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**The Determinants of Customer Perceptions in a Dynamic  
Business Environment: An Exploratory Analysis of the ASP  
Business Model**

A thesis submitted in partial fulfillment of the requirements for the degree of

**Doctor of Philosophy**  
at  
**The University of Waikato**

by

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The University of Waikato

2008

# Abstract

Outsourcing attracted much attention in 1989 when Kodak outsourced its data center operation to IBM (International Business Machines Corp.). Nowadays, this strategy has become more popular. At the beginning of this century, the ASP (Application Service Provider) model was considered one of the typical solutions of Internet-based IT (Information Technology) outsourcing. Although this model has been transformed and renamed (e.g. SaaS - Software as a Service), the principle concept of providing IT service through the Internet or wide area network is still there.

This study attempts to explore the determinants of customer perception of Internet-based IT outsourcing by obtaining a comprehensive understanding of the ASP model. The research dimensions not only include factors affecting users' perception of service quality but also ASP business position (i.e. the firm origin of ASP and its provider type) and services utilized by the customers. Through the study of firm history, two important theoretical themes of this research - path-dependence and Ansoff's product/ market growth matrix - are taken account of in exploring the influence of the determinants.

Web-based questionnaire survey research is conducted together with a documentation study to collect data. Targeting the customers of the top 50 ASPs selected by ASPnews.com during the period 2001-2004, the researcher contacted 597 potential respondents, and 196 responses were returned. The valid sample consisted of 175 responses, and 124 of them not only provided full information for satisfaction evaluation but also the

information for tracking their ASP vendors' business position.

The GLM (General Linear Model) and the Pearson correlation coefficient were the major statistical approaches used to evaluate the survey data for developing a structural model. The research findings indicated that the factors associated with service competitiveness, such as capability and performance, reliability and trustworthiness, affordability, integration and customization, have positive effects on customer perceived satisfaction; whereas lock-in has a negative effect. More specifically, the origin of the ASP firm has a direct effect on capacity and performance, and also directly influences the use of IT adoption services. Based on this finding, a descriptive analysis and qualitative research shows that two mechanisms for path-dependence – existing expertise and perceived expertise - can affect the satisfaction level of capacity and performance of ASP services. On the other hand, provider type has a direct effect on affordability and also directly influences the use of facility supporting services. On this basis, another two mechanisms for path-dependence - transaction cost and standardization - can indirectly impact customer's perception of this business model via affordability. In addition to those major findings, some other determinants (e.g. software applications, brand of applications, and intensity of service used) were also identified in this study.

The study result can be used for theoretical understanding about the determinants of ASP customer's perception. It not only indicates a new perspective to enhance the current body of research on this topic, but can also be more broadly applied to any fast-growth firm, rapid-change business, or technology intensive industry.

# Acknowledgements

I would like to sincerely thank the following people for their contribution to this research project.

Dr. Scott Koslow, my chief supervisor, for his continued encouragement, patience and guidance to ensure the completion of this project. His speciality in statistics has provided appropriate and valuable guidance in the data analysis for my research.

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Dr. Bob McQueen and Dr. Jim Corner, for their assistance and advice in the early stages of my study.

My parents, Yu-Ho and Lee-Chiung Liang, and my brother Ken, my sisters Annie, Eva, and Nancy, my brothers-in-law, J.C. and Chen, and Alice, my sister-in-law, for their emotional support throughout the length of my study.

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# Chapter 1

## Introduction

This chapter explains the research topic by outlining the research background and objectives. The application service provider (ASP) outsourcing market is introduced to give a concept of the research subject of this study. The research gap, research questions, and research method are then identified, followed by the research implications, contribution, scope, and limitations. The chapter closes an outline of the thesis.

### **Chapter Contents**

- 1.1 Background of Customer Perception Study
- 1.2 ASP Outsourcing Market
- 1.3 Research Gap
- 1.4 Theoretic and Applied Research Questions
- 1.5 Research Method
- 1.6 Research Implications and Contributions
- 1.7 Research Scope and Limitations
- 1.8 Thesis Outline
- 1.9 Chapter Summary

### **1.1 Background of Customer Perception Study**

Customer perception, especially the perception of satisfaction, has become an important issue for marketing practitioners and academicians. Many researchers have investigated the impact of customer perception of

satisfaction on firms. For example, Anderson et al. (1994) found that firms that attain high satisfaction receive greater economic returns. Some studies (Bitner 1990; Cronin & Taylor, 1992; LaBarbera & Mazursky, 1983; Oliver & Bearden, 1985; Oliver & Swan, 1989; Rust & Zahorik, 1993; Zeithaml et al., 1996) concluded that consumer satisfaction has a strong influence on purchase intentions (i.e. to switch or repatronize a service).

Other studies (Anderson et al., 1984; Cronin & Taylor, 1992; Kekre et al., 1995; Mano & Oliver, 1993; Oliver 1993; Rust et al., 2000; Spreng et al., 1996; Szymanski & Henard, 2001) examined the factors influencing customer perception of satisfaction. They identified a variety of dimensions from various aspects, and found that service quality is one of the most important dimensions for assessment.

### **Service Quality**

A number of researchers have noted that quality is an antecedent of satisfaction (Anderson & Sullivan, 1993; Churchill & Suprenant, 1982; Cronin & Taylor 1992; Fornell, 1992; Fredericks & Salter; 1995; Oliver & DeSarbo, 1988). For example, Parasuraman et al. (1985, 1988) proposed that satisfaction is led by perceived service quality. Based on this notion they created SERVQUAL, a five-dimension model for measuring service quality. Other researchers developed similar, albeit slightly different, models such as the multistage model of customers' assessments of service quality and value (Bolton & Drew, 1991), the SERVPERF (Cronin & Taylor, 1992), the dynamic process model of service quality (Boulding et al., 1993), and the customer value package (Fredericks & Salter, 1995).

Other authors have applied these service quality frameworks to electronic data processing settings (Bailey & Pearson, 1983; DeLone & McLean, 1992; Doll & Torkzadeh, 1988; Ives et al., 1983; Ives & Olson, 1984; Somers et al., 2003; Tse & Wilton, 1988) as well as to industrial business-to-business (B2B) settings (Durvasula et al., 1999; Pitt et al., 1995; Szmigin; 1993). Examples are the thirty-nine-factor model for measuring and analyzing computer user satisfaction (Bailey & Pearson, 1983), the WebQua (Barnes & Vidgen, 2002), the SITE-QUAL (Yoo & Donthu, 2001), the PIRQUAL (Francis & White, 2002), the IRSQ (Janda et al., 2002), and E-S-QUAL (Parasuraman et al., 2005).

All of these models were designed for the purpose of delivering superior service quality, because this is expected to enhance customer loyalty, provide for higher probability of retention, and in turn greater profits. For instance, in the customer value package, Fredericks and Salter (1995) suggested that market share and firm profit can be increased by delivering superior customer value and increasing customer loyalty. Consistent with their suggestions, a number of researchers (Jacobson & Aaker, 1987; Buzzell & Gale, 1987; Rudie & Wansley, 1985) also argued that high service quality leads to higher profits, less cost, and greater market share.

As a result, perceived service quality is a primary factor affecting customer perception, and is strongly related to marketing development. Thus improvement of service performance should be of top priority in marketing strategy and tactics.



## **How Flexible Are Firms to Change in Service Quality?**

It is generally accepted that if a firm wants higher sales, more loyal customers, or other desirable outcomes, then service must be improved; and that firms have a relatively free latitude to change their service record at a whim. More explicitly, firms are able to change themselves like a chameleon to improve various parts of their service, hence increase their performance. However, as firms may diversify, does this strategy work for all firms? While it seems that firms consider quality improvement as the primary tool for satisfying and retaining customers (Lemon et al., 2002), it is evident that such a strategy might not always work (e.g., Oliva et al., 1992).

Certainly, service quality can strongly influence customer perception; however, other factors may also play crucial roles. A better understanding of these factors may help firms to develop more effective service strategies.

### **Path-dependence**

A considerable body of literature suggests that the past history of firms can restrict their future performance (Cohen & Levinthal; 1990; David, 1985; Schilling, 1998; Tushman & Nelson, 1990). This has been termed the phenomenon of path-dependence. For example, a firm that began as an independent service vendor (ISV) might find it difficult to become an ASP. The core business of ISVs is software development with application installation, deployment, maintenance, and customization being the specialties that attract more potential users. However, when the company turns into an ASP, the lack of infrastructure technology to support the

software delivery might dissatisfy existing customers. Infrastructure-provider-turned ASPs specialize in infrastructure software but lack expertise in application software, and this limitation might also make their customers decrease their intention to keep in the same provider. Because pure-play ASPs do not develop software, they outsource the hosting elements to hosting service providers and network providers. The complexity of coordinating with software vendors could easily diminish the ASP's service quality. All these cases demonstrate that changing a firm's focus is not easy because of the constraints of history, background, and origin; especially when knowledge or technology is involved. Compared with traditional industries, it appears that the industries with modern technology are more to feel the effect of the effect of path-dependence.

### **Product / Market Growth Choices**

This research proposes that the approaches which firms develop constrain them in their ability to respond to consumers in important ways. Specifically, some firms grow by offering new types of service to existing consumers and others grow by offering the old types of services to new customers. Such choice of strategy is not random, but rather is based on the relative skills firms bring to competitive markets, and therefore firms evolve into specific niches. Ansoff's product / market growth matrix explicitly illustrates these strategies.

In short, the theoretical objective of this research is to explore the determinants of customer perceptions of the repositioning business in a high-tech rapid change environment, and then focus on these factors to

investigate if whether there are any limits in service/product innovation in a dynamic industries context.

To test models over a timeframe that one can study effectively, this research will focus on the rapidly evolving market for ASP services. The following subsection will outline more details relative to the operation of ASPs to bring readers up to speed in this radically new market.

## 1.2 ASP Outsourcing Market

Ever since Kodak outsourced its data center operation to IBM in 1989, (Applegate & Montealegre, 1991) IT outsourcing has become a viable strategy in the management of information systems (Kern & Willcocks, 2000). According to Grover et al. (1996) an increasing number of companies are recognizing the separation of data ownership from data processing. They acknowledge the technical sophistication of service providers, and concentrating their resources on providing high added value services. Kung (2000) indicated that by offering space, equipment, technology support, business service and professional consultation, outsourcing is a feasible way for firms to acquire technology.

Many observers speculate that the twenty-first century will be Web-centric. Based on the Internet, receiving IT services through an ASP is regarded as a substantial new alternative outsourcing model on a subscription basis. Some researchers (Lo & Yuan, 2002) considered ASPs as being the key players in the Third Wave of IT outsourcing.

Because of its ability to deliver IT service in a cheaper and more flexible way than the traditional method, the ASP industry has experienced strong growth in the past few years. Organizations, both large and small, have been increasingly outsourcing their applications to ASPs (Chen & Soliman, 2002; Lo & Yuan, 2002; Vorisek & Feuerlicht, 2004). The ASP model has been considered to have the greatest potential to change the manner in which IT service is provided, and therefore it has become the dominant method for application delivery (Kavan et al., 2002; Susarla et al., 2003).

However, since the emergence of the ASP model, some 80 percent of new businesses have discontinued their services within the first five years because of a growing problem with this business model (Vorisek & Feuerlicht, 2004; Wohl, 2001). In terms of clients, this model might be either a panacea or a poison; in terms of ASP's survival, this model is both an opportunity and a challenge.

Notwithstanding that the development of this model was hampered for some time, it is currently used by some of the biggest IT companies (e.g. Google and Microsoft). According to Adam Gross, director of product marketing at salesforce.com (one of the most successful ASP vendors):

In 2001 or 2002 some large companies were saying the idea of web-hosted software was bunk - that the model could only be used for a limited number of applications. With Google and Microsoft we're now seeing the final proof that this is really right for

all kinds of applications, not just CRM [customer relationship management]. (Zetlin, 2005, Para. 5)

After seeing the media coverage of ASP's rise, fall, and reform, the researcher considers that ASP outsourcing is basically a good model. A reason for this view is that ASPs themselves have had to rework their service strategies in response to the requirements of customers and market (Pring, 2002). In order to reach this goal of being a successful business model, a comprehensive understanding of customer perception and its determinants is essential.

A practical object of this thesis is to develop a conceptual model for understanding the relationship between the ASP model and customer's perception of satisfaction, in order to provide guidance for this repositioning industry and for developing better innovation and promotion strategies for those industries in a dynamic business environment.

### **1.3 Research Gap**

A synthesis of previous literature on the IT outsourcing ASP model shows a number of studies have focused on the evaluation of service quality (Chen & Soliman, 2002; Lo & Yuan, 2002; Ma et al., 2005; Sigala, 2004; Somers et al., 2003). A variety of issues that might influence service quality were discussed in these papers, such as availability, scalability, security, performance, service reliability, stability, pricing, comprehensiveness, network reliability, customization and integration, continued evolution of applications, and sustainability.

For the purpose of providing a clear picture for potential consumers of ASP services, some researchers (Kern & Willcocks, 2000) examined the relationship between IT outsourcing and the ASP service model. Further research has looked at the similarities and differences between conventional information system outsourcing, electronic data interchange (EDI), and ASP model (Smith & Kumar, 2004); and gave detailed descriptions and examined the feasibility for this model (Vorisek & Feuerlicht, 2004); and discussed the trends of ASP development (Chou, 2004; Currie & Seltsikas, 2001; Gupta & Herath, 2005; Sharma & Gupta, 2002).

To help people avoid risk whilst they are dealing with ASP vendors, researchers explored the major propositions for considering an ASP option or selecting an ASP (Currie & Seltsikas, 2001; Gupta & Herath, 2005; Kern et al., 2002; Martin, 2000). Once an ASP is selected, it is essential to understand and then manage the ASP-client relationships; Kavan et al.'s (2002) study was conducted for addressing this issue. Somers et al. (2003) developed a computing satisfaction instrument for Enterprise Resource Planning (ERP) users who are considered as one of the most potential users of ASPs. Susarla et al. (2003) analyzed the post-usage satisfaction with ASP services.

These research studies are relevant to the present study; however, none evaluated customer perception from multiple influences, nor did they pay attention to the history of ASP firms. For example, a firm's business position might be associated with the potential strength from a previous specialty; pricing issues might affect the category and scope of services

utilized by customers; or the concern of transaction costs might generate a lock-in effect. In addition to service quality, these concerns might influence the customers' satisfaction level. Thus, the researcher of this study considers these concerns as a gap and would like to extend the current understanding of ASP service model by identifying the determinants of customer perception of satisfaction from a variety of aspects.

In addition to provide a model for assessing ASP customers' perception, an adapted model based on Ansoff's product / market growth matrix is discussed with the consideration of study results regarding the firm's origin along with its associated factors.

In conclusion, based on the assertions of the prior literature, the researcher has extended the study by adding some extra dimensions as introduced below.

1. The business position of ASP vendors in terms of firm origin and provider type that might influence customer perceptions of services/products is studied.

This research item is based on the assumption that the firm origin may be associated with some heritage, specialties, or expertise that could be an advantage or limitation in fulfilling users' needs; on the other hand, the provider type might be associated with customers' expectation and requirements that could also affect the customer perceptions of satisfaction.

2. An ASP firm origin and market strategy model is presented.

Adapted from the Ansoff's product / market growth matrix, this model also consists of four marketing growth dimensions: market penetration, product development, market development, and diversification. These strategy options could be adopted once successful entry into the market has been achieved. This model is helpful to examine the relationship among the ASP firm origin, the relative determinants to customer perception of satisfaction, and the market growth strategy.

For the purpose of ASP service/ product innovation and marketing promotion, this model suggests an appropriate strategy in terms of service performance for each type of ASP firm origin.

3. The effect of services utilized by customers will be examined.

This research item is based on the assumption that it is easier to satisfy users by some services than others, depending on firm origins. For example, software implementation might cause less trouble than application integration in ISV-turned ASP, but pure-play ASP might be more efficient for an application integration service. This difference shows that what might be difficult to change is historically-based expertise which shows up in the model as capacity and performance limitations. In addition, the perceived expertise might affect the users' evaluation of quality in terms of the ASP services utilized.



4. The power of lock-in effect is investigated.

As firms outsource their IT business and even part of their core business to ASP vendors, many technology issues and commercial secrets may be involved in the outsourcing interaction process. The concern of trustworthiness, transaction or switching cost might cause a lock-in effect on these firms and keep them staying with the same ASP vendor. In addition, one possible reason why Ansoff's strategy choices are constrained may be the extent to which customers are locked-in. Thus the effect of lock-in in a marketing service context has been investigated.

5. Focus is on best-practice leaders in a fast growth/ change industry.

The major research data has been collected from the users of the top fifty ASPs that were selected by ASPnews.com. Hence, the target population consists of a broad range of businesses because the users of these top fifty ASP vendors come from different countries and various industries.

## 1.4 Theoretic and Applied Research Questions

This study endeavours to address a number of concerns associated with the adoption of the ASP business model in trying to predict ASP user satisfaction. These concerns can be grouped into two main issues: the business position context and the service quality context.

### 1.4.1 Business Position Context

In this study, business position includes firm origin and provider type. The former is related to the history of a firm; whereas the latter, which has usually resulted in the competence of the former, is associated with the scope of service provided by a business. Both of these components are relative to the expertise and experience of a business. For example, according to Rogoff and Lee (1996), firm origin has an influence on business management, and since many ASPs have been transformed from other IT businesses (Davis, 2001; Gunson, 2001), expertise from their original businesses might have some effects on customer perceived satisfaction, and also be associated with their market growth strategies (Aaker, 2001).

Thus, the concern is:

the influence of business position on ASP customer perception and the market growth strategies (Aaker, 2001; Rogoff & Lee, 1996).

### 1.4.2 Service Quality Context

The concerns in the service quality context include a wide range of considerations. Ekanayaka et al. (2002) proposed that while the ASP business model offers many advantages for customers, few companies are prepared to outsource their mission-critical ERP systems to ASPs. Some reasons for this phenomenon could be the reliability, trustworthiness or some other concern, for example, availability, integration, performance, pricing, security, sustainability (or long-term viability), and lack of customization (Chou, 2004; Ekanayaka et al., 2002; Sharma & Gupta, 2002).

Since the emergence of the ASP model, there is no empirically validated instrument for measuring the service quality of ASP vendors. Ascertaining the critical factors of the measurement is an issue to be addressed.

Based on these concerns, this research explores the critical factors influencing ASPs customer's perception. These include:

- i) the elements that determine customer perception in the ASP service quality context (Chou, 2004; Sharma & Gupta, 2002); and
- ii) an instrument for measuring the ASP customers' perception of satisfaction level (Chen & Soliman, 2002).

In short, considering both contexts of business position and service quality, the focus question of this research is:

*From the users' perspective, what are the explicit and implicit factors that determine their perception of satisfaction toward a repositioning fast-growth rapid-changed technology-intensive industry? How do they work? and Why does this make a difference to firm performance? (For more detail, see Chapter 5).*

## 1.5 Research Method

The research method of this study consists of three approaches: a conceptual model, a measurement model, and a structural model.

The conceptual model is associated with the relationships between the determinant variables and customer's perception of satisfaction. This model has been developed on the basis of the documented research, literature review and identification of the theoretical relationships which are associated with the variables of interest. Chapters 2 to 5 provide explanation regarding the conceptual model.

The measurement model is examined for a satisfactory level of validity and reliability. Construct validity has been adopted in this study to investigate whether a scale measures the unobservable social construct that it purports to measure. For this purpose, convergent validity and discriminant validity have been assessed.

The structural model is associated with the significant relationships between the independent variables and dependent variables. A general linear model (GLM) and the Pearson correlation coefficient have been utilized to evaluate the survey data that is collected for developing the structural model.

The method of data collection is a web-based questionnaire survey. In addition to the quantitative data, some qualitative data are also used; these data are collected through documentation study and archival research to determine firm origin and provider type, and the open-ended response to the questionnaire for a more comprehensive understanding of the research findings.

A multi-method research approach is used in this research. More description regarding the measurement model and the structural model can be found in Chapter 6 to Chapter 8. Chapter 6 focuses on introducing the methodology and design used for this research. Chapter 7 displays the procedure of analyzing the structural model; the approaches such as factor analysis, GLM, Pearson's correlation coefficient are used. Chapter 8, targeting the research results of Chapter 7, constructs an in-depth exploration through the consolidation of descriptive analysis and qualitative study.

## **1.6 Research Implications and Contributions**

The present research findings are expected to contribute to theoretical understanding about the determinants of ASP customer's perception of satisfaction, and offer a new perspective to enhance the current body of research on this topic. The research on this business model innovation also has implication for practitioners (e.g. ASP vendors, marketplaces, and industry). With a better understanding of the customer's point of view and also the constraints on firm growth, a vendor can pursue effective and efficient marketing strategy to meet the requirements of the existing customers and attract more prospective ones. More than that, the outcome of this research will also be useful in strategy decision-making for Internet-based outsourcing businesses or any fast-growth industry, as the design of this research includes a number of dimensions that focus on the characteristics of these sectors.

Finally, as there are some issues that have never been discussed in this research field, the results should indicate directions for future research. More details of these issues can be found in Chapter 9.

## **1.7 Research Scope and Limitations**

This research investigated the factors that influence ASP customer's perception of satisfaction. Two important theoretical themes of this research - path-dependence and Ansoff's product/ market growth matrix – have been taken account of in exploring the influence of the various factors related customer perception. Dimensions such as ASP vendors' firm origin and provider type, service utilized by the customers, and the factors associated with users perceived service quality, are all included in the research's scope. The relationship between some of these factors and other issues (e.g. the applications used, brand of applications, and service scale) are also discussed.

This study is limited by several factors; for example, the constraints of geography that might have caused a self-report bias; and constraints of time and finance that limited the depth and breadth of the survey. In addition, some other limitations such as non-response bias, and interpretative constraints might have occurred. More details can be found in Chapter 9.

## **1.8 Thesis Outline**

This thesis consists of the introduction chapter followed by eight more chapters. The content of these chapters is briefly discussed in this section.

## **Chapter 2 Theoretical Review: Satisfaction and Service Quality**

A background study pertaining to satisfaction and service quality is conducted by reviewing the theoretical literature, and is presented in this chapter. It includes the measures for assessing service quality and satisfaction level in the realm from traditional services to Information systems service, from tradition outsourcing to ASP business model.

## **Chapter 3 IT Outsourcing: the ASP Industry Context**

Being the main subjects of this study, ASP and its relevant issues e.g. the definition, features, history and prospects, ecosystem and architecture, firm origin, and provider type are extensively introduced in this chapter.

## **Chapter 4 Strategic Constraints on Firm Evolution**

This chapter elucidates why the influence of firm evolution should be included in the process of planning marketing strategy. Path-dependence, the supporting theories, and its relative mechanisms such as increasing return, lock-in and lock-out effect, and network effect and network externality are demonstrated. Ansoff's product / market growth matrix and these issues that are related to the characteristics of ASP business model (e.g. customization, transaction cost, and expertise) are also introduced here.

## **Chapter 5 Research Model and Research Hypotheses**

In this chapter, the development of the research mode, research questions, and research hypotheses are presented. In order to explicitly introduce the hypotheses, the possible factors which are based on the review of the previous literature are demonstrated.

## **Chapter 6 Research Methodology and Design**

Here, the research methodology and research design utilized in this study are described. Details about data measurement and operationalization of the study variables are included.

## **Chapter 7 Results 1: Factor and Regression Analysis of Survey**

### **Questionnaire**

In this chapter, the procedure of statistics analysis is illustrated. The findings of the research are presented, and final version of the research model is established and demonstrated.

## **Chapter 8 Results 2: Review of Explicit and Implicit Determinants of**

### **Customer Perception**

Based on the analysis of the results in Chapter 7, a more elaborate coverage of the customer perception of ASP is documented in this chapter. The chapter presents the results of the descriptive analysis and the findings from the qualitative research.

## **Chapter 9 Discussion of Research Findings and Conclusion**

This is the last chapter of the thesis. The study results are discussed, followed by some recommendations. The limitations and implications for future research are stated.



## 1.9 Chapter Summary

Starting from the background review of customer perception, the author has tried to justify that customer perception is influenced by many aspects.

A brief of ASP outsourcing market was then presented. Following this, the research gap, research questions, research method, research implications and contributions, and research limitations were noted. Finally, this chapter concludes with a thesis outline which includes a brief introduction to each chapter.

In Chapter 2, a theoretical review pertaining to customer perception of satisfaction and service quality is conducted.

# Chapter 2

## Theoretical Review: Perception of Satisfaction and Service Quality

This chapter reviews the theoretical literature pertaining to perception of satisfaction and service quality. This discussion focuses on several aspects: traditional services context, the computing service context, e-commerce service context, outsourcing service context, and the ASP context. The potential determinants of customer perception of satisfaction are examined by studying the measurement scales established by researchers in each of these contexts.

### Chapter Contents

- 2.1 Customer Perception of Satisfaction
- 2.2 Customer Satisfaction and Service Quality
- 2.3 Information Systems Service Quality Assessment
- 2.4 Chapter Summary

### 2.1 Customer Perception of Satisfaction

Customer Perception of satisfaction has attracted considerable attention from researchers and practitioners (Johnson et al., 1995; Kekre et al., 1995; Martensen et al., 2000; Mitta et al., 1998; Oliver & Burke, 1999; Shimp & Bearden, 1982; Wong, 2000). Studies asserted that customer satisfaction is a strong predictor of corporate success in terms of market share, return on investment, and cost reduction (Anderson et al., 1984; Oliver 1993; Oliver &

DeSarbo, 1988; Spreng et al., 1996). Some researchers have argued that this issue may be sequentially linked to customer loyalty, customer retention, and profitability (Bitner, 1990; Lemon et al., 2002; Oliver, 1980; Oliver & Bearden, 1985; Oliver & Linda, 1981; Oliver & Swan, 1989; Rust & Zaborik, 1993). Hence, during the past two decades, customer satisfaction management has emerged as a strategic imperative for most firms (Honomichl, 1993).

### **2.1.1 A Definitive Framework for Consumer Satisfaction**

Consumer satisfaction is a measure of how products or services supplied by a firm meet consumer requirements. Reviewing of definition of satisfaction, Bailey and Pearson (1983) indicated that satisfaction in a given situation is the sum of one's feelings or attitudes toward a variety of factors affecting that situation. Cadotte et al. (1987) indicated that the perception of satisfaction can be conceptualized as a feeling developed from an evaluation of the use experience. Howard and Sheth (1969) and Mano and Oliver (1993) suggested that this perception is the buyer's cognitive state of being adequately or inadequately rewarded for the sacrifices he/she has made. In short, Oliver (1997) argued that it is a consumer's fulfillment response in judging a product or service feature.

In terms of the time of occurrence, Tse and Wilton (1988) noted that consumer satisfaction is the consumer's response to the evaluation of the perceived discrepancy between prior expectations and the actual performance of the product as perceived after its consumption. Regarding

the evaluation focus, Fornell (1992) concluded that it is a global postpurchase evaluation of the consumption of product or service. Similarly, Westbrook (1987) and Wong (2000) worked out that it is an overall emotional sensation affected by the consumption effect.

The literature reveals significant differences in the definition of satisfaction. In summarizing these definitions, Giese and Cote (2000) identified these definitions and pointed out three general perspectives for consumer satisfaction: 1) it is an emotional or cognitive response of an individual consumer; 2) the response occurs at a particular time base, it might be prepurchase, before consumption, during consumption, or evolving; and 3) the response pertains to a particular focus, such as expectations, consumption experience, product attributes/ benefits, salesperson/store, information provided by others, or multiple foci. These three general components provide an initial basis in evaluating the perceived satisfaction for the present study.

The next section presents some specific conceptualizations for evaluating satisfaction level.

### **2.1.2 Conceptualizations for Evaluating Satisfaction Level**

Two different evaluation conceptualizations have been developed for studying the customer perception of satisfaction: transaction-specific satisfaction and cumulative satisfaction (Johnson et al., 1995). The former regards satisfaction as an individual, transaction-specific measure or evaluation of a specific product or service experience, whilst the latter

considers satisfaction as a customer's overall judgment based on several transactions or the experience to date with a product or service provider (Johnson & Fornell, 1991; Mittal et al., 1998).

A significant strength of the cumulative satisfaction construct over the transaction-specific approach is that it is able to effectively predict subsequent behaviors and economic performance (Fornell et al., 1996; Johnson et. al, 1995). In order to predict the development of a business model or an industry, it is appropriate to evaluate the overall consumption preference and the satisfaction level instead of just focusing on a particular transaction or episode. Accordingly, cumulative satisfaction is the most relevant conceptualization when the object is the evaluation of ASP users' overall experience. The researcher accepts this conceptualization and uses it as a research frame in this study.

In conclusion, the present research examines the overall perception of satisfaction about ASP business model from a variety of perspectives. Focusing on cumulative satisfaction measurement issue, the relevant literature has been reviewed and summarized in the following section.

## **2.2 Customer Satisfaction and Service Quality**

A number of published studies have endeavored to discuss service quality-satisfaction models (Bitner 1990; Boulding et al., 1993; Cronin & Taylor, 1992). Hackman and Wageman (1995) proposed that delivering a high level of service quality is usually a good strategy for businesses to

achieve high levels of customer satisfaction. It appears that service quality is a crucial determinant of satisfaction level. Researchers (Cronin & Taylor, 1992) argued that it is an antecedent of consumer satisfaction. Theoretical and empirical evidence show that high levels of service quality can benefit a company through cost savings, and greater market share which results in greater profitability (Jacobson & Aaker 1987; Buzzell & Gale, 1987; Phillips et al., 1983; Rogerson 1983; Shapiro 1983). Sureshchandar et al. (2002) investigated the relationship between service quality and customer satisfaction, and found that these two concepts are independent but closely related. They concluded that an increase in one is likely to lead to an increase in the other. In all, service quality is an important issue in their studies.

The next section discusses the service quality characteristics to provide a definition of this concept as it is used in the present study.

### **2.2.1 The Characteristics of Service Quality**

Parasuraman et al. (1985) indicated that quality is an elusive and indistinct construct, and thus not easy to demarcate a measure. Basically, there are two types of quality, product quality (or goods quality) and services quality.

Most of the studies that have tried to define and assess quality focus on the product rather than service because the service sector has more complex characteristics. For example, Parasuraman et al. (1985) proposed that the three well-documented characteristics of services, intangibility, heterogeneity, and inseparability, can differentiate service quality from

product quality. Because of these characteristics, it is not easy to set precise manufacturing specifications concerning uniform quality for measuring services. Likewise, it is difficult to know how consumers perceive their services and evaluate service quality, and to separate the production and consumption of many services (Bateson, 1977; Carmen & Langeard, 1980; Grönroos, 1978; Regan, 1963; Upah, 1980; Zeithaml, 1991). Researchers also indicated that operationalizing the dimensions of service quality is more complicated than for product quality; and may limit managerial control of the service provider over quality, especially for those services where consumer participation is intense during the service delivery or consumption. Therefore, measuring service quality is more challenging than product quality because not only the outcome of a service but also its process of delivery has to be evaluated.

Keaveney (1995) argued that the well-established differences between products and services can help a firm understand how to satisfy consumer in both service and product. This point of view can be broadly interpreted as that a better understanding of the difference between product and service is necessary in evaluating quality. However, DeRose (1987) pointed out that services are not always bought as separate, particular requirements; instead, they are often bundled together with material or supply requirements. In other words, the distinction between product and service offerings is steadily becoming blurred. Generally, goods are classified into three categories in empirical studies (Abernethy & Butler, 1992): products, services, and combinations of both. The third category (i.e. product/service combinations) certainly describes the characteristics of ASP firms, the object of this

research, as these firms not only provide services in system development, implement, maintenance, but also provide IS facility in both software and hardware. Generally, they provide a large amount of service together with a small portion of product. Thus, in terms of background study, the research associated with both service quality and product quality assessment has been reviewed. Therefore, in the discussion hereafter when the term “service” is used, it also includes “product” but more attention is paid to service quality evaluation.

### 2.2.2 Service Quality Satisfaction Theories

In general, there exist two types of service quality: technical and functional. The former involves what the customer is actually receiving from the service, whereas the latter involves the manner in which the service is delivered (Grönroos, 1982). Most of the discussion in literature pertaining to service quality is associated with either technical quality or functional quality or both.

Two important concepts have been widely used in service quality evaluation models. These concepts are expectation and perception. Olson and Dover (1976) viewed expectation as pre-usage beliefs about a service quality. Tse and Wilton (1988) discovered that expectations can be the attributes, evaluative assessment of performance or value in reference to an incident. Oliver and Burke (1999) pointed out that once customers have expectations from a standard, these work as referents for performance evaluations. As for perception, this term is regarded as the perceived performance levels in this study. Bolton and Drew (1991) indicated that the



most important determinant of perceived service value is quality, and accordingly, customers' perceptions of service quality are directly affected by disconfirmation. Ferris and Stebbings (2003) indicated that customer perception is associated with the customer experiencing so-called "moments of truth". They considered that this experience is the basic atom of service, and can therefore be determined by the feeling of interaction every moment when a customer comes into contact with any aspect of the organization.

Numerous practical and theoretical models have highlighted the effect of customer's expectation and perceived satisfaction, or use it as the norm in evaluating service quality. For example, Grönroos (1982, 1983) developed a model and showed that consumers evaluate service quality by comparing the service they expect with perceptions of the service they receive. Smith and Houston (1983) found that satisfaction with services depends on the size and direction of the disconfirmation experience where it is related to the person's initial expectation. Concluded from their research about service quality, Lewis and Booms (1983) indicated that delivering quality service means conforming to customer expectations on a consistent basis. Similarly, Bolton and Drew (1991) noted that customers consider that quality is determined by disconfirmation arising from discrepancies between anticipated and perceived performance levels.

In recent years, many research studies have focused on measuring service quality from the viewpoint of consumers by using particular scales. Among these measures, SERVQUAL was one of the notable instruments for assessing customer perceptions of service quality in service and retailing

organizations. Developed, and subsequently modified, by Parasuraman et al. (1991), SERVQUAL has been adopted in a number of published studies pertaining to service quality and customer satisfaction (Crompton & Mackay 1989; Johnson et al., 1988; Webster 1989; Woodside et al., 1989). SERVQUAL consists of twenty-two items categorized into five dimensions: reliability, responsiveness, assurance, empathy, and tangibles. Based on the expectancy-confirmation framework (Expectation - Perception, P-E), Parasuraman et al. (1988) suggested that satisfaction is a function of the degree to which expectations match, exceed, or fall short of product or service perceived; they called this P-E measurement..

On the other hand, based on the methodology of ECSI (as mentioned in Section 2.1.2), Kristensen (1999) concluded that it is customers' perceived quality that drives their satisfaction, and that customer expectation has no substantive effect on satisfaction. Later, Martensen et al. (2000) also endeavored to explore the impact of drivers on cross-industry customer satisfaction and loyalty. They concluded that customer expectations have a negligible impact on all companies in general. Accordingly, as expectation seems unable to strongly affect satisfaction with services, some other constructs must have more effect on evaluating the service quality level.

In addition, some researchers (Brown et al., 1993; Van Dyke et al., 1997, 1999; Paulin & Perrien, 1996; Teas, 1993, 1994) pointed out problems with the P-E framework measurement model. One of the serious problems is that simply investing in better service delivery may not be an ideal strategy to satisfy consumers or reap more profit. For example, Anderson et al. (1997)

found that increasing satisfaction level was likely to increase costs, as this strategy often requires efforts to improve product attributes or overall product design. Buzzell and Gale (1987) indicated that short-run superior quality leads to profit gains through premium pricing, and it is likely to cause buyer dissatisfaction.

Oliva et al. (1992) pointed out that the link between investments in satisfaction and customer behavior is not always easily discerned because the complexity of the relationship may be underestimated. For instance, Reichheld (1996) found that it costs less to retain an existing customer than to acquire a new one. Mittal and Kamakura (2001) revealed that, under the same satisfaction rating, customers with lower thresholds may be more likely to repurchase the brand than those with higher; whereas customers with lower tolerance levels may be more likely to switch brand than those with higher levels. Ratchford (1999) considered that lack of skills or financial support for searching for information about new brands, meant older or less educated consumers would be less likely to switch brands than those who are younger or more highly educated.

Sometimes, satisfaction still increase even if the expectations are not reached, which means that lower levels of performance might also receive good results (Rust et al., 1999). Examining the concept of “classic ideal point” identified by Teas (1993), Parasuraman et al. (1994) noted that if customer’s expectation point is at a finite level and performance goes beyond this point, it might displease the customer. In other words, strictly following the P-E specification might cause problems in this situation. Thus,

the money spent in quality improvement might be wasted. In conclusion, better understanding the relationship between investments in service strategies and customers' repeat purchasing, may help firms to work out more successful service strategies (Coyne, 1989).

The aforementioned comments suggest that it is insufficient to measure service or product quality by merely focusing on the evaluation of the gap between customer expectation and perception; instead, more elements should be considered. An examination of the literature shows that in addition to SERVQUAL, a number of relevant research studies for deriving suitable measurement scales from a variety of viewpoints have been reviewed and empirically investigated. Some of these are presented in the following section.

Study on service quality and satisfaction has focused on the nature of the consumer and their cognitive. For example, researchers (Oliver 1989, Westbrook 1987; Westbrook and Oliver 1991) postulated a strong interrelationship between consumption emotion and user satisfaction. Some studies suggested that consumer emotions may be as essential as cognitive processes for fully understanding consumer behavior (Batra & Ray, 1986; Derbaix & Pham, 1991). Examining the involvement which reflects the inherent need fulfillment, value expression, or interest the consumer has in the product, Mano and Oliver (1993) indicated that a more involving product is likely to lead to a more deliberative evaluation. On this basis, they studied the effect of product-elicited emotions on customer perception

of satisfaction, and concluded that when product emotions and evaluations are considered, a more involving product result in lower satisfaction level.

Prior research on consumer behavior stated that warranties can affect customers by representing assurances about the quality and value of the product and service (Shimp & Bearden, 1982). Kekre et al. (1995) argued that reliability is generally essential for users with a lower level of satisfaction, whereas capability is more important for those with a higher level.

Sometimes, price can enter into quality considerations. For instance, Carman (1990) found that in some situations, high price is adopted as it intimates high quality. Parasuraman et al. (2005) also pointed that service quality issues have been considered more critical than price. However, as service quality improvement often results in cost increases, it can be a dilemma to balance. Accordingly, affordability is still one of the main categories concerning satisfaction and retention (Bitner, 1990; Cronin & Taylor, 1992; Oliva et al., 1992). Arguing that SERVQUAL does not exhibit construct validity; Cronin and Taylor (1992) established SERVPERF, a "performance-based" service quality measurement scale to examine the relationships between service quality, consumer satisfaction, and purchase intentions. They found that besides convenience and availability, price was an important factor as it may enhance satisfaction level and thus affect behavioral intentions. In an exploratory study of customer switching behavior, Keaveney (1995) concluded that along with service failures and service encounters, price was the top category contribute to customer dissatisfaction and ultimately service switching.

However, increasing satisfaction level must not be a goal in itself; it should be a cornerstone in the improvement of a company's performance, in the enlargement of market share, and eventually, in the growth of profitability. Numerous studies support this view. For example, when the majority of managers considered the customer perception of satisfaction as the ultimate management virtue, Fredericks and Salter (1995) asserted that traditional approaches to consumer satisfaction narrowly focus on evaluating the success of their efforts. They suggested that more attention should be paid to delivering superior customer value and increasing customer loyalty. To this end, they established a "customer value package" of five factors - price, quality of product, quality of service, innovation, and business reputation considered to be customers perceive as superior values in the relationship with the seller. Garvin (1987) developed an eight-dimension quality measurement model to provide a good conceptual framework for understanding the multidimensional nature of product quality. These dimensions are performance, features, reliability, conformance, durability, serviceability, aesthetics, and perceived quality. Szymanski and Henard (2001) focused predominantly on modeling the effects of the following factors on buyers' level of satisfaction: expectations, disconfirmation of expectations, performance, affect, and equity. They found that it is difficult to pursue both using satisfaction and increased productivity when consumers expect customized offerings.

These aforementioned assertions illustrated customer satisfaction as a function of service quality that consists of a number of factors. Some of

these factors are taken into account in exploring the determinants of customer perception of satisfaction in this study.

Since the research object of this study is the ASP business model, which is related to IT and B2B industries, the literature pertaining to service quality and satisfaction assessment in this realm is reviewed.

## **2.3 Information Systems Service Quality Assessment**

Customer perception of satisfaction has also been considered an important factor to determine the success of an IT application or IS service. There are a number of studies on consumer behavior pertaining to IT end-user satisfaction (e.g., Bailey & Pearson, 1983; DeLone & McLean, 1992; Doll & Torkzadeh, 1988; Ives et al., 1983; Ives & Olson, 1984; Somers et al., 2003; Tse & Wilton, 1988). Prior studies (Bailey & Pearson, 1983; Doll & Torkzadeh, 1988) posited that end-user satisfaction can be considered as a good guide to analyze the effectiveness of IT usage.

Achieving a high level of satisfaction necessitates insights on the part of managers about what attributes customers use in their evaluation of IS service quality. Thus, having a valid and reliable instrument for measuring the service quality of information systems services providers is necessary in the increasingly competitive market for IS services (Van Dyke; et al., 1997). Although there are many measures for assessing service quality in the retail sector, as mentioned above, these instruments might not be suitable for use across industries (Dabholkar et al., 1996). More specifically, because the

diversity of different types of services, it is necessary to develop a new measurement scale or modify generic quality scales to suit the given type of service (Buttle, 1996; Parasuraman et al., 1994a).

Four dimensions of service context are computing service, e-commerce service, outsourcing service, and ASP service. They are discussed respectively in the following subsections.

### 2.3.1 Computing Service Context

Regarding the evaluation of computing service quality, some researchers conducted studies of consumer behavior and service quality to measure end-user computing satisfaction (e.g., Bailey & Pearson, 1983; DeLone & McLean, 1992; Doll & Torkzadeh, 1988; Ives et al., 1983; Ives & Olson, 1984; Somers et al., 2003; Tse & Wilton, 1988). Some of those measurement models have been widely adopted in analyzing and measuring satisfaction level. For example, Hamilton and Chervany (1981) proposed data currency, response time, turnaround time, data accuracy, reliability, completeness, system flexibility, and ease of use among others as part of a "formative evaluation" scheme to measure system quality. Bailey and Pearson (1983) designed a model for measuring and analyzing computer user satisfaction. They identified thirty-nine factors that can affect satisfaction citing accuracy, reliability, timeliness, relevancy, and confidence in system as the most important, and feeling of control, volume of output, degree of training for vendor support, and organizational position of electronic data processing (EDP) as the least important.



Based on Bailey and Pearson's model, Ives et al. (1983) studied the user satisfaction of EDP. They created a thirteen-item instrument model comprising relationship with the EDP staff, processing of requests for damage to existing systems, degrees of EDP training provided to the users, users' understanding of systems, users' feeling of participation, attitude of the EDP staff, reliability of output information, relevancy of output information (to intended function), accuracy of output information, precision of output information, communication with the EDP staff, time required for new systems development, and completeness of output information.

Using the model of Ives et al. (1983), Raymond (1987) created a twenty-item instrument model. The items are relationship with EDP staff, processing of requests for system change, timelines of output, vendor support, training provided users, user's understanding of systems, user's participation, currency of output, attitude of EDP staff, reliability of output, top management involvement, response turnaround time, convenience of access, relevance of output, accuracy of output, precision of output, communication with EDP staff, time required for systems development, completeness of output, and technical competence of EDP staff.

By focusing on the end-user computing environments with a specific application, Doll and Torkzadeh (1988) established a survey instrument which merges ease of use and information product items to measure the satisfaction of users. This instrument contains twelve items to measure five components of end-user satisfaction: content, accuracy, format, ease of use, and timeliness.

A model developed by Grönroos (1990) had six dimensions: professionalism and skills, attitudes and behavior, accessibility and flexibility, reliability and trustworthiness, reputation and credibility, and recovery for measuring the level of service quality. Johnston (1995) found that helpfulness, care, commitment, functionality, integrity, and flexibility are five criteria for assessing service quality.

