0.05 level) (Gefen et al. 2000). Finally, the average variance extracted (AVE) for each factor should exceed 50% (Fornel and Larker 1981). As shown in Table 4.7, standard item loadings range from 0.69 to 0.94, all estimated standard loadings are significant at $P < 0.001$ level, and the minimum AVE was 0.58 (Table 4.6), suggesting a good convergent validity.

Table 4.7: Construct Convergent Validity

Construct Items	Standardized Parameter Estimate	T-Value
Perceived Performance Gap of Current International Marketing Practices (PG)		
Item 1	0.69	5.84
Item 2	0.94	7.09
Perceived Potential Benefits of E-marketplace Adoption (PB)		
Item 1	0.78	8.40
Item 2	0.70	7.26
Item 3	0.80	8.59
Perceived Resource Readiness for E-marketplace Adoption (RR)		
Item 1	0.82	9.49
Item 2	0.69	7.44
Item 3	0.80	9.23
Item 4	0.89	10.88
E-marketplace Adoption Intention (INT)		

Item 1	0.74	8.23
Item 2	0.90	10.73
Item 3	0.80	9.05

Discriminant validity measures the degree to which measures of two constructs are empirically distinct (Bagozzi et al. 1991, Davis 1989). To assess the discriminant validity, we used the Fornell and Larcker (1981) criteria: average variance extracted (AVE) for each construct should be greater than the squared correlation between constructs. Such results suggest that the items share more common variance with their respective constructs than with other constructs. As shown in Table 4.8, we found that all of the correlation estimates met the criterion, suggesting a good extent of discriminant validity.

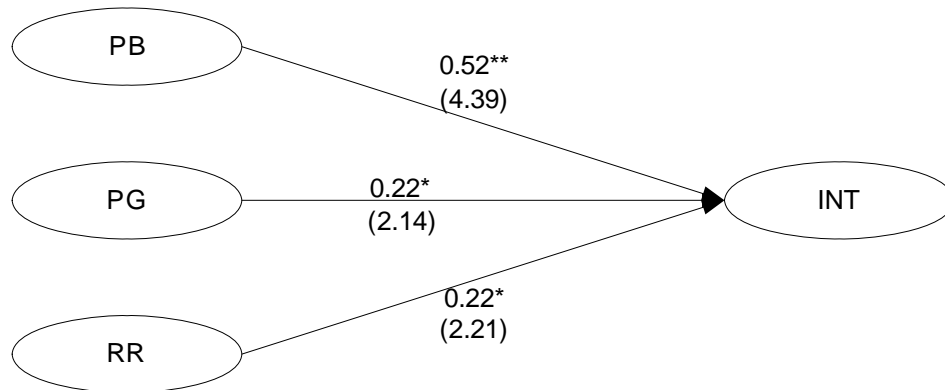
Table 4.8: Construct Discriminant Validity

Constructs	Correlation Matrix			
	1	2	3	4
1. PG	0.82			
2. PB	0.34	0.76		
3. RR	0.24	0.28	0.80	
4. INT	0.45	0.65	0.42	0.82

Note: Value on the diagonal is the square root of AVE; PG: perceived performance gap; PB: perceived potential benefit; RR: perceived resource readiness; INT: adoption intention

Overall, the evidence of good model fit, reliability, convergent validity, and discriminant validity indicates that the measurement model was appropriate for testing the structural model at a subsequent stage.

4.6.2 Structural Model and Research Hypotheses



Chi-Square=57.05, DF=48, P-value=0.17414, RMSEA=0.044, NFI=0.90, CFI=0.97, GFI=0.91, AGFI=0.86, *p<0.05, **p<0.01

Note: PG: perceived performance gap; PB: perceived potential benefit; RR: perceived resource readiness; INT: adoption intention

Figure 4.2 Results of SEM Analysis

Following confirmation of good psychometric properties in the measurement model, LISREL was used to assess the structural model using the structural equation modeling (SEM) technique. Figure 4.2 reports the results of SEM analysis. The model fit was good with $\chi^2(48) = 57.05$, GFI=0.91, AGFI=0.86, NFI=0.90, CFI=0.97, RMSEA=0.044. Data strongly support the proposed links from perceived benefits to adoption intention ($p < 0.01$), perceive performance gap to adoption intention ($p < 0.05$), and perceive resource readiness to adoption intention ($p < 0.05$). Hence, all of our hypotheses have been supported. Generally, these three factors explained a fair amount of the variance in the adoption intention with $R^2 = 0.53$.

4.7 Discussion and Conclusions

This study investigated major causal factors for e-marketplace adoption intention of

SMEs in their international marketing practices in order to yield comprehensive and detailed insights into the phenomenon of e-marketplace adoption of export companies. To better understand these issues, we developed a conceptual model for e-marketplace adoption based on a three match-based framework. Upon examining the model through survey data from 100 small and medium sized export companies in China, we found that perceived performance gap of current international marketing practices, perceived potential benefit of e-marketplace adoption, and perceived resource readiness for e-marketplace adoption all have significant direct effects on firms' e-marketplace adoption intentions. Overall, these three match-based factors accounted for 53% of the variance in e-marketplace adoption intention.

The dominant effect of perceived potential benefit on e-marketplace adoption intention suggested that when companies perceive high value from e-marketplace adoption, they are more likely to try the e-marketplace solution even if there is no high pressure for them to develop a new marketing approach. Hence, a market maker must understand the reasons behind potential users' participation and thereby be able to provide the right incentives for these firms to adopt the market. Lowering the cost for adoption might be useful to attract potential participant firms, but the most important thing for possibly successful market makers is to let the potential participant firms perceive the benefits from adoption. Certainly, it depends on the market makers' marketing ability as well as their ability to design appropriate programs to facilitate potential participant firm's goal achieved.

The significant effects of all these three predictors demonstrated the value of using the

match-based framework to understand the adoption of Internet-based B2B e-marketplaces. The good model fit and satisfactory discriminating power of the constructs, measured by various statistics, suggest the comprehensiveness of the three match-based framework for IS innovation adoption and its ability to predict firms' e-marketplace adoption intention.

This study has several contributions: Firstly, it is one of the first empirical studies to investigate factors influencing small businesses' participation in e-marketplaces. Therefore, this research work contributes to a better understanding of the antecedents influencing small supplier firms' potential participation in Internet-based e-marketplaces due to the e-marketplace evolution. Also it supplements former studies which mainly focused on the buyers' adoption behavior and contributes to our cumulative knowledge in the field of e-marketplace and IOS adoption. Simultaneously it can provide the reference value for the future research studies in other electronic, inter-firm linkages. Moreover, it allows practitioners to identify and evaluate fundamental e-marketplace attributes as well as strategies that would enhance the likelihood of adoption by small firms.

Secondly, SMEs are recognized to be important to economic activity, employment, innovation and wealth creation in many countries (OECD 2002). Because SMEs' management issues, problems and opportunities are very different from those of large corporations, it is necessary to pay more attention on this segment. Moreover, as high-growth SMEs are largely responsible for the economic development of industrialized countries, improving the international connection of the small business

sectors is widely regarded as an increasingly important policy priority in many countries (Bell et al. 2004). Thus, following the trend of the global market served by the e-business, this research provides a deeper understanding of the SMEs' internationalization under the impact of information technologies.

Finally, this study has a special interest in the Asian context. Although market analysts recognize the importance of fitting B2B e-commerce to the special needs of the Asian business environment (Dhawan et al. 2000), there is still little empirical work on this subject. The focus of this study on Chinese business communities enables a comparison with previous research based on the U.S. and European environments (e.g. Choudhury et al. 1998; Reekers and Smithson 1996). Further, as China is the biggest developing country in the world, the study in this place contributes to understanding the process in which e-commerce technology expanding globally. It may provide us a gauge for the expansion of e-marketplace participation in other developing countries as well.