In all, there are a number of factors that might influence the level of service quality in computer end-user. However, in terms of evaluating the service quality of e-commerce, some different criteria are adopted.

### 2.3.2 e-Commerce Service Context

Previous literature (Madu & Madu, 2002) pertaining to quality service in electronic commerce contexts has shown that the factors of performance, website features, structure, aesthetics, reliability, storage capability, serviceability; security, system integrity, trust for data sharing, responsiveness, product/service quality differentiation and customization, Web store policies, reputation, assurance, and empathy might affect the perceived experience of service quality.

Researchers (Zeithaml, 2002; Zeithaml et al., 2000) also proposed an e-service quality assessment model formed by seven dimensions: efficiency, fulfillment, reliability, privacy, responsiveness, compensation and contact. The last three dimensions are more relevant to the recovery scale. Through a series of focus group interviews, Zeithaml et al. (2001) uncovered eleven dimensions of online service quality. These were access, ease of

navigation, efficiency, flexibility, reliability, personalization, security, responsiveness, assurance/trust, site aesthetics, and price knowledge.

Focusing on Internet retail services or website ratings, some adapted SERVQUAL scales have been used in a variety of studies by IS researchers and practitioners to measure the service quality (Kettinger & Lee, 1994, 1997, 1999; Pitt et al., 1995; Watson et al., 1998; Van Dyke et al., 1997; Van Dyke et al., 1999). For example, as the first researchers who introduced the SERVQUAL instrument to the IS literature, Kettinger and Lee (1994) modified SERVQUAL for comprehensively measuring the correlation between the perceived quality gap and user information satisfaction. Gefen (2002) extended the SERVQUAL conceptualization to the realm of online service. He investigated the relationship among the factors of SERVQUAL, and customer trust, perceived risk with vendor, cost to switch vendor and customer loyalty. Rewording SERVQUAL, Harris and Goode (2004) developed a measure for assessing Internet retailing quality, especially for books and airline online sales.

In addition to these measures developed based on SERVQUAL, some other means of evaluating customer perceived online service quality have also been developed in recent years (Chou, 2004; Gounaris, 2005; Parasuraman et al., 2005; Yang et al., 2004; Yoon & Suh, 2004). For instance, Yoo and Donthu (2001) established SITE-QUAL – a four dimension scale for measuring site quality: ease of use, aesthetic design, processing speed, and security. For rating websites, Loiacono et al. (2000) developed a scale known as WebQual. This scale has twelve factors: informational fit to task, interaction, trust, response time, design, intuitiveness, visual appeal,

innovativeness, flow-emotional appeal, integrated communication, business processes, and substitutability. Barnes and Vidgen (2002) created an entirely different scale, also called WebQual, to measure the offering of e-commerce by providing an index of a site's quality (customer perceptions weighted by importance). This scale contains five dimensions: usability, design, information, trust, and empathy.

Francis and White (2002) designed a scale for measuring customer expectations and perceptions of quality in Internet retailing, named PIRQUAL. This scale includes six dimensions: web storage functionality, product attribute description, ownership conditions (which combines email confirmation and ease of calculating total purchase cost with delivery items related to timing), delivery (correct items in good working order), customer service and security. About the same time, Janda et al. (2002) also created IRSQ - a model for measuring the Internet retail service quality. This scale contains nine items: performance, access, security, sensation, information, satisfaction, word of mouth, likelihood of future purchases, and likelihood of complaints.

Wolfenbarger and Gilly (2003) used online and offline focus groups, a sorting task, and an online-customer-panel survey to develop a scale, namely eTailQ, to measure electronic commerce retail quality. This model consists of fourteen instrument items, grouped into four major dimensions: fulfillment and reliability, website design, privacy and security, and customer service.

Most recently, Parasuraman et al., (2005) have developed E-S-QUAL, a scale for measuring the service quality delivered by websites on which

customers shop online. The framework comprises two scales. The basic E-S-QUAL scale has twenty-two items under four dimensions: efficiency, fulfillment, system availability, and privacy. The second scale, E-RecS-QUAL, which is suitable for measuring customers who had non-routine encounters with the sites, contains eleven items categorized into three dimensions: responsiveness, compensation, and contact. Gounaris (2005) has also developed an instrument – INDSERV - to measure B2B service quality. This scale includes four factors of perceived quality: potential, soft process, hard process and output.

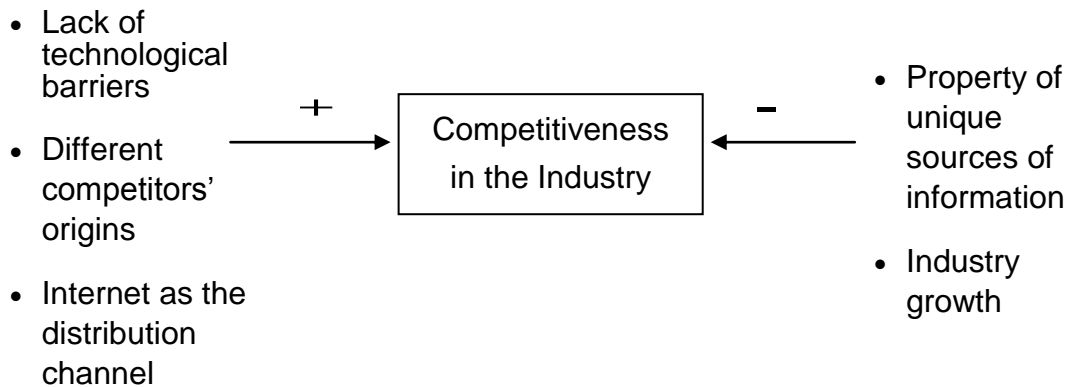
Since ASP is sort of outsourcing service, the determinants of outsourcing service quality are worthwhile to examine. The associated studies are presented in the following section.

### **2.3.3 Outsourcing Service Context**

Based on the assumption that good service is provided in a competitive environment, Lopesl and Galletta (1997) found that some factors have a positive effect on competitiveness in the outsourcing vendors. These are lack of technological barriers, different competitors' origins, and the Internet as the distribution channel. In contrast, industry growth and property of unique sources of information have a negative effect (see Figure 2.1).

Figure 2-1

*Factors that Affect Competitiveness of the Outsourcing Service Providers*



(Source: Lopesl & Galletta, 1997)

Hsu (1998) found that the completion degree of an outsourcing contract and the reputation of an IT outsourcing provider have positive effect on the partnership between firms and IT outsourcing provider. By measuring outsourcing's impact on business performance as well as on user satisfaction, Lee and Kim (1999) also confirmed that outsourcing success can be viewed as the level of fitness between customers' requirements and outsourcing outcomes.

Prior studies emphasized that partnership is one of the most important factors in successful IS outsourcing (Fitzgerald & Willcocks, 1994; Lasher et al., 1991; Lee & Kim, 1999). Fitzgerald and Willcocks (1994) argued that outsourcing partnerships are difficult to maintain as there is an asymmetry of resources and a power relationship that favors the service provider. Lee and Kim (1999) pointed out some ways to maintain a good long-term relationship, for example, sharing risks and benefits, viewing the relationship as a series of exchanges without a definite endpoint, and

establishing a range of mechanisms to monitor and execute the partnership's operations.

Anderson and Narus (1990) argued that the greater the influence a firm has over its partner firm, the less conflict the firm encounters because it is in the best interests of the partner to comply with the firm's request for action. Lee and Kim (1999) found that the higher the degree of joint action, coordination, and cultural similarity, the higher the quality of partnership. Anderson and Narus (1990) cited eight characteristics belonging to a good partnership: outcomes given comparison level, communication, trust, cooperation, conflict, relative dependence, influence over partner firm, and satisfaction.

Based on Anderson and Narus' assertion, Grover et al., (1996) identified communication, trust, cooperation, and satisfaction as the most important factors affecting partnerships. Lee and Kim (1999) also asserted that the partnership quality consists of five components: trust, business understanding, benefit and risk share, conflict, and commitment.

While many theories emphasized the importance of maintaining a long-term partnership, Lacity and Willcocks (2000) presented a different argument. They explained how using of multiple suppliers leads to more successful IT outsourcing, because the client can acquire the best fitting supplier for each outsourcing function, and thereby, reduce risk. Feng (1999) also suggested using multiple vendors is the ideal strategy for outsourcing, because of the spawning and rapid growth of IT; vendors can not be the expert in a diversity of skills to meet all firms' expectations.

Short-term contracts are a common element in successful partnerships. Lacity and Willcocks (2000) recommended that firms sign contracts only for requirements that are known and stable; in other words, the contract's term should be no longer than three or four years because most contracts cannot anticipate the changes in an evolving environment. Hsu (1998) found that the higher the uncertainty of the IS outsourcing project, the lower the certainty of contract's completion; whereas the higher the certainty of contract's completion, the higher the outsourcing performance.

It seems numerous types of scales are available to be selected; however, these instruments are more valid for evaluating conventional IT end-users, Internet retail services, or generic B2B contexts. When it comes to ASP, which is a more complex business model, their validity is still in question. Thus, none of these scales can be fully and appropriately used to evaluate the ASP customer's perception. A more precise and comprehensive scale is needed for this task.

#### **2.3.4 ASP Context**

ASP is a type of outsourcing. However, there are some differences from traditional IS outsourcing (more details regarding this issue can be found in Section 3.3.3). Based on the previous studies pertaining to measuring traditional service quality or IS outsourcing service quality, researchers presented some approaches which can be considered as an appropriate foundation for studying the determinants and dimensions of ASP service quality (Chen & Soliman, 2002; Holt, 2001; Kakabadse & Kakabadse, 2002;



Seltsikas & Currie, 2002; Susarla et al., 2003). For example, performance is one of the key issues affecting an ASP's development. Susarla et al. (2003) posited that subsequent judgments about satisfaction and reuse of ASPs are determined by performance. However, the functional capability of an ASP can significantly influence its perceived performance.

In relation to the features of an ASP model, mission-critical data may be hosted on the data centers of ASPs. This approach keeps the data outside the direct control of their IT staff. In this case, data might be intercepted in the procedure during retrieval and storage of information from the ASP's server. Thus, for some customers, security is an issue beyond their physical and financial means. Hence, security is the key factor in convincing the potential customers to adopt the ASP model. Many studies (Kakabadse & Kakabadse, 2002; Martin, 2000) support this view.

Since an ASP might provide some enterprise applications specifically related to the customers' (or their partners') existing IT system; and some ASPs might provide best-of-breed application services, but how to completely integrate these solutions becomes one of the main issues of ASP vendors. In other words, integration with the client's non-ASP systems may be problematic. Nevertheless, lack of integration is still a serious concern for the existing and potential customers (Fox, 2001; Holt, 2001; Sharma & Gupta, 2002). Holt (2001) postulated that if ASPs have to host a number of applications this might force them to sort out the problem of integration. In their research, Susarla et al. (2003) emphasized the importance for ASPs to facilitate integration with existing applications in client organizations. They

considered that integration is as essential as the superior performance delivery, rigorous enforcement of SLAs, and certainty of applications meeting standards of software capability.

Similar to the concern over integration, lack of customization is another barrier to ASPs development (Seltsikas & Currie, 2002; Sigala, 2003). Pappalardo and Cox (1999) indicated that while ASPs can provide minimal customization under pressure from customers, they do not offer business users a high degree of customization for high end applications (e.g. ERP, CRM) as most system integrators do. Hence, they pointed out that, in terms of users, it is important to understand how they can get what they want from their ASP while also benefiting from the lower costs associated with outsourcing. Examining the effect of customization, Smith and Kumar (2004) suggested that this factor might not only increase the cost and lower the economies of scale but also deteriorate system performance, and limit marketability.

From a technology point of view, delivery of service is considered the most essential element of the ASP. Holt (2001) suggested that this is difficult to assess before the users access it. He recommended some approaches such as clustering, load-balancing, and failover to offer high level services in accessibility and availability. Greschler and Mangan (2002a, 2002b) pointed out that in addition to a delivery mechanism, it is necessary to develop an infrastructure that enables the provider to provision, manage, meter, and support the applications they are serving. Ekanayaka et al. (2002)

considered channel conflicts and lack of delivery mechanisms as some of the main concerns for some companies reluctance to enter the ASP industry.

Some researchers posited that training is one of the important services provided by ASPs (Holt, 2001; Marymor, 2001). Training associated with the application that the customers adopt is necessary, especially for these high-end applications (e.g. ERP), upgraded and new version users, and also for their new employees. This service can efficiently increase an ASP's competitive.

Kakabadse and Kakabadse (2002) assumed that sustainability of ASPs is a serious concern. In their survey, sustainability is the key concern followed by ignorance of the ASP market, the lack of customization, security concerns and choice of partner. Their findings uncovered that 44 percent of ASP vendors declared themselves as unprofitable. This relatively high percentage could cause the potential users to hesitate before taking action to adopt a service.

Based on Simon's (1977) decision-making model, Chen and Soliman (2002) developed a value-driven approach to outsourcing using ASPs. They indicated that production cost advantages and transaction costs are the top factors influencing a firm's decision to outsource its IS functions; whilst asset specificity, which refers to how easily the asset can be used elsewhere by other users, has a negative effect on an organization's decision to outsource. Speaking of cost concerns, although some researchers observed that ASPs might bring some cost-effective benefits (Davis, 2001; Harney, 2003;

Microsoft, 2000; Sharma & Gupta, 2002; Sovie & Hanson, 2000), Kakabadse and Kakabadse (2002) also pointed out that ASP applications have hidden costs. They suggested that when customers are making a long term plan, if the ASP solution costs more than adopting the ownership model, then they should trade off such costs against other factors such as "fewer IT management concerns", and an enhanced capability to "focus on core competences".

Pricing strategy is another focus of academics and practitioners (Chamberlin, 2001; Ekanayaka et al., 2002; Sharma & Gupta, 2002). Kakabadse and Kakabadse (2002) determined that the adoption of effective pricing models is an important aspect that needs to be considered by organizations. Pricing models adopted by ASP users include pay by a fixed, one-off fee, a per transaction fee, a percentage-of-value fee, a subscription fee, by size of data managed, by user application; some are adopted concurrently.

Having discussed the elements that play an important role in the judgment about ASP development have been discussed above, the arguments associated the key factors of influencing ASPs service quality will now be summarized.

Chou (2000) indicated that reliability, availability, scalability, affordability, and reference account are the index for evaluating the degree of customer loyalty. Reference account shows the number of existing users; the more users in the reference account the greater the likelihood of efficiently communicating or sharing data with business partners; in short, greater compatibility.

Seltsikas and Currie (2002) provided various elements for the purpose of evaluating ASP model: time to market, pricing models, reliability, availability, scalability, data security, service level monitoring, and bandwidth requirements.

Sharma and Gupta (2002) also presented concerns about data control and value, pricing strategies, inter-alliance problems, bundled services approach vs. software product approach, long-term viability, Internet connectivity, services and support, and security, that might affect ASP's ability to meet the requirements of customers.

Kakabadse and Kakabadse (2002) examined some concerns about ASPs development including the level of satisfaction with ASP services. They identified sustainability, lack of customization, security, and long term costs as particular concerns of the customers.

Ekanayaka et al. (2003) established a model to evaluate the ASP offering. The results indicated six categories that impact on service quality: security, integration, pricing, customer service, service level monitoring and management, reliability, availability, and scalability (RAS).

Susarla et al. (2003) conducted research by empirically evaluating IT service initiatives and analyzing customer satisfaction. They found that a company whose IT employees are very proficient in Internet or in application management is not likely to have very high expectations of the ASPs. Ma et al. (2005) evaluated the gap between customer perception and expectation in service quality of ASP. They concluded that offering a higher

quality of service is a good approach to improve ASP's customer satisfaction. Seven dimensions: features, availability, reliability, assurance, empathy, conformance, and security were identified in their study as contribution to quality service.

Overall, the constructs of efficiency, fulfillment, bandwidth, privacy and security of data transfer and storage, trust, credibility, availability, scalability, responsiveness of staff, partnership quality, integration and flexibility issues are applicable for measuring ASP customer perception of satisfaction when focusing on service quality.

### 2.3.5 Section Conclusion

Service quality is one of the most important parts in evaluating satisfaction level of information systems service. This section has cited a number of studies pertaining to service quality measurement from the aspects of computing service, e-commerce service, and outsourcing service. Several well regarded measurement scales have been discussed in this section including those developed by Bailey and Pearson (1983), Ives et al. (1983), Ekanayaka et al. (2003), and Parasuraman et al. (2005).

The Thirty-nine-factor model of Bailey and Pearson (1983) contains the most components for evaluating satisfaction of computing users and is suitable for the exploratory research to investigate the factors affecting customer perception of satisfaction. This model has been widely adopted by other researchers (e.g. Ives et al., 1983). The model is able to cover a large percentage of the research aspects for the ASP context; however, because

of some special features of the ASP industry (see Section 3.3.2), it does not completely meet the evaluation requirement of the present study. Parasuraman et al.'s instrument (2005) has the same problem, as their model is mainly used for assessing Internet retailing quality. Ekanayaka et al. (2003) measurement model would appear to be the one most suitable for this study; nevertheless, the dimensions included in their model are not comprehensive. Therefore a combination of the models of Ekanayaka et al. (2003) and Bailey and Pearson (1983) has been used as the foundation of the research model used for this study. Some relevant factors introduced above will be included in the final model. Chapter 5 presents an elaborated discussion of the model.

## 2.4 Chapter Summary

This chapter has reviewed the theoretical studies in the context of customer perception of satisfaction and service quality. Several relevant models in the area of computing, e-commerce, outsourcing, and ASP were examined, and parts of the dimensions in these models adopted as the potential determinants of the dependent variable of this research. The next chapter provides a comprehensive overview of IT outsourcing and one of its new operational styles – the ASP business model.

# Chapter 3

## IT Outsourcing: the ASP Industry Context

For the purpose of providing a clear picture of the subject of this research, this chapter introduces the concept of the ASP business model including its related preceding businesses (i.e. IT outsourcing, and hosting service), its evolution, ecosystem and architecture, opportunities and obstacles, prospects, firm origin type, and provider type.

### **Chapter Contents**

- 3.1 IT Outsourcing
- 3.2 Hosting Service Overview
- 3.3 ASP Concept
- 3.4 Chapter Summary

### 3.1 IT Outsourcing

IT outsourcing delegates non-core IT jobs to an external vendor who is professional in that job so that the company can concentrate on its core competence. Outsourcing is not merely buying service from a provider; a significant degree of two-way information exchange, co-ordination, and trust should be involved as well.

Lo and Yuan (2002) distinguished three waves of IT outsourcing. They identify the first wave as technology-centric, the second wave as



business-centric and the third wave as industry-centric. They considered that ASPs are the new outsourcing providers of today - the third wave.

In the first wave of outsourcing, companies outsourced their mainframe and data center facilities to third-party vendors. This strategy benefited a number of customers, especially those small and medium enterprises which lacked the capital and manpower to operate their own IT departments.

The second wave of outsourcing occurred between 1980 and 1990 when these applications used for areas such as client server technologies and enterprise resource planning systems were widely adopted. During this period, outsourcing played an important role helping the customers to operate these applications.

The third wave of outsourcing was caused by the development of the Internet technology which is the cradle of the ASP model. ASPs manage and deliver application capabilities to customers from data centers through a wide area network. Smith and Kumar (2004) argued that the ASP model can be considered as a type of outsourcing. In addition to the adoption of remote computing modes, another feature of the third wave IT outsourcing is that small and medium enterprises (SMEs) are able to receive the service of using high-end software applications and support at an affordable price.

Table 3-1 illustrates the critical changes in the IT outsourcing phenomenon.

Table 3-1

*Comparison of the Three Waves of IT Outsourcing*

	<b>First Wave</b>	<b>Second Wave</b>	<b>Third Wave</b>
<b>Period</b>	1960s to 1980s	Mid -1980s to 1999	1999 – present
<b>Focus</b>	Technology -centric	Business-centric	Industry-centric
<b>Infrastructure or technology basis</b>	Centralized or Stand alone computing	Distributed computing and client/server technology	Remote computing, Internet and broadband technology
<b>Service orientation</b>	Technical expertise	Applications and business functions	Utilization of specialized/ specific applications (pay as you use)
<b>Software ownership</b>	Service bureau	Client organization	ASP
<b>Software type</b>	Tailored software	Shrink-wrapped software – opportunity for ISV	Use selected applications software as needed
<b>Main types of outsourced tasks</b>	Mainframe facilities, datacenters, bespoke software	System development maintenance; business functions (accounting, HR, procurement), business processes (supply chain management, help desk, call centers)	Not only enterprise and horizontal systems, but also industry specific & vertical applications
<b>Outsourcing providers</b>	Service bureaus	The Big-Five Management Consultancy Firms	ASPs
<b>Main beneficiaries</b>	Large firms	Large corporations	SMEs

Source: Lo and Yuan (2002)

## 3.2 Hosting Service Overview

The hosting service is one of the main features of the ASP model. In order to present a comprehensive concept of ASP, a brief introduction to the hosting service is given in this section.

### 3.2.1 Definition of Hosting Service

Wikipedia<sup>1</sup> (2005) defines Web hosting as a service “that provides individuals, organizations and users with online systems for storing information, images, video, or any content accessible via the Web”. Secker (2001) defines Web hosting as “the business of housing, serving and maintaining files for one or more web sites within an internet data center (IDC)” (p. 27). Overall, Web hosting can be considered as a process by which a third-party service provider furnishes facilities such as a data center, network bandwidth, server equipment, system software, and storage capacity to its customers with varying degrees of administrative and managed services to support an Internet presence or Web-based software application.

Usually, the customer is responsible for the website content and/or the software application, whereas the hosting provider is responsible for all day-to-day operations, maintenance of the systems, and the network. Thus, Reynold (2004) indicated the necessity of a backup system for a reliable Web

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<sup>1</sup> Wikipedia is a free encyclopedia. In this study, it is merely used to provide a rough concept for a term, issue, or jargon when it is initially presented. Afterward, the more elaborated introduction will be made based on the review of academic literature. The citations from Wikipedia or other dictionaries (e.g. New Hacker Dictionary) are displayed in the end of Reference section.

hosting service in order to prevent data loss due to server crashes, hard drive problems, and hackers.

### **3.2.2 Categories of Hosting Service**

Generally, there are four main categories of hosting services: dedicated, shared, enterprise, and colocation.

#### **3.2.2.1 Dedicated Hosting**

Dedicated hosting is where a customer's website or Web-based application is stored on a rented server which has high capacity hard disks and is dedicated to that customer only. In this case, the hardware, software, and network connectivity that are needed to run the application are dedicated as well.

Because higher-end and deeper technical support is offered by the hosting vendor as well, dedicated hosting saves the customer the hassle of hiring staff to configure, administer, maintain, and manage the systems, network, and security. The principal work for the customer is to manage the website content or Web-based application.

#### **3.2.2.2 Shared Hosting**

Shared hosting, or virtual hosting, is storing multiple customer websites or applications on one server. In this case, all the components that are related to the server are shared as well. Usually, shared hosting providers merely offer low-cost light technical support; therefore, this type of hosting is mainly adopted by small businesses.

### **3.2.2.3 Enterprise Hosting**

Enterprise hosting is to host multiple servers in a complex customized configuration (e.g. N-Tier architectures). This type of hosting is suitable for customers who rely on the server for their operational functions such as operating system administration, cluster management, server load balancing, and database administration. Generally, enterprise hosting providers offer highly customized solutions and advanced levels of technical support.

### **3.2.2.4 Colocation**

Colocation (often spelled "collocation" or "co-location") is an equipment hosting service, placing the server equipment or telecommunications equipment in a facility (or data center) that is specifically designed for the storage of computer hardware for hosting purposes. The services include the provision of power, network bandwidth, physical security, data center space, and server monitoring. Colocation is suitable for those customers who own the equipment (e.g. servers, firewall, tape backup device, switch etc.). Often the customer is in charge of the configuration, administration, management and maintenance of the hardware and software specific to its application or systems, while the colocation center providers supply reliable, secure and neutral Internet hosting services with fast connections.

### **3.2.3 Web Hosting and ASP**

The provision of Web access and connectivity is the primary service of an Internet service provider (ISP). However, quite often it offers hosting

services as well. Tao (2000) indicated that when an ISP, which is based on Web hosting services, moves into sophisticated e-commerce, messaging, and other complex Web hosting services, it is regarded as an ASP. Brain (2003) also argued that if a Web hosting company provides an e-mail service under the approaches that run exchange servers, POP servers or IMAP4 servers and distributes e-mails on a monthly-fee basis, then this company is named an E-mail server ASP.

Accordingly, Web hosting is the basic element of forming the ASP business model as most of the other services of ASP are provided on the basis of improving the efficiency and promoting the function of this service.

### **3.3 ASP Concept**

ASP is the typical solution for IT outsourcing in the age of e-commerce. Since ASP is part of the main subject of this study, it is necessary to thoroughly understand the concept of this service model. For this purpose, the issues associated with this business model are presented in the following sections.

#### **3.3.1 Definition of ASP and ASP Business Model**

There are two definitions of ASP. The term can refer to 1) an Active Server Page, or 2) an Application Service Provider. In this study, ASP refers to the latter, Application Service Provider.

The ASP Industry Consortium (ASPIC), a coalition of companies formed in May 1999 to promote and educate the industry, considered ASP delivers and manages application capabilities to multiple entities from a data center

across a wide area network (ASP Industry Consortium, 2000). It offers the following definitions:

provides applications and all the IT infrastructure and support services necessary to deliver them to customers on a subscription basis. ASPs typically host applications at a remote data center and deliver them to customers via the Internet or a private network.

An ASP is a third-party service firm that deploys, manages, and remotely hosts a software application with centrally located servers in a rental or lease arrangement.

Gunson (2001) also defined the ASP as "a mediator that facilitates remote, centrally managed 'rent-an-application' services between a client and an independent software vendor" (p.5). Beeson Gregory, indicated that "ASP offer outsourcing of individual IT services or complete functions across a wide area network (WAN), usually in return for a monthly fee, rather than upfront software licenses" (Classe, 2000, para. 7).

A similar definition is given by Gartner Group. This organization noted that ASPs deliver application functionality and associated services across a network to multiple customers using a rental pricing model (Cited in Scholl, 2001).

International Data Corp. (IDC) defines ASPs as "service firms that provide a contractual service offering to deploy, host, manage, and lease software from a centrally managed facility at low cost" (Gillian, 1999).

Ovum indicated that an ASP provides software application capabilities on a rental basis according to a service-level agreement, and delivers the service on a one-to-many basis via a WAN - usually an IP network (Ring, 2001).

Taking into consideration the evolution of the ASP model, the definition of ASP in this study is summarized as follows:

a company that centrally deploys, delivers and manages network-hosted application and associated services on a one-to-many basis to multiple customers via a wide area network using a rental pricing model according to a service level agreement.

However, this research is based on a broader definition of ASP. The ASP not only offers IT services and application outsourcing via network, but also on-demand application and business processes. While a growing number of ASPs regard their service model as "software-as-a-service" (SaaS), "on-demand computing", and "utility computing" or an entirely different term, in this study they are all called ASP. Accordingly, software provided via an ASP business model is called on-demand software.

A business model is defined as "the mechanism by which a business intends to generate revenue and profits. It is a summary of how a company plans to serve its customers. It involves both strategy and implementation" (Vassiliadis et al., 2006, p. 284)

Magretta (2002) stated the terms "business model" and "strategy" are often used interchangeably by people. However, he considered that a business model is more likely to be a system that shows how the pieces of a business fit together, whereas strategy is more targeted toward being competitive



Osterwalder et al. (2005) argued that the business model is more about how a business works as a system and strategy includes execution and implementation.

Vassiliadis et al. (2006) pointed out that a business model is the totality of how it:

- \* Defines and differentiates its product offerings;
- \* Creates utility for its customers;
- \* Acquires and keeps customers;
- \* Goes to the market (promotion strategy and distribution strategy);
- \* Defines the tasks to be performed;
- \* Configures its resources;
- \* Captures profit.

Accordingly, an ASP business model (also simply called ASP model) is a customer service approach of providing computer-based services by housing the application software on the vendor's server for users to access through Internet and a Web browser using Hyper Text Markup Language (HTML) or special purpose client software under a subscription or rental pricing strategy.

In early 2005, a number of applications were available to the public users through the ASP business model; for example, Salesforce.com, RightNow Technologies, and NetSuite are some of the well-known business solution ASPs. Some free applications such as Yahoo-Calendar, Google-Dictionary, the FreeDictionary.com, and Wikipedia<sup>1</sup> are also considered as services provided under the ASP business model.

### 3.3.2 Features of ASPs

ASPs delivering software over the Internet or a VPN (Virtual Private Network) founded on the Network-centric computing model are also known as Web subscription services. Network-centric computing is a computing architecture that shifts complexity from the edge to the center of the network. This architecture provides new ways to access information and eliminates the most frustrating corporate desktop issues. Therefore, this model is widely used by companies and institutions of all sizes to increase productivity and security while reducing IT costs.

Hosting (also known as website hosting) is the business of housing, serving, and maintaining files for one or more websites. Typically, an individual business hosting its own site would require a similar connection and this would be expensive. Using a hosting service lets many companies share the cost of a fast Internet connection for serving files. This is the motivation to create an ASP. In order to reach the goal of fast Internet connection, most hosting services offer connections on T-carrier<sup>2</sup> system lines.

More specifically, the typical ASP business model is one where the ASP vendors own the software and the facilities for hosting and maintaining the application, so that the customers do not need to worry about the hardware and software.

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2 T-carrier system is the first successful system that supported digitized voice transmission. The transmission media of this entirely digital system can be a pair of twisted pair copper wires, coaxial cable, optical fiber, digital microwave, and other media. It can provide high speed and a variety of transmission objects.

Some key features of ASPs are listed below. An ASP will:

- 1) Own and operate the software application;
- 2) Own, operate and maintain the servers that run the application;
- 3) Deploy, deliver and manage application and associated services shared by multiple customers; in other words via a one-to-many model;
- 4) Supply services from a central location, over the Internet or a private network, as opposed to running them on the customer's premises;
- 5) Provide services for a subscription or usage-based fee backed by a service level agreement (SLA).

For instance, Appshop provides application outsourcing and consulting services; Atomz, and CrownPeak provide hosted website search and content management services; BMC Software provide enterprise management solutions; Clickability is a single-source provider of hosted web publishing technologies; EmailLabs provides email marketing solutions; EMPLOYEASE.COM provides human resources services; Jamcracke provides aggregates, and integrates Web-based IT and business services; LivePerson provides hosted solutions for managing online customer interactions; NetSuite provides application colocation services; RightNow, Salesforce.com, and Surebridge provide CRM services; Aspective is a CRM distribution, and provider of e-commerce solutions. All of these ASPs supply computer-based services to customers over a network.

### 3.3.3 Difference between Traditional Outsourcing and ASP Service

Factor (2002) indicated that outsourcing is legitimately considered a forerunner of the new service dubbed ASP. He argued that the advent of network computing in the late 1980s, the Internet in the early 1990s, and the new software development tools and techniques, combined with the profound changes in global economies, have given rise to the totally new models of outsourcing, such as ASP.

Although ASP utilization can be considered as a type of IT outsourcing (Smith & Kumar, 2004), they are not the same. Currie and Seltsikas (2001) illustrated some fundamental differences between traditional IT outsourcing and application outsourcing as shown in Table 3-2 below.

Table 3-2

*Differences between Traditional IT and ASP Outsourcing*

<b>Traditional IT outsourcing</b>	<b>Application outsourcing by ASPs</b>
<ul style="list-style-type: none"> <li>● One-to-one</li> <li>● Applications owned by customer</li> <li>● Large up-front costs</li> <li>● Legacy applications paid by customer</li> <li>● Application located at customer or 3rd party site</li> </ul>	<ul style="list-style-type: none"> <li>● One-to-many</li> <li>● Applications owned by ASP</li> <li>● No up-front costs</li> <li>● Pricing based on usage</li> <li>● Application located at ASP, 3rd party or at customer site accessed across their LAN</li> </ul>

(Source: Currie & Seltsikas, 2001)

Ma et al. (2005) compared the ASP model with traditional IT outsourcing. They found that both models offer standard, non-critical applications; clients for both expect capable and reliable vendors, and both need to maintain a good relationship with customers. The models differ in terms of target

markets, vendor characteristics, contract type, available functions, product customization, and resource ownership. Details of the differences are illustrated in Table 3-3.

Table 3-3

*A Comparison of Traditional IT/IS Outsourcing and ASP Model*

	<b>Aspects</b>	<b>Traditional IS outsourcing model</b>	<b>ASP model</b>
<b>Similarities</b>	Client expectation	The quality and availability of support staff; the ability of the vendor to grow; indication of some vendor competence; and tangible evidence of success	The quality and availability of support staff; the ability of the vendor to grow; indication of some vendor competence; and tangible evidence of success
	Applications	Standard, non-critical applications	Standard, non-critical applications
	Contract	Service level was specified in a contract to govern the services that providers rendered	Service level was specified in a contract to govern the services that providers rendered
	Client relationship	Maintain a good relationship with clients	Maintain a good relationship with clients
<b>Differences</b>	Target markets	Large clients with IT departments	SMEs with low IT expertise
	Vendor characteristics	“Name” vendors, with potential global span	Enterprises and start-ups
	Contract types	Large, broad, strategic	Short, standard, usage-based, and non-strategic
	Available functions	Pick services from application development to infrastructure operation	Web-based application services
	Product customization	Tailored or client-determined	Standard packages with one size fits all
	Resource ownership	Mixed bag	Vendor server hardware and application ownership

(Source: Ma et al., 2005)

After reviewing the literature about differences between traditional IT/IS outsourcing and the ASP service model, several conclusions can be made and these are now presented.

### **IT Outsourcing**

1. IT outsourcing usually means that a company gives all or a significant part of its IT service to a third party supplier. It may be that the supplier takes over the responsibilities of a whole department.
2. The IT outsourcing service precisely meets the requirements of clients by customizing applications. It focuses on some specific task and is costly. In other words, outsourcing tends to be a one-to-one service.

### **ASP**

1. The major feature of ASP is that it provides Web-based application services via the Internet or networks. ASPs provide kit and software to a number of user organizations that deliver their current services over an ASP infrastructure, and therefore users can run ASP systems themselves through ASP's host server and have access through remote terminals.
2. ASPs provide general or uniformly designed applications; it is a one-to-many service type, in other words, numerous clients share one application or service. Very limited customization of applications is offered.
3. ASP users do not have to be concerned about up-front costs.
4. Payment for ASP is available as lease or on a pay-as-you-go basis.

5. ASP is more process based. It represents a thin vertical slice of a business process.

It is important to note that although Parry (2005) indicated that the traditional approach of ASPs focused more on outsourcing and hosting than on providing an application as a service, however, while the traditional software license model was discarded, users have regarded software as a service (SaaS) instead of a product. Thus, SaaS is considered as a outgrowth of ASP or the late model of ASP. Therefore, while the ASP model is more centered on applications and services instead of on outsourcing and hosting, ASP and outsourcing have now become two very different models.

In short, traditional ASP represents the convergence of outsourcing and technology, and takes the former to the new stage; however, the modern ASP is gradually departing from simple outsourcing because it pays more attention to application services.

### 3.3.4 Evolution and Development of ASP

From an evolutionary perspective, the ASP model has had continual alteration since its emergence. Benton (2002) stated that the initial launch of the ASP industry was in 1998. At that time, a number of dot-coms with large start-up capital, but without infrastructure, were urgently seeking a solution for their application employment and management problems. The idea of an ASP model was formed to meet these requirements.

In the first phase, ASPs were mostly application outsourcers (see Parry, 2005). They mainly hosted and delivered online one or more specific solutions such as enterprise resource planning (ERP), CRM and e-commerce (EC). These solutions were originally designed for in-house deployment. In the second phase, the ASP industry adapted the service to suit the demand of marketplaces, for instance, they established strong partnerships for providing customization and integration services (Seltsikas & Currie, 2002). They integrated services between hosted and non-hosted applications, while some ASPs supplied network applications that combined IT and communications technology. Some applications were designed from inception for centrally managed delivery, and these marked a development from the previous stage. At that time, 70 percent of the ASP markets were in North America; and around one fifth of the overall businesses had adopted the ASP model. ASPs attracted more attention than any other service model in outsourcing at that stage.

Gradually, as ASP customers were requesting more services, ASPs recognized that the business model was overly simplified. To meet the requirements of customers, some ASPs migrated to the next level; they delivered not just applications, but also business services, information and systems management. They attempted to wrap business process outsourcing (BPO) around their applications. Major ASPs distinguished themselves in their abilities and turned to partnerships with other providers and vendors to be able to offer all-inclusive, single point-of-contact services to their own customers (Gupta & Herath, 2005).



However, in spite of the improvement in application and service provision, the survival of ASPs was not ensured. According to Wohl, (2001) around 80 percent of new ASPs disappeared within the first five years because of consolidation and bankruptcy. This high percentage of failures was the result of easy entry to the market and bad business models. Other reasons were a lack of awareness of the service by potential customers, and a shortage of capital (Seltsikas & Currie, 2002). Many ASPs have been crushed by the weight of data centers and infrastructure investments after the burst of the dot-coms. Hultquist (2004) indicated that many of the now-defunct ASPs provided outstanding services but were unable to receive the support required to withstand the economic downturn and the withdrawal by unstable investors. It is apparent that the ASP industry still remains immature and this situation has forced a number of ASPs to consolidate for survival.

Recently, the term “ASP” seems to have been replaced by other terms. For instance, IDC has already adopted "hosted application management" to describe companies that provide outsourced hosting of packaged software. The term SaaS has emerged (Seltsikas & Currie, 2002). A major percentage of the surviving ASP vendors announced that they are offering SaaS. Also known as “applications delivered as a service”, SaaS is a development of the ASP model as it largely overcomes the problems that existed in ASPs. As a result, these companies have become the new generation of ASPs (Garretson, 2005).

The characteristics of the SaaS delivery model include on-demand, built from the ground up to be shared software; technology advances such as Web services and service-oriented architecture; plus five years of added maturity for both the applications and executives running ASPs. A key to these developments is the premise that users should regard software as a service rather than a product. In addition, some researchers (e.g., Cummings, 2005) even regard software-as-an-appliance as the best of the ASP models as they consider this technology can be more easily operated and there is more security. As a consequence, it should be able to meet rapidly changing business needs, and make the ASP more prevalent in eMarketplaces.

While many ASPs have struggled to survive the market's slow acceptance of outsourcing, some vendors such as Salesforce.com, RightNow, and Google have taken the leadership role in this market by delivering outstanding services to their customers.

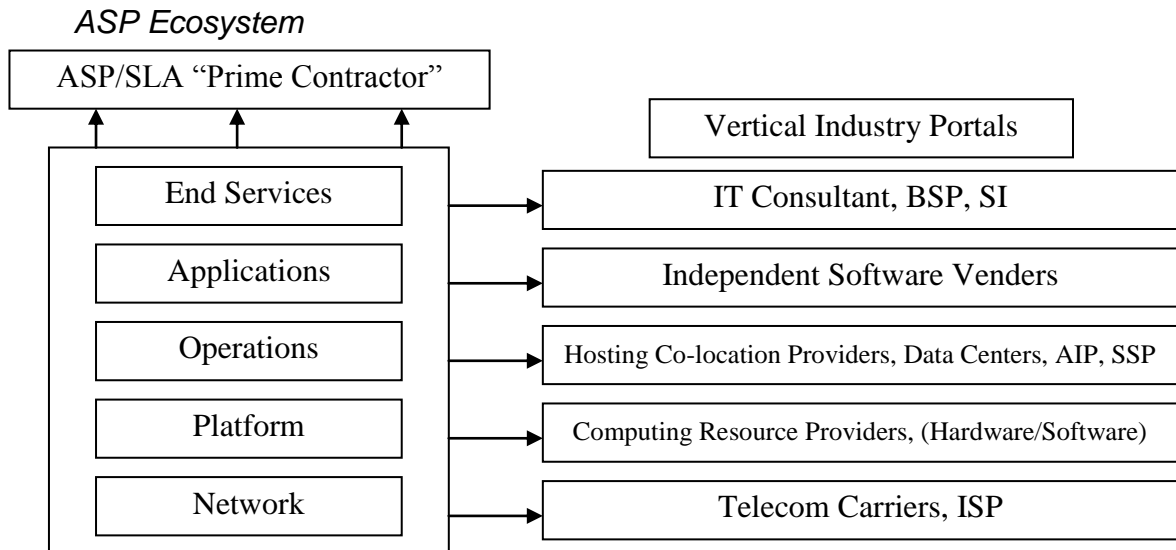
### **3.3.5 ASP Ecosystem and ASP Architecture**

Since a number of ASP vendors have tried to provide all-inclusive, point-of-contact services to their customers by partnership with associated providers and vendors, the ASP model is more likely to be regarded as the functionality of the ASP ecosystem. This ecosystem is a complex and dynamic phenomenon consisting of hardware and software providers in the fields of computing and networking (Seltsikas & Currie, 2002). Dewire (2000) noted that ASP is structured into three layers:

1. a back-bone service provider (BSP) layer – provides high-capacity, long-haul connectivity;
2. storage and Internet service provider layer – the alliances with ISP, storage service providers (SSP) and commerce service providers (CSP); and
3. a software layer – forms the front (or the client end). The client organization rents the software to access the application via the Internet (p.16).

The Gartner Research Center considered ASP as a form based on five levels (network, platform, operations, end services, and applications). The relationship between those five levels is illustrated in Figure 3-1.

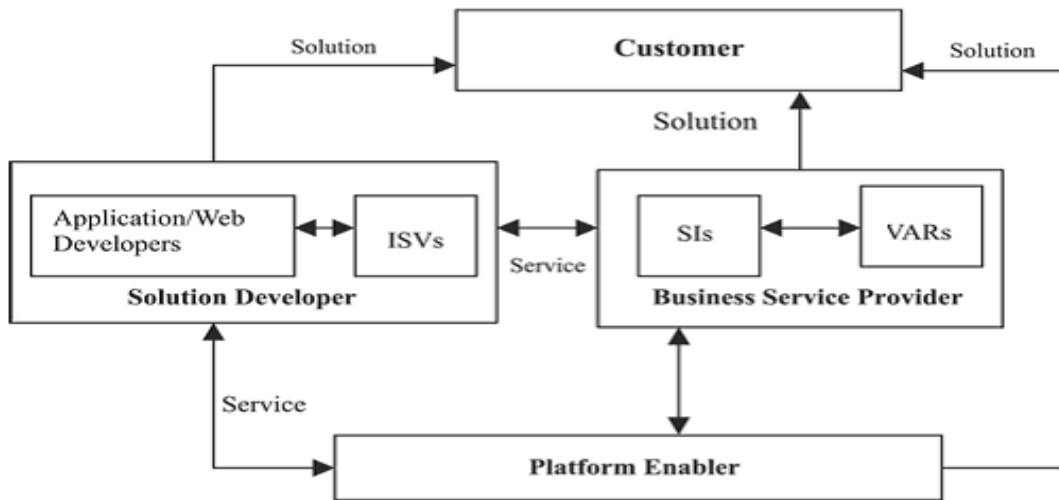
Figure 3-1



Source: Gartner Research (2000.11.6) Cited in Li (2001, P.77)

Ekanayaka et al. (2003) identified the participants of the ASP model as network service providers, ISP, independent software vendors (ISV), value added resellers (VAR), system integrators (SI) etc. They presented an ASP ecosystem model as in Figure 3-2 below.