The main limitation of the study consists in the sampling method. As most of the data is collected from convenience sampling method, it cannot be guaranteed that participants in the study are representative of the population at large. It might be therefore difficult to generalize our findings from these results to other small and medium sized-export companies in China. Hence, future research would benefit from expanding the sample to include a broader area. The second major limitation of the study lies on instruments. The operationalization of several constructs in this study was not carried out extensively in previous studies, which to some extent limits our

ability to cross-check the external validity of the results, although reliability, convergent validity, and discriminant validity were empirically tested.

Since our empirical study only focused on the SMEs adoption decision of Internet-based B2B e-marketplace in their international marketing practices, further research is needed to test and justify the application of this framework. We suggested that the framework be applied in the context of large organizations and other IS innovation adoption as well. Such empirical testing would allow researchers to identify necessary modifications to the framework to enlarge its generalizability in the adoption research of IS innovations. Another interesting direction for future research would be to compare e-marketplace adoption in industrialized countries with developing countries, using the framework and methodology proposed in this study. These countries have different e-commerce environments and firms tend to have different technology competence. Therefore, such comparisons could reveal distinct adoption behavior.

Chapter 5: Determinants of Firms' E-commerce Strategic Use Intentions

5.1 Introduction

5.1.1 Background

Over past decades, a rapid development took place in the field of information and communication technologies. The explosive growth of the Internet, including commercial networks and services, was accompanied by an astounding increase in the population of Internet users. The business potential of e-commerce is irrefutable given approximately 685 million people—11% of the world's population—had access to the Internet by 2003 (I-Ways 2005). The Internet technology generates a world of the electronic marketplace where time and individuality are constantly redisplayed and reinterpreted by national and international technological architecture. Though difficult to account for accurately, growth in Internet sales has exceeded most expert estimates. This rise in the importance of the Internet both as a source of information exchange and commerce leads us inexorably closer to a truly global community (Marshall and McKay 2002). There can be little doubt that e-commerce has had, and will continue to have, an enormous impact on the commercial, social and economic fabric of society.

For business, e-commerce and a global economy offer the prospect of access to worldwide marketplaces and hence exciting opportunities to expand its reach cost effectively, operating free of time and location constraint (24 x 7 x 365), and

potentially building and leveraging communities of interest (Rayport and Jaworski 2001). It is emerging as an increasingly important way for organizations to reach potential customers. Now, organizations find it more and more important to represent themselves on the Internet to get more customers, to increase the public's awareness of the companies and their products, and to sell more. More and more businesses are discovering the World Wide Web (WWW) as a fundamental tool to conduct daily business. Since commercial use of the Internet commenced in earnest around 1994 (Peterson et al. 1997; Poon and Jevons 1997), there has been an explosive and overwhelming increase in the use of the Internet technologies especially the WWW for business purpose.

The potential of the Internet for the transformation of commerce is immense, and so are the challenges for businesses as they participate in the Goldrush of the Information Age. When all companies come to embrace Internet technology, the Internet itself will be neutralized as a source of advantage. Basic internet applications will become table stakes—companies will not be able to survive without them, but they will not gain any advantage from them (Porter 2001). Gaining the full potential and benefits from e-commerce depend on the consistent integration and implementation of all kinds of e-commerce technologies into existing business processes while at the same time adjusting these processes. For most organizations, developing and managing e-commerce strategies is clearly vital to any successful e-commerce venture (Chen 2001; Lientz and Rea 2000; Venkatraman 2000; Willcocks and Sauer 2000).

5.1.2 Strategic Use of E-Commerce

Sabherwal and King (1991) defined an application as strategic if it has a profound effect on a company's success and destiny, by influencing or "shaping" the company's strategy or playing a direct role in the implementation or support of the company's strategy. Underlying this definition, the strategic use of technology occurs when the technology-based opportunities become integral to corporate strategy to gain competitive advantages (Morone 1989). At any given time, a firm is confronted by a diversity of technical possibilities. However, amidst these possibilities, only several firms find opportunities to build strategic advantage. Although most firms can be aware of developments in a particular technology field, not all of them can recognize the strategic opportunities latent in technology developments and build strategy around them.

For the Internet-based e-commerce, the opportunities presented by the channel seem to be readily apparent: by allowing for direct, ubiquitous links to anyone anywhere, the Internet lets companies build interactive relationships with customers and suppliers, and deliver new products and services at very low cost (Chosh 1998). But not all corporations show the same zeal in building e-commerce strategy and systematically identify the type and range of products and services developed and /or redesigned in the light of the Internet. While some firms have chosen to develop their web sites to a high level of sophistication and integration, many others appear to be contented with maintaining a simple firm informational web site over the years. The

sophistication and complexity of the firm's website reflects the strategic priority of the firm placed on Internet (Angehrn 1997; Kowtha and Choon 2001).

Hence, though there has been a rush by most firms to establish some presence on the Internet, many of them are mainly motivated by the fear of damaging their image by not doing so (McBride 1997; Widdifield and Grover 1995). For most organizations currently on the Internet, Internet use is peripheral to their main business activities (McBride 1997). Online activities often appeared to be ad hoc, circumspect, and tangential to the corporate strategy of the firm. Lots of companies have just established their presence without an in-depth rethinking of their marketing and advertising strategy and approached the Internet primarily as a publishing medium (Coleman 1998; Dutta and Segev 1999; Pratt 2002). Especially in developing countries, while enterprises are increasingly connected to the Internet, their involvement in e-commerce remains limited (I-Ways 2005; UNCTAD 2004). It seems that the strategic use of the e-commerce has not been taken as a part of strategic information systems planning and related directly to business goals for most of the companies.

As we mentioned above, the significant value gained from the e-commerce development will be in the degree of strategic use of e-commerce. Establishing a Web presence helps to create awareness about the firms but does not do much toward improving their profitability. Hence, considering the condition of low strategic use rate of e-commerce, it is necessary to study different drivers for the strategic use of e-commerce. Then we can explain the different e-commerce strategies applied by

companies and answer the question why some firms can build their strategies around e-commerce opportunities. Thus, given the tremendous potential of e-commerce development, firms' e-commerce strategic use intention could be a very interesting topic to be investigated, which is defined in this study as the extent to which a company intends to use e-commerce as a strategic weapon for its competitive advantage.

5.1.3 Significant Prior Research and Problem Statement

The diffusion and use of e-commerce applications and technologies have long been of research interest. Now, there is a rapid growth of literature on the adoption and use of e-commerce by organizations, in which considerable research focuses on e-commerce strategies (Aldridge, Forcht, and Pierson 1997; Angehrn 1997; Gallagher 1999; Hartman and Sifonis 2000; Jutla and Bodorik 1999; Lederer, Mirchandani, and Sims 1997; Levy and Powell 2003; Lindemann and Schmid 1999; Lu and Yeung 1998; Porter 2001; Riggins 1999; Schlueter and Shaw 1997; Segev, Porra, and Roldan 1998; Simeon 1999). However, researchers interested in e-commerce strategies are more concerned about strategy building for successful implementation and their effects on firms' adoption and/or use of e-commerce applications. Little literature mentioned the issue of why some firms build their strategies around e-commerce opportunities while others have different choices, and why some are more adept than others at incorporating e-commerce-based opportunities into their over all competitive strategies.