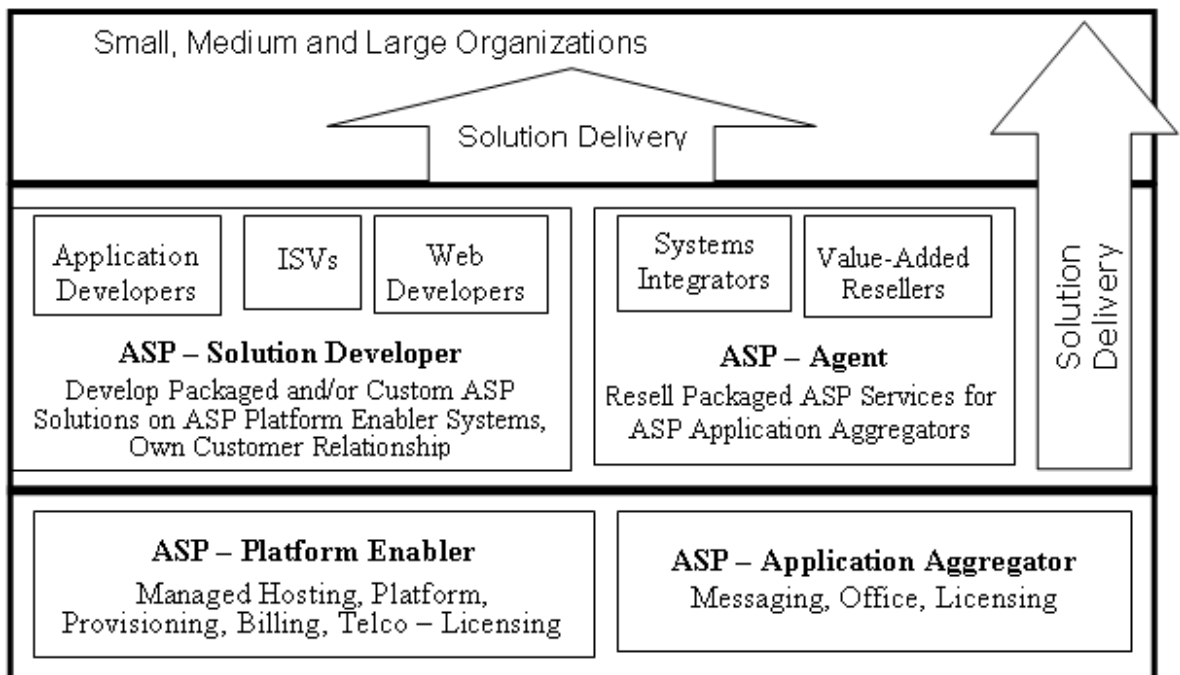
Figure 3-2  
The ASP Ecosystem Model



Source: Ekanayaka et al. (2003)

Microsoft (2000) studied the roles played under different organizations scales in delivering ASP services to customers and illustrated the architecture as in Figure 3-3.

Figure 3-3  
ASP Architecture



Source: Microsoft ASP Evolution and Resources White Paper (2000)

An ASP is similar to a Web hoster but requires much more advanced skill to deliver. The ASP model is not primarily about technology, outsourcing or even IT expertise, but about service (Corbett, 2000a). Lin et al. (2001) also concluded that individual ASPs can only offer very limited professional services unless they cooperate with other service providers. Therefore, partnerships are a critical factor in the ASP model; while some ASPs view the provision of enabling services to other ASPs as advantageous, others might perceive the other ASPs as competitors (Currie & Seltsikas, 2001).

In short, a good partnership that is able to offer seamless collaboration with the supporting vendors is significant for the success of ASPs.

### 3.3.6 Purpose for Adopting ASP Services

Levinson (2003) recommended a list of criteria to evaluate whether a company needs the service from ASP. These are:

1. if a company does not have an It staff, or its IT staff is small;
2. if a company does not have a big technology infrastructure;
3. if a company does not have well-established, deeply ingrained sales process;
4. if a company does not have the luxury of twelve to eighteen months to deploy an application; or
5. if a company does not have sufficient budget for an IT department.

For example, when the SMEs intend to provide EC services or to devise an e-business strategy under the situation of an IT manpower shortage, lack of capital to acquire IT equipment and EC expertise, they are able to outsource the EC or e-business implementation to ASPs, and access the application software over the Internet. Therefore, the existence of the ASP model is closely associated with SMEs and EC.

### **3.3.6.1 ASP in SMEs**

Since the appearance of ASPs, a number of experts have advocated the advantages of this model. They have argued that it might have more benefits for small and medium size enterprises (SMEs) rather than large scale businesses (Vorisek & Feuerlicht, 2004). According to Batiste (cited in Corbett, 2000, p. S4), three groups of clients can greatly benefit from ASPs: 1) the SMEs that must implement solutions quickly and without interruption to their business; 2) the SMEs which require some level of customization to fit special business requirements; and 3) those high-end global companies that require unique solutions combining an equal measure of customized and standard features to serve their customers and work with suppliers around the world.

Currie and Seltsikas (2001) suggested that the ASP model can offer new opportunities for SMEs to procure high end application (e.g. ERP) and other vertical as well as horizontal applications. Heart and Pliskin (2002) observed that it is difficult and hardly affordable for SMEs to own, maintain, and manage around the clock the networks computing applications and infrastructures to meet the requirement of Business-to-Business

e-commerce; therefore the concept of eRental via the Internet ASP might be attractive to some industries, particularly SMEs. Similarly, Ramos (2002) pointed out that if SMEs outsource their IT operations to ASPs, they have better control of their operating expenses, because they have a fixed cash payment at each period of time. Woerndl et al. (2003) considered SMEs to be relatively inflexible in utilizing information systems and information technology, and they concluded that ASPs might be able to promote SME flexibility.

In summary, according to the research, ASPs are very likely to create opportunities for SMEs to compete with large companies in the arena of B2B e-commerce by providing associated IT hardware and software through a pay-by-use rental model that is more affordable and more flexible for SMEs.

### **3.3.6.2 ASP and e-Commerce Implementation**

Peabody's (1999) viewpoint is that ASPs have emerged because of evolutionary changes in four areas: communications and networking, computer platforms, software development methodology, and the IT discipline to operate the enterprise in concert. Some of these changes have also fostered the growth of e-commerce.

When a number of dot-coms, the promoters of e-commerce, had to deal with the challenges of a lack of infrastructure and a scarcity of network application expertise, the ASP model has been considered to be the solution for these problems. Lee et al. (2003) also argued that to meet the requirements of e-commerce, IT outsourcing had to transform rapidly into multiple

partnership types to obtain IT know-how and the optimal utilization of resource, and this is exactly the functionality of the ASP model. Consequently, ASP has a significant position in e-commerce development.

In general, it is human resource consuming, fund consuming, and time consuming to adopt e-commerce. If the transaction goes smoothly, outsourcing to an ASP enables a company to focus its resources on its core competencies rather than having to maintain costly systems in-house. DiSabatino (2000) found that the big companies are not likely to outsource their messaging systems, because they have better technology at a more affordable price than any ASP can offer them. Nevertheless, some large organizations are looking for ASPs to host applications not yet installed, such as CRM and EC (Torode, 2000). Musthaler (2000) indicated that the ASP market addresses seven problems: integration uncertainties, large capital investment, system security, software licensing issues, complex networking, IT staff shortage, and unpredictable costs. Corbett (2000) also suggests that speed, focus, flexibility, connectivity, scalability, and price are all leveraged and taken to Internet-time through outsourcing e-commerce. Nearly every task that is repeatable, predictable, and manageable may be applied by ASP through the Internet to supply and deliver software functionality (Musthaler, 2000; Peabody 1999). Until now, the ASP model is more successful than it was in providing services such as Web hosting, EC, ERP, and CRM.



In summary, all of the requirements indicated above are associated with the conducting of EC. Apparently, ASP can be a good solution to maintain the elaborate networking computer systems required by supporting today's bandwidth-hungry multimedia business applications for e-commerce. ASP is the future of outsourcing in the era of e-commerce.

### **3.3.6.3 Opportunities for ASPs**

There were some perceived opportunities for ASP in the early stage of its development. For example, ASPs can address problems such as demand for Web-based or e-commerce applications, the high cost of specialized software or enterprise applications, shortage of IT expertise, and IT infrastructure as well as bandwidth expansion. Microsoft (2000) announced that adopting ASP services should receive the following benefits: predictable costs and low initial investments; enablement of corporate resources to focus on mission-critical goals; and shortening of the time-to-market and time-to-benefit for new IT solutions.

There are other advantages to be had in adopting the ASP model. For example, Ekanayaka (2003) considered that the ASP model is a type of outsourcing and the strength of outsourcing is that a business can focus on core competencies and cost-effectively receive technical expertise. Researchers (Davis, 2001; Fox, 2001; Harney, 2003; Sharma and Gupta, 2002; Sovie and Hanson, 2000) have proposed that ASP has advantages such as new application functionality, more effective utilization of scarce IT resources, broader access, faster implementation and relatively low upfront capital expenses, predictable and consistent costs, scalability and reliability,

all of which make it easier and faster to adopt the latest software in terms of time-to-market. In addressing the issue of security and reliability, Higgins (2006) indicated that customers can seamlessly access the application during a disaster-recovery period since the ASP vendors assume responsibility for back-ups and update software with the latest releases.

In summary, Smith and Kumar (2004) pointed out that the ASP model is suitable for those companies that have any of the following requirements. In terms of financial requirements, these are 1) a need to reduce total costs; 2) a desire to balance cash inflows and outflows by reducing upfront costs. In terms of IS Management the requirements are 1) a desire to quickly gain access to new technology; 2) a need to address internal IT staffing problems (e.g. issues about learning, maintaining and supporting the application); 3) a desire to have an IS infrastructure that supports an increasingly distributed workforce; and 4) a need to have IS employees focus on higher value-added activities.

In the recent years, the development of the ASP model has evolved into SaaS, a new generation of software providers. With more reliability and more flexibility than the traditional outsourcing and first-generation ASP model, SaaS has enabled many companies to lower upfront deployment costs, increase the deployment speed, and enable customers to switch vendors easily. However, these advances are not the only opportunities of this new model. According to Garretson (2005), the adoption of on-demand software offers users more choices to utilize suitable and required

components of application. Web services and service-oriented architecture make customization and integration easier.

The prevalence of enterprise mergers and acquisition has created chaos in software application market in recent years. In order to deal with this situation, renting software applications is a perfect way to avoid loss caused by discontinuity of service because of business consolidation. Therefore, ASP, especially the new generation of the ASP model, is attracting more attention.

#### **3.3.6.4 The Obstacles/Threats to ASPs**

Although a number of advantages have been illustrated, ASPs are not yet a perfect model. Some problems, such as data privacy and compliance issues, expense, complexity, difficulty of deployment and management, customization, integration issues, and security risks still bother the not-yet-profitable, young ASPs as well as their customers.

There are some inherent disadvantages, for instance, Fox (2001) stated that there is a serious concern about the lack of integration between the company's in-house customer databases and the ASP databases that store the delegated registration data, which means that integration with the client's other systems may be problematic. Also, ASPs can only afford a customized solution for the larger clients, so small clients must generally accept the application as provided. From the client's point of view, customization is another problem that should be addressed in addition to integration.

Even though subscribing to an ASP allows a company to avoid purchasing, installing, supporting and upgrading expensive software applications; obtaining this benefit depends on the ability of an ASP vendor to keep a promise and follow the contract. For many potential customers, this is still a real concern.

In spite of their popularity, most of ASPs are still targets for virus control systems, network planning, web hosting, and co-location services. Seldom do businesses outsource their accounting and finance systems associated with security and the corporation's secrets. Finally, security is another major concern (Davis, 2001). Potential customers usually expect a greater professional level of security than they already have in-house.

Speaking of these threats, Marymor (2001) suggested that every ASP should have a service agreement that is part of the contract between the customers and the ASP. Susarla et al. (2003) also asserted that the customers should emphasize rigorous enforcement of SLAs. However, continuing consolidation of an ASP vendor may alter the type or level of service available. From the reliability view-point, researchers maintained that the uncertainty about the future survival of an ASP vendor is a main reason that many companies resist taking action to use ASP services (Davis, 2001; Fox, 2001).

Lastly, the defensiveness of some CIOs, the resistance-to-change by some IT staff, the novelty of ASP, and the concern of sinking costs are also a barrier to further development of ASP (Factor, 2002).

### **3.3.6.5 Prospects for ASPs**

In the beginning, when the ASP model emerged with claims of extensive advantages for client organizations, a number of companies identified themselves as application services providers. However, large numbers of customers were hesitant about adopting these outsourcing models. Some users had even regarded their experience of going down the ASP path as a nightmare. Since then, many ASPs have not been able to continue this service model, and some have gone out of business. Obviously, a more mature model is needed for convincing customers that they will not find themselves in the same predicaments caused by ASPs that did not work properly.

However, it seems the outlook has changed, Vorisek and Feuerlicht (2004) found that the ASP model can help clients to efficiently solve their IT problems more completely than the traditional approaches. This is because of dramatic changes in enterprise applications and their high costs. In their view, ASP will become the dominant approach for delivery of high end applications through the SaaS model in the near future. They suggested that the organizations still adopting license software and in-house implementation need to make preparations for the arrival of this trend in order to take full advantage of it.

### **3.3.7 ASP Firm Origin Type**

At the time of the ASP boom in 2000, the ASP model appeared to be an attractive choice when compared to traditional business models. Consequently, many companies were keen to formulate strategies for this

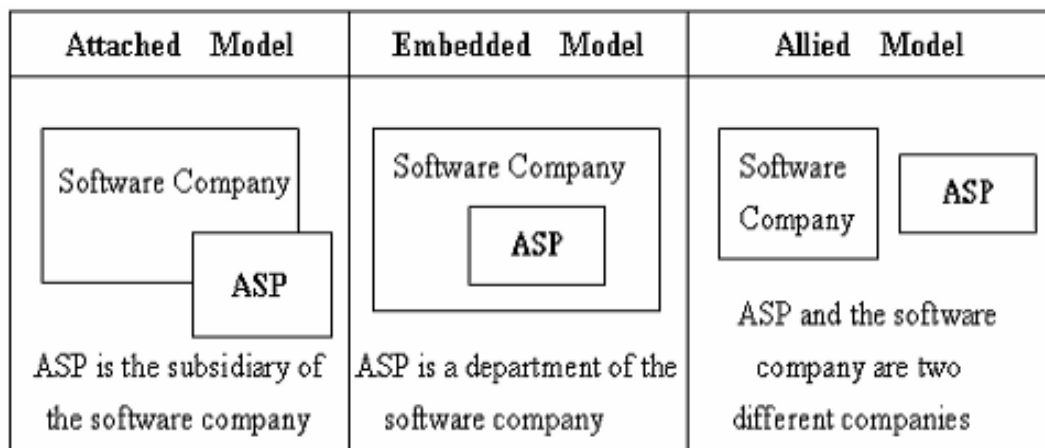
emerging market. Some industries, such as start up ASPs, ISPs, ISVs, network service providers (NSP)<sup>3</sup>, and IT service providers were trying to create a presence in the ASP market (Davis, 2001; Gunson, 2001). This led to a variety of ASP types.

In terms of the source of the application software, Hsu (1999) identified three of the most common models in the early stage of ASP evolution.

- 1). Attached model. The ASP is the subsidiary business of an ISV.
- 2). Embedded model. The ASP is one department of an ISV.
- 3). Allied model. The relationship between the ASP and the ISV is a partnership.

This model is illustrated in Figure 3-4.

Figure 3-4  
*ASP Forming Model*



Source: Hsu (1999)

<sup>3</sup> a Network Service Provider (NSP) is a company that provides backbone services to an Internet service provider (ISP).

Chou (2004) categorized three models of ASP vendor according to the firm's background.

1. Monopolization model. In this model, an ASP company is formed by famous high-end application software companies such as SAP, Oracle, Peoplesoft and J.D. Edwards. Those companies are well known for ERP application development; and ASPs formed under this model have the advantages of owning a large customer base and expertise of application as an outcome. These positives enable them to launch into the medium size business and dot-coms or dot-nets market more easily.
2. Integration model. This model is also known as a pure-play ASP. The ASP is a start-up business formed by the integration of a system integrated provider, ISV, or IT consultants, such as Corio, AristaSoft or eBaseOne. Their services include application customization and systems integration. They provide a variety of applications to meet the requirements of customers. In order to offer integrated IT and EC services, the formation of partnerships and strategic alliances is necessary. Bright Star and Ciber were developed under this model.
3. Spin-off model. For the sake of offering more services to enterprises, some IT departments reform their business into ASPs; in other words, this type of ASP departs from the IT department of another business. Although understand the system and business of the same enterprises fairly well, they lack knowledge and experience of running an ASP business. For example, Information

Technology Total Services, and eLITEON are well known in the field of this type of ASP.

Krappe (2001) categorized ASP suppliers as: (1) Pure-play ASPs (such as Corio); (2) Infrastructure management companies (such as the Telecoms, Exodus, Loudcloud); (3) Legacy software vendors that have an ASP division (like Oracle and PeopleSoft); and (4) Vertical niche ASPs (such as Portera (ISV) and Salesforce.com (ASP)). Many of the infrastructure companies do not have application management expertise, while the software companies do not have technical (network and systems) skill. Vertical ASPs offer point solutions that are not integrated with other enterprise applications.

Davis (2001) also noted more types of ASP in the market place: Pure-play ASP, horizontal niche player, wireless application service provider, aggregator, vertical niche player, full service provider, and managed service provider. Studying the generic models of ASP sourcing, Kakabadse and Kakabadse (2002) posited that ASP companies might consist of the following professionals: ASPs web-sourcing, wireless sourcing, application hosting, and application outsourcing.

In summary, the types of ASP firm origin introduced above have different focuses, for example, Hsu's firm model focuses on the relationship between the software provider and the ASP; Chou's firm model puts more emphasis on the background business of the ASP's origin company whose core business might not be the software development. Kakabadse and Kakabadse (2002) categorizes ASPs by examining the content of their services.



However, as well as the disparities, these models have some similarities in categorization as well. For example, the legacy software vendors that have an ASP division mentioned in Krappe's ASP categorization are very similar to the ASPs formed under Chou's spin-off model and those ASPs formed under Hu's embedded model. The concept of pure-play ASP within Krappe's categorization and Davis' categorization is similar to the ASP which is defined by Chou as the integration model.

Understanding the ASP firm origin enables the researcher to investigate further into the relationship between the firm origin and the customer's perception of satisfaction. For this purpose, based on Krappe's categorization and Chou's firm model, this study targets the provision of service/product and classifies ASP into three major types of firm origin. They are pure-play ASP, infrastructure- provider-turned ASP, and ISV-turned ASP.

### **Pure-play ASP**

Pure-play ASP is defined as a new, small business that delivers services through the Internet and manages client relationships by acting as a complete end-to-end solution provider. All the ASPs which immigrated from IT consultants, SI (System Integrator), and VAR (value-added resellers) are defined as pure-play ASPs. In other words, the scale of this type of ASP is much broader than the traditional definition of pure-play ASPs in this study. For example, companies like Corio, ServiceNet, Surebridge are considered as ASPs with this type of firm origin.

Pure-play ASPs do not develop software. They are used to coordinate with software vendors. Likewise, as hosting requires major investment and a set of skills which is not their core business, pure-play ASPs are not infrastructure resellers either; they outsource the hosting elements to hosting services providers and network providers (Davis, 2001).

In general, the services of this type of ASP are an add-on business. They have to take the responsibility of application implementation and integration, manage the data center and provide continuous connectivity and support.

### **Infrastructure-provider-turned ASP**

This type of ASP is the immigrant of platform companies and network equipment suppliers, e.g. ISP, NSP, ASP Infrastructure Provider (AIP) or all of the associated inside infrastructure service providers. They are facilities-based ASPs that specialize in infrastructure as well as backroom hardware/software and services which are used to host, operate and deliver Internet computing. Examples of these types of ASPs are Clickability, USi, and VeriCenter are the ASPs.

Possessing the infrastructure technology or even their own commercial data center or associated infrastructure, infrastructure-provider-turned ASPs are able to resourcefully operate hosting centers equipped with value-added functionality to support the special demands of application hosting and provisioning, and this is the advantage of this type of ASP. Nevertheless, they specialize in infrastructure software but lack expertise in application software and this is regarded as their limitation.

### **ISV-turned ASP**

Some ISVs have transformed into ASPs and offered their software applications through the ASP model. In this study they are referred to as ISV-turned ASPs. They offer ASP-like services by themselves rather than entering into partnerships with ASPs. Since software development is their prime business, they are considered to have their specialties in application installation, deployment, maintenance, and customization. They already owned their application software and had customers before they functioned as ASPs.

However, some ISV-turned ASPs do not have the infrastructure to support delivery of software (Holt, 2001), or lack infrastructure technology. This weakness makes delivery of all the software a customer may require unlikely to be achievable. Despite this weakness a high percentage of ASP companies are regarded as this type of ASP, including, Employease, Oracle, Peoplesoft, and Ultimate Software.

### **3.3.8 ASP Provider Type**

In terms of service scope, ASP vendors can be categorized into six types. (Dewire, 2000; Focacci et al., 2003; Sharma & Gupta, 2002). These are Enterprise ASPs, Local ASPs, Professional ASPs, Vertical market ASPs, Volume Business ASPs, and ASP aggregators.

- i. Enterprise ASPs. These are the most widely recognized form of ASP. They provide high-end business applications that require customization and are designed for several industries, such as ERP, CRM, EC

applications, and supply extended application management-related services for business. Most offer a pre-integrated portfolio of complementary suites and applications. They are both horizontal and vertical in terms of customer target, as their primary focus is the management of enterprise-level applications.

- ii. Local ASPs or regional ASPs. This type of ASP supplies a wide variety of services for smaller businesses within a limited area.
- iii. Professional ASPs. Also known as specialist or functional ASPs, this type of ASP delivers a single application or more professional service applications for a specific need across industries. These applications include payroll, credit card payment processing, website services, human resource services, and customer relationship management.

As the primary focus is function-driven application management in a wide range of industries, this type of ASP tends to have a horizontal customer approach but more depth and breadth in terms of addressing the aspects of the business functions in which they specialize. Woollacott (2000) suggested that specialist ASPs would need to form partnerships to provide a wider dimension of services.

- iv. Vertical market ASPs. These ASPs provide a solution package (e.g. health-care and medical organizations, insurance or retail industry, real estate, and education) or tailor their services to thoroughly address the requirements for specific industries. The chief difference between vertical ASPs and other ASPs is their differing approaches to software.

While the regular ASPs provide industry-standard, out-of-the-box applications, the vertical ASPs provide proprietary applications that are specially programmed for the industry.

- v. Volume Business ASPs: also known as Quantified ASPs. These ASPs supply small or medium-sized businesses with prepackaged low-end, generic standard software applications in volume. Usually, this type of ASP deals primarily with general business applications that require little customization and can be used in the form of a modified template for standard business applications (e.g. word-processing and spreadsheet applications). Many of these are one-dimensional in scope, and, therefore, cover only general business functions; they lack multi-dimensional depth.
- vi. ASP aggregators, also known as AASPs. These ASPs bring together or aggregate numerous underlying ASPs to provide customers with a wider range of software application suites and associated services than a single ASP can provide alone. ASP aggregators are in essence an ASP with a wide strategic and operational scope.

Some researchers (e.g. Cone, 2000) consider that ASP can also be divided into a two-category classification (vertical ASPs and horizontal ASPs) based on the degree of industry specialization. Vertical ASPs concentrate on a specific industry with services developed especially for that industry, while horizontal ASPs might provide services to several industries without customizing its services toward a particular industry.

In spite of the fact that there are several types of ASPs, Williams (2002) claimed that only two or three ASPs are suitable for the needs/desires of any specific customer. On the other hand, some ASPs can be categorized into more than one type, for example, they can be vertical market ASPs and also professional ASPs.

### **3.3.9 ASP Services**

A wide range of services can be provided based on the application software. Normally, at the beginning ASP vendors provide Network facility installation, co-location, and website hosting. Some provide application designing and development, software installment, and the related hardware equipment requested by customers.

After the system is deployed, services such as application delivery, software maintenance, user training, technical support, IT consulting, and trouble shooting may be provided.

To meet customers' further needs, some services such as application customization, upgrading, and integration might be offered by some ASPs.

It is difficult and inefficient to provide services that cover all these items, thus, an ASP usually only provides some of these services depending on its firm origin, provider type, and service scope.

## **3.4 Chapter Summary**

This chapter has presented an overview of IT outsourcing and hosting services, and introduced ASP concepts and their relevant issues. The

difference between traditional outsourcing and ASP service model was discussed. From the presentation of the evolution and development of ASP, and also its ecosystem and architecture, this research indicates that ASP is a complex model with a variety of firm origins. In this study, three major types are categorized: pure-play ASP, infrastructure-provider-turned ASP, and ISV-turned ASP. In respect of service scope, ASP vendors are categorized into six types: Enterprise ASP, Local ASP, Professional ASP, Vertical market ASP, Volume Business ASP, and ASP aggregator.

The relationship between the firm origin and service scope, and the satisfaction level will be examined later in detail in this chapter. For this purpose, besides the service quality and the factors that potentially influence customer's perception of satisfaction, it is necessary to study some conceptions particularly associated with ASP services. For example, path-dependence and existing expertise might affect the performance of service offering, and the difference in prior knowledge between each type of ASP firm origin and service scope could also impact on the development of the ASP industry. Customization has been included in several models for evaluating IT services; thus this issue might have more impact on the satisfaction level in this context than in other contexts. Pricing/cost was not considered as factor in assessing service quality, but some studies pertaining to ASP evaluation indicated that this issue is important. The next chapter provides more details of these subjects.

# Chapter 4

## Strategic Constraints on Firm Evolution

Some constructs associated with the development of ASP industry are outlined in this chapter. The first section examines the construct of firm origin, the ASP firm origin and market strategies model which is based on Ansoff's product/market growth matrix is introduced. Subsequently, the constraints of improving service quality are studied through investigating the effects of path-dependence. Some other issues related to the nature of the ASP business model and those factors that might cause potential effects on ASP customer's perception of satisfaction are also discussed.

### **Chapter Contents**

- 4.1 Ansoff's Product / Market Growth Matrix
- 4.2 Path-dependence
- 4.3 Other Associated Influences
- 4.4 Chapter Summary

### 4.1 Ansoff's Product / Market Growth Matrix

When studying customer perception of satisfaction, service quality is usually the essential factor to be evaluated. However, for more accurate results, the impact of some other factors (e.g. path-dependence) that make service quality insignificant should also be considered in making an assessment plan. In addition, in respect of the businesses partially associated with



radically new products/service or innovation, an appropriate market growth strategy is the key to achieve a higher level of satisfaction.

Known as a leading strategy theorist, Ignor Ansoff (1957) created a framework with four possible product/market combinations, the Ansoff Growth matrix. This matrix is an approach that provides an alternative concept for businesses to decide their optimal market growth strategy by considering ways via existing and/or new products, in existing and/or new markets. The four strategies making up this matrix are presented below in Figure 4-1.

Figure 4-1

*Ansoff's Growth Matrix*

	Existing Products	New Products
Existing Markets	Market Penetration	Product Development
New Markets	Market Development	Diversification

Source: Ansoff, I. (1957)

#### 4.1.1 Introduction of Four Strategies

Ansoff's growth matrix contains four dimensions: market penetration strategy, product development strategy, market development strategy, and diversification strategy. These are now discussed in more detail.

### **Market Penetration Strategy**

This strategy is suitable for adoption when a firm intends to enter/ penetrate a current market with existing products by increasing the level of marketing effort or the efficiency or effectiveness of marketing effort, and incorporating minor modifications in services. For example, gaining competitors' customers to increase market share, revitalizing the brand to attract non-users, and exploiting new functional use to encourage current clients to consume more product/service are considered good approaches.

Focusing on the product/market growth matrix, Aaker (2001) presented some suggestions for each set of strategies. Regarding market penetration, he argued that with the advantage of having existing resources and experience, a firm can develop growth avenues in the existing product markets with less challenge.

### **Product Development Strategy**

This strategy involves developing new products to sell to existing customers. A firm with a market for its current products might pursue a strategy of developing other products catering to the same market. For example, Microsoft is often releases new versions of operation system or Office productivity software to its customers in the computer software industry. Aaker (2001) suggested approaches such as adding product features, refining product, expanding the product line, developing new generation products, and developing new products for the same market as ways of advancing on this growth path. Usually, when a firm creates new products, it can attract new customers for these products. Therefore, new product

development can be an important business development strategy for firms to stay competitive.

### ***Market Development Strategy***

This strategy is for new markets to take up existing products. An established product in the marketplace can be extended or targeted to a different customer segment, as a strategy to make more profits for the firm. A good example of developing a new market for an existing product is VIAGRA. This drug was first marketed for treating male erectile dysfunction. When it was found to be useful in treating Pulmonary hypertension and Raynaud's phenomenon, the product was given other names (e.g. Revatio). Aaker (2001) noted that some strategies such as expanding geographically, expanding into new market segments, and evaluating market expansion alternatives are helpful for this growth strategy. He concluded that if the business is operating successfully, it is worth attempting to develop the market by using existing products.

### ***Diversification Strategy***

This growth route is diversification involving new products and new markets. For example, 3M Company is an American corporation with a worldwide presence. The company's early innovations included waterproof sandpaper and masking tape in the 1920s. To date, it produces over 55,000 products used for various purposes in various fields, including adhesives, abrasives, laminates, passive fire protection, dental products, electrical materials, electronic circuits, optical films, and supply chain management software. This product range has resulted in the company entering new markets where

it had no presence before. Aaker (2001) recommended some relevant approaches to cater for this strategy, such as a sales force or channel of distribution, a brand name and image, R&D efforts, staff and operating systems, and marketing and marketing research.

Each type of strategy represents a significant venture for the company, and progressively increased exposure to risk. Among the four development strategies, the matrix - penetration strategies is the most conservative; and diversification strategy presents the highest risk. The reason for the high risk in the diversification strategy is that the companies are committing to high uncertainty in both the new products and the new markets.

The Ansoff Product / Market Growth Matrix is one of the most celebrated of all strategic modelling tools. Based on this framework, many research studies in different fields have been developed and empirically tested (Kleinschmidt & Cooper, 1984; Levitt, 1983; Porter, 1980; Varadarajan & Berry, 1983). When applied to ASP market promotion, since each firm origin of this business model has involved innovation in product/service to some degree, the characteristics of this matrix are suitable to use for determining the strategy adopted for each firm type. The question arises as to how this matrix would fit with each firm origin and the framework would look like? These will be studied further in this research.

#### **4.1.2 ASP Firm Origin and Market Strategies Model**

When the ISV-turned ASPs shift in pricing from a one-time license to a rental or subscription mode, or when their products can be accessed by users via

Internet without installing luxurious computer hardware, the outcomes might be increases sale rates and make their products more affordable for the customers (e.g. in a company, more staff or more departments can use an application when they do not have to spend much money to purchase IT equipment for running that application) .

Some pricing models can even help these ASP vendors to improve the market growth rates by increasing the frequency and quantity used. These cases are examples of approaches suggested by Ansoff in his first route of growth strategy - Market Penetration Strategy

When the infrastructure-provider-turned ASP strategically allies with the independent software vendor to offer not only the facilitating services but also the application services for their existing users, this can also promote their market growth rate. This is a typical example of developing products and services for an existing market.

When ISV-turned ASPs deliver their existing products (applications) through the Internet or networks, they are most likely to geographically expand their markets into new market segments. These ASP vendors can be viewed as the practitioners of adopting the strategy of extending their market using existing products.

With regard to the diversification strategy, as noted in Section 3.3.7, the pure-play ASP is very similar to the business that enters a new market with new products by related diversification. For example, in terms of some pure-play ASPs that were transformed from systems integrators, the

provision of Web hosted application delivery service might offer a low cost channel capable of generating many thousands of new users and millions in top line revenue. When infrastructure providers-turned ASPs provide new products or services (e.g. application services, which are developed by their ISV partners) for new customers, this also can be considered as diversification strategy.

By applying the theory of Ansoff's alternative growth strategies in describing the characteristics of each ASP firm origin type, an ASP firm origin and market strategies model is created as shown in Figure 4-2.

Figure 4-2

*ASP Firm Origin and Market Strategies Model*

	Present Products	New Products
Existing Markets	<ul style="list-style-type: none"> <li>● ISV-turned ASP</li> </ul>	<ul style="list-style-type: none"> <li>● Infrastructure-Provider-turned ASP</li> </ul>
New Markets	<ul style="list-style-type: none"> <li>● ISV-turned ASP</li> </ul>	<ul style="list-style-type: none"> <li>● Pure-play ASP</li> <li>● Infrastructure-Provider-turned ASP</li> </ul>

Adapted by Liang for this research

This model is used for identifying the relationship between the firm origin and those factors that affect ASP customer perception in order to present a clearer picture about this complicated association.

## 4.2 Path-dependence

Undoubtedly, service quality has a considerable impact on the level of customer perception; however, other factors, unrelated to the quality of service or product, may also play important roles. For example, Cohen and Levinthal (1990) regarded the level of related experience with prior technologies as a main element of adopting a newer technology. Researchers indicated that prior technology background helps firms adopt new technology more efficiently (Beecham & Cordey-Hayes, 1998; Chatterji, 1996; Helfat, 1997, Lambe & Spekman, 1997). This concept was proved by Zhu et al.'s (2006) research regarding the usage of electronic data interchange (EDI). They found that EDI users with previous Internet operating system (IOS) experience tended to find it easier to accept this new technology by better understanding the difficulty of process change and the true costs.

Schilling (1998) pointed out that final outcomes of a strategy may be swayed by trivial or random events which happened in the initial stage of the technology development. For example, in the 1980s, Sony's Betamax, arguably a better format, was defeated by VHS. The victory of VHS was not due to any technical superiority, but to several trivial factors (e.g. Sony's strategy mistakes and a minor design defect of Betamax). Thus, David (1985) stated that "important influences upon the eventual outcome can be exerted by temporally remote events; including happenings dominated by chance elements rather than systematic forces" (p. 332).

This shows that history is important in the actual development, especially in the cumulation of knowledge or technology. The trend of technology innovation usually follows an existing technological trajectory or competence. In short, bygones are rarely bygones; history has great influence on the development of business, and this phenomenon is known as “path-dependence”.

In conclusion, although service quality is one of the most important factors in evaluating satisfaction level, the effect of path-dependence is also a crucial element that should be considered.

#### 4.2.1 Definition of Path-dependence

This phrase is used to mean that everything has causes. Sewell (1996) broadly defined path-dependence as “what happened at an earlier point in time will affect the possible outcomes of a sequence of events occurring at a later point in time” (pp. 262-3).

However, Pierson (2000) argued that the broader version of dependence can merely indicate the unsurprising claim that history matters. He considered that the alternative, narrower definition suggested by Levi (1997) can better elucidate the impact of history:

Path-dependence has to mean, if it is to mean anything, that once a country or region has started down a track, the costs of reversal are very high. There will be other choice points, but the entrenchments of certain institutional arrangements obstruct an easy reversal of the initial choice. (p. 28)



More clearly exemplifying this conception, Levi (1997) considered that a better metaphor is a tree instead of a path. There are many branches growing from the same trunk of a tree, but no matter how bountiful it is, the branches will never grow too distant from the trunk.

#### **4.2.2 Mechanism for Path-dependence**

Regarding the technology issue, the path of a technology is often characterized by nonergodicity, which means that the small events may have a large impact on final outcomes (Arthur, 1989). From the origin of path-dependence, several mechanisms function to lead to the final result. These mechanisms are increasing return, network effect, network externalities, lock-in, and lock-out.

##### **4.2.2.1 Increasing Return**

The importance of path-dependencies is increased where conditions of increasing returns exist (Teece et al., 1997). Increasing returns processes can also be described as self-reinforcing or positive feedback mechanisms. Functioning at the origin of path-dependence, increasing returns precede steps in a particular direction and cause further movement in the same path. This process leads to a reinforcing pattern as the relative benefits of the current activity compared with other alternatives increase over time. Self-reinforcing makes insignificant circumstances become magnified positive feedbacks to the trajectory, and the end result of a positive feedback is often amplifying and explosive (Arthur, 1989; John, 1999). This

phenomenon explains why the small events of history can become important.

A typical example is the rule of the road. In most countries, cars drive on the right and have steering wheels on their left side, but in the UK and countries that were part of the British Empire cars drive on the left, have their steering wheels on their right side. Technically, the two options are equivalent. The initial choice to drive on a particular side was accidental, but remains a legacy in these countries because of the existing positive feedback mechanism.

The bandwagon effect is significant in explicating the positive feedback process. The bandwagon effect means a popular trend that attracts growing support; it implies that people tend to follow the crowd. Without evaluating the strengths and weaknesses of something, people often act (or believe) because other people act (or believe) the same. In the market, suppliers imitate each other and consumers imitate each other. When studying customer perception of satisfaction and their future purchasing strategies, the impact of the bandwagon effect should not be neglected.

Another mechanism that relates to the positive feedback process and causes path-dependence to occur is the network effect - the phenomenon whereby a service becomes more valuable as more people use it, thereby encouraging ever-increasing numbers of adopters. Since the object of the present study is related to network and information technology, more discussion regarding the network effect is given in the next section.

#### 4.2.2.2 Network Effect

The network effect is a characteristic, that is, when the value of a good or service varies directly from the number of others who already own that good or are using that service (Katz & Shapiro, 1985). In other words, it is a situation whereby a product or service becomes more valuable as more people use it. For example, the benefit of calling and texting in the same Web might gradually create a network effect.

According to Metcalfe's Law, the value of a product can be stated as the square of the number of its users ( $n^2$ ). If a product or service has exceeded a certain number of users (critical mass), it will attract more people to use it, and its value heightens exponentially. Critical mass is the point at which the value of the product/service increases exponentially. After this point, new users have to pay more for this product/service which has come to be considered more valuable (Downes & Mui, 1997).

However, Sculley and Woods (2000) reported that the value of an IT network, e.g., the Internet, actually increases faster than Metcalfe's formula of  $n^2$ . They explained that Metcalfe's network law is based on a telephone or fax network which is a point-to-point connection between two people whereas the IT network is multiple, simultaneous between groups of people's connections. Therefore, the potential value of the IT network is not just  $n^2$ , but  $n^n$ .

No matter whether it is  $n^2$  or  $n^n$ , this increasing rate obviously shows that the network effect creates trends in supplier or buyer behavior, and makes a

significant difference to the final outcome. Based on this theory, Hunt and Morgan (1996) emphasize that this effect is what causes path-dependence.

Shapiro and Varian (1998) indicated that new technologies only bring value when the public accepts them. Thus, they noted that the network effect can maximize the value of intellectual property, differentiate products, lock in customers, and negotiate standards alliances. Therefore, the network effect products have become more prominent in modern life as technologies have made progress during recent decades. For example, in the late 1990s, many dot-coms believed that when a new market containing strong network effects was forming, firms should pay more effort in obtaining a large market share rather than making big profit.

Another related concept to network effect which is also one of the many sources of increasing returns is network externality. Many networks effect markets differ from those in traditional industries in their conduct and performance due to the presence of network externalities. The details of which are presented below.

#### **4.2.2.3 Network Externalities**

Also known as “positive consumption externalities”, network externalities is one of the effects in causing increasing returns (Schilling, 1998).

Katz and Shapiro (1985) noted that a network externality is the increasing utility that a user derives from consumption of a product as the number of other users who consume the same product increases. Liebowitz and

Margolis (1999) stated that a network externality is the increase in the net value of an action an agent derives from a good when the number of other agents consuming the same kind of good changes. It would seem that network externality is very similar to the network effect. However, Katz and Shapiro (1994) indicated that network effects should not properly be called network externalities unless the participants in the market fail to internalize these effects. They argued that when the owner of a network (or technology) is able to internalize network effects, they are no longer externalities.

Regarding the technology issue, Katz and Shapiro (1986) stated that network externalities often exist in technologies that need specific learning before being adopted; when the technology is utilized and expanded further, the learning is more necessary and worthwhile.

Investigating the effect of network externalities on the strategy of infomediaries, Pan (1998) found that when there are still relatively few users, factors like brand and pricing are more important in the competition for market share. With an appropriate strategy and the right capabilities, a late entrant at this stage may catch up with, and even surpass, early movers without too much difficulty. As the users installed base gets larger, the number of users exerts more influence on the competition for market share than brand or pricing. Thus, Schilling (2002) noted that planning a competition strategy for industries associated with technology standards is different from planning for traditional industries, because the impact of network externalities might have to be considered for the former industries.

By locking-in an inferior technology and locking-out a superior technology, the network effects that pose externalities make path-dependence a barrier to market-based economies evolving toward the most efficient technologies (Hunt & Morgan, 1996). In many cases, lock-in and lock-out are viewed as the results of path-dependence.

#### **4.2.2.4 Lock-in and Lock-out**

Lock-in and lock-out usually exist in the IT industry when products are in compatible between different systems. The term “lock-in” in this study means “vendor lock-in”; it is also known as “customer lock-in” or “proprietary lock-in”. According to Wikipedia<sup>1</sup> (2005), lock-in is “a situation in which a customer is dependent on a vendor for products and services and cannot move to another vendor without considerable switching costs, real and/or perceived” (para. 1).

Hertz and Vilgon (2002) proposed that from the company’s point of view, the lock-in effect limits the possibility of a specific customer account changing to the competitors of the company. Gerdelman (1994) proposed that a good customer service experience can lock in customers. However, Håkansson and Snehota (1995) warn that a lock-in effect may cause a business relationship to become a burden to the parties involved.

A monopoly may be formed when a lock-in effect creates market barriers to entry; and a lock-out effect can develop as a result of formation of a monopoly. When a customer is using a product with a proprietary format or lack of configurability, this user cannot use another vendor’s product in

conjunction with this product. This is called lock-out. Schilling (1998) stated that a firm may be locked out because the technology standard it supports is not compatible with the competing standard. In her view being technologically locked out is likely to lead to disastrous outcomes for a firm. Furthermore, she indicated that those industries with strong network externality effects can also face lock-out if they do not have sufficient installed base to meet customer requirements, or if they fail to predict future customer needs and requirements.

Huge switching cost is the main factor causing lock-in as it can retain customers in the same vendor or supplier. This issue has increasingly attracted the attention of researchers. For example, Jones et al. (2002) proposed six dimensions of switching cost and examined their correlations to customer retention. In addition to switching cost, Bitner (1990) speculated that time or money constraints, lack of alternatives, and habit might also affect service loyalty. With respect to path-dependence, once the trajectory has been shaped or the eventual outcome has emerged, it becomes difficult to return to the original situation because change is costly and so firms must take approaches to minimize pay-off change (Reich, 1987; Teece et al. 1997).

A technology that by chance gains an early lead in adoption may eventually corner the market of potential adopters, with the other technologies becoming locked out (Arthur, 1989, p116). This means that firms with the top quality services (or products) might not always dominate the market, as chance events may cause lock-in on inferior technologies (Arthur, 1983).

Since the ASP model is still immature, many service providers that are unable to provide an outstanding quality of services or products might take advantage of the lack of service standardization to keep their customers from switching. On the other hand, satisfactory services might make the possibility of locking in customers even higher in the beginning of the development of an industry, for example, Tamm and Günther (2000) indicated that an ASP is likely to create greater dependency, and therefore greater customer lock-in, if it knows to invest in its own branded services explicitly for the customer.

#### **4.2.2.5 Section Conclusion**

In summary, caused by the mechanisms of increasing return, amplified by the network effects and network externalities which result in the lock-in and lock-out effects, the random minor historical events occurring at the origin of technology development might have an immense impact on the eventual outcome and make a big difference to the anticipated result. Thus, Arthur (1989) noted that the power of path-dependence apparently can make the strategic planning more complicated and cause unpredictable results.

It seems that path-dependence might make a marketing strategy difficult to determine, and even make the efforts exerted on service or product quality improvement ineffectual. Regarding this concern, Schilling (1998) argued that the influences of path-dependence might be beyond the control of firms; however, the effects are indirect and firms therefore should focus on managing those factors that are controllable in order to minimize the impact of path-dependence. Similarly, Cooper (2000) considered that it is



possible to form a model to remove or avoid some idiosyncratic events in the process of planning marketing strategy. Despite the complexity of technology trajectories, Schilling (2002) also indicated that if the hidden order underlying a complex system can be explored, the influences of random events can be more clearly detected; and therefore the process of technology selection can be modeled and the final outcomes can be more accurately forecast.

In conclusion, some researchers considered that path-dependence is an important dimension and its power is massive (Arthur, 1988; Cohen and Levinthal 1990; Teece, et al. 1997; Zhu et al. 2006), some emphasized the effect of lock-in caused by a particular standard (Arthur, 1988), some (Cooper, 2000; Montealegre, 2002; Schilling, 2002) argued that although the trivial events of history can have a profound impact on the eventual result, some of the factors that are path-dependence centered can be controlled. Thus the process of a new strategy development can be tactically planned. They pointed out that it is possible to model and predict technological lock-out. Based on their own theoretical frameworks, both points of view are reasonable to some degree. However, most of their arguments are targeting traditional technology-intensive markets. In studying the marketing planning of ASP which is more associated with Internet or Web-based technology, the researcher has investigated whether these effects affect a customer perception in this industry. If the research result shows that they do, the advance concern is that if these impacts are stronger than the influences caused by service quality, how do they work ? and Can they be modeled?

## 4.3 Other Associated Influences

Although path-dependence is one of the main possible concerns besides service quality in impacting on the development of fast growth or transformed industry, some other potential influences indirectly related to path-dependence (e.g. expertise), or not related to path-dependence but associated with the nature of the ASP business model (e.g. transaction cost, standardization and customization) also play an important role in determining customer perception of ASP. These influences are discussed in the following subsections.

### 4.3.1 Expertise and Perceived Expertise

The adoption of the ASP business model is an innovation for a business. In respect of innovation, Damanpour (1991) defined it as “[the] adoption of an internally generated or purchased device, system, policy, program, process, product, or service that is new to the adopting organization (p. 556).

He considered that the purpose of innovations is to improve performance or effectiveness through the approach of changing an organization. However, differences in organization’s background might influence innovativeness; for instance, the differences in the technologies that existed in the business might make the innovation more effective in boosting competitiveness.

Since ASP is a complex ecosystem consisting of hardware and software providers in the fields of computing and networking (see section 3.3.5), there is a wide difference between each type of ASP and the scope of their

services. Accordingly, expertise, especially the existing technological knowledge, plays an important role in the development of this industry.

The word expertise has a variety of meanings. For example, Becker (1964) and Schultz (1961) considered expertise as a specific kind of human capital, and a technological knowledge resource. McCroskey (1966) viewed it as “authoritativeness”, Whitehead (1968) referred to it as “competence”, Applbaum and Karl (1972) stated that it is “expertness”. According to Fogg (1999), expertise is associated with the qualities of experience, intelligence, power, and knowledge. In this study, expertise is regarded as the technology, capability or knowledge base possessed by an entity such as an individual person or an organization.

Crano (1970) investigated the dimensions of expertise and revealed that subjects exposed to a high-expertise source showed more agreement with the advocated position than those exposed to a low-expertise source. Cooper and Kleinschmidt (1986) found that a strong knowledge base assists in the development of new products. Furthermore, it facilitates marketing and technological collaboration between the innovative product and the firm's existing expertise (Montoya-Weiss & Calantone, 1994; Zirger & Maidique, 1990). Brockman and Morgan (2003) also proposed that a strong existing knowledge base helps firms obtain a shared interpretation of associated newly acquired information by improving their operating competence. These viewpoints explain why prior knowledge is important for the fast growth firms and innovative firms.

Cohen and Levinthal (1989) indicated that without the knowledge base generated from prior R&D investment, a firm might be locked out of their business. Likewise, Ayers et al. (1997) and Dougherty (1990, 1992) considered that high interdepartmental collaboration in terms of critical skills and information can greatly increase the success of a new service/ product. These suggestions support the views of Holland (1975) that communal memory may result in new products and greater services creativity by recombining shared knowledge.

Considering that learning is more difficult in novel domains, Cohen and Levinthal (1990) argued that the level of prior related knowledge is crucial to the ability of evaluating, assimilating and utilizing external knowledge. They called these abilities a firm's "absorptive capacity". In their view, it is important to invest in expertise in the early stages during the development of technical capability because of the effect of history- or path-dependence on the development of absorptive capacity and innovative performance. About the same time, Tushman and Nelson (1990) pointed out that core and linking technologies have their own technological trajectories. They suggested that in the expertise-intensive industries, managers should improve structures, roles, and processes to deal with the complexity of product/ service.

More specifically, Cohen and Levinthal (1990) noted that more proactive, exploiting opportunities present in the environment, independent of current performance are the characteristics of firm with high levels of absorptive capacity. Koslow et al. (2006) indicated that when high internal motivation is involved, teams that possess high expertise will derive more advantage

than those possessing low expertise. They also speculated that the size of a firm can determine the firm's ability to specialize and divide up complex tasks and thus affect the absorptive capacity of organizational learning, and ultimately the degree of innovation.

Collectively, domain-relevant existing expertise could affect the performance of fast growth industries. Basically, ASP can be regarded as a new technology-intensive industry and a creation of transformation from various firm origins. As each type of firm origin has a different history with its prior own strengths and expertise, the assertions as noted above imply that expertise should be one more determinant of its development. For example, the expertise of ISV-turned ASPs is the comprehension of application software (e.g. installation, deployment, maintenance, and customization); the expertise of infrastructure-provider-turned ASPs is the competence of providing infrastructure service to keep application operating efficiently. The expertise of pure-play ASPs is the ability to coordinate effectively with software vendors, the knowledge of managing application and data centers, and the experience of the IT consultants. These different expertises might have different impacts on the absorptive capacity of their organizational learning, and subsequently on the competence of their business offerings as well as service performance, and therefore, the achievement of the transformation and innovation of this business model.

In addition to examining the impact of expertise, perceived expertise is also an important dimension as its impact might be greater than expertise through the Influence of word-of-mouth. In focusing on the context of

communication, Crisci and Kassinove (1973) investigated the effect of the perceived level of communicator expertise and the strength of advice on behavioral compliance. They concluded that these components positively related to subject compliance with source recommendations. McGinnies and Ward (1980) assessed the factors that impact the communicator's persuasiveness and found out that a source with a high level of perceived expertise and trustworthiness generated the most opinion change.

Trustworthiness together with expertise have frequently been considered as potential determinants of source credibility (Hovland and Weiss, 1951; Dholakia and Sternthal, 1977; Ohanian, 1991). For instance, in exploring the relationship between advertising and consumer behavior, Ohanian (1990, 1991) found that a correlation between the constructs of expertise, trustworthiness, and attractiveness. However, of the three dimensions, perceived expertise was the only factor significantly related to respondents' purchase intentions when the source was a celebrity.

Abernethy and Butler (1992) pointed out that a high level of credibility might result from word-of-mouth, and this mode of communication can exert significant influence on the choice of a provider. However, it is difficult to be manipulated, especially for an innovative business that only a small number of consumers have tried. Similarly, studying the credibility of websites, Fogg (1999) demonstrated that highly credible websites have high levels of perceived expertise and trustworthiness. He argued that advertisements from highly reputed organizations increase trustworthiness.

Vanhonacker (2007) indicated that from the consumer point of view, a perceived lack of expertise appears to decrease the consideration of retention even when a brand-bridging strategy is conducted. By examining cues that elicit herd behavior and influence consumer on-line choices, Huang and Chen (2005) studied the perceptions of trustworthiness and expertise, and found that sales volume and the number of positive customer comments of a product influenced the on-line product choices of subjects. In all, these findings and explanations indicate that perceived expertise influences the perceived trustworthiness, purchase intention, retention, and also the perceived satisfaction level.

#### 4.3.2 Transaction Cost Theory

Arrow defined transaction costs as "the costs of running the economic system" (1969, p. 48). Barzel saw them as "the costs associated with the transfer, capture, and protection of rights" (1997, p. 4). Eggertsson called them "the costs that arise when individuals exchange ownership rights for economic assets and enforce their exclusive rights" (1990, pp. 14-15). Cheung (1992) broadly stated that transaction cost is any cost that arises due to the existence of institutions; hence, it is also called "institutional cost".

In all, transaction cost is a type of non-monetary cost that is paid for making an economic exchange. While switching cost is more likely to anticipate the outlay occurring in the future, transaction cost is more associated with the cost incurred in the present arrangement.

Historically, the transaction cost theory first developed by Coase (1937) and later Williamson (1975) asserted that interactions between buyer and seller have a cost which is caused by incomplete contracting, and firms will choose transactions that economize on coordination costs. Transaction costs include search and information costs, bargaining and decision costs, and policing and enforcement costs. Williamson (1985) stated that transaction costs give an explanation for the existence of organization hierarchy, and the degree of hierarchy which is the extent of centralization of power and control. In his view, this model consists of four basic elements: (1) The transaction is the basic unit of analysis; (2) transactions vary with respect to their frequency, uncertainty, and asset specificity, which affects the ease of redeploying assets to other users; (3) there are a set of generic modes of governance, including markets, hierarchies, and intermediate forms; and (4) "transactions, which differ in their attributes, are aligned with governance structures, which differ in their costs and competence" (Williamson 1996, p. 356).

At the same time, Miller and Vollman (1985) provided a perspective of transaction costs within the electronics industry. They explained that unplanned flows of information lead to changes in transactions, causing significant overhead costs. Considering that the drivers of support costs were hidden in traditional accounting systems, they pointed out that support costs are not driven by production volume, but by four types of transactions: logistical, balancing, quality, and change transactions.



In the IT context, Rajagopalan et al. (1996) applied transaction cost economics in their analysis of information technology outsourcing. Focused on the contracting environment, they explained what is present at the stage of contracting between outsourcing companies and their clients, whether or not the client has an IT department. They considered that IT management needs to reduce costs throughout the organization, therefore the outsourcing decisions are usually rationally and economically motivated; for example, the factors such as consolidation of data centers, improvement in IS organization, and overall IT knowledge acquisition have more influence on outsourcing decisions.

Following from this, Ang and Straub (1998) studied economic determinants of IS outsourcing. They decided that the ability to explain outsourcing within the larger context of organizational strategy and environment can be improved by comparing economic theories and models. They found that similar to their effect on production, transaction economies can influence IS outsourcing. They suggested that managers should analyze the value of transaction costs when they are making a decision to invest money in outsourcing.

Most recently, Smith and Rupp (2003) pointed out that Williamson's transaction cost model helps to explain why outsourcing transactions which are not core competencies is descriptive of the evolving ASP environment when an individual firm may utilize this model for its decision in a "build or buy IT infrastructure" strategy. Their study was similar to that of Pisano (1990) who investigated the locus of a corporation's R&D boundary and

explored under what conditions firms make rather than buy R&D. Smith and Rupp (2003) also pointed out that the market cannot sustain a larger number of players without a change in the cost or the goods offered. Their findings are regarded as the decision criteria for practitioners.

In some researchers' point of view, transaction cost can provide a coherent framework for investigating the determinants of vertical integration over different industries (Isaksen & Dreyer, 2000). When vertical integration is one of the main concerns for some ASP services, transaction cost should be taken into account for evaluation.

In conclusion, transaction cost has specific influence on the organizational strategy, it includes the adoption of IT outsourcing and the use of the ASP model.

### 4.3.3 Standardization versus Customization

Standardization and customization are two alternative components of providing a product/service which is cost-effective and able to more accurately meet the requirement of customers. While the first is required for lowering the cost through economies of scale, the second is necessary for making products more appealing to specific customers.

- **Standardization**

Standardization can be defined in different terms; for example, in the context of technologies and industries, standardization is "the process of establishing a technical standard among competing entities in a market,

where this will bring benefits without hurting competition” (Wikipedia<sup>1</sup>, 2005, para.1). In the context of marketing, Lee and Carter (2005) acknowledged this term as “a global marketing strategy for the provision of standardized goods or services unchanged in any one country” (p. 32).

According to the North Atlantic Treaty Organization (NATO), standardization can be generally categorized into three levels: compatibility, interchangeability and commonality (DStan, 2000). Compatibility, the lowest level of standardization, is the ability that allows the replacement of one subsystem in the originally designated system in a relatively transparent manner without causing unacceptable interactions which might lose data or cause problems for operation. Interchangeability is the capability that an object can be substituted by another object without adapting the code for using the object. Commonality, the highest level of standardization, is about equipment or systems that have the feature of one entity possessing like and interchangeable parts with another piece of equipment or a system entity.

In the ASP services context, Tao (2000) determined two levels of standardization. The basic level is the standardization of data formats of major applications, and the advanced is the user interfaces of major applications. He pointed out that a basic level can help the ASP company process user data effectively; whereas the advanced level can help the ASP customers adopt the application easily without a learning curve. Further, he considered that the ASP model, together with service standardization, will lead to a networked economy.

Standardization is generally used to meet the common customer needs, to reach an economy of scale, to promote products to global customers, to shorten the time to market, and to reach regional market agreements. However, when it comes to the ASP context, service standardization tends to be more important in promoting competition. Quinton (1999) argued that standardization helps dictate the choice of software vendors. In addition, Feinberg et al. (2000) reported that the standardization of software could lower the switching costs for customers; ASPs would, therefore, have to find other ways to retain customers. In contrast, an industry-specific standard can be beneficial to ASPs if they are in a position to impose them on their ISV partners.

Since the technical and marketing standards might be determined by the vendor who has a big market share, the standard is one of the critical factors influencing the future competition of ASPs.

- **Customization**

Customization can be defined as the service representative's ability (or willingness) to alter the product offering in terms of specific service attributes, to suit the individual customer's needs (Smith & Barclay, 1997).

Generally, customization is a marketing strategy suggested by researchers to address the concern of heterogeneity (Berry, 1980; Sasser and Arbeit, 1978). In an IT context, customization is commonly used in adapting the application software to meet the various requirements of customers. Accordingly, the current software development strategy is typical of

'make-to-order' or customized software development. Most off-the-shelf high-end software packages (e.g. ERP) do not meet the precise needs of the majority of manufacturing operations, therefore adaptation or customization is necessary. Fully tailor-made software would of course be the ideal product for the CEO/CIO without considering the cost.

Although some companies can afford to fully integrate all their applications across a common platform, smaller companies would be priced out of the market if software was only offered as a "one size fits all" and could not be customized. Even worse, it could cause trouble in system performance or compatibility between different systems to rewrite codes in off-the-shelf software. This is another reason for stressing the importance of customization.

Focusing on information management system (IMS) outsourcing, Sherwin (1998) argued that customization is required in system merging, and training for all the users should be conducted. Harris (2000) added that customization is fairly common and most of this deals mainly with the change of output reports.

Pine (1993) claimed that to retain customer loyalty, a business should regard every customer as an individual by offering customized products and services at a reasonable price, thus, mass customization (MC) is considered as a strategy to cost-efficiently satisfy the individual needs of so many different customers. In recent years, MC has been largely conducted in developing information systems and e-business. For example, Warkentin et al. (2000) found that many software vendors offer downloads of their

products from websites, and there is a trend toward leasing applications from ASP on an as-needed basis.

Davis (1998) mentioned that cost is the main concern for the majority of the customers who avoid customization. Usually, the cost caused by 1) the initial implementation of modified system or the installation of altered application; 2) the continued maintenance of customized software; and 3) the program upgrading. Harris (2000) also raised concerns about customization – development cost, test issues, difficulties of upgrades. Targeting ERPs, Stedman (1998) stated two reasons against customization: faster implementation, and lower upgrade complexity.

The discussion above concludes that the standardization and customization issues represent a fundamental dilemma faced by many ASP companies. Customization generally yields a richer and more satisfying customer experience, building customer loyalty and greater value-added revenue through a relationship building process; whereas standardization reduces cost and skill requirements, assuring a minimum performance level which is more measurable, but depersonalizes the interaction.

Because of the diversity of customers, all businesses must continually search for the optimal trade-off and maximal organizational effectiveness, thus it makes performing a balancing act between standardization and customization essential and a significant challenge. Ramasubbu (2005) wrote that there are multiple forces that affect standardization and customization decisions, such as economic incentives, external

technological standards, the product design, a competitive landscape and customer base influence. However, from a cost viewpoint, the level of transaction cost also plays an important role in deciding the degree of standardization and customization. In an IT context, businesses try hard to obtain the optimal dividing-line between standardization and customization. Is this strategy applied to the ASP industry too? This question is worth exploring further.

#### **4.4 Chapter Summary**

Focusing on the factors that are outside of the context of service quality, this chapter introduced their potential influence on ASP users' satisfaction levels. First, the ASP firm origin and market strategies model which was developed based on the Ansoff's product / market growth matrix was illustrated. Then, path-dependence and those mechanisms for this concept were introduced. Finally, other theories associated with the ASP model and its customer perception were discussed.

The next chapter demonstrates the research model of this study and carefully articulates the hypotheses to be tested. The linkage among the existing theories and the implied effects of the mechanisms for path-dependence, and the associated factors of firm evolution on the ASP customer perception are also discussed.

# Chapter 5

## Research Model and Research Hypotheses

This chapter presents a conceptual model of factors which determine the customer perception of satisfaction with ASP, together with the proposition of the research questions. Following is the discussion of hypotheses of this study. Most of the hypotheses are based on the findings of the previous literature introduced in Chapter 2 to Chapter 4.

In this chapter, the potential influence of the mechanism for path-dependence is discussed. Each mechanism will show up as a specific pattern of linkage with associated constructs of the conceptual model. Paying close attention to these patterns makes it possible to determine the correct mechanism for path-dependence in this market.

### Chapter Contents

- 5.1 Developing the Research Model
- 5.2 Research Hypotheses
- 5.3 Determining Mechanisms for Path-dependence via Customer Service Model Linkages
- 5.4 Chapter Summary

### 5.1 Developing the Research Model

This section covers two subjects. Firstly, a research model will elaborate on the relationship of the concepts as presented in this research. The model has been developed on the basis of literature and theories concerning



customer satisfaction assessment. Secondly, research questions which are used to describe the concept of the research model are discussed. These queries will illustrate the research problem, while the research model will show the relationship between each construct.

### 5.1.1 Research Model

The object of this research is to comprehensively investigate the factors which determine ASP customer perception. These potential determinants are included in three clusters of constructs: ASP business position, service utilized, and user perception of service competitiveness.

The first cluster of constructs (i.e. business position), based on prior study and archival research pertaining the ASP ecosystem, identifies the firm origin and provider type of the study object. This cluster is used for exploring the relationship between business position and the level of customer's perceived satisfaction. Besides service quality, path-dependence and Ansoff's product / market growth matrix are the main concepts for evaluating this linkage.

According to the discussion in Chapter 4, there is a great difference between each type of ASP and the scope of their service. It could therefore be inferred that customer perception of satisfaction might be affected not only by the type of ASP but also by the scope of the service or the service itself. It is therefore worthwhile exploring the effect of the characteristics of service utilized by customers on the satisfaction level. Reference to the research model, the second cluster of constructs (i.e., service utilized) is determined by those items which were obtained from documentary

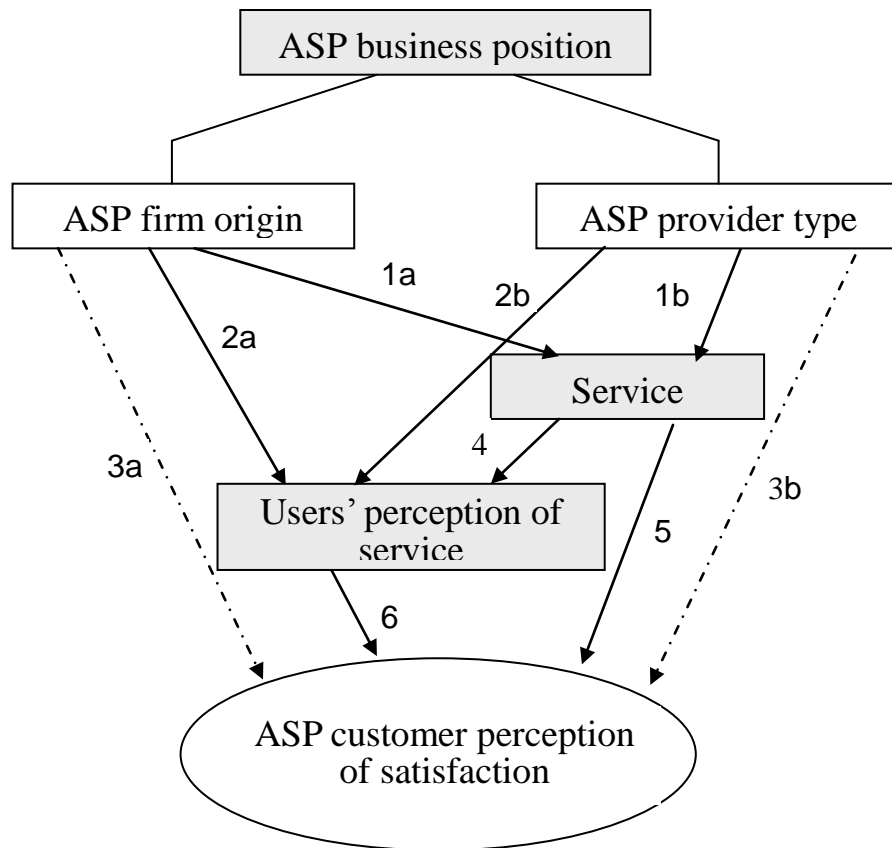
research in terms of discovering the character of services utilized by ASP users. More details are presented in Section 5.2.2.

The third cluster (i.e. competitiveness evaluation) can be used to measure the correlation between user perception of service competitiveness and satisfaction. This cluster includes some factors of the computer user satisfaction measure scale developed by Bailey and Pearson (1983) and the ASP service quality evaluation model established by Ekanayaka et al. (2003), along with factors mentioned in other theoretical and empirical articles that appear useful for evaluating the satisfaction of ASP customers (see Table 5-1). The term “competitiveness” represents service quality plus some other considerations (e.g. pricing, lock-in effect, market share).

Figure 5-1 below shows the ASP customer perception of satisfaction model. The numbers displayed in the model refer to the research questions that follow in section 5.1.2.

Figure 5-1

*ASP Customer Perception of Satisfaction Model*



### 5.1.2 The Research Questions

While the research model presents an overall conception of research objective, the research questions clarify the problem statement. Based on the research model, six research questions are suggested.

1. What effect does the ASP firm origin and ASP provider type have on the service utilized? (as Figure 5-1: 1a and 1b)
2. What effect does the ASP firm origin and ASP provider type have on the user perception of service competitiveness? (as Figure 5-1: 2a and 2b)
3. What effect does the ASP firm origin and ASP provider type have on the ASP customer perception of satisfaction? (as Figure 5-1: 3a and 3b)

4. What effect does the service utilized have on the user perception of service competitiveness? (as Figure 5-1: 4 )
5. What effect does the service utilized have on the satisfaction of ASP customers? (as Figure 5-1:5 )
6. What effect does user perception of service competitiveness have on ASP customer perception of satisfaction? (as Figure 5-1:6 )

## 5.2 Research Hypotheses

This section presents an operational definition of each dimension of the research model, along with its potential elements. An operational definition is a clearly defined set of procedures to explain how concepts or variables are labeled (Zikmund, 1997).

### 5.2.1 ASP Business Position

In this study, the term 'business position' is defined as the status or image of a firm from the view of researcher, and it is identified based on business background, presented strength, existing specialty, service scope, consumer segment, and market focus. Two dimensions are included for exploring this issue: ASP firm origin, and ASP provider type.

#### 5.2.1.1 ASP Firm Origin

Examining the business owners/entrepreneurs of small businesses, Rogoff and Lee (1996) categorized firm origin into three basic groupings: Creators, Inheritors, and Operators. They found that firm origin leads to important discriminate outcomes among these three groupings, as their study results

showed that operators have the highest level of risk ignorance whereas the creators have the lowest. Operators reported the lowest level of satisfaction regarding their current business while the inheritors reported the highest. Accordingly, firm origin might also have influence on other concerns, for example service utilized, the user's perception of service competitiveness, and their perception of satisfaction which are the main issues of the present study.

The term 'firm origin' has been created based on the notion that an ASP is a consortium of businesses. It is evident that so far no one ASP can provide all types of services independently; therefore, besides strengthening their own professional expertise, developing strategic alliances and partnerships with other companies is an essential strategy for an ASP vendor who wishes to provide a seamless, wide range service to their customers. More specifically, firm origin is used to describe the existing professional speciality of a business before it began operation in the ASP industry.

In this study, firm origin is categorized into three types: Pure-play ASP, Infrastructure-provider-turned ASP, and ISV-turned ASP. For example, pure-play ASP is a start-up ASP vendor that acts as a complete end-to-end solution provider, whose major business is delivering services through the network and managing client relationships. This type of ASP does not understand software as ISVs do, but understands the functionality of the application as well as the requirement of customers, so is able to customize the application for the functionality required by the customer. An ASP company might be established by a team including the chief executive officer

(CEO) and chief information officer (CIO) of an independent software vendor; in this case, this type of ASP is named ISV-turned ASP. If an ASP is transformed from a data center infrastructure provider, network equipment supplier, network service provider, independent service provider, or infrastructure software provider, then this type would be termed an infrastructure-provider-turned ASP. Chapter 3 (3.3.7) provides more details regarding this aspect.

ASP firm origin is a new construct. It might have an effect on the satisfaction of ASP users (e.g. a pure-play ASP might satisfy its users more easily than infrastructure-provider-turned ASP because its consultant background might help it more efficiently provide customization services).

Therefore it is proposed that:

**Hypothesis 1a:**

The ASP firm origin will directly influence customer perception of satisfaction.

It is important to explore the relationship between firm origin and the customer's perceived satisfaction. For example, TECO is an electric and machinery company that was transformed from an industrial motor manufacturer in Taiwan. In general, the refrigerators it produced received a higher level of satisfaction than other brands, because the users had confidence in the quality of the compressor installed in the refrigerator.

Customer perception of satisfaction is the main research object of this study. However, this dependent variable might be affected by such factors as

services utilized and service competitiveness (see Hypothesis 3a and Hypothesis 4). Consequently, the ASP business position might indirectly influence customer's perception through affecting the services utilized and service competitiveness.

An ASP with a different type of firm origin has its own speciality, and this area of expertise determines the service type and scope provided by ASPs (e.g. an ISV-turned ASP is more likely to provide high-end application services than the infrastructure-provider-turned ASP). Thereupon, when two ASP vendors with different types of firm origin provide similar services, prospective customers might choose the services depending on the firm's origin. It is therefore expected that:

**Hypothesis 1b:**

The ASP firm origin will directly influence the services utilized.

In view of the fact that each type of firm origin has its strengths and weaknesses as discussed above (see 3.2.1.1), this might affect the user perception of service competitiveness in different aspects (e.g. the performance of the service from an infrastructure-provider-turned ASP might be better than those provided by the pure-play ASP, and performance is part of the criteria of evaluating the degree of service competitiveness). Based on this assumption, it is proposed that:

**Hypothesis 1c:**

The ASP firm origin will directly influence user perception of service competitiveness.

### **5.2.1.2 ASP Provider Type**

Provider type is determined by the customer segment served, the requirement of customers, targeting solutions, the product (application) function and scale, and the service breadth and depth.

Basically, there are specialist/functional ASPs, vertical market ASPs, enterprise ASPs, local ASPs, and volume ASPs. A specialist/functional ASP is an ASP vendor whose core business is delivery or management of a single category of application. A vertical market ASP delivers a solution package for a specific customer type or specific industry. An enterprise ASP delivers broad spectrum solutions or high end applications. A local ASP delivers small business services within a limited region. A business ASP is a vendor that offers a low cost packaged solution via its own website; it is also known as volume ASP as its high volume is one way to lower the unit cost of each transaction. More details about these types of ASP are presented in Chapter 3 (Section 3.3.8).

In the researcher's view, because each type of ASP has different target markets, this dissimilarity might influence the level of satisfaction. For example, the customers of a business/volume ASP might be more easily satisfied than the other customers because the applications provided by this type of ASP are mainly used in general IT processing without requiring complicated learning efforts. On the other hand, the customers of a specialist ASP might have higher expectations than other customers because the applications provided by this type of ASP are more focused on some specific objectives, and very often, the precision, reliability, and security are considered



the compulsory elements to reach these objectives (e.g. a financial company might expect an absolutely reliable system to make sure all the data is updated and secured). Also, the customer of an enterprise ASP might have extra requirements because the services they provide are more focused on the operation and maintenance of high end applications. This case, more people and organizations associated with the customers and their existing systems would be involved. It might end up a complex application in which extra functions or efforts would be required to achieve a stable and efficient process performance.

The explanation above shows that different types of ASP providers will encounter disparity in users' expectations and requirements depending on the service/product they provide and the customers they serve. Accordingly, the researcher assumes that these diversities might cause some degree of impact on the customer perception of satisfaction. Thus, it is hypothesized that:

**Hypothesis 2a:**

The ASP provider type will directly influence customer perception of satisfaction.

Consequently, this disparity may affect customers' preferences when choosing services and their selection opportunities, for example, some types of ASP vendors provide a variety of application services, but these are not intensive enough to meet some particular needs of customers. It is therefore expected that

**Hypothesis 2b:**

The ASP provider type will directly influence the services utilized.

In addition, differences between provider types might affect user evaluations of service competitiveness. For example, some products or services provided by some specific types of ASP might be cheaper, others might have better performance, some might be more reliable, some might be easier to use, and some might be easier to maintain. Therefore it is proposed that:

**Hypothesis 2c:**

The ASP provider type will directly influence user perception of service competitiveness.

**5.2.2 Service Utilized**

Usually, the ASPs provide a variety of services to their customers. To determine the service items appropriate for this study from such a big service scope, the researcher examined the ten most common services provided by the top fifty ASP vendors. These are application development, application maintenance, application integration, data center, hardware installation, Internet facility, IT consulting, software implementation, software upgrading and user training. As a result, these items make up the service utilized cluster.

**Application Development**

Application development means the process of developing software in a systematic fashion. Its life cycle includes the following tasks: defining user requirements, deriving system requirements or features, surveying existing grid components, identifying useful grid components, developing components to fit into the gaps, integrating the system, deploying and testing

the system, and maintaining the system during its operation. In other words, this service designs or creates software applications by applying a wide variety of technologies (e.g. system analysis, programming, code reviews, and application testing) and practices such as compilers, code repositories, and word processors.

### **Application Maintenance**

The software maintenance means the changes of application software for the purpose of correcting defects and deficiencies found during field usage as well as the addition of new functionality to improve the usability and applicability of that software, in order to keep pace with the changes in the business and technological context. Web applications and website maintenance are included in this study. So examples of application maintenance would be new management processes and service delivery implementation, fault analysis, design update, upgrades and patches, code review, documentation maintenance, and application enhancements.

### **Application Integration**

Application integration is defined as the process of bringing data or a function from one application program together with that of another application program. It creates communication between applications performing distinctive functions, and allows data from software to be read or manipulated by a second so that common information can be shared and updated resulting in ease of use. Examples are creating communication between CRM, Billing, and Logistics, sharing and updating common information with customer details and product catalog information.

Usually, to integrate an existing program with a new program or with a Web service program of another company is a challenge for a business. The use of object-oriented programming<sup>4</sup> is helpful for the future integration of an application program; while the Extensible Markup Language (XML)<sup>5</sup> is helpful to exchange data among disparate programs in a standard way.

### **Data Center**

This service provides a facility to be used for housing electronic equipment, for example, computers and communications equipment. Usually, it is maintained by an organization for the purpose of handling the data necessary for its operations. Server colocation and Web hosting are considered as typical samples of this service in the current study.

### **Hardware Installation**

Some ASPs emphasize that no hardware installation is required when they provide e-Business solutions, because their customers can access the application hosted on the server of the ASPs, but some ASPs still provide hardware installation services for their customers depending on their requirements. A hardware installation service involves the installation of devices used for IT or computing network (e.g. routers and switches installation, infrastructure deployment) and ensuring that it can function properly. This service is important for startup companies.

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4. A programming approach based on the concepts of data abstraction and inheritance. Unlike procedural programming techniques, object-oriented programming concentrates on what data objects comprise the problem and how they are manipulated, not on how something is accomplished.

5. XML is a capable way for describing many different kinds of data that use in WWW.

### **Internet Facility**

Internet facility includes the hardware and software that are utilized to support the Internet-provided service, such as application delivery, website development, Web site hosting, search engine submission, and e-commerce implementation.

### **IT Consulting**

This service provides temporary external resources for information technology development or usage (e.g. implement, deployment, and administration of IT systems for e-business or e-commerce). IT consulting personnel often have degrees in computer science or management of information systems; however, in this study, IT consulting is focused more on the requirements of e-commerce or e-business.

### **Software Implementation**

This service involves installing the software followed by testing the software to ensure its performance.

In this study, the software relates to e-commerce and e-business (e.g. B2B, CRM, and contact and call center software implementation) and high-end enterprise applications which are deemed to be too complex to be installed properly (e.g. Enterprise Resource Planning).

### **Software Upgrading**

This service is defined as a replacement of software with a newer version, in order to bring the system up to date, for example changing the version of an operating system, office suite or various other tools.

## **User Training**

In this study, user training means IT skills training. This service refers to the acquisition of knowledge, skills, and attitudes as a result of the teaching of vocational or practical skills and knowledge and relates to specific useful skills. For example, some ASPs provide end-user and administrator training in the field of how to operate the CRM application, some offer customized Web-based and/or on-site training. Some provide this service at a cost, and some provide it at no cost.

Because of the differentiation of characteristics, the service item itself or the intensity of its use might affect the satisfaction of customers. For example, some services are likely to create fewer customer complaints than others (e.g. user training); and some services are easier to provide to users in general (e.g. hardware installation). It is therefore expected that:

### **Hypothesis 3a:**

The service utilized will directly influence customer perception of satisfaction.

More specifically, in terms of customers, the differences among the adopted services might result in different views of service competitiveness. For example, some aspects, hardware installation, application development and software implementation might meet the user requirements in performance, whereas other services such as application integration may not. The software upgrading might be able to impress the customers with its effectiveness, whereas application maintenance may not. These suppositions are developed in the next hypothesis:

**Hypothesis 3b:**

The service utilized will directly influence user perception of service competitiveness.

**5.2.3 User Perception of Service Competitiveness**

A number of academic and practical studies concerning service quality have suggested many factors related to customer's perception. After summarizing and examining these factors, nine dimensions which are either most commonly adopted or have been considered as the most likely to affect the perceived satisfaction were extracted in the initial stage. These dimensions are operational reliability, usability, service availability, scalability, supportability, customization and integration, affordability, business status, and lock-in effect. Amongst these factors, the first six are more associated with service quality evaluation, while the last three are vital in assessing service competitiveness.

These dimensions and their components, together with source of references, are summarized in Table 5-1.

Table 5-1

*Source of References of the Potential Determinants of the Research Model*

Dimension	Components	Source of References
Operational Reliability	In general*	Bailey & Pearson (1983) Chou (2000) Ekanayaka et al. (2003) Garvin (1987) Grönroos (1990) Hamilton & Chrvany (1981) Ives et al. (1983) Kekre et al. (1995) Lo & Yuan (2002) Madu & Madu (2002) Parasuraman et al.(1985) Raymond (1987) Wang (2001) Wolfenbarger & Gilly (2003) Zeithaml et al. (2000)
	Crisis management	Bailey & Pearson (1983) Ives et al. (1983)
	Damage compensation (Recovery)	Bailey & Pearson (1983) Grönroos (1990) Parasuraman & Zeithaml (2005) Zeithaml et al. (2000,2001)
	Security, Trust and confidentiality	Bailey & Pearson (1983) Barnes & Vidgen (2002) Ekanayaka et al. (2003) Grönroos (1990) Grover et al. (1996) Janda et al. (2002) Kakabadse & Kakabadse (2002) Lee & Kim (1999) Loiacono et al. (2000) Madu & Madu (2002) Martin (2000) Parasuraman & Zeithaml (2005) Wolfenbarger & Gilly (2003) Yoo & Donthu (2001) Zeithaml et al.(2000)
	Stability	Keaveney (1995)



Table 5-1 (Continued-1)

*Source of References of the Potential Determinants of the Research Model*

Dimension	Components	Source of References
Operational Reliability (cont.)	Accessibility	Bailey & Pearson (1983) Ekanayaka et al.(2002) Grönroos (1990) Holt (2001) Janda et al. (2002) Raymond (1987) Sharma & Gupta (2002) Yoo & Donthu (2001) Zeithaml et al. (2001)
Usability	In general	Barnes & Vidgen (2002) Cronin & Taylor (1992) Doll & Torkzadeh (1988) Factor (2002)
	Response/ turn around time	Bailey & Pearson (1983) Hamilton & Chrvany (1981) Loiacono et al. (2000) Parasuraman & Zeithaml (2005) Raymond (1987) Szymanski & Henard (2001) Zeithaml et al. (2000)
	Operational efficiency	Bailey & Pearson (1983) Keaveney (1995) Parasuraman & Zeithaml (2005) Szymanski & Henard (2001) Zeithaml et al. (2001)
	Friendly interface	Bailey & Pearson (1983) Hamilton & Chrvany (1981) Ives et al.(1983) Sigala (2003) Raymond (1987) Yoo & Donthu (2001) Wang (2001) Zeithaml et al. (2001)
	Flexibility	Bailey & Pearson (1983) Grönroos (1990) Hamilton & Chrvany (1981) Johnston (1995) Zeithaml et al. (2001)

Table 5-1 (Continued-2)

Source of References of the Potential Determinants of the Research Model

Dimension	Components	Source of References
Service Availability	In general	Chou (2000) Cronin & Taylor (1992) Ekanayaka et al. (2003) Madu & Madu (2002) Parasuraman & Zeithaml (2005) Susarla et al. (2003)
	Service scope	Barnes & Vidgen (2002)
	Function completeness	Bailey & Pearson (1983) Hamilton & Chrvany (1981) Johnston (1995) Keaveney (1995) Raymond (1987)
	Implementation time	Ives et al. (1983)
	Maintenance	Bailey & Pearson (1983) Kekre et al. (1995) Ma et al. (2005) Seltsikas & Currie (2002)
Scalability	In general	Ekanayaka et al. (2003) Seltsikas & Currie (2002)
	System compatibility	Ives et al. (1983) Raymond (1987)
	Application integration	Fox (2001) Holt (2001) Sharma & Gupta (2002) Susarla et al. (2003)
	Application innovation/ upgrading	Fredericks & Salter (1995) Loiacono et al. (2000)
	System expansibility.	Bailey & Pearson (1983) Raymond (1987)
Supportability	In general	Bailey & Pearson (1983) Johnston (1995) Raymond (1987) Wolfenbarger & Gilly (2003)
	Consulting service	Ives et al. (1983)

Table 5-1 (Continued-3)

*Source of References of the Potential Determinants of the Research Model*

Dimension	Components	Source of References
Supportability (Continued)	Relationship and communication with staff of ASP vendor	Bailey & Pearson (1983) Grönroos (1990) Ives et al. (1983) Loiacono et al. (2000) Raymond (1987)
	Education training service	Bailey & Pearson (1983) Holt (2001) Ives et al. (1983) Marymor (2001) Raymond (1987)
	Timeliness	Bailey & Pearson (1983) Doll & Torkzadeh (1988) Raymond (1987)
Customization and Integration	Customization capabilities	Bailey & Pearson (1983) Pappalardo & Cox (1999) Sigala (2003)
	Customization function	Madu & Madu (2002) Zeithaml et al. (2001)
	Integration capabilities	Bailey & Pearson (1983) Ekanayaka et al. (2003) Fox (2001) Holt (2001) Johnston (1995) Madu & Madu (2002) Sharma & Gupta (2002) Susarla et al. (2003)
Affordability	In general	Cronin & Taylor (1992) Ekanayaka et al. (2003) Sharma & Gupta (2002)
	Pricing scheme	Carman (1990) Chen & Soliman (2002) Fredericks & Salter (1995) Keaveney (1995)
	Cost acceptability	Chen & Soliman (2002) Davis (2001) Harney (2003) Sharma & Gupta (2002) Sovie & Hanson (2000)

Table 5-1 (Continued-4)

Source of References of the Potential Determinants of the Research Model

Dimension	Components	Source of References
Affordability (Continued)	Pricing mode used	Chen & Soliman (2002) Kakabadse & Kakabadse (2002)
	Expenses percentage	Nordgaard (2003)**
Business status	In general	Fredericks & Salter (1995) Grönroos (1990) Hsu (1998) Madu & Madu (2002) Martensen et al. (2000)
	Reputation	Fredericks and Salter (1995) Hsu (1998) Madu & Madu, 2002
	Market share	Rust & Zahorik (1993) **
	Application brand	Ekanayaka et al. (2002)
	Stability and sustainability.	Kakabadse & Kakabadse (2002) Sharma & Gupta (2002)
Lock-in effect	In general	Gerdelman (1994)
	Enough information for selecting ASP vendor	Bitner (1990) Ratchford (1999)
	Limited switching impact	Bitner (1990)
	Acceptable switching cost	Bitner (1990) Jones et al. (2002)
	Locked-in concern.	Hertz & Vilgon (2002) Håkansson & Snehota (1995) Tamm & Günther (2000)
Firm's Origin		Beecham & Cordey-Hayes (1998) Chatterji (1996) Cohen & Levinthal (1990) Helfat (1997) Lambe & Spekman (1997) Lopesl & Galletta (1997)

\* "*In general*" means the supporting theories were focused on the dimension rather than any of its components.

\*\* This component is associated to customer satisfaction in some ways, but not necessarily the determinant of customer perception of satisfaction in the researchers' viewpoint in their studies.

## **Operational Reliability**

In this study operational reliability is defined as the stability and security in Web-based IT processing and the precision and confidence in output.

Operational reliability has been identified as the most important concern for customers to assess the service quality (Bailey & Pearson, 1983; Chou, 2000; Ives et al., 1983; Lo & Yuan, 2002; Parasuraman et al., 1985; Raymond, 1987; Wang, 2001). Foran (2001) and Schoenfield (2005) pointed out that both existing and prospective customers have strong concerns about ASP security and confidentiality. Sigala (2004) also proposed that security and privacy are the most critical issues and concerns for companies planning to adopt an ASP because this dimension is not only a technical but also a social concern as it relates to trust.

For the purpose of achieving the highest quality and reliability of a complete system during the software development, Xie and Yang (2001) presented a generic formulation to maximize the operational reliability of the software system. Considering that satisfactory reliability of web applications is important to the application provider, Tian et al. (2004) developed an approach by analyzing workload and failure data extracted from server logs to evaluate Web software reliability.

This dimension consists of five factors: 1) crisis management, 2) damage compensation, 3) security, trust and confidentiality, 4) stability, and 5) accessibility.

## **Usability**

Usability is defined as the ease and efficiency of receiving the service or utilizing the application. It is a key to IT user satisfaction, especially for customers of Web-based services.

Factor (2002) argued that usability is a common quality which is most likely to impact on users and the user interface. Doll and Torkzadeh (1988) believed that usability plays an essential role in increasing satisfaction by improving the man-machine interface in end-user computing environments. Wang (2001) found that ease of use is a critical factor when measuring the effectiveness of digital marketing while examining Web customer information satisfaction. Sigala (2003) also included 'ease of use' as one of the criteria for measuring service quality.

This dimension consists of four factors: 1) response/turnaround time, 2) operational efficiency, 3) friendly interface, and 4) service flexibility.

## **Affordability**

Affordability is defined as the ability to meet the expense of purchasing the application and relevant services from the ASP vendors. Chou (2000) identified affordability as one of several factors that can determine the development of ASP marketplaces. Noting that affordability is a big concern for SMEs, Gerrit and Gunther (2000) suggested that a competitive and flexible pricing model is essential. They indicated that the subscription model could create incremental business by reaching SMEs.

This dimension comprises of four factors: 1) pricing scheme, 2) cost acceptability, 3) pricing mode used, and 4) expenses percentage.

### **Service Availability**

In this study, service availability concerns the breadth and depth of the service offered by ASP vendors. Chou (2000) stated that availability is one of the indexes of customer loyalty to ASP vendors. Seltsikas and Currie (2002) also deemed availability should be the norm for measuring the performance of the ASP model.

This dimension consists of four factors: 1) services scope, 2) function completeness, 3) implementation time, and 4) maintenance.

### **Scalability**

Scalability is defined as the capability of an application or a system to increase total throughput without decreasing the performance when expanding the resource and increasing its workload.