According to Morone (1989), it is one thing to make technology decisions consistent with corporate strategy, and quite another to bring the potential opportunities that technology creates to bear on the formulation of corporate strategy. If the former is a technology strategy, the latter is the strategic use of technology. Therefore, among lots of existing research on e-commerce strategy, the issue of strategic use of e-commerce has not been well studied. Few studies focused on the e-commerce strategic use intention. Leder et al. (1997) investigated the link between the benefits organizations seeking from electronic commerce and their intention to use electronic commerce for such benefits. However, their research did not provide a complete picture of the formation of e-commerce strategic use intention. The reason is that it only focused on the effect of benefits, without considering other factors. Thus, the factors affecting a firms' strategic use intention of e-commerce remain under-investigated in the academic literature.

5.1.4 Objective and Research Question

The purpose of this study is to investigate the drivers for companies to apply and develop e-commerce for strategic purpose. We would like to discover what forces “drive” companies to put e-commerce use and development as a strategic weapon for their competitive advantage, and uncover key factors affecting such adoption intention. In this paper, an integrated e-commerce strategic use intention model will be empirically assessed. Our research questions are:

What are the key factors that affect firms' strategic use intention of e-commerce?

5.2 Theoretical Foundations and Research Framework

E-commerce refers to the use of electronic means and technologies to conduct commerce, including within-business, business-to-business, and business-to-consumer interactions (Choi et al. 1997). In the sense that e-commerce is often embedded in a firm's core business processes; it can extend basic business products and services; and it can streamline the integration with suppliers and customers, e-commerce is suggested to be a Type III IS innovation (Zhu et al. 2003).

In this study, strategic use intention of e-commerce is defined as the extent to which a company intends to use e-commerce as a strategic weapon for its competitive advantage. Based on this definition, our research in e-commerce strategic use intention can be considered as a specific kind of e-commerce adoption intention research. As e-commerce can be deemed as a kind of IS innovation, we believe that theoretical foundations of IS innovation adoption are well suited for studying e-commerce strategic use intention. Hence, the match-based framework we proposed in Chapter 3 will be appropriate to study the firms' e-commerce strategic use intentions.

5.3 Research Model and Hypotheses

Based on our theoretical framework, we proposed a conceptual model for e-commerce strategic use intention, as illustrated in Figure 5.1. This conceptual model posited three predictors based on the three matches—the perceived potential benefits from e-commerce strategic use, the perceived performance gap from current business

practices, and the perceived resource readiness for e-commerce strategic use—for firms' e-commerce strategic use intentions.

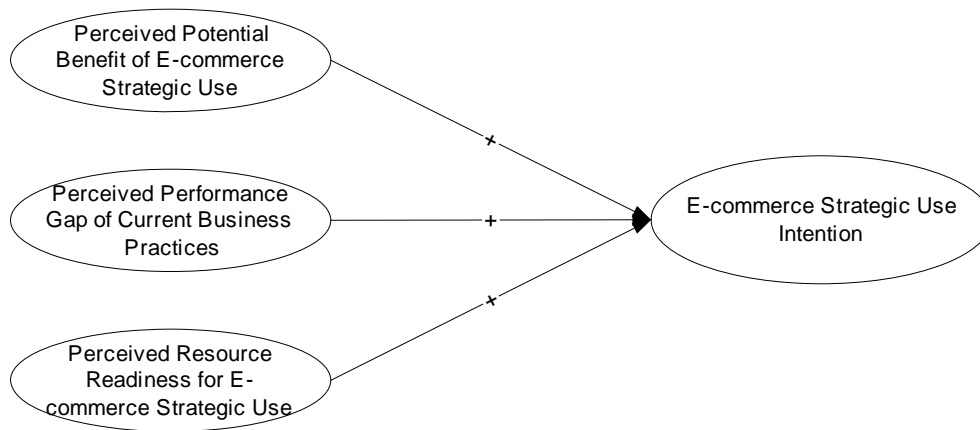


Figure 5.1: Research Model of E-commerce Strategic Use Intention

Perceived Potential Benefit of E-commerce Strategic Use

The perceived potential benefit of e-commerce strategic use is defined as the extent to which the e-commerce development is perceived to be a useful approach for companies' recent strategic needs without considering the internal resource constraint.

As we mentioned before, Sabherwal and King (1991) defined an application as strategic if it has a profound effect on a company's success and destiny, by influencing or 'shaping' the company's strategy or by playing a direct role in the implementation or support of the company's strategy. Underlying this definition is the notion that technologies are used to gain and sustain competitive advantage. The strategic use of e-commerce requires the companies to develop a clear e-commerce strategy aligned with the specific business objectives and values to guide the identification of the type and range of products and services to be developed and/or redesigned (Angehrn 1997).

Therefore, from the innovation-needs match perspective, the perceived potential benefit of e-commerce is considered as a major factor affecting a firm's e-commerce strategic use intention. Here, we proposed that:

H1: The perceived potential benefit of e-commerce has a positive effect on the firm's e-commerce strategic use intention.

Perceived Performance Gap of Current Business Practices

The perceived performance gap of current business practices is defined as the extent to which a firm's current business practices are perceived to be insufficient to meet its strategic needs. The performance gap can result in a low satisfaction level with existing systems, which, in turn, will provide the impetus to find new ways to improve performance (Rogers 1983; Zaltman et al. 1973). As the strategic issues are tied to an awareness of some real or anticipated performance gap (Dutton and Duncan 1987), if companies' strategic needs can be fulfilled by the current business practices, there will be little incentive for the firms to highly develop new business approaches, such as Internet-based e-commerce. Therefore, from the performance-needs match perspective, perceived performance gap of current business practices is considered as a major factor affecting a firm's e-commerce strategic use intention. Here, we proposed that:

H2: The perceived performance gap of current business practices has a positive effect on the firm's e-commerce strategic use intention.

Perceived Resource Readiness for E-commerce Strategic Use

The perceived resource readiness for e-commerce strategic use is defined as the extent to which a firm's current resources are perceived to be ready for the requirements of e-commerce strategic use. Firms that make strategic use of technology must have the capacity to identify and develop technology-based opportunities for advancing the firm toward the realization of its strategic vision (Morone 1989). This suggests a need for strong internal technology related resources for the strategic use of technology. Similarly, e-commerce involves the used of information technology to enhance communications and transactions with all of an organization's stakeholders such as customers, suppliers, government regulators, financial institutions, managers, employees, and the public at large (Watson 1998). Hence, the strategic use of e-commerce requires significant Internet related investments to produce measurable returns or cost reduction (Angehrn 1997). Therefore, from resource-innovation match perspective, the perceived resource readiness for e-commerce strategic use is considered as a major factor affecting a firm's e-commerce strategic use intention. The more a firm's current resources are perceived to be ready for the requirements of the e-commerce development, the more likely the firm will make strategic use of e-commerce. Here, we proposed that:

H3: The perceived resource readiness for e-commerce strategic use has a positive effect on the firm's e-commerce strategic use intention.

5.4 Research Method

5.4.1 Instrument Development

A survey study was carried out to test the proposed theoretical model. While available, measurement instruments were directly adapted from the existing validated items in pervious research. Since we are focusing on the match-based measurements, many items were self-developed for more accurate fit between the instrument and the context of our study. Because many items were developed by us, they were reviewed by a panel of experts for face validity. Then, the original instruments were translated from English to Chinese. Translation accuracy was verified by a MIS professor and one Ph.D. student. After that, a pretest was conducted to determine whether the respondents had any difficulty in understanding the survey questions and whether further revision was needed to improve the clarity of wording. The questionnaire used the seven-point Likert scales anchored at ‘strongly disagree’ at (1), ‘strongly agree’ at (7), and ‘neither agree nor disagree’ at (4), neutral point. All items are listed in Appendix B.