Seltsikas and Currie (2002) indicated that scalability is one of the performance criteria for evaluating the ASP model. Investigating the key issues in outsourcing e-commerce functions to ASP, Lo and Yuan (2005) also concluded that scalability is a service quality factor. Other researchers (Chou, 2000; Sigala, 2004) have suggested that scalability relates to the technical abilities of the ASP technology, and this factor therefore is one of the dimensions for measuring ASP service quality.

This dimension consists of four factors: 1) system compatibility, 2) application integration, 3) application innovation/ upgrading, and 4) system expansibility.

## **Supportability**

Supportability is defined as the ability to provide the user with assistance with computer hardware, software, or other electronic or mechanical products to the user, including learning to use a product or solving specific problems with that product.

Bailey and Pearson (1983) and Raymond (1987) asserted that vendor support is a common instrument for measuring end-user computing satisfaction. In focusing on SMEs, Raymond (1987) also included training provided for users and users' understanding of systems as a criterion of measurement.

Chou (2004) viewed customer support as the key to success for the ASP model. He argued that the implementation of a call center system is necessary to address this concern in the ASP marketplace. Hope and Khair (2001) argued that 24/7 user support is considered the most important benefit for ASP customers, and as this service creates positive experiences, it makes it one of the most convincing marketing strategies.

Sigala (2004) suggested ASP service quality should cover several criteria, including user support, while Ekanayaka et al. (2003) considered help desk services, education training, and support for account administration are essential aspects of customer support.

This dimension consists of four factors: 1) consulting service, 2) communication with staff of ASP vendor, 3) education training service, and 4) timeliness.



### **Business Status**

Business status is operationally defined as the position of a business in the industry, mainly determined by brand market share and goodwill.

In his study of customer satisfaction, Fornell (1992) found a negative correlation between market share and customer's perception of satisfaction. However, Chou (2000) conducted more advanced research on this issue, and found that the relationship between market share and consumer perception of competitiveness depends on network externality. This means that there is a positive correlation between market share and consumer perception of competitiveness when network externalities exist.

Tai (1996) studied the factors affecting outsourcing satisfaction, and found that goodwill can be used as a criterion when selecting an outsourcing service provider and/or evaluating their services. He accordingly concluded that goodwill was positively related to the user perception of service competitiveness.

This dimension consists of four factors: 1) reputation, 2) market share of ASP vendors, 3) brand of application, and 4) stability and sustainability.

### **Lock-in Effect**

The conceptual definition of lock-in effect has been described in Chapter 2. The operational definition of this term is the difficulty for users to switch to other vendors. The more it costs (e.g. transaction cost, dislocation cost) for a user to switch to other suppliers, the tighter the user is considered to be locked-up. In other words, if users can switch to other suppliers without extra

cost, it implies that lock-in effect does not exist in this service or product. Lock-in effect often exists in the IT industry because of the lack of compatibility between different systems

This dimension consists of four factors: 1) enough information for selecting an ASP vendor, 2) limited switching impact; 3) acceptable switching cost; and 4) locked-in concern.

### **Customization and Integration**

Customization is defined as an adaptation of the application software or services in order to reach the requirement of the business or to fit the characteristics of a company.

The results of Wetzel's (2001) ISP customer satisfaction survey showed that some amount of customization or even self-customization is the norm for hosted applications. Madu and Madu (2002) also highlighted customization as one of the main factors in their model of measuring e-quality.

Smith and Kumar (2004) found that customization increases the system support costs and reduces economies of scale. They asserted that customization have an adverse effect on system performance and lead to less satisfaction if the purpose of customization is to meet the conflicting requirements of different customers.

Seltsikas and Currie (2002) argued that ASPs cannot avoid the issue of customization because customers will require integration across applications and business processes. Integration is defined as the use of software and hardware systems architectural principles to bring together a set of computer

applications to share the data and link the workflow. In the assessment criteria of Bailey and Pearson (1983), integration is included as one of the critical factors.

Currie and Seltsikas (2001) suggested that customers should be very careful when evaluating their partnerships with ASPs. The ability of integration is one of the important areas for evaluating ASP partnerships. They pointed out that integration should be considered as important as security.

This dimension consists of three factors: 1) customization capabilities, 2) customization function, and 3) integration capabilities.

A number of prior studies in the fields of IT/IS outsourcing and ASPs have paid attention to investigating the relationship between service quality and customer satisfaction (Currie, 2004; Eklöf & Westlund, 1998; Hackman & Wageman, 1995; Hertz & Vilgon, 2002; Johnson et al., 1995). Sigala (2004) noted that service quality is a crucial success factor for the ASP model. These studies concluded that if customers receive a high quality service delivery this will result in a high level of perceived satisfaction. Based on these assertions, it is hypothesized that:

**Hypothesis 4:**

User perception of service competitiveness will directly influence customer perception of satisfaction.

### 5.2.4 Hypotheses Summary

In this section, the research hypotheses are summarized to present clear concepts so as to understand their relationships.

- Hypothesis 1a ASP firm origin will directly influence customer perception of satisfaction.
- Hypothesis 1b ASP firm origin will directly influence the services utilized.
- Hypothesis 1c ASP firm origin will directly influence user perception of service competitiveness.
- Hypothesis 2a The ASP provider type will directly influence customer perception of satisfaction.
- Hypothesis 2b ASP provider type will directly influence the services utilized.
- Hypothesis 2c ASP provider type will directly influence user perception of service competitiveness.
- Hypothesis 3a The service utilized will directly influence customer perception of satisfaction.
- Hypothesis 3b The service utilized will directly influence user perception of service competitiveness.
- Hypothesis 4 User perception of service competitiveness will directly influence customer perception of satisfaction.

### 5.3 Determining Mechanisms for Path-dependence via Customer Service Model Linkages

For giving a clear picture to understand the articulation between the existing theories and the conceptual model of this research, the implied effects of the mechanisms for path-dependence together with the associated factors of firm evolution and innovation (see sections 4.2 and 4.3) on the ASP customer's perception of satisfaction are presented below.

- 1) **Increasing returns** - implies effect via lock-in, and business status.

Since increasing returns are significant in explicating a positive feedback process, this mechanism might be able to result in lock-in when consumers imitate each other.

As mentioned in Section 5.2.3, business status is mainly determined by brand market share, therefore, increasing returns might accordingly affect business status via the intermediate effect of lock-in.

- 2) **Lock-in** – implies effects via affordability.

When consumers have been locked-in, their ability to bargain will be diminished. In other words, the affordability to the customer will be lower.

- 3) **Network effects** – implies effect via lock-in, affordability, and business status.

According to the background study in Chapter 4, the network effect can maximize the value of intellectual property, differentiate products, lock in customers, and negotiate standards alliances. It means this mechanism might indirectly affect customer's perception via lock-in and business status.

Based on the assertion of Downes and Mui (1997), if a product or service has exceeded critical mass, it will attract more people to use it, and new users will have to pay more for this product/service which has come to be considered more valuable. This will lessen its affordability to the customer.

- 4) **Network externality** – implies effect via usability, supportability, lock-in, and business status.

Since network externality is the increasing utility that a user derives from consumption of a product as the number of other users who consume the same product increases (Katz & Shapiro, 1985), this mechanism might have an intermediate effect on perceived satisfaction via usability. In addition, similar to increasing returns and network effect, network externality might result in lock-in effect and impact on market share which is one factor of business status. On the other hand, if a product is widely used by consumers, it is easier and cheaper to obtain support (e.g. better knowledge and skill to fix the product problem, and less unit cost to buy the parts for replacement).

- 5) **Expertise** – implies effect via operational reliability, service availability, usability, scalability, supportability, and service utilized.

Researchers (Ayers et al., 1997; Brockman & Morgan, 2003; Cooper & Kleinschmidt, 1986; Dougherty, 1990, 1992) found that a strong existing knowledge base helps in the development of new service/ products by improving their quality and operating competence. Based on these assertions, expertise might be considered as a source of increasing operational reliability, usability, scalability, supportability, and service utilized, because these factors are highly related to the service quality and operating competence.

- 6) **Perceived expertise** – implies effect via operational reliability and service utilized.

According to the background research, perceived expertise is one of the important determinants of attracting new customers and retaining existing customers. It implies that perceived expertise might affect customers' evaluation of the quality of service or product they received. For example, initial trust in a business and decision about consuming scope might be made by this mechanism.

7) **Transaction Cost Analysis** – implies effect via affordability.

Transaction costs include search and information costs, bargaining and decision costs, and policing and enforcement costs.

In the context of fast growth or transformed industry, unplanned flows of information lead to changing transactions, that can result in significant overhead costs. Researchers (Ang & Straub; 1998) indicated that a transaction economy has an influence on the adoption of IS outsourcing. Smith and Rupp (2003) considered transaction cost as the cause of the existence of ASP industry.

All of these opinions point out that transaction cost is associated with the development of ASP business. Accordingly, this element might affect perception of service by influencing the cost.

8) **Standardization vs. customization** – implies effect via integration, scalability, usability, supportability, affordability, lock-in, and the service utilized.

The degree of standardization vs. customization might determine the elements of usability such as response/ turnaround time, operational efficiency, ease of use, and flexibility. Furthermore, it might influence the

cost of receiving the ASP service, the cost of having customer support, the level of integration, the scale of service provided, the preference of service utilization, and the trustworthiness on the operational level. By affecting so many factors, standardization vs. customization might be a determinant of customer's perception as well.

In all, many of these mechanisms for path-dependence can be related to the ASP business position (i.e. ASP firm origin and business type), and since most of these might have effects on customer's perception via service utilized and the potential factors of service competitiveness, the influence of path-dependence can be examined through testing Hypotheses 1a to 1c and 2a to 2c.

## 5.4 Chapter Summary

This chapter has presented the research model, research questions, and research hypotheses of this study. Three clusters of constructs regarding the research hypotheses – ASP business position, service utilized, and user perceptions of service competitiveness were discussed. Possible factors that might describe the characteristics of the clusters of constructs were illustrated. Furthermore, the potential determinants of the linkages between mechanisms from path-dependence, service utilized and service competitiveness were depicted.

In Chapter 6, the research methodology and design is discussed. The chapter also includes the measurement of study variables, research ethics and issues of confidentiality.



# Chapter 6

## Research Methodology

This chapter describes and explains the research approach, research design, and measure of study variables. The research approach section contains the method selected for this study and the explanation of this choice. The research design section includes data collection method, sampling, questionnaire design and distribution, and documentation study. The measures section includes the measurement design of the study variables. Finally, a section of research ethics and confidentiality are presented.

### **Chapter Contents**

- 6.1 Research Approach
- 6.2 The Research Design
- 6.3 Operationalizing the Study Variables
- 6.4 Research Ethics and Confidentiality
- 6.5 Chapter Summary

### **6.1 Research Approach**

Applied projects usually have budget and time constraints. Thus, it is important to consider several factors before choosing a method, for example, time constraints, availability of data, nature of the decision, and the benefits versus costs. The details regarding the research method used in this study and the reasons why it has been selected are outlined in the subsection below.

### 6.1.1 Research Method

Kumar (1999) stated that there are three types of research: descriptive, correlational, and explanatory. In this study, the nature of the research questions shows that to explore the determinant factors affecting customer's satisfaction and then further examine these specific factors is the main purpose of this research. Locke et al. (2004) asserted that correlational research is used to explore whether there is a relationship between or among variables. Kumar (1999) indicated that descriptive research is used when the main theme is to describe what is prevalent. It appears that these methods can reach the goal for this research; therefore, this study should be regarded as mainly correlational and partially descriptive research.

In terms of the correlational research, three types should be considered: observational, survey, and archival. Observational research investigates behavior in natural environments. It has excellent external validity; however, it takes considerable time and effort for the observation of a number of participants. Archival research uses public records as a research database. It also has excellent external validity, but these data might be difficult to use. Most importantly, the nature of this research makes it difficult to find the solution by this method because such information has not been collected previously. Nevertheless, the method could be used to obtain a clearer picture of the findings in this study.

Survey research is the most common method in marketing research to gather primary information regarding a prospective customer's knowledge, awareness, and attitudes (Rogers, 2001; Zikmund, 1997). In addition, Kuter and Yilmaz (2001) argued that survey research is one of the most important areas of measurement in applied social research. Relating to humanity, Leutbecher (2002) stated that survey research is a tool to learn about people's knowledge, beliefs, preferences, and satisfaction, and to measure these magnitudes in the population. Based on their descriptions, survey research is considered an ideal tool for collecting data for assessing the preferences and expectations of the ASP customers in this study.

Correlational research permits the researcher to analyze the relationships among a large number of variables in a single study. Survey research is a technique for gathering information from a large number of users (Brehob, 2001). These features show that this research is regarded as quantitative (Davis, 1997). However, generally speaking, a study that contains only or mostly quantitative data misses the rich texture of interpretation that an integrated approach makes possible. Therefore, some researchers (Bamberger, 2000; Kumar 1999) suggest that an integrated approach might be a solution in some situations. Eisenhardt (1988) also suggested that the combination of data types can be highly synergistic. For example, Eisenhardt and Bourgeois (1988) combined quantitative data from questionnaires with qualitative evidence from interviews and observations to examine the politics of strategic decision-making. In order to deeply explore the research problems, the researcher of this study decided to adopt a qualitative approach to augment the correlational survey research

approach. Targeting some respondents whose answers were ambiguous, the researcher requested more explicit information from them by email or by telephone.

In conclusion, this study used survey questionnaires to collect statistical data. This quantitative work is complemented by an approach that measures information comprised of respondents' opinions and values gathered from the emails and telephone interview.

### 6.1.2 Survey and Web-based Questionnaire

Some researchers (Dillman, 2000; Leece et al., 2004) have observed that conducting a survey by utilizing Internet technologies may reduce the time, effort, and financial resources needed to do it. For the respondents, Web-based questionnaires are less time-consuming to complete than paper-and-pencil versions. This feature makes it more likely for a potential respondent (the CEO or CIO of a firm) to complete the survey work.

Due to financial constraints, the researcher was not able to afford trips to the United States, Canada and Europe (i.e. the bases of the customers of the top fifty ASPs) to interview the potential respondents, or even to make international toll calls for a telephone survey. Posting the questionnaires by regular mail is not cheap either, and most importantly, involves a time delay to receive responses. Therefore, a Web-based survey was chosen as the primary data collection approach in this project because of its speediness, inexpensiveness, suitability for complex question styles, and ease of receiving longer answers to open-ended questions.

Some weaknesses have been identified in Web-based surveys. For example, this approach might not appropriately generalize its results to the population as a whole, because not every single potential participant is able to access the Internet. However, this is not a weakness in this study because the target sample of this survey consists entirely of Internet users. A further weakness of this form of data collection identified by Dillman (2000) and Leece et al, (2004) is that it produces a significantly lower response rate than other approaches. Ritter et al. (2004) posited that the low response rate of internet questionnaires might be caused by the concern about software viruses. This concern could mean that participants are likely to delete emails from strangers. Therefore, to increase the response rate, a report of the research results will be offered to the respondents as a reward. In addition to the Web-based survey, email and telephone were used as follow-up instruments.

## 6.2 Research Design

The research design is the overall plan that the researcher uses to collect data, and it can provide a specific blueprint for conducting a study. In this section, the details including the data collection method, sample and sampling, questionnaire design, questionnaire distribution and responses, and documentation study are discussed.

### 6.2.1 Data Collection Method

There are several approaches to collecting data: questionnaire, documents, archival records, interviews, direct observation, participant-observation, and physical artifacts. This research has explored the determinants of ASP

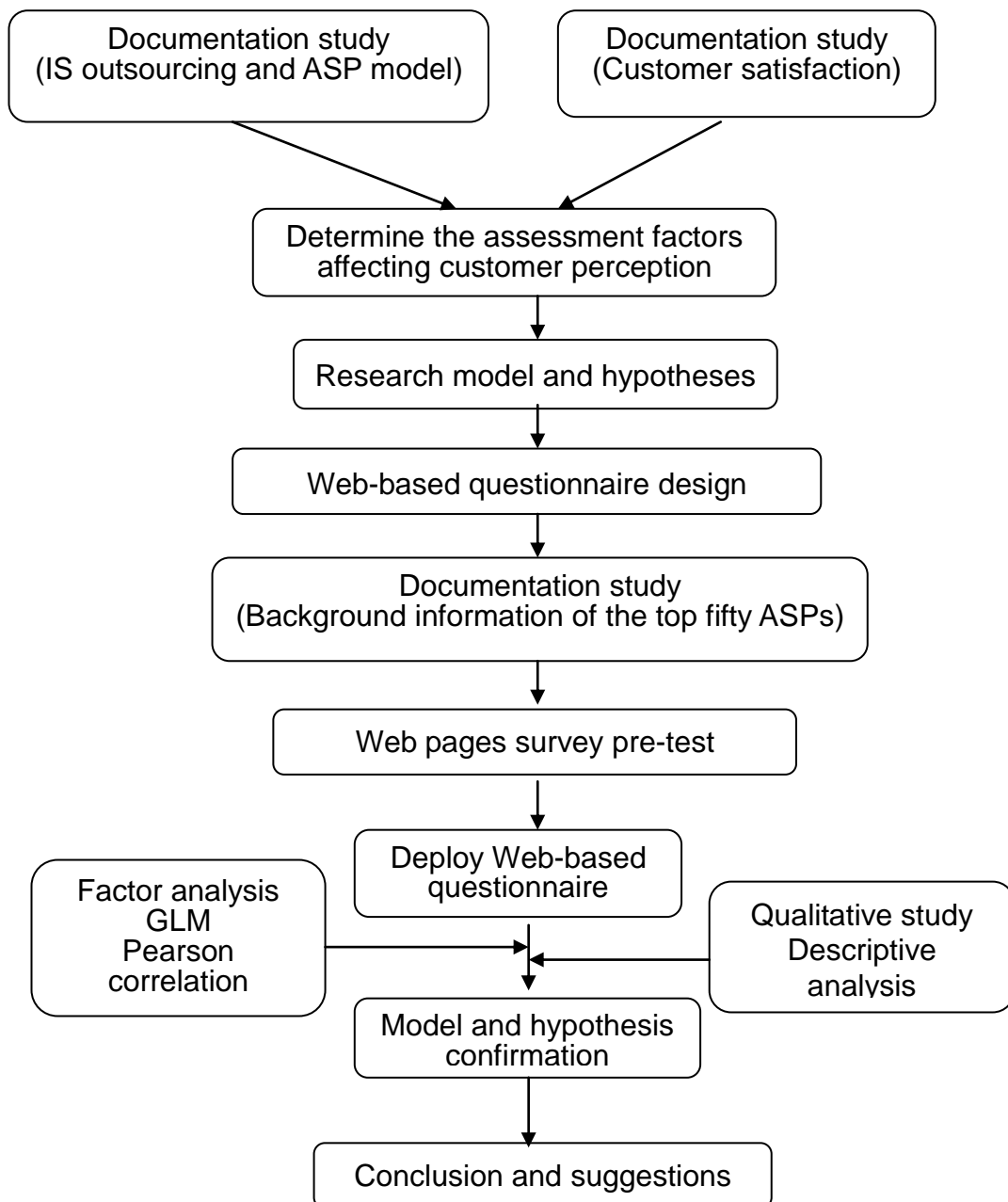
service adoption and satisfaction evaluation by analyzing primary and secondary data. Primary data were collected through Web-based questionnaires. A self-administrated questionnaire with a reader-friendly layout (see Appendix B) was employed to survey the preferences and satisfaction of services provided by ASPs. After data were gathered, some interviews were conducted via telephone or email to further explore, or better understand, the opinions of the respondents.

Secondary data came from documents of the top fifty ASP companies selected by ASPnews. The documents included the history of the company, the background of the founder(s) or the board of director(s), the services or products provided by the business, the partners/alliances/competitors/customers of the company, and the management team of the organization. These data were needed for understanding the firm origin and the provider type of the ASPs.

Questionnaire survey data were collected during the period of December 2003 through August 2004. Documentation data had been gathered since 2002. This is a long period that saw media coverage of ASPs rise, fall, and reform. Figure 6-1 is a flowchart of this research procedure.

Figure 6-1

Flowchart of the Research Procedure



### 6.2.2 Sample and Sampling

The sampling procedure of this research involved developing a sampling frame which constituted a representative subset of the population, and adequately represented the unit of analysis. The following sections discuss the issues of unit of analysis, site selection, and sample size.

### **6.2.2.1 Unit of Analysis**

The unit of analysis is a firm as ASPs mostly serve firms rather than individual users. In other words, ASPs regard firms, rather than individual users, as their customers. However, a firm consists of users, and thus they are the target population of the study. For minimization of the error variance, a homogeneous sample is suggested (Mittal, 2001). Therefore, the person who represents the firm's answers to the questionnaire is limited to the CEO or CIO, whoever is in charge of the outsourcing business via the ASP model. For those small businesses without an in-house IT department, the potential respondent is the employee who has been considered as the main user of the ASP services.

### **6.2.2.2 Site Selection**

Owing to the immaturity of the ASP model, a number of ASPs have disappeared from this industry or the ASP subsidiary has closed during the past five years. They may have encountered lukewarm market responses, burned up their capital funding, or experienced various problems in implementing the ASP model. Therefore, in order to ensure sustainability of research objects during the study period, the top fifty ASPs on the list of ASPnews.com (since 2001) were targeted as the main research objects of this study, and the primary data collected from their customers.

The following are the criteria for becoming a top fifty ASP as proposed by the ASPnews.com. The ASP must:



- Have the provision of network-based applications and/or services as their core business;
- Have a substantial and active end-user customer base for those services;
- Be able to demonstrate proven revenue streams;
- Be innovators in the online delivery of software-based services; and
- Be recognized as a leader by others within the industry.

For more details regarding the criteria, please see Appendix C.

The names of the top fifty ASPs during the study period are listed below:

Agilera, Appshop, Aspective, Atomz, AppServ, Avasta, BlueStar Solutions , BMC Software, Breakaway Solutins, Ciscosystems, Clickability, Concur, Corio, CrownPeak Technologies, ecatalog, EmailLabs, Employease, Groove Networks, Intacct, eOnline, esolutions, infolink, Interliant, Intranets.com, Jamcracker, JD Edwards, Kintera, LivePerson, ManagedOps, NetSuite, NuBizz, Omniture, OpenAir, Oracle, Outtask, PeopleSoft, QwestCyberSolutions, Ramco Marshal, RightNow, Salesforce.com, Salesnet, stayinfront, Surebridge, SWsoft, Tangent Ltd., Telecomputing, TriZetto Group, Ultimate Software, Unisys, Upshot.com (Siebel CRM OnDemand), USi, VeriCenter, Vocus, WebEx, and WebSideStory.

To make the results more generalizable, the data was gathered inter-industry. This was the criterion for selecting a site for this research. Since the users of the top fifty ASPs came from a variety of businesses or industries, it meets the requirement to consider these users as the sample site.

### 6.2.2.3 Sample Size

Researchers (Argyrous, 1996; Lucas, 1991; Zikmund, 1997) asserted that sample size determines the accuracy of data analysis and hypotheses testing. The larger the sample, the more precisely it reflects the target group. However, the degree of precision decreases as the sample size increases, and sometimes, a large number of observations is of little value if major sources of variation are neglected in a study. So, the sample group needs to match the survey category and be easy to survey.

It can be helpful to consider factors such as time available, budget and necessary degree of precision when deciding on sample size. However, the rule of thumb is the most suitable guideline for deciding on the sample size for this study. According to the regression rule of thumb, the sample size or the number of observations should be at least ten times the number of independent variables in the equation to reach an acceptable level of validity and reliability (Benbasat, 1989; Bryk & Raudenbush, 1992; Lucas, 1991).

Owing to the possibility of missing values among the required data, surveys returned are not always all usable. In addition, the response rate of a Web-based questionnaire survey is usually much lower than traditional surveys (Ritter et al., 2004). Because of these concerns, the researcher decided to send 1000 emails to the potential participants requesting research assistance.

### 6.2.3 Questionnaire Design

The questionnaire was designed to obtain a comprehensive view of ASP customer perception. It is based on previous studies measuring user satisfaction of IS (Bailey & Pearson 1983; Doll & Torkzadeh, 1988; Raymond, 1987; Ives et al., 1983; Peterson & Wilson, 1992), and comprises three main categories - Part One, Part Two and Part Three. The general structure of the questionnaire is described below.

Part One focuses on exploring two levels (i.e., satisfaction and importance) for each dimension of service competitiveness assessment with mainly closed questions. This type of question is used because it is deemed to be efficient and specific in measuring attitudes. Part Two refers to the service item received by respondents, application type, application customization as well as integration level, pricing model, and lock-in concerns. It finishes with an overall satisfaction assessment on a six-point scale, ranging from "Not at all satisfactory" (scale value of 1) and "extremely satisfactory" (scale value of 6).

Part three contains demographic questions mainly related to the organizational profile, personal and job-related profile. An open-ended overall comment is requested in this part.

The first version of the questionnaire was reviewed by academics peers. Their suggestions for improvement concerned structure, wording, and measurement scales. The format of the Web-questionnaire was considered awkward to browse, the font size was too small to read, there were not enough response categories for the respondent to answer, and it contained very specific questions that a respondent might not know the answer to.

The revised questionnaire was then evaluated by three practitioners of IS and IT outsourcing. The results from this pre-test were used as a guideline for the second revision. The outcome showed that there were too many questions for the respondents to answer patiently and properly, so part of the content was deleted. For instance, there were forty-six questions in Part One and only thirty-six after revision. There were fifteen questions in Part Two, with only ten after revision. Part Three consisted of seven questions after three were deleted.

The questionnaire was sent to local ASPs as well as their users for a final assessment. Some technical problems were discovered during that stage. For example, the format of the Web-questionnaire was not easy to read on the screen, and the feedback function through the form processor was unstable. After these problems were solved the final version was produced.

#### **6.2.4 Questionnaire Distribution and Responses**

When the survey population had been determined, the next step was to search the user sites of the top fifty ASPs. For this purpose, the researcher requested a customers list by sending emails to these ASPs, or by browsing their websites. Afterward, the researcher tried to search the potential participants according to the customers list.

The criteria for selecting potential respondents were:

1. For those firms that have an in-house IT department, the potential participant was the CIO;

2. For those firms without an in-house IT department, the potential participant was the CEO in charge of the utilization of ASP services; and
3. If there was no such CEO managing the utilization of ASP service, then the potential respondent was the middle manager, supervisor, or the staff handling the use of ASP service.

Overall, the experience of managing the adoption of ASP service was the main requirement of a potential respondent in this research.

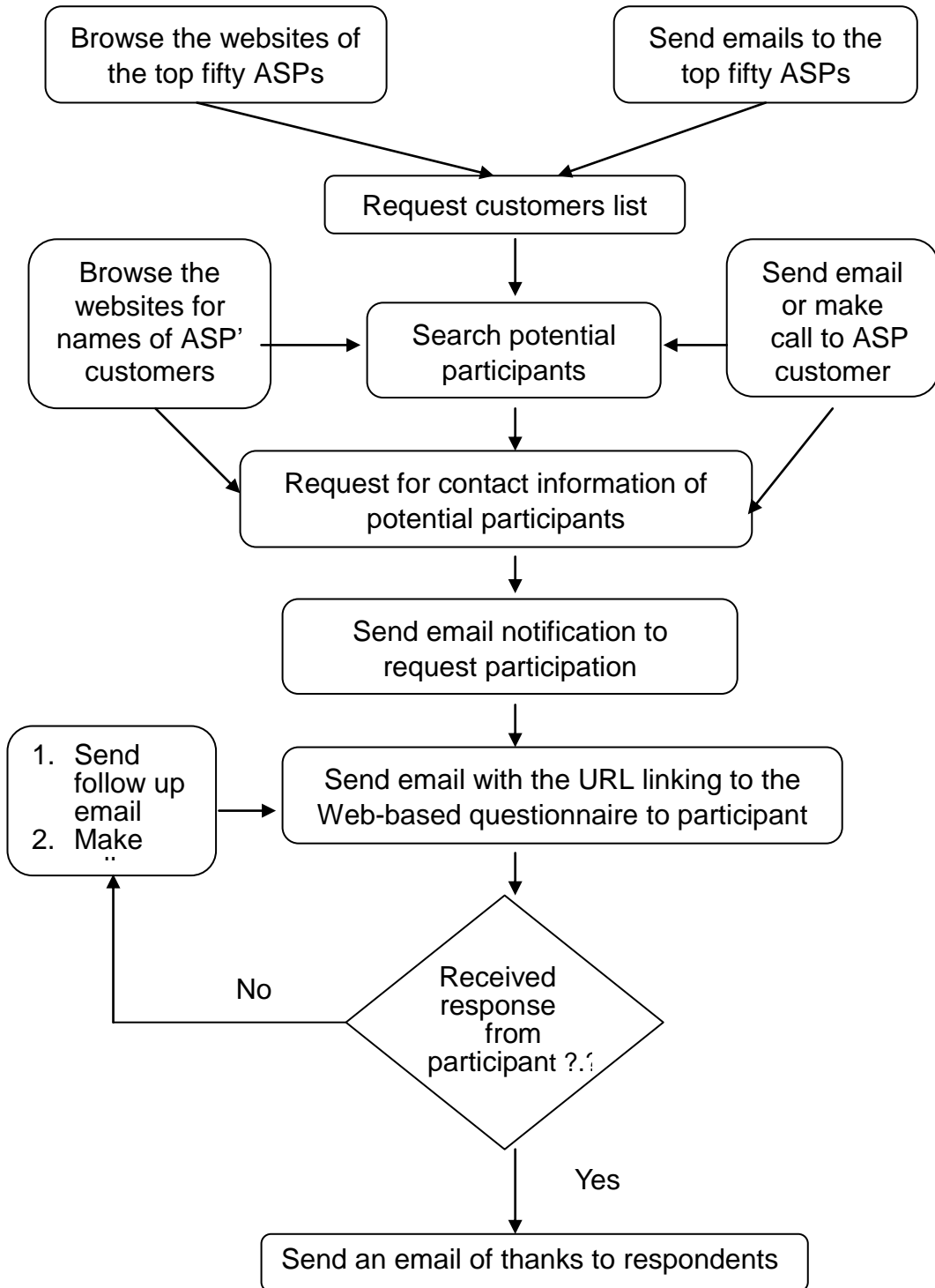
To reach the potential respondents, names and the contact information (e.g. email address, telephone or facsimile number, postal address) were needed. This task was performed by sending inquiry emails or making international calls to the data center or human resource department of the companies that the potential respondents were working for.

After this information had been received, a notification by email was sent to the potential respondents, and a request made for participation. Once the approval was granted, an email with the URL linking to the Web-based questionnaire was sent to the respondents. If a response was not received within two weeks, then a follow-up reminder e-mail was sent. If there was still no reply after the reminder e-mail, a follow-up call was made to determine why there was no response. All respondents were sent an email expressing gratitude for their assistance.

The process of data collection took 9 months to complete involving considerable effort. The flow chart of the procedure, Figure 6-2, is shown below.

Figure 6-2

Flowchart of Questionnaire Submitting and Receiving



### 6.2.5 Documentation Study

Documentation data were collected from ASPnews, ASPstreet, ASPinland, Outsourcing, the ASP Industry Consortium, MIC (Market Intelligence Center, a division of Institute for Information Industry, Taiwan), ASPIC, IDC, OVUM (an independent advisory organization for Information, Communication and Technology), Gartner Group (provider of research and analysis to the IT industry). In addition, each website of the top fifty ASP vendors selected by ASPnews was browsed to gather their history, background and service/product provision information.

The purpose of conducting the documentation study was to establish the criteria for defining firm origin and provider type of the top fifty ASPs. Accordingly, based on the criteria, the researcher identified the firm origin and the provider type for the top fifty ASP vendors in order to do advanced analysis.

## 6.3 Operationalizing the Study Variables

According to Chapter 5, three examination clusters are involved in the research model. Therefore, the measure of independent variables is described in three subsections: ASP business position, service utilized, and user perception of service competitiveness. The measure of dependent variable is presented in the last subsection.

### 6.3.1 ASP Business Position

As mentioned in Chapter 3, ASP business position focuses on two issues: ASP firm origin and ASP provider type. In the following subsections, the criteria for determining ASP firm origin type and ASP provider type are discussed. The criteria details were obtained mainly through documentary research.

#### 6.3.1.1 ASP Firm Origin

ASPnews.com, the online source of global news and analysis for the ASP industry, publishes the ASP News Review newsletter and other titles on ASP issues. It provides a searchable directory of ASPs and related companies. This information was helpful in defining the firm origin of ASP companies. In addition, the history of the company, the background of the founder(s) or the board of directors, the partners and alliances, the competitors, the production/services/solutions provided were the main factors in identifying the ASP firm origin for this study.

In order to clarify the firm origin type of each participant ASP vendor, the researcher adopted the procedure described below.

1. Studied the background and history through archival information, (e.g. the company's Web site, the annual reports) of the ASP vendor in order to explore its predecessor.
2. Investigated the background of the predecessor and discovered its previous core services/products and their specialty.



3. If the vendor was a start-up ASP, discovered who are its founder(s) and the board of director(s), and then explored their specialty and their tasks in the organization.
4. If this required information above could not be collected, the researcher examined the character of the ASPs production, service, and solutions as these could provided some indication of the firm origin. For example:
  - If the ASP vendor provides full-service, offering a portfolio of name brand applications (developed by other ISVs); or if its main service is IT consultation or system Integration, application management, it is possible to consider that this vendor is a pure-play ASP;
  - If the ASP vendor has its own hosting infrastructure; if its main product is infrastructure software; if its core business is network installation, advanced operating infrastructure provision, or Internet-based application hosting; it is possible that this vendor is an infrastructure-provider-turned ASP;
  - If the ASP vendor's key product is owner-developed Internet-based business applications, or if its service is deployment or advanced management for these applications, then it is probable that this vendor is an ISV-turned ASP.
5. Collected information about the ASP's strategic alliances partners – Since the roles of ASP vendors and their partners are complementary, it means that the partners are required by ASP vendors to provide a satisfactory service to their customers. Thus, the firm origin of the ASP

vendor can be defined by studying the character of products/services supplied by these partners.

6. Collected information about the competitors – In general, the competitors provide the same or similar types of products/services as the ASP vendors to the customers. This feature helps to better understand the characteristics of ASP vendors, including its firm origin.

#### **6.3.1.2 ASP Provider Type**

Compared with firm origin type, it is easier to define the provider type of each ASP vendor. Basically, ASPstreet.com, the leading collaborative portal and marketplace for ASPs and ASP enablers and buyers, has already compiled a searchable and browsable directory of companies that lists application service providers, investors and media sources. This information provides enough concepts for determining the ASP vendors' provider type. In addition, the provider type of an ASP might be inferred by looking into the following items: type of application provided, numbers of customers, and the character of customers and competitors. For example, if the vendor's main service is the management of high end business applications (e.g. ERP, EC application) this vendor is probably an enterprise ASP. If the vendors' products are used for a specific need (e.g. human resources, customer relationship management), then it is very possible that it is a specialist ASP. If the products/service of the vendor are targeting a specific industry (e.g. healthcare), this vendor can be considered as a vertical market ASP. If the customers of the vendor are small firms, and mostly located in a specific area, then this vendor is more likely to be a local/regional ASP. If the

vendor's products are multi-functional and low-end with prepackaged application for end-users (e.g. word-processing), or if it supplies services in volume, it can be considered to be a volume business ASP.

### 6.3.2 Service Utilized

The service utilized relates to the services employed by the ASP users. There were ten options for the respondents to tick from a pull-down menu in questionnaire Part Two (Question 3), and more than one selection (multiple choices) was allowed. The services on the list were collected, based on the most popular or most common services delivered by the top fifty ASP vendors.

### 6.3.3 Factors of User Perception about Service Competitiveness

An exploratory ASP user satisfaction instrument was developed in Part One of the questionnaire. An attribute performance level scale was designed for measuring how much the participants perceive about their ASP vendors reaching the standard of each service competitiveness evaluation items. A six point Likert-type scale, where 1: Strongly disagree; 2: Disagree; 3: Somewhat disagree; 4: Somewhat agree; 5: Agree; and 6: Strongly agree, was used to measure the user opinions of service competitiveness.

On the other hand, a five point Likert-type scale, where 1: Not important at all, 2: Slightly important, 3: Moderately important, 4: Highly important, and 5: Extremely important, was used to measure the degree of importance for each item of service competitiveness. A "Not Applicable" box was

presented at the end of each statement as another option for those respondents who considered that the statement did not apply to them. This type of question format was adopted because it is efficient and specific in measuring attitudes, and relatively easy to complete (Robson, 1993).

In addition to the Likert-type scale, single choice and multiple choice, some open-ended questions were also used in Part Two and Part Three of the questionnaire as an auxiliary to collect more data for this measure.

#### **6.3.3.1 Operational Reliability**

Operational reliability was assessed in terms of stability and smoothness of information system or associated technology implemented by ASP vendors. In addition, the ability of solving a problem, damage repair, and disaster recovery is evaluated. The degree of protecting customer's privacy and respecting their confidentiality is examined. As users access data through the network, the security and reliability is also assessed. A five-item scale was used to assess the satisfaction and importance level of this construct (see Appendix A).

#### **6.3.3.2 Usability**

Usability is more than simply testing or measuring user behavior and preference. In measuring this construct, attention needs to be paid to all aspects of the usage process. Investigating the usability problems within a company's Web-based information system, Alexander and Chen (2003) suggested that error prevention is essential in addressing the concerns of usability. This means usability refers to not only speed but also precision.

In this study, usability refers to the comfort, simplicity, and effectiveness in operating the application system hosted on the servers of ASPs. A friendly and flexible interface between IT equipment might help to improve the ease of use, speed the system response time, and increase the efficiency of application processing. Therefore the service flexibility, response time, operational efficiency, and ease of use related to the application system were investigated. A four-item scale was used to assess users' perception of usability (see Appendix A).

### **6.3.3.3 Affordability**

Affordability is assessed in terms of the cost and acceptability to pay for the service provided by the ASP. All of the following concerns were evaluated, whether the charge is reasonable, whether the price was higher than those of competitors, and whether the charging mode was acceptable. In Part One, a four-item scale was used to measure this construct (see Appendix A).

In addition, a seven-option multiple-choice question targeting the pricing model was designed for measuring the affordability of adopting an ASP business model in Part Two.

### **6.3.3.4 Service Availability**

Service availability concerns the breadth and depth of the service provided by the ASP vendors, thus, the variety or scope of services received by the respondents was assessed. Issues such as the application implementation time, the completeness of promised service, and application and data maintenance were evaluated. In Part One of the questionnaire, service availability was assessed by a four-item scale (see Appendix A).

In Part Two, an eleven-option multiple-choice question was used to collect data regarding the services employed by respondents. An additional thirty-eight option multiple-choice pull-down menu type of question was designed to investigate what kind of application was usually adopted by the customers.

#### **6.3.3.5 Scalability**

Scalability is determined by the stable degree of the applications or systems while they are operating under the expanded resources (e.g. hardware). Respondents were asked to rate the ease of switching system without impacting the data base, the ease of integrating or upgrading system without deteriorating the performance, and the efficiency of expanding the system. A four-item scale was used to measure the scalability of the application and system provided by the ASP vendors (see Appendix A).

#### **6.3.3.6 Supportability**

Supportability is assessed in terms of time effect, service coverage, comfort and ease of receiving the assistance requested by the customers. This assessment included the ease of receiving support, the provision of technique consulting and training service from ASP vendors (or their alliance partners), and the timeliness of service completion. This construct was assessed on a four-item scale (see Appendix A).

#### **6.3.3.7 Business Status**

The vendor's business status was assessed in terms of the respondent's impression of the ASP vendors and its services/products compared to the

services/products provided by other ASP vendors. The measurement included the reputation of the ASP vendors and their offerings, the market share and the sustainability of ASP vendors, and the brand of delivered application. In Part One of the questionnaire, a four-item scale was used for this purpose (see Appendix A).

#### **6.3.3.8 Lock-in Effect**

Lock-in effect is assessed in terms of the degree to which users are forced to remain with their present ASP although not satisfied with the services or products. Switching costs is significant when changing suppliers (Valletti, 2000). Therefore, switching impact and switching costs were used as the main items to measure the lock-in effect.

In addition, Liebowitz and Margolis (1999) concluded that lock-in is inevitable only if it is assumed that both customers and suppliers are passive. Evidence of the capabilities and certifications of potential ASP technical support operations and employees is one of the critical procedures in selecting ASPs (Focacci et al., 2003; Liebowitz & Margolis, 1999). Therefore, collecting more information about potential ASPs and taking steps to protect firms' own interests should be helpful to avoid the lock-in effect. Hence, these considerations were regarded as the items for measuring the lock-in effect in this study. In Part One, a four-item scale was used for this purpose (see Appendix A).

In addition, respondents were asked to answer a twelve-option multiple-choice question in Part Two of questionnaire to indicate the reasons why they were still using the services provided by the same ASP

vendor. This question was designed to examine the lock-in effect in-depth. The first five options show that customers do not have a perception of being locked-in and the remaining indicates the degree of the perception of being locked-in.

#### **6.3.3.9 Customization and Integration**

Customization is assessed in terms of the degree to which the respondent perceives that the vendor has adapted the application software or the services to accommodate the customer's needs. Integration is assessed in terms of the degree of smoothness in operating a set of integrated computer applications. In this study, customization and integration were assessed in two parts. In Part One of the questionnaire, a three-item scale was used (see Appendix A). In Part Two, the respondents were requested to answer a five-option single-choice question. This question was designed to examine the preference between the degree of customization/integration and its expense.

According to Susarla et al. (2003) expectations about ASP service have an important effect on the performance evaluation of ASPs. Therefore, as well as evaluating the level of perceived satisfaction with the factors discussed above, the respondents' expectation level about each factor was assessed.

#### **6.3.4 Dependent Variable**

Various researchers have operationalized customer satisfaction by using a single-item (one-item) scale while many others have used multiple-item scales.



When used in social science, multi-item measures can be superior to a single, straightforward question. In academic studies, the multi-item scale is generally adopted to measure customer satisfaction. This is for achieving greater reliability and a high degree of internal validity. With a single question, people are less likely to give consistent answers over time, thus, asking more than one question about the same issue is more likely to provide a true picture of a specific concept.

On the other hand, a single item measure has become the norm in other contexts; for example, the measure of overall health in population studies (Rohrer, 2004). The one-item scale for measuring overall satisfaction is commonly used in commercial studies. (Mittal, 2001). Though unreliability or random error might be associated with this measure, this problem is less serious than systematic bias, which is usually caused by respondent demographics. Thus, commercial studies usually pay more attention to customer-specific variability in satisfaction rating to reduce the systematic bias.

Overall satisfaction is a rating of the perceived satisfaction in global viewpoint of respondents. There is considerable precedent for using single-item to measure the level of overall satisfaction (e.g. Cronin & Taylor, 1992; Gounaris, 2005; Kekre et al, 1995; Kelley et al., 1993; Mittal & Kamakura, 2001; Mittal et al., 1998; Parasuraman et al., 1991, 1988, 2005; Wirtz & Lee, 2003). LaBarbera and Mazursky (1983) examined the use of single- versus multi-item scales and found that a multi-item measure could cause a significant non-response bias because of the length of the

questionnaire. Furthermore, they indicated that it might result in false answers by respondents when several items in the questionnaire are used to evaluate the specific variables repetitively over time. Therefore, the use of multi-item scale could have decreased reliability.

Czepiel and Rosenberg (1976) considered that the use of a single-item overall measure can summarize subjective responses to several different aspects. Day (1977) and Kelley et al., (1993) also considered satisfaction as a global entity, which can be appropriately measured by a single-item scale. Comparing the reliabilities between single-item and multi-item scale, Yi (1990) found the reliability of single-item scales acceptable in measuring satisfaction. This finding explains why many researchers prefer a one-item scale for measuring overall satisfaction. For example, SERVQUAL is a well known multiple-item scale for measuring consumer perceptions of service quality; however, it still uses a single-item scale to evaluate overall quality and to examine its convergent validity.