Perceived Performance Gap of Current Business Practices

Perceived performance gap of current business practices was operationalized with three items. Respondents were asked to indicate the extent to which they agreed with statements that: 1) the process to achieve their companies’ strategic objectives will be very difficult based on their current business practices; 2) the investments to achieve their companies’ strategic objectives will be unaffordable based on their current

business practices; and 3) the return on the investment to achieve their companies' strategic objectives will be unsatisfactory based on their current business practices.

Perceived Potential Benefits of E-commerce Strategic Use

Perceived potential benefit of e-commerce strategic use was operationalized with five items with the reference from the study of Zhuang and Lederer (2003). Respondents were asked to indicate the extent to which they agreed with statements that without considering the internal resource constraint, the active application and development of e-commerce will help their companies to achieve their recent strategic objectives through 1) improving their image and enhancing their reputation; 2) providing them a new marketing approach and a broader market; 3) providing them a new communication approach with customers and enhancing the business relationships with the customers; 4) providing better customer services; and 5) improving their business process and enhancing their operational efficiency.

Perceived Resource Readiness for E-commerce Strategic Use

Perceived potential benefit of e-commerce strategic use was operationalized with five items. Respondents were asked to indicate the extent to which they agreed with statements that: 1) the existent hardware of their companies can satisfy the needs the active application and development of e-commerce; 2) the financial costs to maintain and support the active application and development of e-commerce are affordable for their companies; 3) for existent employees, the active application and development of e-commerce is not very difficult; 4) their companies have sufficient resources for the

the active application and development of e-commerce; and 5) base on their companies' ability there are no big difficulties for them to actively apply and develop e-commerce.

E-commerce Strategic Use Intention

E-commerce strategic use intention was operationalized with three items. Respondents were asked to indicate the extent to which they agreed with statements that: considering their companies' e-commerce strategy in the near future, 1) the active application and development of e-commerce will be a strategic weapon of the company to enhance the company's competitive advantage; 2) their companies will invest more resources in application and development of e-commerce; and 3) the active application and development of e-commerce will be their companies' important business strategy in the near future.

5.4.2 Data Collection

In this study, we focus on the Chinese companies for two reasons: firstly, the business potential of e-commerce in China is immense. As of December 2004, 94 million people had gone online, making China the second largest Internet-user market in the world, behind only the U.S., according to the China Internet Network Information Center (CNNIC 2005), which has carried out 15 semiannual surveys of Internet users in China since 1997. With over 1.25 billion people and double-digit economic growth, China could potentially emerge as the largest Internet and telecommunications market in the world if certain economic, environmental, and organizational barriers are

effectively addressed.

Secondly, although many Chinese firms have followed the leap-frogging approach to significantly upgrade their technology infrastructure for e-commerce diffusion and to establish their web presence, the strategic use problems are quite serious in Chinese companies. Most of Chinese firms have started the first step by connecting to the Internet and setting up websites to introduce and advertise their products and service, but only a very small number of them have actually moved further to the next step to conduct e-commerce activities (Tan and Ouyang 2004). The Network Economy Research Center in Beijing University (2001), supported by State Economic and Trade Commission, surveyed 638 large and medium-sized enterprises in 2001. Of them, 87% were reported to have connected to the Internet and 69% of them had created their websites. However, only 4% of them reportedly had conducted online purchases and 4% of them had offered online sales for their products.

Considering the difficulty to collect the data directly from companies, in this study, we use part-time MBA student as our sample frame because in China managerial experience is generally a prerequisite for enrollment in Chinese MBA program. Especially for part-time MBA program, most of the students hold management appointment in their firms. During the course of his/her duties, they are likely to encounter strategic application of e-commerce or to be involved in the consideration of such development. As they would be the one who knows about the firm's current conditions and strategies, they could provide correct information of their firms' attitudes and strategies of e-commerce development. However, as the theoretical

population should be senior executives in the position of making strategic decisions, the use of part-time MBA students for data collection is questionable. Although they might have some managerial experience, they can be poor surrogates for corporate executives who are familiar with corporate strategies and often involved in strategic decision making. That is the major limitation of this method.

Self-administered questionnaires were used to gather the data for this study. The part-time MBA students at four western universities in China were selected as the sample frame for this study. The invitation was made by announcement in several courses. As an incentive for their participation, subjects were given ¥20 for each completed questionnaire. The questionnaires were directly sent to the part-time MBA students who agreed to participate into this study by us in person. 292 questionnaires were returned and 260 had complete data for analysis.

The dataset had been further screened based on the respondents' formal job title. Only the surveys with the respondents at the level of company-level decision makers such as president/CEO, vice-president, and director/manager of their departments were kept for testing. Finally, 176 records had been kept for testing. The characteristics of the respondents are shown in Table 5.1.

Table 5.1: Descriptive Statistics of Respondents

Characteristics of Respondents	Category	Effective	Percentage
		Data	(%)
Respondent's Formal Job Title	President/CEO	9	5.11%
	Vice-President	18	10.23%
	Department Director/Manager	149	84.66%
Respondent's Years	<=1	41	23.30%

in Position	1 to 5	116	65.91%
	5 to 10	12	6.82%
	>10	2	1.14%
	Missing value	5	2.84%
Respondent's Years in Company	<=1	20	11.36%
	1 to 5	73	41.48%
	5 to 10	50	28.41%
	>10	29	16.48%
	Missing value	4	2.27%
Respondent's Gender	Male	131	74.43%
	Female	43	24.43%
	Missing value	2	1.14%
Respondent's Age	<25	0	0.00%
	25-29	45	25.57%
	30-39	109	61.93%
	>=40	20	11.36%
	Missing value	2	1.14%
Usage Level of Internet-based E-commerce Applications in the Respondent's Company	Almost no use of Internet-based e-commerce applications	27	15.34%
	Just begin trying some Internet-based e-commerce applications	50	28.41%
	Begin to use some Internet-based e-commerce applications, but they do not play an important role in the company's business	51	28.98%
	The Internet-based e-commerce applications play an important role in the company's business	44	25.00%
	Missing value	4	2.27%
Number of Employees of the Respondent's Company	Less than or equal to 50	36	20.45%
	51 to 100	27	15.34%
	101 to 300	37	21.02%
	301 to 500	13	7.39%
	501 to 1000	15	8.52%
	More than 1000	45	25.57%
	Missing value	3	1.70%
Industry of the Respondent's Company	Manufacture	88	50.00%
	Trader	85	48.30%
	Missing value	3	1.70%

5.5 Analysis and Results

Structural equation modeling has been adopted for data analysis. Following Anderson and Gerbing (1988), we adopted two-step approach in which first a valid and reliable measurement was established, and subsequently the structural model was tested in order to avoid misinterpretation of structural relationships. In the first step, we first examined the validity and reliability of the first-order constructs. Then we tested the validity of the second-order constructs of perceived potential benefits and resource readiness.

5.5.1 Measurement Model

The measurement model was tested using confirmatory factor analysis (CFA) on the data collected from the study in LISREL. Table 5.2 shows the descriptive statistics of the study constructs respectively.

Table 5.2: Descriptive Statistics of Constructs

Study Constructs	Mean	Std Dev
Perceived Performance Gap of Current Business Practices (PG)	3.74	1.29
Perceived Potential Benefits of E-commerce Strategic Use (PB)	5.24	1.07
Perceived Resource Readiness for E-commerce Strategic Use (RR)	4.90	1.07
E-commerce Strategic Use Intention (INT)	4.66	1.23

5.5.1.1 Model Fit

Model fit is assessed in terms of following indices and standards: goodness-of-fit index (GFI) and normed fit index (NFI) greater than 0.90, adjusted goodness-of-fit index (AGFI) greater than 0.80 (Gefen et al. 2000), comparative fit index (CFI)

greater than 0.90 (Jiang and Klein 1999/2000), and root mean square of approximation (RMSEA) lower than 0.08 for a good fit and lower than 0.05 for an excellent fit (Browne and Cudeck 1992). A significant chi-square for a model typically means a poor fit. However, given the large sample size, a significant chi-square is likely. Thus, we did not use chi-square as a criterion for determining goodness of fit.

The result of CFA indicated that the model fit of the measurement model was good with $\chi^2(98)=135.21$, GFI=0.91, AGFI=0.88, NFI=0.91, CFI=0.97, RMSEA=0.047.

Table 5.3 reports the overall fit indices of the models.

Table 5.3: Overall Measurement Model Fit

Goodness of Fit Indices	Measurement Model	Desired Levels
Degree of Freedom	98	-
χ^2	135.21	Smaller
Root Mean Square Error of Approximation (RMSEA)	0.047	<0.05
Normed Fit Index (NFI)	0.91	>0.90
Comparative Fit Index (CFI)	0.97	>0.90
Goodness of Fit Index (GFI)	0.91	>0.90
Adjusted Goodness of Fit Index (AGFI)	0.88	>0.80

5.5.1.2 Reliability

Reliability measures the extent to which indicators used to measure a construct reflect a true common score for the construct (Kerlinger 1986). It shows the degree to which the items are free from random error, and therefore yield consistent results. Cronbach's α is the most widely used measure for assessing reliability of the measures (Chau 1999). A value of more than 0.7 is deemed to provide satisfactory reliability

(Nunnally 1978). The α values in Table 4.3 range from 0.79 to 0.89 (Table 5.4), indicating adequate reliability.

In addition, reliability was examined based on Composite Reliability (CR) and Average Variance Extracted (AVE). Composite reliability test is a test superior to Cronbach's alpha test because this test is not affected by the number of items in the scale and unidimensionality. The average variance extracted measures the overall amount of variance in the indicators accounted for by the latent construct. A scale is said to be reliable if $CR > 0.70$ and $AVE > 0.50$ (Bagozzi and Yi 1988). As shown in Table 5.4, the CRs range from 0.81 to 0.89, and the AVEs range from 0.53 to 0.66, which are above recommended cut-off values, indicating adequate reliability.

Table 5.4: Construct Reliability

Constructs	α	CR	AVE
Perceived Performance Gap of Current Business Practices (PG)	0.79	0.81	0.59
Perceived Potential Benefits of E-commerce Strategic Use (PB)	0.89	0.89	0.62
Perceived Resource Readiness for E-commerce Strategic Use (RR)	0.84	0.85	0.53
E-commerce Strategic Use Intention (INT)	0.85	0.85	0.66

Note: α = Cronbach's α ; CR = Composite Reliability; AVE = Average Variance Extracted

5.5.1.3 Convergent Validity and Discriminant Validity

Convergent validity is the degree with which the items of a given construct are measuring the same underlying latent variable. Convergent validity was assessed using three criteria. First, the standardized factor loadings, which are indicators of the degree of association between the latent factor and each item, should be larger than 0.60 (Chin et al. 1997). Second, the standardized factor loadings must be statistically

significant (0.05 level) (Gefen et al. 2000). Finally, the average variance extracted (AVE) for each factor should exceed 50% (Fornel and Larker 1981). As shown in Table 5.5, except item1 for perceived performance gap has a loading equal to 0.59, standard item loadings range from 0.60 to 0.94. All estimated standard loadings are significant at $P < 0.001$ level, and minimum AVE=0.53 (Table 5.4), suggesting a good convergent validity.

Table 5.5: Construct Convergent Validity

Construct Items	Standardized Parameter Estimate	T-Value
Perceived Performance Gap of Current Business Practices (PG)		
Item 1	0.59	7.89
Item 2	0.94	12.98
Item 3	0.73	9.82
Perceived Potential Benefits of E-commerce Strategic Use (PB)		
Item 1	0.68	9.84
Item 2	0.82	12.84
Item 3	0.86	13.8
Item 4	0.86	13.79
Item 5	0.7	10.19
Perceived Resource Readiness for E-commerce Strategic Use (RR)		
Item 1	0.6	8.24
Item 2	0.75	11.18
Item 3	0.6	8.28
Item 4	0.81	12.5
Item 5	0.85	13.32
E-commerce Strategic Use Intention (INT)		
Item 1	0.76	11.39
Item 2	0.84	13.05
Item 3	0.84	13.05

Discriminant validity means the degree to which measures of two constructs are

empirically distinct (Bagozzi et al. 1991, Davis 1989). To assess the discriminant validity, we used the Fornell and Larcker (1981) criteria: average variance extracted (AVE) for each construct should be greater than the squared correlation between constructs. Such results suggest that the items share more common variance with their respective constructs than with other constructs. We found that all of the correlation estimates met the criterion, suggesting a good extent of discriminant validity (Table 5.6).

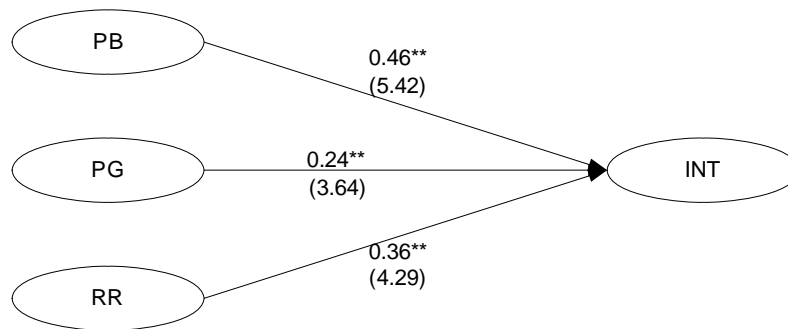
Table 5.6: Construct Discriminant Validity

	Correlation Matrix			
Constructs	1	2	3	4
1. PG	0.77			
2. PB	0.07	0.79		
3. RR	0.07	0.53	0.73	
4. INT	0.30	0.67	0.62	0.81

Note: Value on the diagonal is the square root of AVE; PG: perceived performance gap; PB: perceived potential benefits; RR: perceived resource readiness; INT: strategic use intention

Overall, the evidence of good model fit, reliability, convergent validity, and discriminant validity indicates that the measurement model was appropriate for testing the structural model at a subsequent stage.

5.5.2 Structural Model and Research Hypotheses



Chi-Square=135.21, DF=98, P-value=0.00762, RMSEA=0.047, NFI=0.91, CFI=0.97, GFI=0.91, AGFI=0.88, *p<0.05, **p<0.01

Note: PG: perceived performance gap; PB: perceived potential benefit; RR: perceived resource readiness; INT: strategic use intention

Figure 5.5 Results of SEM Analysis

Following confirmation of good psychometric properties in the measurement model, LISREL was used to assess the structural model using the structural equation modeling (SEM) technique. Figure 4.5 presents the results of SEM analysis. The model fit was good with $\chi^2(98)=135.21$, GFI=0.91, AGFI=0.88, NFI=0.91, CFI=0.97, RMSEA=0.047. The paths are all significant, positive, and consistent with theory. All of the hypotheses proposed in the causal model were supported. The results showed that the decision makers' 1) perceived performance gap of current business practices, 2) perceived potential benefits of e-commerce strategic use, and 3) perceived resource readiness for e-commerce strategic use play a significant role in determining their strategic use intention of e-commerce. These three factors explained a fair amount of the variance in the strategic use intention with $R^2=0.60$.