In this study, a multi-item measure was conducted to evaluate the satisfaction level and importance level of each item pertaining to the service competitiveness (see section 6.3.3) to explore the factors affecting customer's perception of satisfaction. These factors are complex. More specifically, they are the dependent variables for the factors of business position and service utilized; they are also the intermediate variables between these independent variables and the overall perceived satisfaction; moreover, they are the independent variables of the overall perceived satisfaction. In other words, they are the basis for rating satisfaction level.

Regarding overall perceived satisfaction, a six-point scale in Part Two (Question 10) was used for rating the comprehensive satisfaction about ASP services. This is the ultimate dependent variable in this research.

## 6.4 Research Ethics and Confidentiality

This research followed the general obligations of students with respect to ethical conduct in research, and also has observed the University of Waikato's Human Research Ethics Regulations 2000, which can be accessed from

[http://www.waikato.ac.nz/research/unilink/uow/EthicalResearch\\_Hdbk.pdf](http://www.waikato.ac.nz/research/unilink/uow/EthicalResearch_Hdbk.pdf)

The regulation details include the following considerations: the effect of legislation, the prevention of unauthorized use of personal information, the standards of ethical conduct required and the procedures that apply for the maintenance and monitoring of those standards, the obligations of researcher, informed consent of participants, and social and cultural sensitivity.

Focusing on the requirements of regulation, the researcher emphasized the confidentiality of the questionnaire respondents before they began to respond to the questionnaire. In the stage of data collection, the potential respondents were asked if they were willing to participate in the research. The respondents who expressed their willingness to do so were informed that their answers would be kept completely confidential and used only for research purposes.

## 6.5 Chapter Summary

This chapter described the research method and explained why it was used in this study. Afterward, the research design, including the sample size, and how data has been collected were introduced. The research instrument and operationalization of the study constructs were discussed. The research ethics and confidentiality were presented at last.

In Chapter 7, the procedure of data analysis is addressed. The study results, including the development of research model and the test of research hypotheses, are also illustrated.

# Chapter 7

## Results 1: Factor and Regression Analysis of Survey Questionnaire

In this chapter, the modeling technique is discussed followed by an introduction of the approaches used to examine the instruments and the structural model.

More specifically, two parts are included in this chapter. The first part refers to the preparation of the data before analysis. Section 7.1 describes the sample characteristics. Section 7.2 shows the process of purification and the reduction from a large number of variables to a smaller number of factors. Section 7.3 described the measure and instruments. The second part discusses the procedure of data analysis. Section 7.4 explores the research and discusses its findings.

### **Chapter Contents**

- 7.1 Sample Characteristics
- 7.2 Scale Purification and Factor Analysis
- 7.3 The Measurement Model
- 7.4 Hypotheses Test and Research Findings
- 7.5 Summary of Hypothesis and Research Model
- 7.6 Chapter Summary

## 7.1 Sample Characteristics

This research targeted the users of the top fifty ASP vendors selected by ASPnews.com between 2001 and 2004. This survey was conducted from 1 December 2003, to 31 August 2004. Five hundred and ninety seven users were contacted with a request to reply to the Web-based questionnaire, 196 responses were returned, a response rate of 32.8%. However, there were twenty-one invalid questionnaires as some respondents presented the same satisfaction rate all the way or only answered a very limited part of the questionnaire. Thus the number of valid surveys was 175, making the valid response rate 29.3%. Among these valid surveys, 124 of them provided not only full information for satisfaction evaluation but also the information for tracking their ASP vendors' background which was required for the business position analysis in a subsequent stage of the research; therefore, the data provided by the respondent could be used a further analysis after scale purification. However, as for the factor analysis, same outcomes were obtained whether or not these fifty-one respondents that did not present the name of their ASP were included.

Afterwards, the data quality is another concern. Armstrong and Overton (1977) assumed that persons who respond less readily are like non-respondents. Thus, the researcher divided the respond sample into two groups according to the questionnaires returned time, and performed an independent-samples t test for measuring the non-response bias. The result showed no significant difference between these two groups. This

finding decreases the likelihood that the sample contained significant non-response errors which could have biased the survey results.

To determine if the respondents were unusual in any way, the researcher analyzed their demographic characteristics, and these are presented in the next subsection.

### 7.1.1 Participants' Demographic Characteristics

The demographics data (Table 7-1) included five categories: respondents by industry, respondents by position, periods (years) of ASP services received, numbers of employees, and numbers of IT employees.

The respondents came from businesses across twenty industries and were the customers of twenty-eight ASPs based in Canada, the United States of America, or the United Kingdom (see Appendix D and Appendix E for more detail). This characteristic makes the results more generalizable.

The investigation of the period of ASP service employment discovered that almost all of the respondents (96.53%) had been receiving the service for more than one year, and over than half of them had been involved with the services of ASP vendors for more than three years. As their responses are based on a long period of using experience, the responses should be reliable.

Inspection of their position indicates that the respondents were in middle to high positions and in charge of either strategy decision-making or IT support. The number of employees shows that the size range of respondents' firms

was nearly equal. Thus, their feedback is able to express broad and empirical viewpoints.

As already noted, rule-of-thumb has been commonly used for determining the minimum sample size in multiple regression analyses. Conservatively, ten times the number of variables is the necessary sample size for accurate estimation. However, some researchers express different viewpoints about this issue. For example, Green (1991) introduced a slightly more complex rule-of-thumb:  $N \geq 50 + m$  ( $N$  represents the minimum number of subjects, and  $m$  stands for number of predictors). He argued that in terms of the power to check a typical effect size, a reasonable acceptable rule might be to have a minimum base sample size of fifty observations and then roughly eight additional observations per predictor. Lo (1997) indicated that, in general, five observations will be needed for each independent variable. Vittinghoff and McCulloch (2007) found that compared with ten events per predictor variable (EPV), only a minor degree of extra caution is warranted with between five and nine EPV, as the accuracy is nearly as good as that with between ten and sixteen EPV.

As a result of purification, fourteen variables were abstracted for exploring their effects on customer perception of satisfaction. The number of valid respondents (i.e. 175) was above the lowest standard of rule-of-thumb. If excluding the fifty-one surveys, 124 respondents are slightly less than the minimum number of general rule-of-thumb. However, based on the other methods, the sample size is still acceptable for valid analysis.



The abstracted fourteen variables were categorized into five dimensions. Some dimensions were non-normally distributed, but after transformation, this problem was fixed. The histograms and normal Q-Q plots of these dimensions, together with the ultimate dependent variable, can be found in Appendix F.

In conclusion, the analysis of participants' demographic characteristics shows that the respondents came from a wide range of industries and different sizes of firms, and had been involved with the ASP for a reasonably long period. Moreover, most of them occupied an important position, an essential for answering the questions of this research. The robust background of respondents provides strong evidence of no response bias in this study.

Table 7-1

*Participants' Demographic Characteristics of Valid Sample*

<b>Demographic Characteristics</b>	<b>Percent</b>	<b>Demographic Characteristics</b>	<b>Percent</b>
<b><i>Respondents by Industry</i></b>		<b><i>Respondents by Position</i></b>	
Admin/Customer Service	0.52%	Top management	17.01%
Accounting	0.52%	Middle management	32.47%
Advert/Media/Entertain	6.19%	First Level supervisor	13.92%
Communication	2.06%	Professional (Non-IT) support employees	4.64%
Construction	1.55%	IT support employees	14.43%
Consulting	4.12%	Secretarial or Clerical staff	5.15%
Education & Science	7.22%	Other operating personnel	12.37%
Engineering, Oil & Mining	0.52%	<b><i>Number of Employees</i></b>	
Financial Services	6.19%	Less than 10	8.25%
Government	4.12%	10-50	20.10%
Healthcare & Medical	2.58%	50-100	15.46%
Hospitality & Tourism	1.55%	100-500	19.07%
I.T./Communications	11.86%	500-1000	12.37%
Insurance	1.03%	1000-10000	14.95%
Manufacturing (discrete)	7.73%	More than 10000	9.79%
Manufacturing (process)	9.79%	<b><i>Number of IT Employees</i></b>	
Retail/Consumer Prods.	2.06%	None	8.99%
Sales & Marketing	6.19%	Less than 5	28.65%
Trade & Services	2.06%	5-10	15.73%
Wholesale	2.58%	10-50	20.79%
Other	19.59%	50-100	10.11%
<b><i>Periods of ASP services received</i></b>		More than 100	15.73%
Less than 1 year	3.47%		
1-2 years	16.76%		
2-3 years	21.39%		
3-4 years	30.64%		
4-5 years	8.09%		
More than 5 years	19.65%		

## 7.1.2 Participants' ASP Firm Origin

Using the criteria of categorizing ASPs firm origin type, the background data of the participants' ASPs was analyzed. Table 7-2 is a summary of the ASP

firm origin type distribution. Table 7-3 presents the relationship between the participants and their ASP firm origin.

Table 7-2  
*ASP Firm Origin Type Distribution in this Research*

<b>ASP Firm Origin Type</b>	<b>Count</b>	<b>Percent</b>
Pure-play ASP	8	29%
Infrastructure-turned ASP	7	25%
ISV-turned ASP	13	46%

Table 7-3  
*Participants' Distribution of ASP Firm Origin Type*

<b>ASP Firm Origin Type</b>	<b>Users Response Count</b>	<b>Percent</b>
Pure-play ASP	32	26%
Infrastructure-turned ASP	34	27%
ISV-turned ASP	58	47%

The information in Tables 7-2 and 7-3 shows that thirty-two respondents have been the customers of eight pure-play ASP vendors. Thirty four respondents have been customers of seven infrastructure-turned ASPs. Fifty-eight respondents have been the users of thirteen ISV-turned ASPs.

### 7.1.3 Participants' ASP Provider Type

Discussions in Chapter 3 (3.3.8) show that, in terms of service characteristics and scope, there are more than five types of ASP. However, using the results of sample analysis, only three types of ASPs have been investigated in this study. The details regarding ASP provider type are listed in Table 7-4. Table 7-5 presents a summary of participants' distribution in terms of employing services from these three types of ASP.

Table 7-4

*ASP Provider Type Distribution in this Research*

Code	ASP Provider Type	Asp Count	Percent
1	Enterprise ASPs	7	25%
2	Volume Business ASPs	10	36%
3	Specialist ASPs	11	39%

Table 7-5

*Participants' Distribution of ASP Provider Type*

Code	ASP Provider Type	Users Response Count	Percent
1	Enterprise ASPs	48	39%
2	Volume Business ASPs	31	25%
3	Specialist ASPs	45	36%

#### 7.1.4 Participants' ASP Service Content

The ten most popular service items were found through the pioneer survey, and each customer might have adopted more than one service from their ASP vendors. Table 7-6 demonstrates the content of services received by the respondents.

Table 7-6

*Summary of ASP's Service Content Received by the Respondents*

Code	Service Name	Users Response Count
UB03A	Application development (e.g. designing, selling)	72
UB03B	Software implementation	93
UB03C	Hardware installation	36
UB03D	Internet facility (e.g. application delivery)	67
UB03E	Data center (e.g. website hosting, co-location)	45
UB03F	Application maintenance	85
UB03G	Application integration	58
UB03H	Software upgrading	60
UB03I	User training	85
UB03J	IT consulting (e.g. technical support)	77

## 7.2 Scale Purification and Factor Analysis

In this section, the data from Part One of the questionnaires is analyzed. Thirty-six questions (items) were involved. For determining user satisfaction with ASPs, the researcher assessed two aspects of each item. One is the “attribute performance level”<sup>6</sup> which was used to evaluate the perceived satisfaction with the service. The higher the attribute performance level expressed by the respondents, the more satisfaction they received. The other aspect is the “importance level” which is used to evaluate the expectation of the service. The higher the importance level expressed by the respondents, the stronger they are affected by the satisfaction with that assessed service item. Two commercial statistics packages – SPSS 13.0 and Excel 5.1 for Windows were used to analyze data in this study.

### 7.2.1 Item Analysis and Reliability Estimates

In order to identify and then eliminate the ambiguous items as well as non-discriminating test items, an item-analysis was performed (Cronbach, 1951; Churchill, 1979) before further data assessment. Data for the initial refinement of the thirty-six-item instrument were gathered from the sample of 124 valid respondents. To establish a level of reliability at this stage, item-to-total correlations were examined (last column of Table 7-7 and Table 7-8). Generally, items were retained in the scale when the item-to-total correlation was at least 0.40 (Guilford, 1995; Streiner & Norman, 1995).

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6. It is named “Agreement Level” in the Part One of the questionnaire.

Table 7-7

Summary of Descriptive Statistics for the Full Data Set and Reliability of Attribute Performance Level Analysis (n = 124)

Descriptive Statistics							Item-to-Total Correlation
Dimension Name	Item #	Original Code	Minimum	Maximum	Mean	Std Dev	
Operational reliability	Item1	A01A	1	6	4.69	1.20	0.68
	Item2	A04A	1	6	3.35	1.36	0.30
	Item3	A06A	1	6	5.13	0.82	0.75
	Item4	A07A	1	6	5.05	0.88	0.79
	Item5	A09A	1	6	5.02	0.89	0.66
Service usability	Item6	A10A	1	6	4.69	1.20	0.72
	Item7	A14A	1	6	4.86	1.08	0.86
	Item8	A15A	2	6	4.90	1.09	0.81
	Item9	A16A	1	6	4.46	1.13	0.88
Affordability	Item10	A17A	1	6	4.56	0.99	0.74
	Item11	A18A	1	6	4.68	0.91	0.78
	Item12	A19A	1	6	4.42	1.10	0.67
	Item13	A20A	1	6	4.29	1.26	0.41*
Service availability	Item14	A21A	1	6	4.13	1.33	0.63*
	Item15	A22A	1	6	4.87	0.82	0.67
	Item16	A23A	1	6	4.74	1.18	0.67
	Item17	A25A	2	6	5.14	0.78	0.74
Scalability	Item18	A26A	1	6	3.90	1.46	0.34
	Item19	A27A	1	6	3.97	1.27	0.50
	Item20	A28A	1	6	4.72	1.09	0.71
	Item21	A29A	1	6	4.79	0.96	0.69
Supportability	Item22	A30A	1	6	4.57	1.12	0.77
	Item23	A32A	1	6	4.97	0.98	0.73
	Item24	A34A	1	6	4.54	1.13	0.49*
	Item25	A35A	1	6	3.49	1.07	0.47
Business status	Item26	A36A	1	6	4.66	1.06	0.57*
	Item27	A37A	2	6	4.55	0.94	0.27
	Item28	A38A	1	6	4.53	1.23	0.51
	Item29	A39A	1	6	4.35	1.44	0.58*
Lock-in effect	Item30	A40A	1	6	4.94	1.01	0.80
	Item31	A41A	1	6	3.08	1.41	0.48
	Item32	A42A	1	6	3.14	1.43	0.42
	Item33	A43A	1	6	4.02	1.41	0.48
Customization & integration	Item34	A44A	1	6	4.27	1.28	0.70
	Item35	A45A	1	6	4.72	1.25	0.50*
	Item36	A46A	1	6	4.12	1.35	0.59

\*: item-to-total correlation is less than 0.4 in the correspondent item of important level (as last column of Table 7-8) therefore it has to be eliminated.

Table 7-8  
 Summary of Descriptive Statistics for the Full Data Set and Reliability of Importance Level Analysis (n = 124)

Descriptive Statistics							Item-to-Total Correlation
Dimension Name	Item #	Original Code	Minimum	Maximum	Mean	Std Dev	
Operational reliability	Item1	A01I	1	6	4.47	0.75	0.54
	Item2	A04I	1	5	3.53	1.11	<del>0.63*</del>
	Item3	A06I	2	5	4.45	0.77	0.47
	Item4	A07I	2	5	4.42	0.70	0.61
	Item5	A09I	2	5	4.39	0.73	0.73
Usability	Item6	A10I	1	5	4.26	0.72	0.67
	Item7	A14I	3	5	4.44	0.55	0.68
	Item8	A15I	1	5	4.38	0.74	0.16
	Item9	A16I	2	5	4.05	0.75	0.53
Affordability	Item10	A17I	2	5	4.06	0.75	0.71
	Item11	A18I	2	5	3.92	0.76	0.50
	Item12	A19I	2	5	3.68	0.80	0.45
	Item13	A20I	1	6	3.69	0.95	<del>0.17</del>
Service availability	Item14	A21I	1	5	3.65	1.00	<del>0.04</del>
	Item15	A22I	2	5	4.16	0.75	0.77
	Item16	A23I	2	5	3.72	0.81	<del>0.36</del>
	Item17	A25I	3	5	4.40	0.68	0.66
Scalability	Item18	A26I	1	5	3.76	0.89	<del>0.49*</del>
	Item19	A27I	1	5	3.52	1.06	0.57
	Item20	A28I	2	5	3.86	0.93	0.70
	Item21	A29I	1	5	4.21	0.73	0.74
Supportability	Item22	A30I	1	5	3.58	0.95	0.49
	Item23	A32I	2	5	4.11	0.77	0.70
	Item24	A34I	1	5	3.60	1.02	<del>0.10</del>
	Item25	A35I	1	5	3.94	0.85	0.85
Business status	Item26	A36I	1	5	4.00	0.93	<del>0.01</del>
	Item27	A37I	1	5	2.83	0.86	<del>0.49*</del>
	Item28	A38I	1	5	3.19	1.24	0.67
	Item29	A39I	1	5	4.22	0.86	<del>-0.02</del>
Lock-in effect	Item30	A40I	2	5	4.11	0.79	0.76
	Item31	A41I	1	5	3.51	0.87	0.49
	Item32	A42I	1	5	3.58	0.92	0.54
	Item33	A43I	1	5	3.65	1.04	0.55
Customization & integration	Item34	A44I	1	5	3.78	0.84	0.43
	Item35	A45I	1	5	3.90	0.95	<del>0.25</del>
	Item36	A46I	1	5	3.62	1.14	0.44

\* item-to-total correlation is less than 0.4 in the correspondent item of attribute performance level (as last column of Table 7-7), therefore it has to be eliminated.

Regarding item-to-total correlation, Items 2, 18, 27 of attribute performance level and items 13, 14, 16, 24, 26, 29, 35 of importance level have low corrected item-to-total correlations, and these items are recommended for deletion (Netemeyer et al., 2003). For the purpose of analyzing the data set of attribute performance level and importance level in pairs, those items with the low corrected item-to-total correlation had to be dropped in both groups (the data set of attribute performance level and these of the importance level). As a result, Items 2, 13, 14, 16, 18, 24, 26, 27, 29, 35 in both groups were eliminated. After eliminating these items, item-to-total correlations were acceptable. The corrected results reveal a moderate to high level of correlation ( $.40 < r < .88$ ) in the attribute performance level and ( $.40 < r < .85$ ) in the importance level. Therefore, the remaining twenty-six items were considered adequate for advanced investigation in both groups.

### 7.2.2 Principal Components Factor Analysis

After the initial scale purification, the sample data were examined using principal components factor analysis as the extraction technique and Oblimin with Kaiser Normalization as the oblique rotation Method. This method is preferred because the researcher of this study believes that the analyzed factors are likely to be correlated, and a regression equation is expected to be generated by GLM. Stewart (2001) suggested the adoption of an oblique rotation factor analysis approach under the following concerns or conditions: the behavioral nature of participants, potential errors of measurement, and expected interrelations among the theoretical constructs.

Researchers (Hair et al., 1998; Straub, 1989) have provided some guidelines to improve the convergent validity (Nunnally, 1978) and discriminant validity



(Price & Mueller, 1986) for academics while performing factor analysis. The criteria are (1) using a minimum eigenvalue of 1 as a cutoff value for extraction; (2) deleting items with factor loadings less than 0.5 on all components or greater than 0.5 on two or more components; (3) ensuring that none of the components have only one variable in it; and (4) ensuring that the derived components explain 50% or more of the variance in each of the variables, that is, have a communality greater than 0.50. Communality is the proportion of variance of the variable that is accounted for by all of the factors taken together, and a very low communality value can indicate that a variable may not belong with any of the factors.

To reach a satisfactory outcome, the researcher followed the criteria by repeating the factor analysis procedure a number of times and removing the variables with the communality value lower than 0.5, and performing the principal component analysis again. At first, a confirmatory factor analysis (CFA) was conducted targeting the twenty-six items that had been categorized into nine components. However, the result of the CFA indicated that these nine components could not be proved. Therefore, an exploratory factor analysis (EFA) was conducted afterward. A result of five components with fourteen remaining items included from the data set was achieved. More details about the procedure of factor analysis are presented in section 7.3.1.2.

Based on the principle that variables with higher loadings will influence to a greater extent the name of the label selected to represent a factor (Pett et al., 2003), the five factors were identified as 1) capacity and performance; 2) reliability and trustworthiness; 3) affordability; 4) customization and integration; and 5) lock-in effect. Replacing the initial components, these five factors were used to assess the satisfaction level of user perception of service

competitiveness of ASPs. They have been termed the “service competitiveness assessment factors”.

Table 7-9 presents the composition of the new factors and relationship between the five new factors and the initial components. In addition, the original codes and variables are listed in this table as they will be referenced to in Section 7.3.

Table 7- 9  
*The Factors and Their Relevant Data Source of Users’ Perception of Service Competitiveness*

<b>Factors</b>	<b>Investigation Issue</b>	<b>Original Code</b>	<b>Variable</b>	<b>Initial Component Name</b>
Capacity & Performance	Stability	A07A A07I	PFA1 PFI1	Operational reliability
	Function completeness	A22A A22I	PFA2 PFI2	Service availability
	Maintenance	A25A A25I	PFA3 PFI3	Service availability
	System expansibility	A29A A29I	PFA4 PFI4	Scalability
Reliability & Trustworthiness	Trust and confidentiality	A06A A06I	REA1 REI1	Operational reliability
	Reliability and security of	A09A A09I	REA1 REI1	Operational reliability
Affordability	Pricing scheme	A17A A17I	AFA1 AFI1	Affordability
	Pricing mode adopted	A18A A18I	AFA1 AFI1	Affordability
	Cost acceptability	A19A A19I	AFA1 AFI1	Affordability
Lock-in effect	Limited switching impact	A41A A41I	LKA1 LKI1	Lock-in effect
	Acceptable switching cost	A42A A42I	LKA1 LKI1	Lock-in effect
Customization & Integration	Application integration	A27A A27I	CUA1 CUI1	Customization & integration
	Customization capacity	A44A A44I	CUA1 CUI1	Customization & integration
	Integration capabilities	A46A A46I	CUA1 CUI1	Customization & integration

Table 7-10

*Description of Investigation Issues*

<b>Investigation Issues</b>	<b>Question Contents</b>
Stability	Our ASP provides products and service with fairly stable performance.
Function completeness	Our ASP completes functions satisfactorily.
Maintenance	Our applications and data are well maintained by our ASP.
System expansibility	Our application can maintain steady performance as the load increases simply by adding additional resources.
Trust and confidentiality	Our ASP is able to protect our privacy and respect our confidentiality.
Reliability and security of connectivity	We are satisfied with the network reliability and security while we access the service from our ASP.
Pricing scheme	Our ASP imposes a reasonable charge.
Pricing mode adopted	The charging mode of service fees (e.g. fixed one-off fee, per transaction fee, subscription fee, size of data) for our ASP is reasonable.
Cost acceptability	Compared to other types of IT outsourcing expenditure, the ASP services fee is cheaper.
Limited switching impact	The users have starting to search a better ASP vendor, but it takes time.
Acceptable switching cost	It would cost a lot more money to change ASP.
Application integration	The system provided by our ASP is easily integrated with third-party systems.
Customization capacity	Our ASP is capable of appropriately customizing our application to reach our requirements.
Integration capabilities	Our ASP is able to integrate our information systems.

According to Stewart (2001), there are three requirements for using LISREL as a confirmatory approach.

1. A genuine, strong theory that posits a strong and unambiguous structure of relations among constructs and the variables that represent these constructs.
2. There must be a strong and unambiguous *a priori* structure that serves as the basis for the test of fit.
3. The fit of the data to the *a priori* structure must be better (by some acceptable criterion) than the fit to structures suggested by alternative theories... (p.77)

This exploratory study has made some assumptions that have never been explored in the ASP or IT outsourcing context. Without a strong and unambiguous *a priori* structure, statistical tools that require both strong theory and strong measurement such as LISREL, confirmatory factor analysis and, more recently, Structural Equation Modeling (SEM), are not relevant in this study. This explains why an EFA has been used in this stage, and why a GLM is conducted in the subsequent measurement.

### 7.3 Measurement Model

Before testing the structural model, the measurement model has to be examined for an acceptable level of reliability and validity.

Reliability is the assurance that the items posited to measure a construct are sufficiently related to be reliably considered as a set of items (Cronbach, 1951). There are many ways in which reliability can be tested, such as test-retest, split-half and internal consistency. In this study, internal consistency

is considered the most appropriate measure to examine the reliability of data set. Cronbach's alpha has been widely applied to measure the internal consistency with constructs evaluated by multiple items (Bearden & Netemeyer, 1999; Kaynak, 2002; Morgan et al., 2004; Smith & Albaum; 2004). Since multiple items were examined in this research, this measure was adopted to estimate the reliability.

Validity is the extent to which a test measures what it purports to measure. Compared with the other validity (e.g. content validity, criterion validity), construct validity seemed to be the most suitable for this study. There are numerous ways to test for construct validity. Some researchers (Campbell & Fiske, 1959; Dröge, 1996) suggested that the convergent validity and discriminant validity are the core criteria for claiming construct validity. Marchevsky (2000) recommended convergent validity, discriminant validity and factorial validity to measure construct validity. In this study, convergent validity, discriminant validity, and factorial validity were all tested, because the convergent validity and discriminant validity are related to generalisability which was an expectation in this study. Factorial validity was used for measuring the clustering of correlations of questionnaire responses. This measure was established through the factor analysis conducted in the previous section (principal components factor analysis).

The measurement focused on two clusters of data: service competitiveness and services utilized. These are discussed in the following subsections.

### 7.3.1 Service Competitiveness Assessment Factors Evaluation

In the following subsections, the five service competitiveness assessment factors that were extracted from the analysis are assessed.

#### 7.3.1.1 Reliability - Internal Consistency

Indicator reliability and composite reliability have frequently been used for obtaining Cronbach's alpha value in reliability tests (Fornell & Larcker, 1981; Long, 1983). Indicator reliability can be derived by squaring the factor loading (Byrne 1998). Composite reliability can be calculated as follows: (square of summation of factor loadings) / (square of summation of factor loadings + summation of error variances) (Fornell and Larcker, 1981). The acceptable value for indicator reliability is 0.4 and higher (Bagozzi & Baumgartner, 1994; Bauer et al., 2005) and 0.7 for composite reliability (Fornell & Larcker; 1987). Similarly, Nunnally (1978) suggested that 0.7 is the minimum Cronbach's alpha value to meet the requirements of reliability; however, a value as low as 0.6 is acceptable for an exploratory study (Brown & Muchira, 2004).

In the following sections internal consistency will be discussed for two aspects – attribute performance level and importance level.

#### ***Attribute performance level***

Table 7-11 indicates that, all items, except A07A and A25A, have an acceptable indicator reliability degree (0.50 – 0.85). In addition, all components have satisfactory Cronbach's alpha values (0.74 – 0.89 for each component, 0.86 for all fourteen items of these five factors).

Table 7-11

*Scale Development of Attribute Performance Level*

Factors	Variables	Original Code	Factor Loadings	Indicator Reliability	Error Variance	Composite Reliability (Cronbach's Alpha)	Average Variance Extracted
Capacity & Performance	PFA1	A29A	0.91	0.83	0.17	0.82	0.53
	PFA2	A22A	0.78	0.61	0.39		
	PFA3	A25A	0.62	0.38	0.62		
	PFA4	A07A	0.57	0.32	0.68		
Reliability & Trustworthiness	REA1	A06A	0.80	0.64	0.36	0.74	0.59
	REA2	A09A	0.73	0.53	0.47		
Affordability	AFA1	A17A	-0.92	0.85	0.15	0.89	0.72
	AFA2	A18A	-0.91	0.83	0.17		
	AFA3	A19A	-0.71	0.50	0.51		
Lock-in Effect	LKA1	A41A	0.89	0.79	0.21	0.87	0.77
	LKA2	A42A	0.87	0.76	0.24		
Customization & Integration	CUA1	A46A	-0.89	0.80	0.20	0.87	0.69
	CUA2	A27A	-0.88	0.77	0.23		
	CUA3	A44A	-0.71	0.50	0.50		

\* Alpha = 0.86 for 14 items

***Importance level***

Table 7-12 illustrates that except A09I, A25I and A29I, all items have an acceptable indicator reliability degree (0.50 – 0.75). All factors have acceptable Cronbach's alpha values (0.63 – 0.84 for each component, 0.85 for the whole fourteen items of these five factors).

Table 7-12  
Scale Development of Importance Level

Factors	Variables	Original Code	Factor Loadings	Indicator Reliability	Error Variance	Composite Reliability (Cronbach's Alpha)	Average Variance Extracted
Capacity & Performance	PF11	A07I	.82	0.67	0.33	0.80	0.50
	PF12	A22I	.74	0.54	0.46		
	PF13	A25I	.68	0.46	0.54		
	PF14	A29I	.57	0.32	0.68		
Reliability & Trustworthiness	RE11	A06I	.80	0.63	0.37	0.63	0.47
	RE12	A09I	.56	0.31	0.70		
Affordability	AF11	A18I	-.87	0.75	0.25	0.84	0.63
	AF12	A17I	-.80	0.64	0.36		
	AF13	A19I	-.71	0.50	0.50		
Lock-in Effect	LKI1	A42I	.86	0.74	0.26	0.84	0.72
	LKI2	A41I	.84	0.70	0.30		
Customization & Integration	CUI1	A27I	.81	0.65	0.35	0.82	0.60
	CUI2	A46I	.78	0.61	0.40		
	CUI3	A44I	.75	0.56	0.45		

\* Alpha = 0.85 for 14 items

### 7.3.1.2 Factorial Validity

Gefen and Straub (2005) indicated that factorial validity is most frequently assessed with an exploratory factor analysis. When factorial validity is acceptable, it means each measurement item correlates strongly with the one construct it is related to, while correlating weakly or not significantly with all other constructs. As a rule of thumb, a measurement item loads highly if its loading coefficient is above 0.6 and does not load highly if the coefficient is below 0.4 (Hair et al., 1998). More details about the procedure of measuring factor validity are discussed below.

#### **Attribute performance level**

The analysis results present a high degree of reliability of the data regarding attribute performance level, since the following criteria are satisfied.



1. The communalities are modest to high with all variables having a final communality estimate of greater than 0.50 (0.568 – 0.862 in this study, as Table 7-13).

Table 7-13  
Communalities of Attribute Performance Level

Original Code	Initial	Extraction
A06A	1.000	.766
A09A	1.000	.739
A07A	1.000	.763
A17A	1.000	.862
A18A	1.000	.861
A19A	1.000	.568
A22A	1.000	.716
A25A	1.000	.719
A29A	1.000	.801
A27A	1.000	.745
A41A	1.000	.816
A42A	1.000	.805
A44A	1.000	.716
A46A	1.000	.834

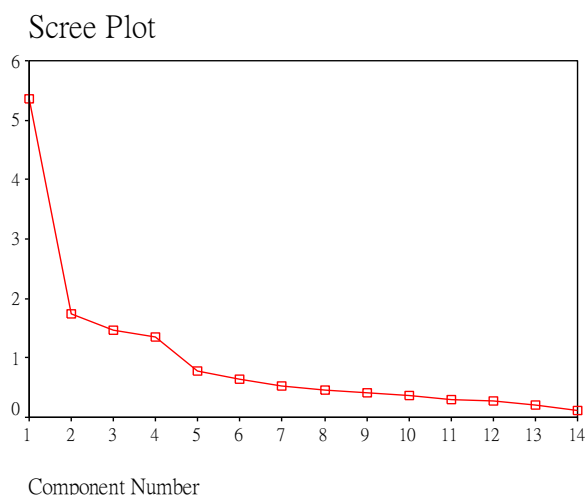
2. The scree plot is useful in determining how many factors to retain. Usually, this plot shows a sharp drop, leveling off to a flat tail as each successive component's eigenvalue explains less and less of the variances. After looking for "elbow, Cattell (1996) recommended selecting all the factors prior to where the plot levels off in a scree plot. Figure 7-1 demonstrates that there are two sharp drops in this research, one is above factor 4, and the other one is above factor 5.

Kaiser (1960) proposed retaining all factors with eigenvalues  $> 1$ . In addition, Jolliffe (1972) lowered this threshold by his suggestion to retain all factors with eigenvalues  $> 0.7$ . Based on their assertions, four factors would meet the requirement of having a minimum eigenvalue of 1 as a cutoff value for extraction; but the researcher decided to adopt the assertion of Jolliffe

(with eigenvalues > 0.7) so five factors were extracted, because these five factors can be used to explore the research questions more efficiently than by using four factors.

Figure 7-1

*Scree Plot of Attribute Performance Level*



- It is necessary to retain sufficient factors to account for a large proportion of the total item variance, e.g. 70-80% (76.499% in this study as in Table 7-14).

Table 7-14

*Total Variance Explained of Attribute Performance Level*

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	5.360	38.283	38.283	5.360	38.283	38.283	3.639
2	1.745	12.462	50.745	1.745	12.462	50.745	1.715
3	1.476	10.545	61.289	1.476	10.545	61.289	3.317
4	1.360	9.717	71.007	1.360	9.717	71.007	3.240
5	.769	5.493	76.499	.769	5.493	76.499	3.022
6	.649	4.633	81.132				
7	.520	3.713	84.845				
8	.457	3.267	88.112				
9	.416	2.974	91.086				
10	.365	2.606	93.692				
11	.298	2.127	95.819				
12	.263	1.882	97.701				
13	.199	1.419	99.120				
14	.123	.880	100.000				

4. Clean factor loadings: The loadings on the factors are fairly high (.569 - .923) in this research. Factor loadings greater than 0.70 are generally considered meaningful since this implies that the construct explains more than 50 percent of the variances in the particular construct (Grant & Higgins, 1991; Howell & Higgins, 1990).
5. None of the off factor loadings is greater than 0.5.
6. No one-variable component exists in this research.

More detail can be seen from the component matrix table below.

Table 7-15  
*Pattern Matrix of Attribute Performance Level*

Original Variable Code	Component				
	1	2	3	4	5
A06A					.802
A07A	.569				.464
A09A	.266				.726
A17A			-.923		
A18A			-.913		
A19A			-.698		
A22A	.778				
A25A	.615		-.214		.272
A27A				-.878	
A29A	.910				
A41A		.888			
A42A		.872			
A44A	.225			-.709	
A46A				-.894	

### ***Importance level***

Similarly to attribute performance level, the analysis result of importance level indicates a high degree of reliability since this assessment category, that is, importance level, also meets all the criteria. Table 7-16 shows that the communalities of all variables are greater than 0.6 (0.633 – 0.798). Table 7-17 shows that the variance explained value is greater than 70%

(72.120% in this study). Table 7-18 expresses clean factor loadings as well. The loadings on the factors are modest to high (.554 - .867). In addition, the entire off factor loadings are less than 0.4 and there are no one-variable components.

Table 7-16  
*Communalities of Importance Level*

Original code	Initial	Extraction
A06I	1.000	.798
A09I	1.000	.697
A17I	1.000	.741
A18I	1.000	.760
A19I	1.000	.675
A25I	1.000	.648
A27I	1.000	.723
A41I	1.000	.756
A42I	1.000	.762
A44I	1.000	.633
A46I	1.000	.797
A07I	1.000	.684
A22I	1.000	.721
A29I	1.000	.703

Table 7-17  
*Total Variance Explained of Importance Level*

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	5.028	35.914	35.914	5.028	35.914	35.914	3.451
2	1.634	11.669	47.583	1.634	11.669	47.583	2.380
3	1.272	9.088	56.671	1.272	9.088	56.671	2.509
4	1.175	8.395	65.066	1.175	8.395	65.066	3.257
5	.988	7.054	72.120	.988	7.054	72.120	1.901
6	.749	5.347	77.467				
7	.583	4.168	81.635				
8	.537	3.835	85.470				
9	.476	3.402	88.872				
10	.422	3.016	91.889				
11	.333	2.376	94.265				
12	.326	2.330	96.594				
13	.275	1.961	98.556				
14	.202	1.444	100.000				

Table 7-17 shows that if four factors were extracted, the eigenvalues would be greater than 1. However, in this research five factors have been extracted, which is the same as the number of factors extracted in attribute performance level. More details as well as the explanation can be found in the discussion in the subsection above. Figure 7-2 demonstrates a clean scree plot from the collecting data too.

Figure 7-2

Scree Plot of Importance Level

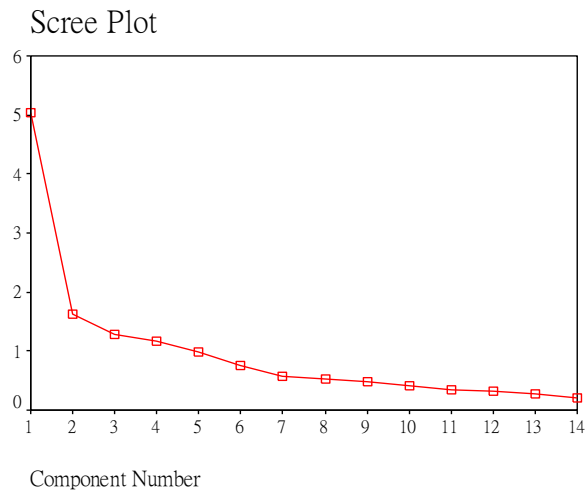


Table 7-18

Pattern Matrix of Importance Level

Original Variable Code	Component				
	1	2	3	4	5
A06I				-.295	.796
A07I	.821				
A09I	.343		.312		.554
A17I				-.801	
A18I				-.867	
A19I			.221	-.704	
A22I	.736				-.274
A25I	.676				.256
A27I		.807			
A29I	.566				.384
A41I			.838		
A42I			.861		
A44I	.207	.745			
A46I		.779		-.277	-.246

The result revealed that the data of attribute performance level and importance level are both consistent with the criteria of distinct construct; it shows that a moderate factorial validity of constructs is used in this pretest study sample.

### **7.3.1.3 Convergent Validity and Discriminant Validity**

Discriminant and convergent validities are often evaluated together to help establish construct validity. Convergent validity tests whether the correlations between measures of the same factor are different from zero and large enough to warrant further investigation of discriminant validity. The convergent validity of the research instrument can be assessed by three measures: indicator reliability, construct (composite) reliability and average variance extracted (AVE) (Fornell & Larcker, 1981).

An indicator reliability of at least .50 observed for each item is considered to be evidence of convergent validity. More about the criteria of evaluating the indicator reliability and composite reliability has been introduced in a previous section (section 7.3.1.1). As for the AVE, this value can be calculated using the following formula:  $(\text{summation of squared factor loadings}) / (\text{summation of squared factor loadings}) + (\text{summation of error variances})$  (Fornell & Larcker, 1981). AVE value has to be greater than 0.5 (Fornell & Larcker, 1981), otherwise the variance due to measurement error is greater than the variance due to the construct, which would mean that the convergent validity of the construct is questionable.

Tables 7-11 and 7-12 demonstrate that each factor of attribute performance level meets all of the requirements for convergent validity, and so has the

importance level except reliability/ trustworthiness, which attained the recommended composite reliability value of 0.6 (Nunally, 1978) and AVE value of 0.4 (Bauer et al., 2005) for newly developed scales.

Discriminant validity is used to assess if there is a high correlation between instruments used to measure different constructs. Therefore, it is necessary to make sure whether each measurement item correlates weakly with all other constructs except for the one to which it is theoretically associated. Discriminant validity can also be analyzed by looking at the level of AVE, and 0.5 is the recommended threshold for an acceptable validity (Chin, 1998). On the other hand, Fornell & Larcker (1981) proposed that all of the AVE have to be greater than the square correlation of each pair of constructs ( $AVE > r^2$ ) to meet the discriminant validity.

Table 7-19 and Table 7-20 display the AVE of each factor for attribute performance level and importance level respectively. According to the AVE value, almost all factors in importance level (except A1 and A5) reach the criteria of acceptable discriminant validity. However, these two factors still highly attained the recommended AVE value of 0.4 (Bauer et al., 2005) for newly developed scales. It would appear that there is no discriminant validity problem in this study.

**Attribute performance level**

Table 7-19

*Average Variance Extracted (AVE) and the Square Correlation of Each Pair of Construct (Attribute Performance Level)*

	A1	A2	A3	A4	A5
A1	Ave = 0.534				
A2	$R^2: (0.043)^2 = 0.002$	Ave = 0.774			
A3	$R^2: (0.35)^2 = 0.123$	$R^2: (0.120)^2 = 0.014$	Ave = 0.724		
A4	$R^2: (0.457)^2 = 0.209$	$R^2: (0.174)^2 = 0.030$	$R^2: (0.336)^2 = 0.113$	Ave = 0.691	
A5	$R^2: (0.567)^2 = 0.321$	$R^2: (0.120)^2 = 0.014$	$R^2: (0.414)^2 = 0.171$	$R^2: (0.341)^2 = 0.116$	Ave = 0.585

**Importance level**

Table 7-20

*Average Variance Extracted (AVE) and the Square Correlation of Each Pair of Construct (Importance Level)*

	A1	A2	A3	A4	A5
A1	Ave = 0.498				
A2	$R^2: (0.301)^2 = 0.091$	Ave = 0.604			
A3	$R^2: (0.32)^2 = 0.102$	$R^2: (0.282)^2 = 0.080$	Ave = 0.722		
A4	$R^2: (0.466)^2 = 0.217$	$R^2: (0.272)^2 = 0.074$	$R^2: (0.364)^2 = 0.132$	Ave = 0.630	
A5	$R^2: (0.415)^2 = 0.172$	$R^2: (0.186)^2 = 0.035$	$R^2: (0.253)^2 = 0.064$	$R^2: (0.360)^2 = 0.130$	Ave = 0.47

In conclusion, the evidence above proves that the gathered data has acceptable reliability and validity, and this provides a strong foundation for advanced analysis.



### 7.3.1.4 Correlation between Attribute Performance and Importance

In this section, the regression correlation between attribute performance and the importance level of each service competitiveness assessment factor are investigated. The Pearson correlation coefficient used for this purpose.

According to Table 7-21, there is significant correlation between attribute performance and importance level for all factors except reliability and trustworthiness. Figures X-1 to X-5 in Appendix G demonstrate the scatter and regression plot of each pair's correlation for the five factors. Since the attribute performance level and importance level are significantly correlated to each other, they are both valid for measuring the satisfaction of each service competitiveness assessment factor. It means when the attribute performance is evaluated, it also implies the effect of importance level which can express the degree of expectation regarding these factors.

Table 7-21

*Pearson Correlation between Attribution Performance and Importance of Five Service Competitiveness Assessment Factors*

	Capacity & performance	Reliability & trustworthiness	Affordability	Lock-in effect	Customization & Integration
Pearson Correlation	.229*	.066	.245**	.372**	.260**
Significance	.011	.464	.006	.000	.004

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

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

### 7.3.2 Evaluation of Service Utilized by Customers

In addition to the service competitiveness assessment factors, one of the important items in Part Two of the questionnaire - service utilized - is

studied in this section. In this study, any service utilized by customers is referred to in brief as service utilized. Similarly to the data process for service competitiveness evaluation, the assessment of service utilized was preceded by factor analysis, reliability and validity examination, although this data is not as complex as the data in Part One.

Because the service utilized data is nominal and coded as 0 and 1, these dichotomous variables (binary score data) might result in distribution problem in factor analysis. Researchers (Holley 1966; Holley and Guilford 1964) recommend using the G-coefficient to address this concern. More specifically, a G-index is added to matrix to measure this coefficient. Stewart (1981) pointed that the G-index of a hypothetical observation resulted from transforming each of the original observations into its complementary pattern (e.g. transform 1, 0 into 0, 1 ... transform 1, 1, into 0, 0) and this extended matrix is then submitted to factor analysis. The following tables show the results from the factor analysis.

Table 7-22  
*Communalities of the Service Utilized*

Original code	Initial	Extraction
UB03A	1.000	.533
UB03B	1.000	.505
UB03C	1.000	.816
UB03D	1.000	.806
UB03E	1.000	.649
UB03G	1.000	.637
UB03I	1.000	.799
UB03J	1.000	.734

Extraction Method: Principal Component Analysis.

Table 7-23

*Total Variance Explanation of the Service Utilized*

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.945	36.810	36.810	2.945	36.810	36.810	2.144	26.802	26.802
2	1.421	17.760	54.570	1.421	17.760	54.570	2.047	25.582	52.384
3	1.114	13.927	68.497	1.114	13.927	68.497	1.289	16.114	68.497
4	.776	9.695	78.193						
5	.620	7.747	85.940						
6	.468	5.848	91.788						
7	.395	4.932	96.720						
8	.262	3.280	100.000						

Extraction Method: Principal Component Analysis.

Figure 7-3

*Scree Plot of the Service Utilized*

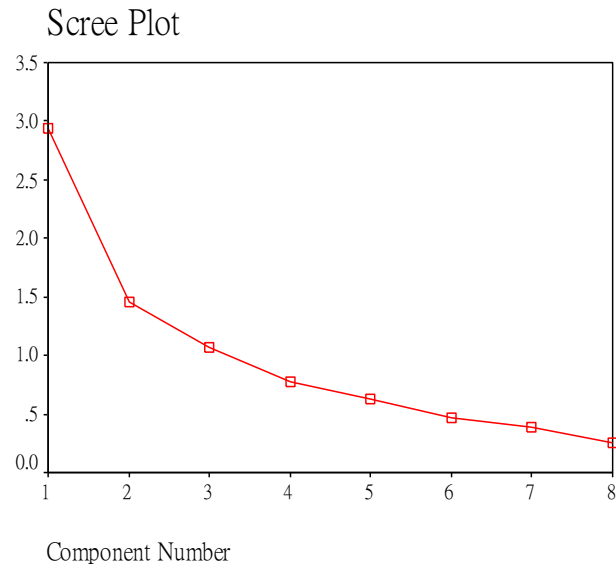


Table 7-24

*Rotated Component Matrix of the Service Utilized*

Original Code	Component		
	1	2	3
UB03C	.903		
UB03G	.753	.258	
UB03A	.630	.334	
UB03I		.847	.285
UB03J	.215	.828	
UB03B	.260	.644	
UB03D			.880
UB03E	.500		.617

Rotated Component Matrix

Through the factor analysis, the service utilized is grouped into three components: system development services, IT adoption services, and facility supporting services. The description corresponding to each component and its items is listed on Table 7-25. The details regarding scale development of service utilized can be found in Table 7-26.

Table 7-25

*Service Utilized and Its Description*

Original Code	Service utilized
	<b>System development services</b>
UB03G	Application integration
UB03C	Hardware installation
UB03A	Application development (e.g. designing, selling)
	<b>IT adoption services</b>
UB03I	User training
UB03J	IT consulting (e.g. technical support)
UB03B	Software implementation
	<b>Facility supporting services</b>
UB03E	Data center (e.g. website hosting, co-location)
UB03D	Internet facility (e.g. application delivery)

Table 7-26

*Scale Development of Service Utilized*

Factors	Variables	Original Code	Factor Loadings	Indicator Reliability	Error Variance	Composite Reliability (Cronbach's alpha)	Average Variance Extracted
System Development Services	SYSDP1	UB03G	.903	0.815	0.185	0.811	0.593
	SYSDP2	UB03C	.753	0.567	0.433		
	SYSDP3	UB03A	.630	0.397	0.603		
IT Adoption Services	ITCOND1	UB03I	.847	0.717	0.283	0.82	0.61
	ITCOND2	UB03J	.828	0.686	0.314		
	ITCOND3	UB03B	.644	0.415	0.585		
Facility Supporting Services	FACISP1	UB03E	.880	0.774	0.226	0.726	0.578
	FACISP2	UB03D	.617	0.381	0.619		

\* Alpha = 0.745 for 8 items

Table 7-26 indicates that the data set of these three components has acceptable reliability and validity for advanced analysis.

## 7.4 Hypotheses Test and Research Findings

After the purification and measure scale inspection, the following procedure is to explore the research findings. Since the five factors of assessing service competitiveness and three factors of assessing service utilized have been extracted from the factor analysis, the interaction relationship between all these factors and the customer perception of satisfaction have to be investigated. In other words, an enormous amount of information is included for evaluation in this research. GLM allows the estimation of the parameters for more complex equations, which is suitable for the requirements of this study.

### 7.4.1 Analysis of Customer Perception and Independent Variables

For assessing customer perception, the overall perceived satisfaction is used as the proxy of customer perception. In this section, the researcher evaluated the relationship and significance between the overall perceived satisfaction (dependent variable) and all the factors (independent variables) of this study. Factors regarding ASP business position (firm origin, provider type) were regarded as fixed factors, and all the other factors (including the five service competitiveness assessment factors and three service utilized factors) were regarded as being covariates. In order to obtain an ideal regression equation, the combination with all the independent variables as well as their square values were included for evaluation. After repeated adjustment through GLM's Univariate analysis, some factors, along with the square value of capacity and performance, and the square value of lock-in effect, were retained. The results are discussed in the following sections.

Table 7-27

*Significance of GLM and Beta Value of Each Parameter*

Source	Sig.	Standardize Beta
Intercept	.000	
Firm origin	.708	0.048
Provider type	.980	0.006
Capacity & Performance	.000	1.690
Reliability & Trustworthiness	.000	0.258
Affordability	.018	0.156
Lock-In effect	.015	-0.377
Customization & Integration	.011	0.165
(Capacity & Performance) **2	.001	-1.295
Lock-in effect **2	.032	0.318
Use of IT adoption service	.042	-0.132
Use of system development service	.329	0.062
Use of facility supporting service	.827	0.014

R Squared = .683 (Adjusted R Squared = .643)

Dependent Variable: Overall Perceived Satisfaction

Table 7-27 demonstrates that all items of the service competitiveness assessment factors (capacity and performance, reliability and trustworthiness, affordability, lock-in, customization and integration) and one factor within service utilized (use of IT adoption services) are statistically significant ( $p < 0.05$ ). However, regarding the fixed variables, that is, firm origin and provider type, neither has a  $p$  value that is less than 0.05. This shows that there is no statistically significant correlation between ASP business position and overall perceived satisfaction.

Using the Beta value on Table 7-27, a regression equation that express the correlation between all of the significant correlation factors and overall perceived satisfaction is displayed below.

$$\begin{aligned} \text{Overall Perceived Satisfaction} = & 1.69 \text{ Perform} - 1.295 \text{ Perform}^2 + .258 \\ & \text{Reliable} + .156 \text{ Afford} - .377 \text{ Lockin} + .318 \text{ Lockin}^2 + .165 \text{ Customiz} \\ & - 0.132 \text{ IT\_Adoption} \end{aligned}$$

#### 7.4.2 Analysis of User Perception of Service Competitiveness

As mentioned previously, user perception of service competitiveness consists of five factors: capacity and performance, reliability and trustworthiness, affordability, lock-in effect, and customization and integration. Generally, according to the GLM analysis result of the last Section (7.4.1), all factors of service competitiveness have significant correlation with the overall perceived satisfaction. This finding supports Hypothesis 4: *User perception of service competitiveness will directly influence customer perception of satisfaction.* More specifically, the effect of each factor can be classified into positive and negative. More details are presented in this section.

In the last column of Table 7-27, the Beta values show the direction of the effect of each service competitiveness assessment factors. However, to confirm and more clearly illustrate the direction of correlation, a Pearson correlation analysis was also conducted, and the results of this correlation and the significance are displayed in Table 7-28 below.

Table 7-28

*Pearson Correlation between Overall Perceived Satisfaction and the Five Service Competitiveness Assessment Factors*

Service competitiveness assessment factors	Overall Perceived Satisfaction	
	Pearson Correlation	Sig.
Capacity & Performance	.716**	.000
Reliability & Trustworthiness	.623**	.000
Affordability	.418**	.000
Lock-in Effect	-.206*	.022
Customization & Integration	.498**	.000

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

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

Capacity/performance has a statistically significant correlation with overall perceived satisfaction (.000), and the Pearson correlation of .716 shows that capacity/ performance has a positive direct effect on this variable. This is the first finding that supports Hypothesis 4; so is termed Hypothesis 4a.

Reliability/trustworthiness has a statistically significant correlation with overall perceived satisfaction (.000), and the Pearson correlation is .623. This shows that reliability/trustworthiness has a positive direct effect on this variable. This is the second finding that supports Hypothesis 4; so is termed Hypothesis 4b.



Affordability has a statistically significant correlation with overall perceived satisfaction (.000), and Pearson correlation is .418. This shows that affordability has a positive direct effect on this variable. This is the third finding that supports Hypothesis 4; so is termed Hypothesis 4c.

Lock-in has a statistically significant correlation with overall perceived satisfaction (.022). As the Pearson correlation is -.206, this shows that lock-in has a negative direct effect on this variable. This is the fourth finding that supports Hypothesis 4; so is termed Hypothesis 4d.

Customization/integration has a statistically significant correlation with overall perceived satisfaction (.000), and the Pearson correlation is .498. This shows that customization/Integration has a positive direct effect on this variable. This is the fifth finding that supports Hypothesis 4; so is termed Hypothesis 4e.

The five sub-hypotheses are summarized below.

Hypothesis 4a: Capacity/performance has a positive direct effect on satisfaction level.

Hypothesis 4b: Reliability/trustworthiness has a positive direct effect on satisfaction level.

Hypothesis 4c: Affordability has a positive direct effect on satisfaction level.

Hypothesis 4d: Lock-in effect has a negative direct effect on satisfaction level.

Hypothesis 4e: Customization/integration has a positive direct effect on satisfaction level.

### 7.4.3 Analysis of Business Position

In the previous section, it was found that there was no direct relationship between the ASP business position and the customer perception of satisfaction. In the following sections, a further investigation revealing the indirect effect between ASP business position and customer perception is conducted and presented.

#### 7.4.3.1 Firm Origin and Service Competitiveness

In this stage, the effect between ASP firm origin and the user perception of service competitiveness is analyzed.

Table 7-29

*Significance of GLM and Beta Value of Firm Origin and Capacity/ Performance*

<b>Source</b>	<b>Sig.</b>	<b>B</b>
Corrected Model	.038	
Intercept	.000	4.724
Firm origin	.027	0.166

Dependent Variable: Capacity/Performance  
R Squared = .040 (Adjusted R Squared = .032)

Table 7-30

*Significance of GLM and Beta Value of Firm Origin/ Reliability*

<b>Source</b>	<b>Sig.</b>	<b>B</b>
Corrected Model	.686	
Intercept	.000	5.016
Firm origin	.686	0.003

Dependent Variable: Reliability/Trustworthiness  
R Squared = .001 (Adjusted R Squared = -0.007)

Table 7-31  
*Significance of GLM and Beta Value of Firm Origin and Affordability*

Source	Sig.	B
Corrected Model	.300	
Intercept	.000	4.355
Firm origin	.300	0.958

Dependent Variable: Affordability  
 R Squared = .009 (Adjusted R Squared = 0.001)

Table 7-32  
*Significance of GLM and Beta Value of Firm Origin and Lock-In Effect*

Source	Sig.	B
Corrected Model	.420	
Intercept	.000	2.912
Firm origin	.420	0.107

Dependent Variable: Lock-In effect  
 R Squared = .005 (Adjusted R Squared = -0.003)

Table 7-33  
*Significance of GLM and Beta Value of Firm Origin and Customization/Integration*

Source	Sig.	B
Corrected Model	.502	
Intercept	.000	0.268
Firm origin	.502	0.114

Dependent Variable: Customization/Integration  
 R Squared = .004 (Adjusted R Squared = -0.004)

The analysis result of GLM shows that ASP firm origin only affects one factor of service competitiveness – capacity/performance. However, this finding more or less supports Hypothesis 1c: *The ASP firm origin will directly influence user perception of service competitiveness.*

**7.4.3.2 Firm Origin and Service Utilized**

The analysis through GLM found that firm origin only significantly correlates with IT adoption services, not the other two categories of the service utilized.

The tables below display the analysis details.

Table 7-34

*Significance of GLM and Beta Value of Firm Origin and IT Adoption Services*

<b>Source</b>	<b>Sig.</b>	<b>B</b>
Corrected Model	.010	
Intercept	.000	0.733
Firm origin	.010	0.281

Dependent Variable: IT adoption services  
R Squared = .073 (Adjusted R Squared = 0.058)

Table 7-35

*Significance of GLM and Beta Value of Firm Origin and System Development Services*

<b>Source</b>	<b>Sig.</b>	<b>B</b>
Corrected Model	.882	
Intercept	.000	0.543
Firm origin	.882	0.013

Dependent Variable: System development services  
R Squared = .000 (Adjusted R Squared = -0.008)

Table 7-36

*Significance of GLM and Beta Value of Firm Origin and Facility Supporting Services*

<b>Source</b>	<b>Sig.</b>	<b>B</b>
Corrected Model	.254	
Intercept	.000	0.918
Firm origin	.254	- 0.0906

Dependent Variable: Facility supporting services  
R Squared = .004 (Adjusted R Squared = -0.004)

Since firm origin can influence IT adoption services, and this service is one item of service utilized, this finding supports Hypothesis 1b: *The ASP firm origin will directly influence service utilized.*

**7.4.3.3 Provider Type and Service Competitiveness**

In this subsection, the correlation between ASP provider type and these factors of assessing service competitiveness is investigated through GLM.

The tables below display the analysis details.

Table 7-37

*Significance of GLM and Beta Value of Provider Type and Capacity/ Performance*

<b>Source</b>	<b>Sig.</b>	<b>B</b>
Corrected Model	.063	
Intercept	.000	4.709
Provider type	.063	0.138

Dependent Variable: Capacity and Performance  
R Squared = .028 (Adjusted R Squared = 0.020)

Table 7-38

*Significance of GLM and Beta Value of Provider Type and Reliability/ Trustworthiness*

<b>Source</b>	<b>Sig.</b>	<b>B</b>
Corrected Model	.102	
Intercept	.000	4.843
Provider type	.102	0.124

Dependent Variable: Reliability and Trustworthiness  
R Squared = .022 (Adjusted R Squared = 0.014)

Table 7-39

*Significance of GLM and Beta Value of Provider Type and Affordability*

<b>Source</b>	<b>Sig.</b>	<b>B</b>
Corrected Model	.009	
Intercept	.000	4.115
Provider type	.009	0.028

Dependent Variable: Affordability  
R Squared = .055 (Adjusted R Squared = 0.047)

Table 7-40

*Significance of GLM and Beta Value of Provider Type and Lock-in Effect*

<b>Source</b>	<b>Sig.</b>	<b>B</b>
Corrected Model	.195	
Intercept	.000	2.852
Provider type	.195	0.164

Dependent Variable: Lock-in Effect  
R Squared = .014 (Adjusted R Squared = 0.006)

Table 7-41

*Significance of GLM and Beta Value of Provider Type and Customization and Integration*

<b>Source</b>	<b>Sig.</b>	<b>B</b>
Corrected Model	.468	
Intercept	.000	3.892
Provider type	.468	0.079

Dependent Variable: Customization and Integration  
 R Squared = .004 (Adjusted R Squared = -0.004)

The results of GLM reveal that provider type has a significant correlation only with affordability, not the other factors of the service competitiveness. Since provider type can influence affordability, and it is one factor for assessing service competitiveness, this finding supports Hypothesis 2c: *The ASP provider type will directly influence user perception of service competitiveness.*

**7.4.3.4 Provider Type and Service Utilized**

The analysis through GLM found that provider type has a significant correlation with only one factor - use of facility supporting services. The tables below display the analysis details.

Table 7-42

*Significance of GLM and Beta Value of Provider Type and IT Adoption Service*

<b>Source</b>	<b>Sig.</b>	<b>B</b>
Corrected Model	.858	
Intercept	.000	1.311
Provider type	.858	0.022

Dependent Variable: IT Adoption Services  
 R Squared = .000 (Adjusted R Squared = -0.008)

Table 7-43

*Significance of GLM and Beta Value of Provider Type and System Development Services*

<b>Source</b>	<b>Sig.</b>	<b>B</b>
Corrected Model	.675	
Intercept	.001	0.642
Provider type	.675	0.0353

Dependent Variable: System Development Services  
 R Squared = .001 (Adjusted R Squared = -0.007)

Table 7-44

*Significance of GLM and Beta Value of Provider Type and Facility Supporting Services*

<b>Source</b>	<b>Sig.</b>	<b>B</b>
Corrected Model	.046	
Intercept	.000	0.438
Provider type	.046	0.142

Dependent Variable: Facility supporting services  
R Squared = .050 (Adjusted R Squared = 0.034)

Since provider type can influence facility supporting services, and this service is one item of service utilized; this finding supports Hypothesis 2b: *The ASP provider type will directly influence the service utilized.*

#### 7.4.4 Analysis of Service Utilized

Sections 7.4.3.2 and 7.4.3.4 illustrate that service utilized can be influenced by business position. On the other hand, service utilized can affect some other factors too. The influence from service utilized is discussed in the following section.

##### 7.4.4.1 Service Utilized and Customer Perception

Table 7-27 shows that the use of IT adoption service has a significant correlation (.042) with overall perceived satisfaction when analyzed together with all factors as independent variables under the evaluation of GLM. Since the use of IT adoption is one factor of service utilized, this result supports Hypothesis 3a: *The service utilized will directly influence customer perception of satisfaction.*

#### 7.4.4.2 Service Utilized and Service Competitiveness

Since there is more than one factor in both service utilized and service competitiveness, a multivariable GLM was conducted to examine the relationship between service utilized and user perception of service competitiveness. Table 7-45 below displays the significance and Beta value of the analysis results.

Table 7-45

*Significance of GLM and Beta Value of Service Utilized and User Perception of Service Competitiveness*

<b>Dependent Variable</b>	<b>Source</b>	<b>Sig.</b>	<b>B</b>
Capacity & Performance	Intercept	.000	5.036
	IT adoption services	.346	0.058
	System development services	.759	0.027
	Facility supporting services	.646	0.042
Reliability & Trustworthiness	Intercept	.000	5.024
	IT adoption services	.328	0.062
	System development services	.577	0.051
	Facility supporting services	.772	0.028
Affordability	Intercept	.000	4.608
	IT adoption services	.188	0.097
	System development services	.986	0.002
	Facility supporting services	.429	0.087
Lock-in Effect	Intercept	.302	0.143
	IT adoption services	.954	0.003
	System development services	.339	-0.076
	Facility supporting services	.118	0.131
Customization & Integration	Intercept	.000	3.999
	IT adoption services	.429	0.071
	System development services	.040	0.266
	Facility supporting services	.838	-0.026



The table above shows that although there are three categories in service utilized, only a system development service has a statistically significant correlation with customization and integration. However, because the system development service is one item of service utilized, this result supports Hypothesis 3b: The service utilized will directly influence user perception of service competitiveness.

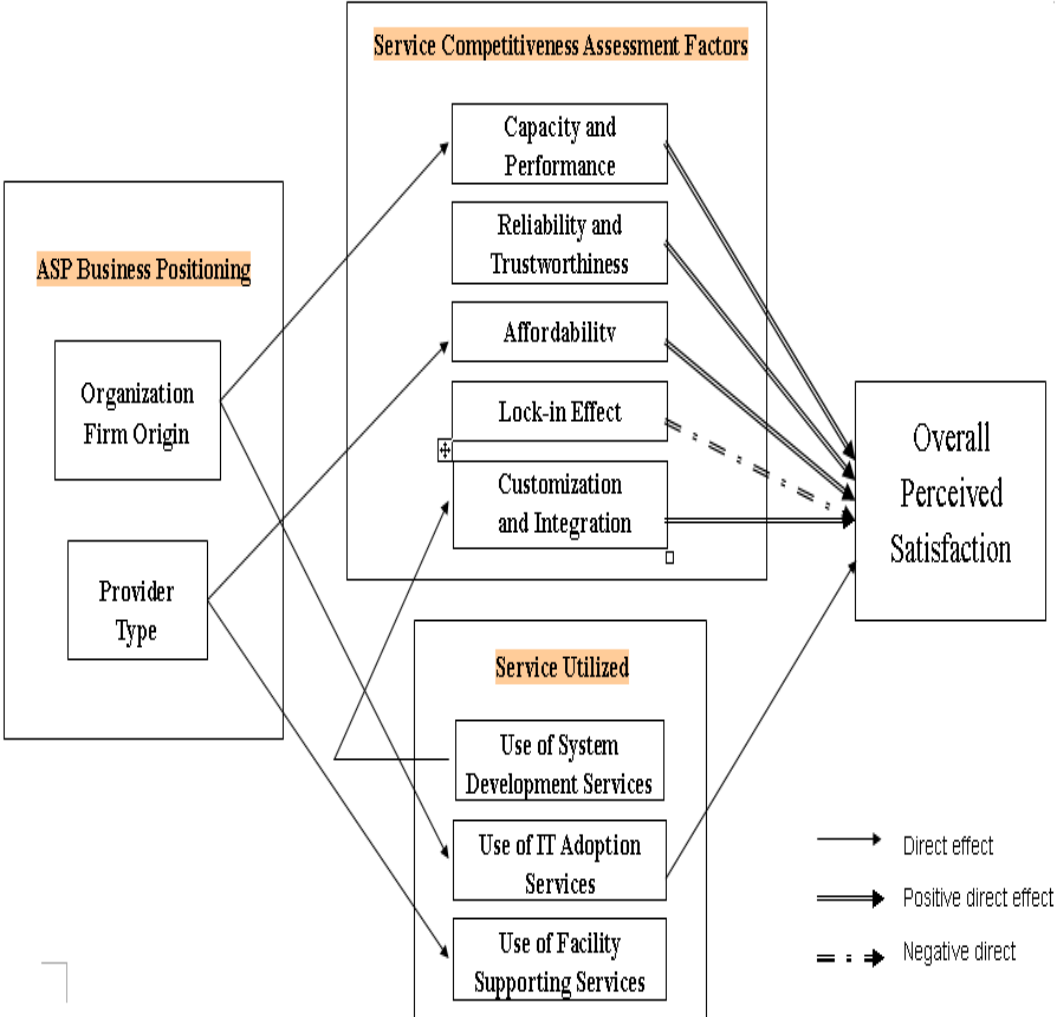
#### 7.4.5 Research Model

The research findings regarding the interaction between the ASP business position, service utilized, and user perception of service competitiveness and ASP customer perception of satisfaction are summarized below.

1. Business firm origin has a direct effect on capacity and performance. Firm origin also directly influences the use of IT adoption services.
2. Provider type has a direct effect on affordability. Provider type also directly influences the use of facility supporting services.
3. The use of system development services has a direct effect on customization and integration.
4. Except for the lock-in that has a negative direct effect, all the other factors (capacity/performance, reliability/trustworthiness, affordability, and customization/integration) in the cluster of user perception of service competitiveness have positive direct effects on ASP customer perception.
5. The use of IT adoption has a direct effect on ASP customer perception.

Figure 7-4 illustrates these results.

Figure 7-4  
 The ASPs Customer Perception Assessment Model



### 7.5 Summary of Hypothesis and Research Model

In this section, a summary of the hypotheses and results is presented to clarify the outcome.

Table 7-46

Summary of Research Hypotheses and Results (Part One)

Hypothesis Code	Hypothesis Details	Data Analysis Approach	Result
Hypothesis 1a	The ASP firm origin will directly influence customer perception of satisfaction.	GLM	Not Supported
Hypothesis 1b	The ASP firm origin will directly influence the service utilized.	GLM	Supported
Hypothesis 1c	The ASP firm origin will directly influence user perception of service competitiveness.		
	The ASP firm origin will influence capacity and performance.	GLM	Supported
	The ASP firm origin will influence reliability and trustworthiness.	GLM	Not Supported
	The ASP firm origin will influence affordability.	GLM	Not Supported
	The ASP firm origin will influence lock-in effect.	GLM	Not Supported
	The ASP firm origin will influence customization and integration.	GLM	Not Supported
Hypothesis 2a	The ASP provider type will directly influence customer perception of satisfaction.	GLM	Not Supported
Hypothesis 2b	The ASP provider type will directly influence the service utilized.	GLM	Supported
Hypothesis 2c	The ASP provider type will directly influence user perception of service competitiveness.		
	The ASP provider type will influence capacity and performance.	GLM	Not Supported
	The ASP provider type will influence reliability and trustworthiness.	GLM	Not Supported
	The ASP provider type will influence affordability.	GLM	Supported
	The ASP provider type will influence lock-in effect.	GLM	Not Supported
	The ASP provider type will influence customization and integration.	GLM	Not Supported

Table 7-47

Summary of Research Hypotheses and Results (Part Two)

Hypothesis Code	Hypothesis Details	Data Analysis Approach	Result
Hypothesis 3a	The service utilized will directly influence customer perception of satisfaction.	GLM	Supported
Hypothesis 3b	The service utilized will directly influence user perception of service competitiveness.		
	The service utilized will influence capacity and performance.	GLM	Not Supported
	The service utilized will influence reliability and trustworthiness.	GLM	Not Supported
	The service utilized will influence affordability.	GLM	Not Supported
	The service utilized will influence lock-in effect.	GLM	Not Supported
	The service utilized will influence customization and integration.	GLM	Supported
Hypothesis 4	User perception of service competitiveness will directly influence customer perception of satisfaction.		
	Capacity/performance has a <b>positive</b> direct effect on satisfaction level.	1. GLM 2. Person Correlation	Supported
	Reliability/trustworthiness has a <b>positive</b> direct effect on satisfaction level.	1. GLM 2. Person Correlation	Supported
	Affordability has a <b>positive</b> direct effect on satisfaction level.	1. GLM 2. Pearson Correlation	Supported
	Lock-in effect has a <b>negative</b> direct effect on satisfaction level.	1. GLM 2. Pearson Correlation	Supported
	Customization/integration has a <b>positive</b> direct effect on satisfaction level.	1. GLM 2. Pearson Correlation	Supported

## 7.6 Chapter Summary

The chapter presented the sample characteristics, the scale purification, and the instruments measure. The techniques for analyzing the correlation between ASP business position, user perception of service competitiveness, the service utilized, and the ASP customer perception of satisfaction were introduced stepwise, and their results presented.

The analyzing techniques are a factor analysis, GLM, Pearson's correlation and assessment of the measurement model. Five factors that encompass fourteen variables) were abstracted and identified. These factors are 1) capacity and performance; 2) reliability and trustworthiness; 3) affordability; 4) customization and integration; and 5) lock-in effect. All of these factors (except the lock-in) have a positive effect on the customer perception of satisfaction. A regression equation that expresses the correlation between all of the significant correlation factors and overall perceived satisfaction has been created. The study results are clearly presented through a model and a table summarizing the hypotheses.

In Chapter 8, based on the findings in this chapter, a more elaborate investigation that consolidates the qualitative study and the descriptive analysis will be conducted to explore the explicit and implicit determinants of customer perception. The supplementary materials, documentary data and the respondents' answers to the open questions, will be reviewed as well.

# Chapter 8

## Results 2: Review of Explicit and Implicit Determinants of Customer Perception

In this chapter, a more elaborate coverage of the customer's perception of ASP services was documented. Based on the analysis results of Chapter 7, the investigation is mainly conducted by a qualitative study combined with descriptive analysis provide a comprehensive explanation of how ASP customer's perception is affected.

### **Chapter Contents**

- 8.1 Further Investigation
- 8.2 Qualitative Study Data Collection
- 8.3 Results of Descriptive Analysis
- 8.4 Chapter Summary

### **8.1 Further Investigation**

Chapter 7 presented the results of the factor analysis and regression phase of the study. In order to address the research objectives in detail, a further study by different means is needed.

Yin (1994) encouraged researchers to make every effort to produce an analysis of the highest quality. He presented some principles for this purpose such as showing that the analysis relied on all the relevant evidence, and used the researcher's prior, expert knowledge to further the analysis. Stake (1995) favored coding data and identifying issues more

clearly at the analysis stage. Eisner and Peshkin (1990) placed a high priority on direct interpretation of events, and a lower priority on interpretation of measurement data.

In this study, a descriptive analysis was conducted to explore the details of the research question from the quantitative phase. The qualitative study was included to assist in the explanation of the survey findings.

### **8.1.1 Necessity for Descriptive Analysis**

The previous study generated a framework that expressed the interaction between the ASPs business position, ASP customer's perception of satisfaction and its assessment factors by the inference data. Nevertheless, a further study targeting the descriptive data is required to provide more insight into this issue. In addition, the descriptive analysis results are needed as a coherent concept to precede the qualitative discussion.

### **8.1.2 Purpose of Qualitative Study**

Researchers (Neumann, 1994; Sieber, 1973) argued that the qualitative data are needed to aid the explanation of survey findings when these are unexpected or unusual, and to assist in the interpretation of statistical results. The purpose of this qualitative study is to collect detailed information from the survey respondents to achieve a better understanding of their views, and to interpret the survey findings.

## **8.2 Qualitative Study Data Collection**

The qualitative data of this study were derived from two main aspects - the documentary data about the top fifty ASP companies, and the respondents to the questionnaire.

The documentary data include document and archival records, and electronic data. These were gathered continually during the three years 2003 to 2006 from numerous sources, such as press releases, relevant ASPs Web sites, outsourcing Web sites, and the discussion board on the Web site where any person could record comments. The documentary data provide the details about the top fifty ASPs, such as the company's history, background and organization structure, its services or products, and its pricing model.

The comments provided by respondent were used to clarify the seemingly ambiguous responses. In sum, in this study twenty-five respondents contributed qualitative data by means of either Web-based or telecom-based contact.

### **8.3 Analysis Results**

This section investigates in detail the customer perception of ASP services based on the findings in Chapter 7. The description analysis regarding the ASP users' responses is discussed. The qualitative data (i.e. praises, complaints, and suggestions) collected from the survey participants are also presented.

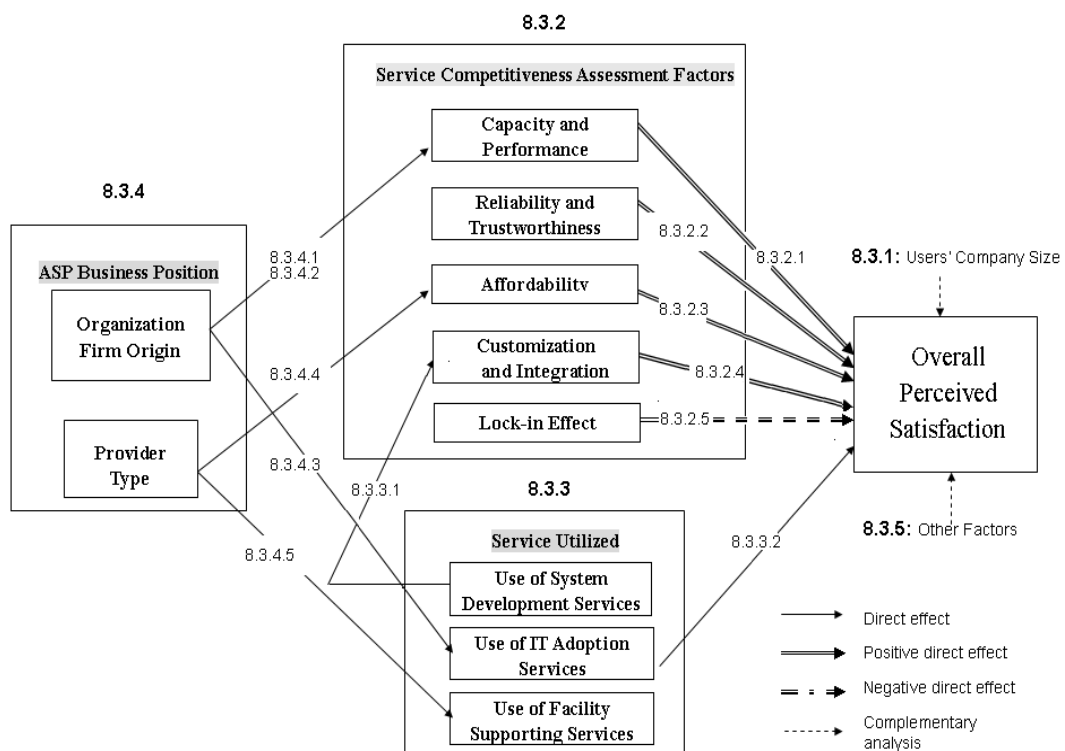
Figure 7-4 displays all of the components that have a significant correlation with customer's perception of satisfaction by either direct or indirect effects. In order to provide a clear picture to understand the analysis details, Figure 8-1 has been developed based on Figure 7-4. It is shown overleaf as a guideline for understanding the structure of Chapter 8.

In Figure 8-1, five main sections (8.3.1 - 8.3.5) are presented for exploring the findings. For example, Section 8.3.1 displays the relationship between



ASPs users' company size and overall perceived satisfaction level. Section 8.3.2 goes into the details of investigating the relationship between service competitiveness and customer perception. Five subsections (8.3.2.1 – 8.3.2.5) are arranged to discuss the relationships among these service competitiveness assessment factors and the customer's perception about ASP services. Section 8.3.3 mainly discusses the effect of service utilized on both customization/integration (Subsection 8.3.3.1) and ASP customer perceived satisfaction (Subsection 8.3.3.2). Section 8.3.4 is directed at the ASP business position (firm origin and provider type) to reveal how and why they affect these service competitiveness assessment factors and services utilized; and subsections 8.3.4.1 to 8.3.4.3 target the firm origin; while Section 8.3.4.4 and Section 8.3.4.5 target the provider type for this purpose. Section 8.3.5 discusses the effects of other factors on ASP customer perception of satisfaction.

Figure 8-1  
Flow Chart of the Findings Discussion



### 8.3.1 ASP User Company Size and Satisfaction Level

Before advanced descriptions are presented, a brief discussion regarding the satisfaction level and the respondents' company size is needed.

Table 8-1 displays the means of five service competitiveness assessment factors and also the satisfaction level for each size of the respondents' company. In this study, business size refers to the number employed by the company; and there are seven levels of employee number. The value of each service competitiveness assessment factor is the mean of the evaluations given by respondents for each item of these factors. The ranking is based on the average of these five factors. The data in the last column, i.e., satisfaction level, came from the responses to Question 10 (Part Two of the questionnaire) regarding the issue of comprehensive evaluation; 1 indicates the highest level of satisfaction and 7 the lowest.

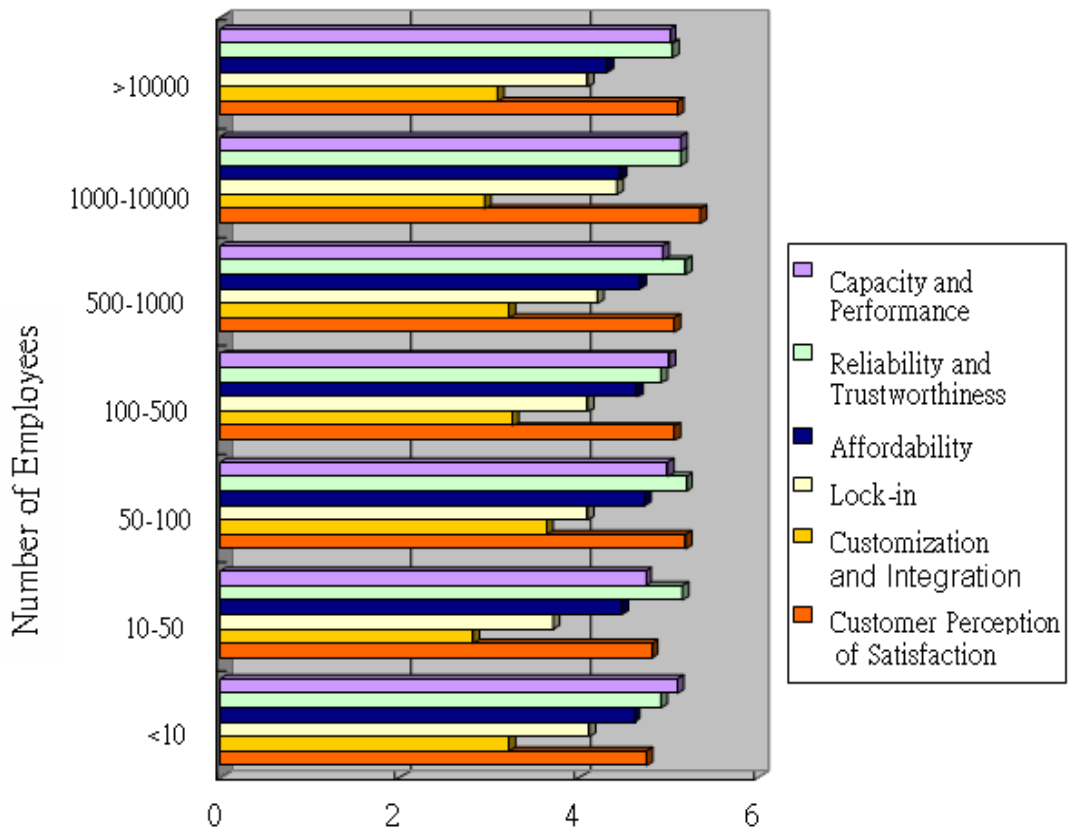
Table 8 -1  
*Descriptive Statistics for Satisfaction Level and ASP Users' Company Size*

No. of Employees	Factors of Service Competitiveness Assessment					Average of the remaining five factors	Rank	Satisfaction Level
	Capacity and Performance	Reliability and Trustworthiness	Affordability	Lock-in	Customization and Integration			
<10	5.09	4.92	4.61	3.22	4.11	22.0	4	7
10-50	4.74	5.14	4.48	2.82	3.71	20.9	7	6
50-100	4.99	5.19	4.73	3.63	4.09	22.6	1	2
100-500	5.00	4.91	4.64	3.26	4.09	21.9	5	4
500-1000	4.93	5.19	4.68	3.22	4.20	22.2	2	4
1000-10000	5.13	5.13	4.46	2.95	4.42	22.1	3	1
>10000	5.01	5.05	4.31	3.09	4.09	21.6	6	3

Table 8-1 shows that those companies with 50-100 employees were given the highest degree of satisfaction by users when evaluated the service competitiveness of their ASP vendors; and also were given the second highest level in customer perception of satisfaction. The companies with 1000-10,000 employees were given the highest satisfaction level. In contrast, companies that have 10-50 employees were given the lowest degree in the five service competitiveness assessment factors, and also the second lowest level in customer perception of satisfaction.

Figure 8-2 demonstrates more details regarding the relationships among company size, individual factors of service competitiveness (capacity and performance, reliability and trustworthiness, affordability, lock-in, and customization and integration) and perception level.

Figure 8-2  
*ASPs Users' Company Size, Service Competitiveness, and Satisfaction Level*



### 8.3.2 Analysis of Service Competitiveness and Customer Perception

As shown on the GLM results of the research findings in Chapter 7, the satisfaction level of all service competitiveness assessment factors have direct effects on ASP customer's overall satisfaction. More descriptive analysis and qualitative details that are associated with this issue will be addressed in the following sections.

#### 8.3.2.1 Capacity and Performance

The outcome of Chapter 7 shows that the factor capacity and performance has the greatest and positive correlation coefficient, which means this factor has a very close relationship with the overall perceived satisfaction (for more details please refer to Sections 7.4.1 and 7.4.2).

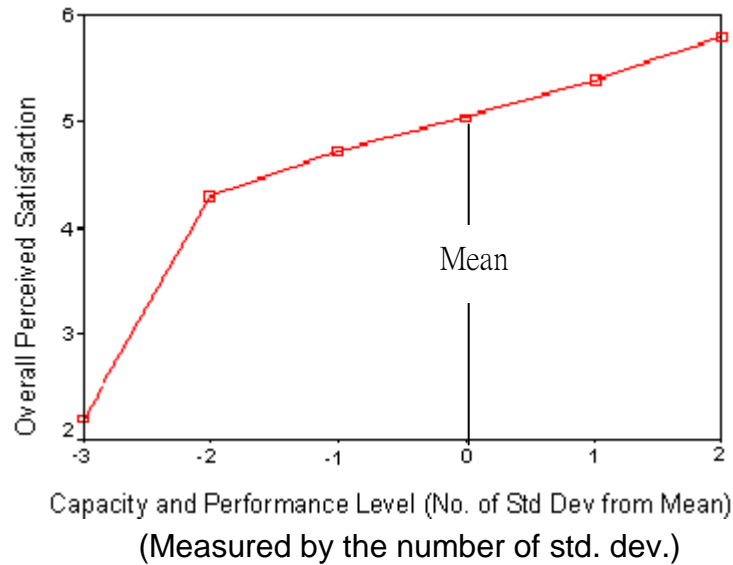
Table 8-2

*Descriptive Statistics for Capacity/Performance and Overall Perceived Satisfaction Level*

<b>No. of std. dev.</b>	<b>Count</b>	<b>Mean of overall satisfaction</b>
2	14	5.79
1	66	5.38
0	4	5.03
-1	24	4.72
-2	11	4.28
-3	5	2.20

Figure 8-3

*Profile Plots of Capacity/Performance and Overall Perceived Satisfaction*



In Table 8-2, when the satisfaction level of capacity/performance is two standard deviations above the mean, its overall satisfaction level is 5.790 out of 6; when it is one standard deviation above the mean, its overall perceived satisfaction level is 5.380 out of 6; and when it is three standard deviations below the mean, its overall satisfaction level is 2.20 out of 6. Obviously, the higher the satisfaction of capacity/performance, the higher the overall perceived satisfaction level. Figure 8-3 highlights this relationship.

From the users' point of view, the capacity/performance strongly influences their feeling about satisfaction. For instance, one of the users who gave a very low appraisal to the services of their ASPs (the overall satisfaction level was way behind the average level) commented:

*We were a very early implementer of XXX [ASP name]... The service is not easy to manipulate and non-intuitive.*

Some users even abandoned an ASP because they could not tolerate its inefficient performance.

*XXX's [the ASP name] products were so complex, so IT-intensive, and so difficult to use (for mere mortals) that we just never got any value out of them. We abandoned it about 18 months ago. We are very pleased with our decision, despite the fact that in doing so we abandoned \$250K of software licenses and another \$250K or so of follow-on work.*

In conclusion, capacity and performance plays an important role in determining customer's perception and the retention of providers.

### **8.3.2.2 Reliability and Trustworthiness**

Similar to capacity/performance, another assessment factor, reliability /trustworthiness, has a positive influence on customer's perception.

Table 8-3 shows that when the satisfaction level of reliability /trustworthiness is higher than two standard deviations, its correspondent overall satisfaction level is 5.435 out of 6; when it is higher than one standard deviation, its overall satisfaction level is 5.35 out of 6; and when it is three standard deviations below the mean, its overall satisfaction level is 2.5 out of 6.

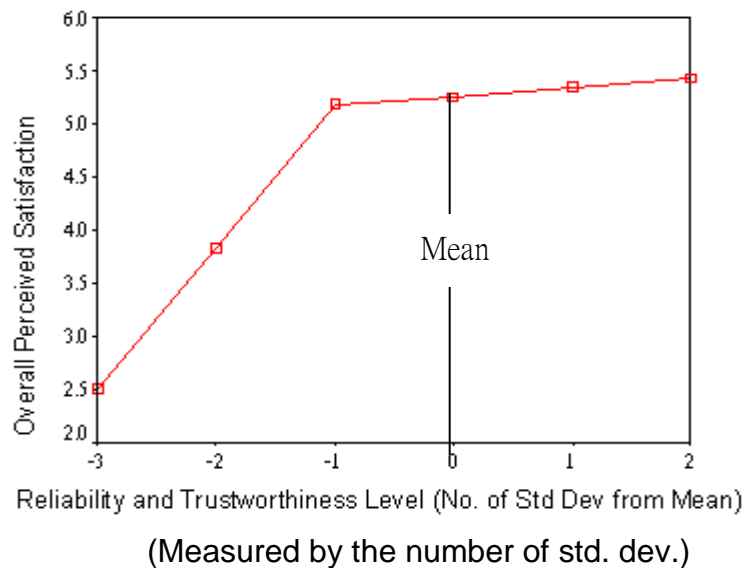
Table 8-3

*Descriptive Statistics for Reliability/Trustworthiness and Overall Perceived Satisfaction Level*

<b>No. of std. dev.</b>	<b>Count</b>	<b>Mean of overall satisfaction</b>
2	23	5.435
1	23	5.350
0	4	5.265
-1	62	5.182
-2	6	3.833
-3	6	2.500

Figure 8-4

*Profile Plots of Reliability /Trustworthiness and Overall Perceived Satisfaction*



### Analysis

Factor (2002) discovered that people are suspicious of ASP's novelty and the basis of their experience. Levinson (2003) stated that security is one of the biggest worries for CIOs, as they can not ensure that their hosted data will not be destroyed or abused by competitors, hackers, or the outside world.