5.6 Discussion and Conclusions

This study investigated major causal factors for companies' strategic use intention of

e-commerce in order to yield comprehensive and detailed insights into the phenomenon of e-commerce adoption for strategic purpose. To better understand these issues, we developed a conceptual model for e-commerce strategic use intention based on a three match-based framework proposed from former studies. Upon examining the model through survey data from 176 part-time MBA students from four Chinese universities, three predictors for e-commerce strategic use intention were identified: 1) perceived performance gap of current business practices, 2) perceived potential benefit of e-commerce strategic use, and 3) perceived resource readiness for e-commerce strategic use. Among them, perceived potential benefit of e-commerce strategic use appeared to be the strongest driver. Overall, these three match-based factors accounted for 60% of the variance in e-commerce strategic use intention.

The significant effects of all these three match-based factors suggested a firm's decision of strategic use of e-commerce is not a random experiment or mindless rush to a new technology. Although companies may rush to establish some presence on the Internet because of the fear of missing an opportunity or of damaging their image by not doing so (McBride 1997; Widdifield and Grover 1995), for most companies, the strategic use intention of e-commerce is, to some extent, based on serious assessments of 1) competitive pressure of e-commerce development from perceived performance gap of current business practices, 2) opportunities for companies to maintain and sustain competitive advantages from perceived potential benefit of e-commerce strategic use, and 3) possibility for companies to reap the advantages from the e-commerce development from perceived resource readiness for e-commerce strategic

use.

In addition, our findings lend weight to the idea that strategic orientation towards new technologies and environments is often based on the firm's existing skill-sets and capabilities. The significant effects of resource readiness and its three subconstructs (financial resource readiness, hardware resource readiness, and human resource readiness) indicate that while perceived potential benefit of e-commerce strategic use or perceive performance gap of current business practices may motivate the firm's e-commerce strategic use decision, there are numerous necessary conditions that contribute to the ability for the strategic use of e-commerce. Even motivated firms must have relative financial resources, hardware resources, and human resources before strategic use of e-commerce is possible.

From the other perspective, these empirical results imply that the major reasons for companies not to progress further in e-commerce development can be the lack of perceived performance gap of current business practices, the lack of perceived potential benefit, and/or the lack of perceived resource readiness. Among these reasons, the lack of perceived potential benefit should be the most important reason, given the dominant effect of perceived potential benefit of e-commerce strategic use. It seems that the firms that strategically make use of e-commerce are more likely than their counterparts to have a broad vision of what their organizations can accomplish, appreciate the role of e-commerce development in achieving their goals, and exhibit strong internal resource readiness.

The significant effects of all these three predictors demonstrated the value of using the match-based framework to understand the firm's strategic use intention of e-commerce. The good model fit and satisfactory discriminating power of the constructs, measured by various statistics, suggest the comprehensiveness of the three match-based framework for IS innovation adoption, within which three predictors of strategic use intention were derived. Also they suggest the framework's ability to identify facilitators and inhibitors of firms' e-commerce strategic use intention.

This study has two major contributions: Firstly, e-commerce has the potential to generate tremendous new wealth. It is also transforming the rules of competition for established business in unprecedented ways. It has become a core element of business strategy and operations for most 21st century enterprises. Despite dramatic success, we are still in the nascent stages of e-commerce technology development and adoption. As one of the first empirical studies to investigate factors influencing companies' strategic use intention of e-commerce, this research work creates a clear picture of the formation of strategic adoption decisions in companies. It enables us to understand the motivators and inhibitors affecting companies to put e-commerce development as a strategic weapon for its competitive advantage. It supplements former studies which mainly focused on the firm's strategic development and its effects on e-commerce adoption and implementation, and contributes to our cumulative knowledge in the field of e-commerce adoption.

Secondly, this study has a special interest in the Asian context in which less research has been conducted in e-commerce adoption and implementation. Given the ongoing

importance of e-commerce, there is a strong need to conduct more studies of e-commerce adoption and implementation in different regional economies and work environments. The focus of this study on Chinese business communities provides more valuable knowledge about e-commerce adoption and use in this area. Moreover, the rapid globalization and economic deregulation experienced by the developing countries result in more important strategic role that e-commerce can play in organizations. Therefore, there is an intense need to understand the strategic drivers behind the e-commerce development. Since China is the biggest developing country in the world, this research is expected to address a significant gap in this crucially important area. Meanwhile, this research contributes to understanding the process in which e-commerce applications are strategically used by companies in developing countries where the problems of the strategic use of e-commerce applications are more serious.

The main limitation of the study is the sampling frame. As the theoretical population should be senior executives in the position of making strategic decisions, the use of part-time MBA students for data collection is questionable. Although they all hold some managerial positions, they can be poor surrogates for corporate executives who are familiar with corporate strategies and often involved in strategic decision making.

The second major limitation of the study consists in the limited geographical area where it was conducted. As we know, China's infrastructure for e-commerce diffusion is characterized by disparities among geographic areas. Large cities and economically advanced coastal provinces enjoy much better infrastructure and have more Internet

users than remote and economically poorer provinces in the western part of the China. As our data is mainly come from western part of the China, we do not know whether these results would apply to these large and economically advanced provinces. Hence, future research would benefit from expanding the sample to include a broader audience base.

The third major limitation of the study lies on instruments. The operationalization of several constructs in this study was not carried out extensively in previous studies, which to some extent limit our ability to cross-check the external validity of the results, although reliability, convergent validity, and discriminant validity were empirically tested.

We suggest this framework be applied by other researchers for further studies on e-commerce or other IS innovation adoptions in different settings. Such empirical testing will allow researchers to identify necessary modifications to the framework to enlarge its generalizability in the adoption research of IS innovations. Another interesting direction for future research would be to compare e-commerce strategic use in industrialized countries with developing countries, using the framework and methodology proposed in this study. These countries have different e-commerce environments and firms tend to have different technology competence. Therefore, such comparisons could reveal distinct adoption behavior.

Chapter 6: Overall Discussion and Implications

The overall objective of this research was to investigate the determinants of the organization level IS innovation adoption. For a systematic and in-depth investigation of organization level IS innovation adoption, we conducted one theoretical study in IS innovation adoption framework and two empirical studies of Internet-based IS innovation adoption on organization level. The aim of the theoretical study was to develop a better framework for IS innovation adoption and verify the explanatory power of the framework with a revisit of prior empirical studies. And the aim of the two empirical studies was to examine our proposed framework in new empirical settings.

In the theoretical study, we explored key determinants of IS innovation adoption decision on organization level. Based on our literature review on previous IS innovation adoption literature, we found that although there are numerous determinant factors on a firm's adoption decision, most of those factors are more remote determinants on adoption decision. Only a small number of those factors reflecting some kinds of match between a firm's performance and its needs or match between the innovation features and the adopting firm's needs, strategies, resources, or capabilities have immediate causal effects.

In order to build an effective and parsimonious framework for IS innovation adoption, we tried to find those key match-based factors affecting IS innovation adoption.

Based on organizational innovation theories and theory of resource-based view of the firm, we identified three key kinds of match-based factors and proposed a research framework for IS innovation adoption. In this framework, a firm's adoption decision of a specific IS innovation is proposed to be affected by three levels of factors: 1) match-based factors, 2) match constituent factors, and 3) peripheral factors.

According to our framework, a firm's adoption decision is directly determined by three kinds of match-based factors: the factors based on the performance-needs match assessment, the factors based on the innovation-needs match assessment, and the factors based on the resource-innovation match assessment. Meanwhile these three match assessments are directly affected by five match constituent factors: the firm's current resource performance, the firm's strategic needs, a firm's available resources for innovation, the perceived potential ability of the specific IS innovation, and the required resources for innovation. And for these five match constituent factors, they are directly subject to numerous peripheral factors.

After the framework has been proposed, the explanatory power of the framework has been verified through a revisit of prior empirical studies. As a whole, this framework provided a systematical explanation on why and how the commonly identified factors will influence a firm's adoption decisions of an IS innovation. It gave a deeper insight into the adoption decision process and provided a much clearer classification of crucial factors affecting IS innovation adoption decision. With the causality consideration among the factors in the framework, this framework distinguished the immediate causal factors and numerous remote determinants of IS innovation

adoption. Through providing a core set of key determinant factors, this framework has its ability in helping IS researchers to build a parsimonious yet powerful model for IS innovation adoption.

After our theoretical study, our match-based framework was used as the theoretical foundation and research framework in two empirical studies. In the first empirical study, our match-based framework has been used to investigate the major causal factors for e-marketplace adoption intention of SMEs in their international marketing practices. After an explorative case study to verify the applicability of our match-based framework, we developed a conceptual model for e-marketplace adoption according to the match-based framework. Three match-based factors “perceived performance gap of current international marketing practices”, “perceived potential benefit of e-marketplace adoption”, and “perceived resource readiness for e-marketplace adoption” have been proposed as three corresponding factors to three match assessments.

One thing that should be emphasized again here is our perceived potential benefit and perceived resource readiness factors are quite different from other similar factors proposed in previous research. Our perceived benefit factor emphasize “without the adopting firm’s resource constraint for adoption”. That distinguished the potential benefit of an innovation from the potential benefit of an innovation that can be realized by the adopting firm. In prior IS innovation adoption research, benefit factors have been considered from a realizable return perspective. Factors such as relative advantages and perceived benefits have all been measured as realizable return for the

adopting firms. These benefit factors are too broad and amorphous to be a good factors for adoption research, because they could be affected by numerous other factors that may relate to the adopting firm's value conversion contingencies, such as the cost of the innovation, the firm's resource readiness for adoption and implementation etc.

Similarly, there are significant differences between our resource readiness concept and other readiness factors in previous research. As we have shown in the framework part, the similar factor reflecting resource readiness concept in prior IS adoption research is a multidimensional concept "organizational readiness" proposed by Iacovou et al. (1995). That organizational readiness refers to both the adopting firm's financial resource readiness for the required financial resources and the IT sophistication of the adopting firm. However, when other researchers used this factor in empirical studies, they tended to measure this concept with items reflecting the firm's financial condition and IT infrastructure condition rather than from a resource-innovation match perspective (Chwelos et al. 2001). Such measurements may have some problems since a small firm with limited financial resources could still establish financial readiness for some innovations requiring few financial resources. Also, a firm with simple IT infrastructure could still establish technological readiness for some innovations not requiring sophisticate IT infrastructure.

Our model has been examined with survey data from 100 small and medium sized export companies in China. Through our results, we found that our three match-based factors all have significant effects on firms' e-marketplace adoption intentions.

Overall, these three match-based factors accounted for 53% of the variance in e-marketplace adoption intention. Such results demonstrated the value of using our match-based framework to understand the SMEs' adoption intentions of Internet-based B2B e-marketplaces in their international marketing practices.

In the second empirical study, our match-based framework has been used to investigate major causal factors for companies' strategic use intention of e-commerce. Here, a firm's strategic use intention is a little different from the normal adoption intention of a firm we focused on in the first empirical study. In this study, the strategic use intention is a high-level adoption intention. It is an intention to actively use an innovation. Since e-commerce is always considered to be adopted by many organizations without an active usage, it is possible that, for many companies, they only have an adoption intention of e-commerce without a strategic use intention. That is the major difference between normal adoption intention and strategic use intention. Since strategic use intention is still a kind of adoption intention, our match-based framework should also be appropriate for this study.

Like in first empirical study, a conceptual model for e-commerce strategic use intention has been built according to our match-based framework. Similar three match-based factors (perceived performance gap of current business practices, perceived potential benefit of e-commerce strategic use, and perceived resource readiness for e-commerce strategic use) have been proposed in our research model corresponding to three match assessments in our framework.

The research model has been examined through survey data from 176 part-time MBA students who are currently holding the managerial position of their companies. Significant relationships have been found from our three match-based factors to a firm's e-commerce strategic use intentions. All of our hypotheses were supported. Overall, these three match-based factors accounted for 60% of the variance in firms' e-commerce strategic use intention. Such results demonstrated the value of using the match-based framework to understand the firm's strategic use intention of e-commerce.

The significant effects of perceived performance gap and perceived resource readiness in both empirical studies suggested that a firms' current resource condition may play both negative role (from performance-needs match perspective) and positive role (from resources-innovation match perspective) in firms' adoption intention. On one hand, more resources promote adoption intention by increasing the perceived resource readiness. On the other hand, a larger resource base discourages change by depressing issue urgency. Hence, while larger companies may perceive more readiness than smaller firms, they may face less pressure to change because of less perceived performance gap. Thus, it implies that, in case an innovation does not require prohibitively large expenditures, small companies may more likely to adoption the innovation than their larger counterparts. That is consistent with Guo and Chen's (2005) empirical findings that bigger companies are no more likely to adopt the Internet than their smaller counterparts. Also, it implies that "size" may not be a good determinant variable in IS adoption research.

The major limitation of this research is the generalizability of our empirical results. As we have mentioned in our empirical studies, our samples mainly came from the companies in the western part of China. Since China's infrastructure for e-commerce diffusion is characterized by disparities among geographic areas with geographical and economical conditions that the western part of the country has long been falling behind the eastern and coastal areas, the digital disparity between the most advanced area and least advanced area is as large as the gap between China and US (Ge and Jain 2003).

Although the innovation process of organizations is a universal phenomenon, innovation research conducted in a large context should make it more useful. We must pay attention to legal, cultural, and economic factors that may affect an innovation study. Hence, it is important to investigate whether or not our research framework can be generalized and empirical findings of our studies are applicable in different cultural and economic contexts. To achieve this, a large body of cross-country/cultural studies needs to be accumulated.

In addition, we suggest this framework be applied by other researchers for further studies on other IS innovations in different settings. Such empirical testing would allow researchers to identify necessary modifications to the framework to enlarge its generalizability in the adoption research of IS innovations. In term of further research, it would also be interesting to study how the three match-based factors would be affected by those peripheral factors. Such studies would help researchers to find some unique causal factors for a specific IS innovation adoption and gain a deeper and more

holistic understanding of a firm's adoption behavior of IS innovation.

Chapter 7: Conclusions

In an era of revolutionary new developments in information technology, IS innovation in its employment among organizations is increasingly crucial to competitive survival and success. The adoption and use of IS innovation to achieve a competitive advantage has received a great deal of attention in recent IS literature. However, existing frameworks in IS adoption research have been limited in its ability to provide a core set of constructs to help IS researchers to build a parsimonious yet powerful model for IS innovation adoption. That provided us impetus for this research in IS innovation adoption.

In this research, we developed a new framework with causality consideration for the factors in the framework to help IS researchers distinguish the immediate causal factors from numerous remote determinant factors of IS innovation adoption, hence, to build an effective and parsimonious model for IS innovation adoption. We demonstrated a solid theoretical basis of our match-based framework in the theoretical study and tried to verify the usefulness of this framework for identifying key causal factors for IS innovation adoption in empirical studies.

In spite of some limitations in our two empirical studies, the results of both empirical studies provided strong empirical evidences of the applicability of this framework in IS innovation adoption. In these two empirical studies, the applications of our match-based framework were successful. It seems that our match-based framework offers an especially promising route for developing research models for IS innovation

adoption. We believe our framework could be applied by other researchers and provide strong theoretical foundations for further studies on IS innovation adoption.

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Appendix A

Perceived Performance Gap of Current International Marketing Practices							
1. The current international marketing approaches can not fulfill the company's needs in expanding towards foreign market. 贵公司现有的国际营销手段并不能满足公司在海外市场扩展方面的需求。	Strongly Disagree				Strongly Agree		
	1	2	3	4	5	6	7
2. Your company is not satisfied with outcomes of current international marketing approaches. 贵公司对于公司现有的国际营销手段的成效不是很满意。	Strongly Disagree				Strongly Agree		
	1	2	3	4	5	6	7
Perceived Potential Benefit of E-marketplace Adoption							
Without considering internal resource constraint, 如果不考虑公司内部的资源限制,							
3. E-marketplace adoption can help your company save the resources (e.g. human, hardware, and financial resources) invested in your international marketing practices. 使用网上贸易市场可以减少贵公司在国际市场扩展过程中所需的人力, 物力, 财力方面的投入。	Strongly Disagree				Strongly Agree		
	1	2	3	4	5	6	7
4. E-marketplace adoption can be very helpful for your company to gain large number of valuable information of foreign customers. 使用网上贸易市场可以有效的帮助你们获得大量的有价值的海外客户信息。	Strongly Disagree				Strongly Agree		
	1	2	3	4	5	6	7
5. E -marketplace adoption can effectively help your company to develop your international market. 使用网上贸易市场可以帮助贵公司有效的扩展你们的国际市场。	Strongly Disagree				Strongly Agree		
	1	2	3	4	5	6	7
Perceived Resource Readiness for E-marketplace Adoption and Implementation							
6. Your company have enough relative knowledge to use e-marketplace for the international marketing practices 贵公司拥有足够的相关知识来使用网上贸易市场来扩展你们的国际市场。	Strongly Disagree				Strongly Agree		
	1	2	3	4	5	6	7

7. For existent employees, using e-marketplace for the international marketing practices is not very difficult. 对于公司现有员工来说，使用网上贸易市场并不是一件很困难的事情。	Strongly Disagree				Strongly Agree		
	1	2	3	4	5	6	7
8. So long as you desire, your company has sufficient resources (e.g. human, hardware, and financial resources) for e-marketplace adoption and implementation. 只要你们愿意，贵公司有足够的资源（人力，物力，财力）来使用网上贸易市场。	Strongly Disagree				Strongly Agree		
	1	2	3	4	5	6	7
9. Based on your company's ability, there are no big difficulties in e-marketplace adoption and implementation. 就你们公司的能力而言，使用网上贸易市场不存在很大的困难。	Strongly Disagree				Strongly Agree		
	1	2	3	4	5	6	7
E-marketplace Adoption Intention							
10. Your company wants to collect more information about e-marketplace. 你们非常愿意去多了解一些关于网上贸易市场的信息	Strongly Disagree				Strongly Agree		
	1	2	3	4	5	6	7
11. Your company wants to try e-marketplace approach in your international marketing practices. 你们很愿意去尝试使用网上贸易市场来扩展你们的海外市场	Strongly Disagree				Strongly Agree		
	1	2	3	4	5	6	7
12. Your company has a clear plan for e-marketplace adoption in the near future. 在不久的将来，贵公司会有明确的计划来使用网上贸易市场	Strongly Disagree				Strongly Agree		
	1	2	3	4	5	6	7

Appendix B

Perceived Performance Gap of Current Business Practices							
Based on current business practices: 仅仅基于贵公司现有的业务手段:							
1. The process to achieve your company's strategic objectives will be very difficult. 公司战略目标的实现将会是一个非常困难的过程。	Strongly Disagree			Strongly Agree			
	1	2	3	4	5	6	7
2. The investments to achieve your company's strategic objectives will be unaffordable. 公司战略目标的实现所需的投入将会是难以承受的。	Strongly Disagree			Strongly Agree			
	1	2	3	4	5	6	7
3. The return on the investment to achieve your company's strategic objectives will be unsatisfactory. 实现公司战略目标的投入产出比将会是无法令人满意的。	Strongly Disagree			Strongly Agree			
	1	2	3	4	5	6	7
Perceived Potential Benefit of E-commerce Strategic Use							
Without considering internal resource constraint, the active application and development of e-commerce will help your company to achieve your recent strategic objectives through: 如果不考虑公司内部资源的限制（假设所有实施和使用所需的人力，物力，财力资源都可以得到满足），基于因特网的电子商务的大力应用和发展可以有效的帮助公司实现近期的战略目标通过:							
4. Improving your image and enhancing your reputation. 改善公司企业形象，提高公司知名度。	Strongly Disagree			Strongly Agree			
	1	2	3	4	5	6	7
5. Providing you a new marketing approach and a broader market. 提供公司新型的营销方式和更广阔的市场。	Strongly Disagree			Strongly Agree			
	1	2	3	4	5	6	7
6. Providing them a new communication approach with customers and enhancing the business relationships with the customers. 提供新型的与客户联系和沟通的方式，加强企业与客户之间的联系。	Strongly Disagree			Strongly Agree			
	1	2	3	4	5	6	7
7. Providing better customer services. 为公司客户提供更加完善的全天候服务。	Strongly Disagree			Strongly Agree			
	1	2	3	4	5	6	7
8. Improving your internal management and enhancing their operational efficiency. 改善公司内部管理，提高运营效率。	Strongly Disagree			Strongly Agree			
	1	2	3	4	5	6	7
Perceived Resource Readiness for E-commerce Strategic Use							

Considering your company's current resource condition: 考虑贵公司现有的资源状况（如人力，物力，财力）：							
9. The existent hardware of your company can satisfy the needs of the active application and development of e-commerce. 公司现有的硬件资源基本上可以满足基于因特网的电子商务的应用和发展所需的硬件方面的投入。	Strongly Disagree			Strongly Agree			
	1	2	3	4	5	6	7
10. The financial cost to maintain and support the active application and development of e-commerce is affordable to your company. 用于维护和支持基于因特网的电子商务的应用与发展的费用相对于公司的整体实力来说是完全可以承受的。	Strongly Disagree			Strongly Agree			
	1	2	3	4	5	6	7
11. For existent employees, the active application and development of e-commerce is not a very difficult. 对于公司现有员工来说，基于因特网的电子商务的应用并不是一件很困难的事情。	Strongly Disagree			Strongly Agree			
	1	2	3	4	5	6	7
12. So long as you desire, your company have sufficient resources (e.g. human, hardware, and finical resources) for the active application and development of e-commerce. 只要你们愿意，贵公司有足够的资源（人力，物力，财力）来用于基于因特网的电子商务的应用与发展。	Strongly Disagree			Strongly Agree			
	1	2	3	4	5	6	7
13. Based on your company's ability, there are no big difficulties in the active application and development of e-commerce. 就贵公司的能力而言，基于因特网的电子商务的应用并不存在很大的困难。	Strongly Disagree			Strongly Agree			
	1	2	3	4	5	6	7
E-commerce Strategic Use Intention							
Considering the company's e-commerce strategy in the near future: 关于公司近期在电子商务方面的战略：							
14. The active application and development of e-commerce will be a strategic weapon of the company to enhance the company's competitive advantage. 贵公司将会把基于因特网的电子商务的应用与发展作为一个战略性武器来提高企业的市场竞争力。	Strongly Disagree			Strongly Agree			
	1	2	3	4	5	6	7
15. Your company will invest more resources (e.g. human, hardware, and finical resources) in the application and development of e-commerce. 在资源（人力，物力，财力）方面，贵公司将会加大在基于因特网的电子商务的应用与发展方面的投入。	Strongly Disagree			Strongly Agree			
	1	2	3	4	5	6	7

16. The active application and development of e-commerce will be your company's important business strategy in the near future. 贵公司将会把基于因特网的电子商务的应用与发展作为近期的一项重要的公司发展战略。	Strongly Disagree			Strongly Agree			
	1	2	3	4	5	6	7