Interestingly, the responses to the survey support these arguments. Customers lack faith in the ASPs' abilities. Some respondents admitted they were unwilling to outsource their key business to an ASP because they are worried about the ASP vendors' stability or sustainability, the loss of control over their own infrastructure, and security. Therefore, some companies only outsourced a very small part of their work.

*We only use the XXX [ASP name] search indexing for our website, as one of several small outsourced services.*

*We chose XXX [ASP name] as a short-term solution. Only a small percentage of our sales staff is required to use it, as it addresses specific needs of those users.*

One respondent presented some advice related to this concern:

*By contracting an ASP, the host company loses the value that internal employees typically bring, such as 'loyalty', business passion, 'gut feel', etc. As a result, ASPs are typically best applied in processes that are referred to as 'non-value added', or 'non-differentiating'.*

Besides security and privacy, the feeling of being disregarded is also a factor in losing the trust of customers. The descriptive data displays that some respondents complained about being neglected by their ASPs because they are small customers. One respondent stated:

*While the XXX [the name of the ASP] worked just fine for us for quite a while, it is perturbing that they have ditched their smaller customers and just left us to figure out something new. So, I am dissatisfied, but I don't think that their product is not cost effective or a good one.*

Originally the ASP was targeted at SMEs, giving them the ability to utilize "best-of-breed" applications at a price they could afford. However, the user's comments quoted above indicate that some ASPs have altered their objectives, and are paying more attention to serving big firms. Obviously, this situation offends small customers, and can destroy their trust. Also in this vein, Smith and Albaum (2004) argued that small firms may need to be aware of their lack of bargaining power. If the client represents a small part of the vendor's business, the client could find him/herself at a disadvantage in disputes.



These findings can also explain why the smallest companies indicated the lowest level of satisfaction about the service delivered by their ASP vendors (see subsection 8.3.1).

However, not all the small firms presented a negative response to this service model if they received strong supports. In general, the users of volume business ASPs (see Section 3.3.8 for more information refer to the relationship between SMEs and this type of ASP) gave a high level of satisfaction to their service provider. Some users completely trust their ASP and rely on it. Extracts from their comments are quoted below.

*We outsource all of our IT needs and I did not want to burden them with a new system. I also thought that if xxx [the name of the ASP] installed XXX [the name of the application] on new servers and was responsible for maintaining them that there would not be any finger pointing if anything went wrong.*

*We are a very small client. We selected this ASP because they contacted us with an offer and have been very supportive.*

Figure 8-4 illustrates that the overall satisfaction level goes up very slowly after the satisfaction of reliability/trustworthiness exceeds its mean, in other words, a very high satisfaction of reliability/trustworthiness makes no great difference in the overall satisfaction level. This implies that an average level of reliability/trustworthiness is enough to meet the expectation of users since they only implement / outsource a small portion of business or non-core business; therefore, they do not expect too much. This finding supports the argument of Susarla et al. (2003) who indicated that the firms with a strong

IT department, or who could be regarded as Internet savvy, normally do not have unreasonably high expectations from the ASPs.

Comparatively speaking, customers expect less in reliability and trustworthiness than in capacity and performance. On the basis of this research, it is concluded that reliability/trustworthiness is a basic requirement whereas capacity/performance is a primary element for satisfying the users.

### 8.3.2.3 Affordability

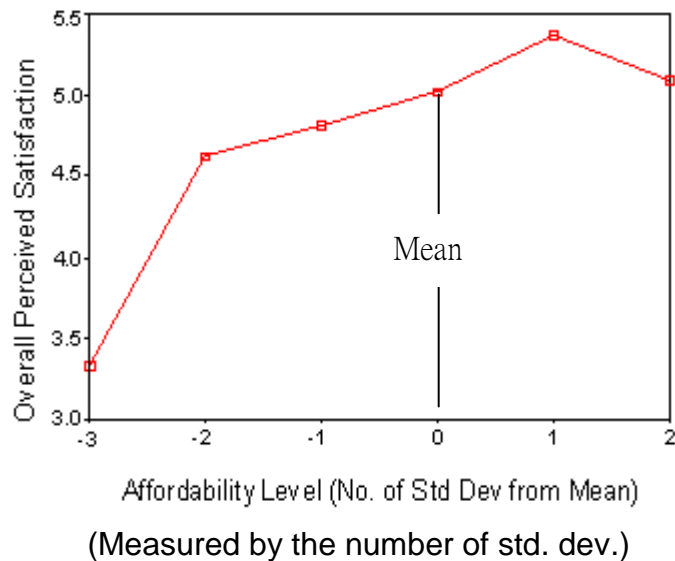
Table 8-4 indicates that, in general, the higher the satisfaction level of affordability the higher the overall satisfaction level, except at the highest affordability level (2 std. dev.) which has a lower overall satisfaction (5.088 out of 6) than the previous affordability level (1 std. dev.). Figure 8-5 illustrates this clearly; when the satisfaction level of affordability is higher than the mean by one standard deviation, it shows the largest overall satisfaction (5.370 out of 6). However, when it reaches two standard deviations above the mean, its overall *perceived* satisfaction level drops off slightly.

Table 8-4

*Descriptive Statistics for Affordability and Overall Perceived Satisfaction Level*

<b>No. of std. dev.</b>	<b>Count</b>	<b>Mean of overall satisfaction</b>
2	12	5.088
1	60	5.370
0	3	5.02
-1	33	4.820
-2	13	4.620
-3	3	3.333

Figure 8-5

*Profile Plots of Affordability and Overall Perceived Satisfaction***Analysis**

Rubens (2002a) showed that ASPs who service and support high-end applications are dealing with large enterprises as the services are still too expensive and complicated for SMEs. This statement was confirmed by the comments given by the respondents of this survey. Some small sized company workers claimed that they like ASPs, but that the service is too expensive.

Furthermore, a few companies have asked ASPs to terminated their contract with their ASPs because of the high costs, even though they were quite satisfied with their ASP services.

*We used XXX [ASP name] for 2 years. It is a good product and supported well by their staff. We stopped using it a few months ago as it very expensive.*

*We stopped using it a few months ago as it is very expensive even though we had a massive discount. I have had a few companies try to sell their search engine solutions, but most only offer a hosted service and ... these solutions are costly too.*

Those users who are happy with cost effectiveness generally give a high appraisal in satisfaction when they assess their ASPs. The comments below were made by respondents who gave the highest satisfaction evaluation to their ASPs.

*One other factor that was important to us in our decision was cost of maintaining the application. With a hosted solution that seamlessly upgrades 3-4 times each year, our cost of maintenance has proved to be quite low compared to traditional alternatives.*

Two more positive comments supported by users who gave fairly high satisfaction level (5 out of 6) to their ASP are presented below.

*It is currently easier and cheaper than building our own in-house application.*

*The ASP meets most of our requirements and the savings of not having the infrastructure in house is large.*

Interestingly, as with capacity and performance, affordability has a strong positive association with overall perceived satisfaction. However, even though the customers were satisfied with the capacity and performance of the service of their ASPs, they noted that if not satisfied with the cost issue, they might still change provider.

The findings in this research seem to be quite different from the assertions of some other researchers (Hope & Khair, 2001) who stated that convenience of application is the customers' top consideration rather than the cost issue.

Since affordability is the main concern for employing the ASP services, more details regarding price model and affordability are discussed next.

### **Pricing models and affordability**

The early providers of ASP services believed that pay-as-you-go would be an attractive pricing model for customers (Chamberlin, 2001). In this subsection, some pricing models are examined to find out which is mainly adopted and most easily affordable. In addition to the traditional models or most commonly used models, some other pricing models utilized by customers are also introduced.

In this study, seven options are presented in Question 7 of Part Two in the questionnaire. The respondents were requested to pick the most suitable for their circumstances. These items are listed as below:

1. A fixed, one-off fee
2. A per transaction fee
3. A percentage-of-value fee
4. A subscription fee (e.g. monthly, annually, etc.)
5. By size of data managed
6. By user application
7. Other

### **Analysis**

Table 8-5 shows that the most adopted pricing model is “a subscription fee”, and 66.7% of the respondents paid their ASP service fee by this model.

An examination of the top three pricing models that have been considered more affordable shows that “by size of data managed” is the top rated one, followed by “a per transaction fee”, and “by user application”. This can be attributed to the high flexibility and negotiability of these payment methods.

Ekanayaka et al. (2003) indicated that flexibility is expected in the cost structure. Likewise, Chou (2004) also argued that flexibility of payment enables a more efficient financial control. Thus, payment flexibility is a big advantage for those with start-up companies. However, according to the results, the most affordable pricing models have a very low percentage of adoption rate, only 1.8%, 3.5%, and 7% respectively. The most adopted pricing model is a “subscription fee”. This pricing model has a high percentage usage rate (66.7%) but a low ranking (the fifth out of six) in affordability level.

Table 8-5

*Rank of Pricing Model and its Affordability*

No.	Pricing Model	Count	Percentage	Rank <sup>1</sup>	Affordability	Rank <sup>2</sup>
1	Fixed, one-off fee	14	12.2%	2	4.362	6
2	Per transaction fee	4	3.5%	4	4.668	2
3	Percentage-of-value fee	2	1.8%	5	4.500	4
4	Subscription fee	76	66.7%	1	4.496	5
5	By size of data managed	2	1.8 %	5	4.835	1
6	By user application	8	7%	3	4.655	3
7	Other	8	7%		4.916	

1: The rank of usage of pricing model

2: The rank of the corresponding affordability level

As well as these popular adopted models, 7% of respondents are utilizing some other pricing models which are listed below.

- A. Per user per month
- B. By subscription based on number of active templates and users
- C. Per image fee
- D. Per page view CPM cost
- E. Monthly fee plus usage
- F. Standard licensing structure - up front fee plus annual maintenance

G. Fixed monthly fee plus one-off fees for additional developments

#### **8.3.2.4 Customization and Integration**

Ekanayaka et al. (2003) discovered that if a user decides to access multiple vendor applications from a sole ASP, it is essential that they use one that is capable of providing integration between the packages in case this requirement arises. Rubens (2002b) also found that customers prefer integrating single Web-native applications that are best-of-breed in each category to create their own virtual suites through the Dot-net framework. Szuprowicz (2001) showed that limited customization may be acceptable to some small companies but not to large corporations.

It seems that for customization as well as for integration, satisfying users is a difficult task. Actually, the descriptive data show that the satisfaction level of customization and integration can directly affect the customer's overall satisfaction in a curved trend. Table 8-6 and Figure 8-6 show the positive correlation between these two variables. However, the increasing rate of overall perceived satisfaction is slower than that for customization and integration. This means the impact of customization and integration satisfaction on the overall satisfaction level becomes less and less. Figure 8-6 shows that when the customization/integration level is two standard deviations lower than the mean, the overall perceived satisfaction is 0.81 (5.31 – 4.50) out of 6, lower than mean level. Nevertheless, when the satisfaction level of customization/integration is two standard deviations higher than its corresponding mean, the overall satisfaction is only 0.23 (5.54 – 5.31) higher than the mean; the slope is much less than the previous one - 0.81.

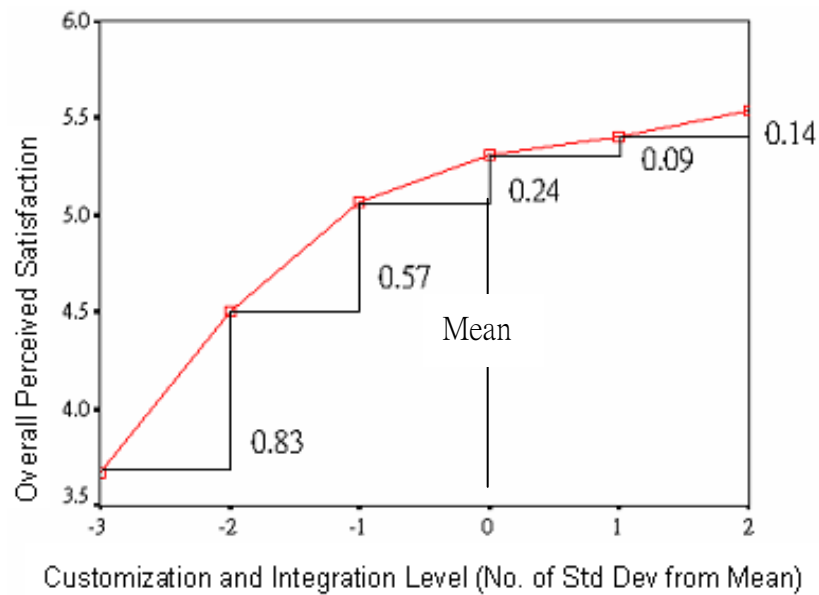
Table 8-6

*Descriptive Statistics for Customization/Integration and Overall Perceived Satisfaction Level*

No. of std. dev.	Count	Mean of overall satisfaction
2	15	5.54
1	48	5.40
0	10	5.31
-1	30	5.07
-2	12	4.50
-3	9	3.67

Figure 8-6

*Profile Plots of Customization/Integration and Overall Perceived Satisfaction*



(Measured by the number of std. dev.)

$$\text{Slope (b)} = \Delta y / \Delta x$$

$$b_{-2} = 0.83 (4.5 - 3.67); b_{-1} = 0.57 (5.07 - 4.5); b_{0_1} = 0.24 (5.31 - 5.07);$$

$$b_{1_1} = 0.09 (5.4 - 5.31); b_{2_2} = 0.14 (5.54 - 5.40)$$

$$b_{-2} > b_{-1} > b_0 > b_1 < b_2$$



## **Preferences of Customization and Actually Adopted**

Additional to the questions in Part One of the questionnaire, there are those in Part Two that are used to examine more detail about the relationship between customization and customer's perception of satisfaction. Regarding these questions in Part Two, respondents were requested to indicate the level of application customization that they received from their ASP vendors.

Following are the five levels for respondents to select.

1. 100% tailor-made software
2. More than 75% modification based on a standard application
3. Nearly 50% modification based on a standard application
4. Standard application with 25% modification
5. Off-shelf packaged software

Subsequently, the respondents were required to select one from the following five options for the purpose of examining their preference between customization and cost.

1. Very high degree of customization and very high cost
2. High degree of customization and high cost
3. Medium degree of customization and average cost
4. Low degree of customization and low cost
5. Very low degree of customization and very low cost

### ***a. Actual adopted level of customization and customer perception***

Based on the information above, the effect of the actual adopted level of customization on the customer perception is addressed in this subsection.

### Analysis

A Pearson correlation coefficient test shows that there is a statistically significant (.022) correlation between these two variables.

Table 8-7

#### *Percentage of Customization Adoption*

Customization level	Satisfaction level (%)						Percentage of customization level (%)
	6	5	4	3	2	1	
100% tailor-made software (n=6)	5	2	20	17			6
More than 75% modification based on a standard application (n=8)	13	6					7
Nearly 50% modification based on a standard application (n=14)	21	7		17		33	12
Standard application with 25% modification (n=43)	26	50	30	33		33	38
Off-shelf packaged software (n=42)	36	35	50	33	100	33	37
<b>Total</b>	100	100	100	100	100	100	<b>100</b>

1. Table 8-7 shows that the “off-shelf packaged software” is the most adopted customization mode for those users who expressed the most satisfaction level (level 6), 36% adopted it.
2. “Standard application with 25% modification” is the most adopted customization mode for those users who showed the second satisfaction level (level 5), about half (50%) adopted it.
3. “Standard application with 25% modification” is the most adopted mode (38%) in this survey, followed by “Off- shelf packaged software” (37%).

Usually, software companies cannot afford to develop packages for every industry; thus, most off-shelf packaged software does not meet the precise needs of most of the adopters. Nonetheless, the findings above show that

the users of ASPs do not consider this a serious problem. A high percentage of users adopted “standard application with 25% modification”, and these users also expressed a high level of satisfaction. This means that even a low percentage of customization can satisfy customers. Chou (2004) indicated that standardization is able to speed up the IT system implementation and decrease the deployment cost. He suggested that limited modified standardized products are the strength of ASPs for meeting the customer’s partial or even major requirements. His argument is confirmed by this outcome.

***b. Gap between customization’s preferences and actual usage***

Some respondents know how to select an optimal strategy between customization and cost. The following comment helps illustrate this situation.

*We haven't found an ASP that covers all our needs without customization which isn't available without high costs, so we go with the path of least resistance. So far, we have run our business effectively on xxx [ASP name].*

However, in terms of customization, there is a disparity between the users’ preference and their actual utilization. In this study, the value (represented by number 1, 2, 3, 4 or 5) of preference level ticked by respondents on the questionnaire was subtracted from the value (also represented by number 1, 2, 3, 4 or 5) of actual usage level. The absolute value of the residual from the subtraction is called the gap (or difference). To ensure that further study was worth conducting, the correlation between the gap and the satisfaction level was examined by a Pearson correlation coefficient test. The test result is 0.035, which indicates that these two factors have a statistically significant correlation with each other.

Figure 8-7 and Table 8-8 demonstrate that the lower the gap, the higher the satisfaction level, which means that those respondents who expressed the highest level of satisfaction also received the service of customization from their ASPs at the same level that they expected (the cost concern included). Therefore the idea that “the higher customization adoption, the higher the customer satisfaction” is not supported when the cost issue is considered.

Figure 8-7

*Profile Plots of Overall Perceived Satisfaction and Gap between Customization Preferences and Actual Usage*

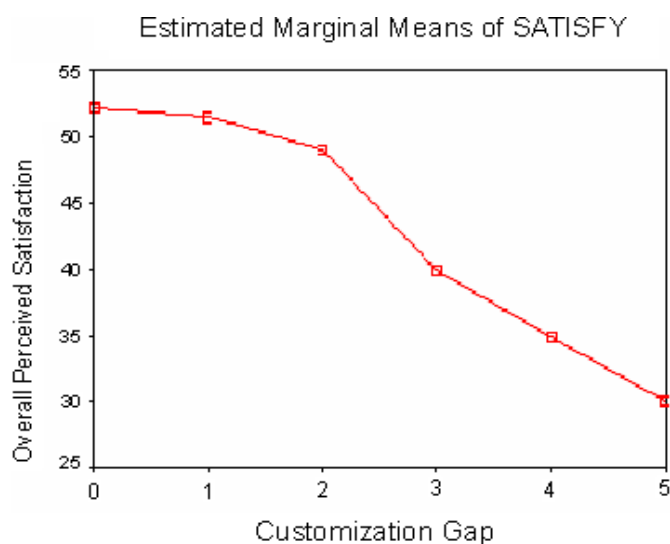


Table 8-8

*Estimated Marginal Means of Satisfaction and Gap between Customization Preferences and Actual Usage*

Customization Gap	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
0	5.219	.160	4.900	5.537
1	5.145	.115	4.916	5.374
2	4.900	.287	4.331	5.469
3	4.000	.642	2.727	5.273
4	3.500	.908	1.699	5.301
5	3.000	.908	1.199	4.801

Dependent Variable: Satisfaction Level

### 8.3.2.5 Lock-in Effect

Chapter 7 shows that lock-in has a direct negative effect on customer's perception of satisfaction. The descriptive analysis and qualitative data, provide more details of how lock-in impacts on the dependent variable.

The descriptive analysis for lock-in effect is based on Question 9 of Part Two in the questionnaire. The answers to the multiple choice questions provide some reasons why the customers continually employ the services from their ASPs is investigated.

The statements for describing the reasons of the respondents' retention of the same providers are listed below.

- A. The users just adopted the ASP services for a short time, and it is not long enough to determine its service quality.
- B. The ASP vendor's services meet all of the users' requirements.
- C. The ASP vendor's services are not completely satisfactory, but this situation is reasonable and acceptable.
- D. The ASP vendor's services are not completely satisfactory but the users cannot find any better ones.
- E. The ASP vendor's services are least satisfactory but the users prefer to wait for a longer time, they expect that this situation will be improved soon.
- F. The users have started to search for a better ASP vendor, but it takes time.
- G. It would cost a lot more money to change ASP.

- H. The dislocation cost of changing ASP is too high  
(i.e. it causes too much trouble to transfer data into a different format).
- I. The users worry about the data compatibility problems between the present and the new systems.
- J. The users worry about the data communication problems with their business partners.
- K. In the contract, the users are not allowed to change their ASP vendor within a period of time.
- L. Others

Statements A - E are more likely to be the positive incentives for the users to remain on the same ASP, whilst statements F - K are more likely to be the negative reasons. Therefore, it is considered that those customers with negative reactions have been locked-in.

### ***Positive reasons***

The following table shows the positive reasons for remaining with the same ASP vendors. The codes are those listed above. A six-point scale was used to measure the satisfaction level: 6- extremely satisfactory; 5- fairly satisfactory; 4- somewhat satisfactory; 3- somewhat unsatisfactory; 2- rather unsatisfactory; and 1- not at all satisfactory. "Percentage of all responses" represents the proportion of each code out of the total responses, e.g. statement code B has 65 (37 + 28) responses out of 139 (the total responses to this question), and  $65 / 139 = 46.8\%$ .

Table 8-9

*The Positive Reasons to Remain on the Same ASPs*

Code	Satisfaction Level												Percentage of all Responses
	6		5		4		3		2		1		
	n	%	n	%	n	%	n	%	n	%	n	%	
A	1	2.5	4	7.5	0	0	0	0	0	0	0	0	3.6
B	37	92.5	28	52.8	0	0	0	0	0	0	0	0	46.8
C	2	5.0	19	35.8	4	57.1	0	0	0	0	0	0	18
D	0	0	1	1.9	3	42.9	0	0	0	0	0	0	2.9
E	0	0	1	1.9	0	0	1	100	0	0	0	0	1.4
Total	40	100	53	100	7	100	1	100	0	100	0	100	72.7*

\* 72.7 is the percentage of responses expressing positive reasons to keep staying with the same ASP.

**Analysis**

From Table 8-9, 46.8% of the respondents considered that they are still adopting the services from their present ASPs because of B (i.e., the ASP vendor's services meet all of the users' requirements). Within these users, 92.5% were extremely satisfied with the services, and 52.8% were fairly satisfied users.

This table also shows that 18% of the respondents considered that the reason of their still retaining the same ASPs was because of C (i.e., the ASP vendor's services are not completely satisfactory, but this situation is reasonable and acceptable). More specifically, 5% of these users were extremely satisfied, 35.8% of them were fairly satisfied, and 57.1% of them were somewhat satisfied with the services of their ASPs.

The comments regarding firm's use illustrate this finding:

*Our business continues, it may be better with another ASP, but we're not feeling growth pain sufficiently to justify moving.*

**Negative reasons**

The following table presents the negative reasons for customers retaining their ASP vendors.

Table 8-10

*The Negative Reasons for Retaining the Same ASPs*

Code	Satisfaction level												Percentage of all responses	Percentage of Lock-in
	6		5		4		3		2		1			
	n	%	n	%	n	%	n	%	n	%	n	%		
F	0	0	0	0.0	1	14.3	1	20	1	100	0	0	2.2	7.9
G	2	40	3	16.7	0	0	2	40	0	0	0	0	5.0	18.4
H	2	40	5	27.8	3	42.9	2	40	0	0	0	0	8.6	31.6
I	0	0	3	16.7	0	0	0	0	0	0	0	0	2.2	7.9
J	0	0	2	11.1	0	0	0	0	0	0	0	0	1.4	5.3
K	0	0	0	0	1	14.3	0	0	0	0	0	0	0.7	2.6
L	1	20	5	27.8	2	28.6	0	0	0	0	2	100	7.2	26.3
Total	5	100	18	100	7	100	5	100	1	100	2	100	27.3*	100

\* 27.3 is the percentage of responses expressing negative reasons to keep staying with the same ASP.

About 5% of the respondents pointed out that their retention of the same provider is because of reason G (i.e., they are afraid that if they changed to a different ASP it would cost a lot more money). Furthermore, the table shows that 18.4% of the respondents thought that expense was the second most important consideration referring to the concern of being locked-in.

About 8.6% of the respondents reported that they were still adopting the services from their present ASPs because of H (i.e., the dislocation cost of changing to a different ASP is too high). More specifically, 31.6% of the respondents show that compared with the other reasons firm being locked



in, high dislocation cost is their most important concern. The following respondent's comment supports this finding.

*One MAJOR consideration of NOT switching ASP provider is the disruption to the business. The technical elements of a switch are easy, but the customization of application makes it very hard to move to a new supplier. ... switching ASP providers would require SIGNIFICANT PROLONGED performance and availability issues.*

Regarding statement F (i.e., the users have starting to search for a better ASP vendor, but it takes time), some respondents explained that they were planning to do so. One wrote this statement:

*...it WAS XXX [ASP name], but we are in the process of leaving them.*

There were reasons other than those already discussed. One respondent stated that he decided to find some other projects to replace the ASP model as it was not suitable for the company.

*The ASP model is not suitable to our company; we decided to adopt alternative projects to replace this model.*

### **8.3.2.6 Section Conclusion**

The descriptive analysis of the relationship between the five service competitiveness assessment factors and overall perceived satisfaction has been discussed for each relationship in the subsections above. In summary, these factors - capacity and performance, reliability and trustworthiness, affordability, and customization and integration - have a positive direct effect on overall perceived satisfaction to different degrees. When comparing the

satisfaction level of these factors, reliability and trustworthiness has the highest mean, followed by capacity and performance, then affordability, customization and integration; with lock-in effect having the lowest. These findings imply that, basically, the users of the top fifty ASPs considered their ASP vendors as being reliable and trustworthy. They were satisfied with the capacity and performance of their ASP, but the cost to use it is high. They do not have very much customization and integration from these services, and they do not consider that their ASP vendors can appropriately meet that requirement. Also, they seem to be aware that they have been locked-in in some way and to some degree. But still, on average they are quite satisfied with the service provided by their ASP vendors. More numeric details are listed in Table 8-11 below.

Table 8-11  
*Ranking of the Five Assessment Factors*

<b>Factors</b>	<b>Mean</b>	<b>Std. dev.</b>
Capacity and Performance	4.98	0.71
Reliability and Trustworthiness	5.09	0.73
Affordability	4.57	0.85
Customization and Integration	4.14	1.04
Lock-in	3.15	1.22
Overall Satisfaction	5.06	0.97

### 8.3.3 Analysis of Service Utilized and Relevant Factors

In this section, more details regarding the service utilized are discussed. Two subsections are presented for this purpose: 8.3.3.1 focuses on the relationship between service utilized and service competitiveness; while 8.3.3.2 focuses on the service utilized and customer perception.

**8.3.3.1 Services Utilized and Service Competitiveness**

Related to the points discussed in Chapter 7 (Section 7.4.4.2), only “the use of system development services” has a statistical correlation with one of the factors for assessing service competitiveness, which is customization/integration. A more descriptive analysis in respect of this issue is presented in this section. Table 8-12 and Figure 8-8 demonstrate the relationship between the satisfaction level of customization/integration and system development services.

Table 8-12

*Satisfaction Level of Customization/Integration and the System Development Services*

Satisfaction level of customization/integration	System Development Services		
	Application development	Hardware installation	Application integration
5.5 - 6	4	2	5
5 - 5.5	17	7	9
4.5 - 5	11	6	13
4 - 4.5	11	6	11
3 - 4	12	7	10
1 - 3	8	4	7

Figure 8-8

*Comparison of Customization/Integration Satisfaction and the System Development Service*

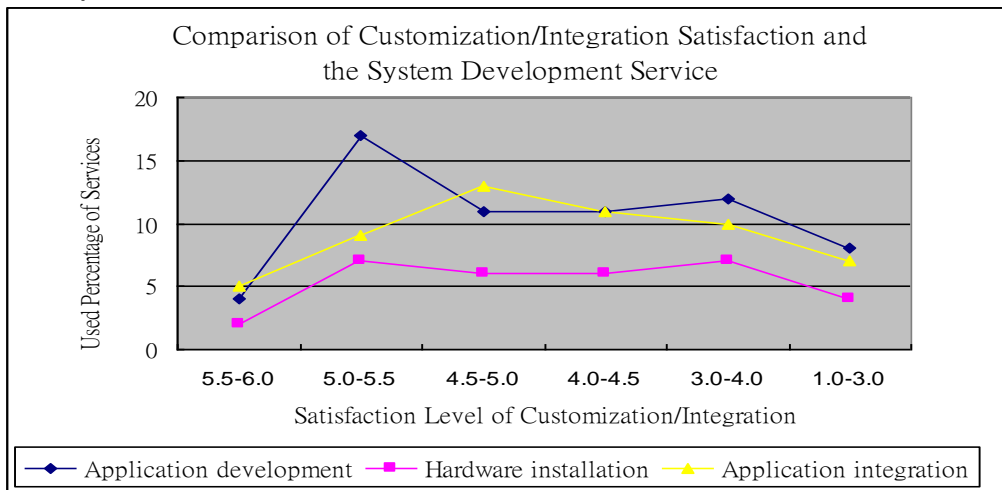
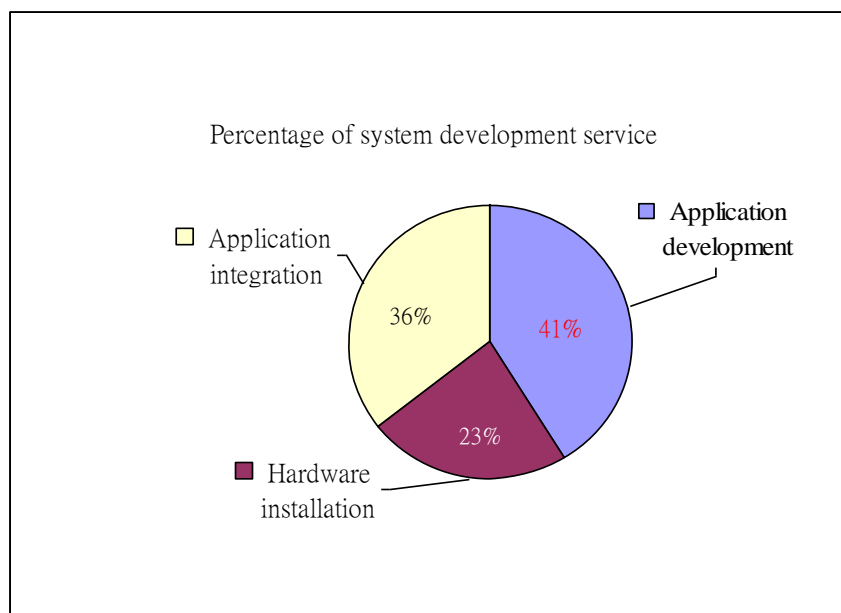


Table 8-12 shows the three components of the system development service: application development, hardware installation, and application integration (more details can be found in Table 7-27). Of these, application development and application integration services have a higher percentage of usage for those customers who have high satisfaction level of customization/integration. This means that customization/integration is more likely to be efficiently conducted via those services related to the modification of software application programs. More specifically, application development is the essential process for building information systems, and it is easier to provide customization services at this initial stage. In regard to application integration service, this is usually provided in the later stage of deploying an information system. To successfully perform this task, more complicated expertise beyond customization is required as more than one application system is involved in this job. Thus, a professional integration service can easily satisfy users. Figure 8-9 clarifies this concept.

Figure 8-9  
*Comparison of Percentage of System Development Services*



### 8.3.3.2 Service Utilized and Customer Perception

From the results displayed in Chapter 7, it was realized that among these categories of the services utilized by ASP customers, only IT adoption services has a significant correlation with customer's perception. As mentioned in section 7.3.2, IT adoption services consisted of three items. How each of them influences the users' satisfaction is examined here.

#### Analysis

Table 8-13 illustrates three conclusions.

1. Software implementation (n=93), user training (n=85), and IT consulting (n=77) are the top three services adopted by the respondents. However, the top three services with high satisfaction (Mean) are data center (4.87 out of 6), Internet facility (4.82 out of 6), and user training (4.82 out of 6).
2. Aiming at the service utilized by the customers who had the highest satisfaction (level 6), the top three services are user training (n=22), Internet facility (n=19), and software implementation (n=18). Except for Internet facility, all the rest belong to the category of IT adoption services.
3. Aiming at the service utilized by the customers who showed the second highest satisfaction (level 5), the top three services are software implementation (n=44), user training (n=38), and IT consulting (n=37). All of these elements belong to the category of IT adoption services.

Table 8-13

*Service Content and Satisfaction Level*

Service items	Satisfaction level						Satisfaction (Mean)	Count (n)
	6	5	4	3	2	1		
<b>System development services</b>								
a. Application development	9	35	12	14	2	0	4.44	72
	13%	47%	17%	19%	3%	0%	100%	
c. Hardware installation	6	13	10	7	0	0	4.48	36
	17%	36%	28%	19%	0%	0%	100%	
g. Application integration	9	26	11	10	2	0	4.48	58
	16%	45%	19%	17%	3%	0%	100%	
<b>Facility supporting services</b>								
d. Internet facility (e.g. Application delivery)	19	30	8	8	1	1	4.82	67
	28%	45%	12%	12%	1%	1%	100%	
e. Data center (e.g. Web site hosting, co-location)	13	21	5	5	1	0	4.87	45
	29%	47%	11%	11%	2%	0%	100%	
<b>IT adoption services</b>								
i. User training	22	38	14	11	0	0	4.82	85
	26%	45%	16%	13%	0%	0%	100%	
j. IT consulting (e.g. technical support)	14	37	11	14	1	0	4.61	77
	18%	48%	14%	18%	1%	0%	100%	
b. Software implementation	18	44	13	17	0	1	4.62	93
	19%	47%	14%	18%	0%	1%	100%	

Figures 8-10 to 8-12 clearly illustrate the concepts described in these statements.

Figure 8-10  
*Percentage of Service utilized by the Respondents*

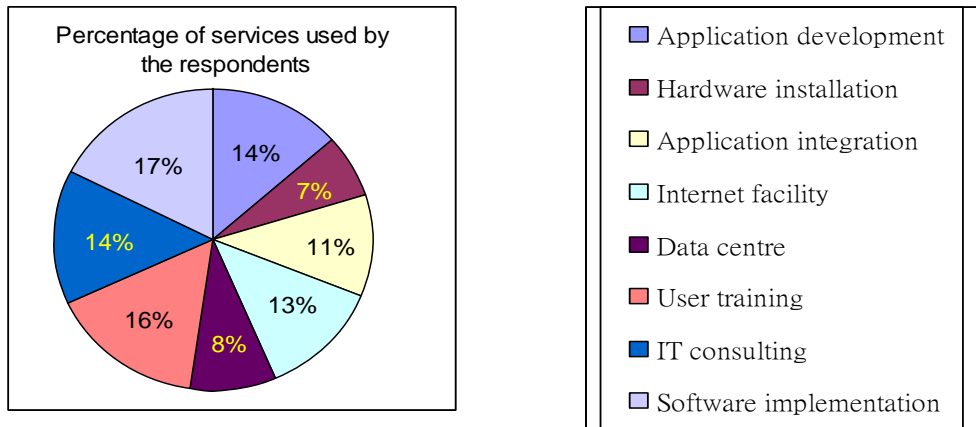


Figure 8-11  
*Percentages of Service Utilized by Customers with the Top Satisfaction Level*

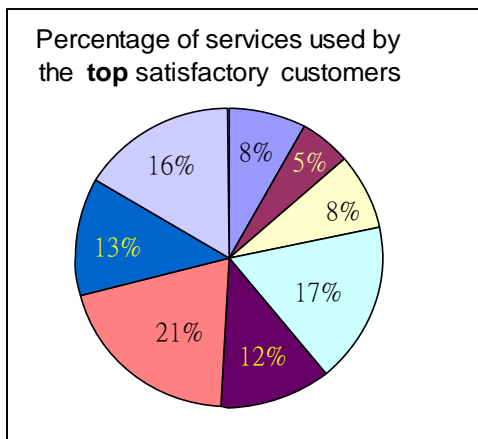
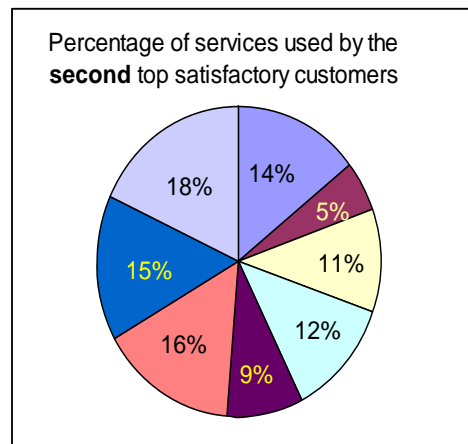


Figure 8-12  
*Percentages of Service Utilized by Customers with the Second Top Satisfaction Level*



These figures show that these elements of IT adoption services cover nearly 50 percent of the whole service items. Taking this into consideration, it can be concluded that software implementation is the initial service in the deployment of IT solutions. User training follows to assist the users operate the IT system accurately. IT consulting is continuous work for solving IT problems or keeping the system running more efficiently. These three services are regarded as the principal jobs for a company without in-house IT employees. Therefore, the outcome of these services has a great influence on the customer's perception.

Since an IT adoption service is the only category that has significant correlation with customer's perception, the remaining categories are not discussed in this section. Besides the three main categories of services, respondents said others were used by customers. These service items, including their user satisfaction levels, are listed in Table 8-14.

At this stage, the constructs which are directly correlated to the customer perceived satisfaction have been discussed. This provides a perspective for understanding this issue; however, it is also important to consider the potential effect what might affect these constructs. According to the results of data analysis, customer perception can be indirectly impacted on by ASP business position. How is this construct affecting the examined topic? Is there any relevant influence hiding behind it? These issues are addressed in the following sections.



Table 8-14  
*Other Services and Satisfaction Levels*

<b>Satisfaction Level</b>	<b>Other Services Provided by ASPs</b>
6	1. Process Optimization
	2. Company Intranet
	3. Web Analytics
	4. Content Management
	5. Search and indexing services
	6. Internet Search Engine
	7. Hosted Search Engine
	8. Software Purchase
	9. Statistical Tracking
	10. Application Hosting
5	1. Accounting, front end & back end
	2. Email Newsletter Management
	3. DB Backup/Recovery
	4. Content Management
	5. Search
	6. Intranet for our main office and regional affiliates - calendar, databases, tasks, discussions, etc.
	7. Remote Database Management.
	8. ASP Search Engine
	9. Provide a search system for our Web site
	10. Search engine service for Web site
	11. Business Process Consulting
	12. Software Hosting
	13. Provision & installation of Database monitoring software that is run in house.
4	1. Email Campaign Broadcast & Management
	2. Technical Support Hotline for MS Office Applications
3	Search Mechanism
1	Bulk email distribution

#### 8.3.4 Analysis of ASP Business Position and Relevant Factors

According to the statistical analysis, some factors in service competitiveness are affected by the ASP business position. For example, firm origin has an influence on capacity and performance, and provider type has an influence on affordability. On the other hand, in terms of services utilized, firm origin

has an influence on IT adoption services, and ASP provider type has an influence on facility supporting services. In the following subsections, the details of how the business position can impact these factors are presented. Firm origin and the market strategy model are also discussed.

**8.3.4.1 ASP Firm Origin and Capacity and Performance**

Table 8-15 displays the descriptive data about firm origin and capacity and performance. There are three types of firm origin: number 1 represents pure-play ASPs; 2 stands for Infrastructure provider-turned ASPs; and 3 equals ISV-turned ASPs.

Table 8-15

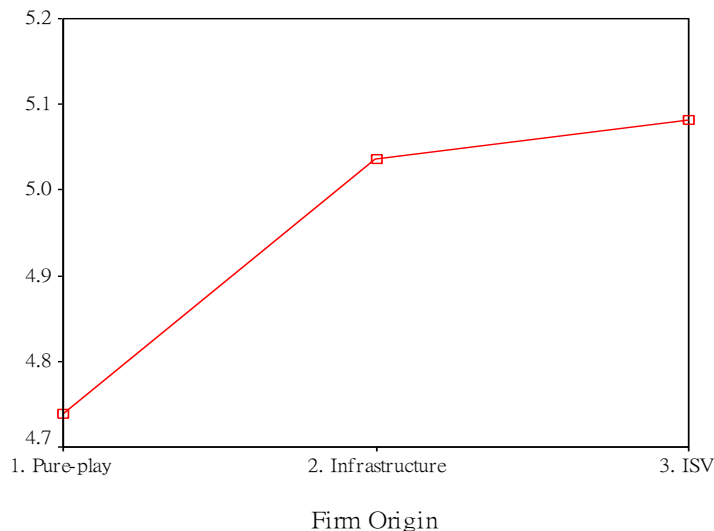
*Estimated Marginal Means of Firm Origin and Capacity and Performance*

Firm Origin	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1. Pure-play ASPs	4.739	.125	4.492	4.986
2. Infrastructure-provider-turned ASPs	5.036	.121	4.796	5.276
3. ISV-turned ASPs	5.081	.093	4.898	5.265

Dependent Variable: *Capacity and Performance*

Figure 8-13

*Profile Plots of the Capacity and Performance Affected by Each Firm Origin Type*



## Analysis

ASPs not only own or host the software, but also take responsibility for running the applications and managing the entire IT infrastructure which rests with the ASP vendor (Sharma & Gupta, 2002). Many ASPs are experts on the applications they work with, so hosting application does not pose too many difficult. However, for those ASPs that do not have much expertise in technology (e.g., software development, network administration), how to keep systems running smoothly and efficiently may be a serious concern.

Table 8-15 and Figure 8-13 illustrate that firm origin types 2 (Infrastructure-provider-turned ASPs) and 3 (ISV-turned ASPs) have very similar means of capacity and performance (5.036 out of 6 and 5.081 out of 6 respectively); and type 1 (pure-play ASPs) has the lowest mean (4.739 out of 6). According to the study, this result can be attributed to the competency of the infrastructure-provider-turned ASP in providing a superior network infrastructure or application platform infrastructure which is beneficial to the task of systematically optimizing performance of application. Likewise, the professionals in software application help the ISV-turned ASPs to run and manage their application efficiently. In this study, a number of the participants' ASPs have strong technology backgrounds; for example, one was transformed from a network company which had created and operated a network of technology businesses in diverse phases of development. One is a provider well known for specializing in content management services; another is a principal supplier of enterprise management solutions that enable companies to control and manipulate their IT infrastructure; and another was the first company to provide the world-class website content

management software. Two others are the rivals of the leading provider of CRM. One of them even provided a system facilitating enterprise customers in monitoring the performance of their applications within the ASP data center, and not many ASP could deliver such real-time views at that time. More specifically, in terms of application manipulation or facility support, even though not all ASPs with type 2 and type 3 are superior to type 1 (pure-play ASP), on the average, their (i.e. type 2 and type 3) existing knowledge base in this area is stronger. This strength is especially helpful in customization which is significantly correlated to performance/capacity level in this study. A better customization service makes the performance of the system more efficient and more flexible.

To examine the relationship between firm origin and customization, two scales which were used to measure the satisfaction level of customization were analyzed for this purpose. They are:

A44: Our ASP is capable of appropriately customizing our application to reach our requirements.

A45: Our ASP provides software that allows us to do functional customizations without touching the source code.

The content in Table 8-16 shows that both Infrastructure-provider-turned ASP and ISV-turned ASP have higher customization levels.

Table 8-16  
*Firm Origin and Satisfaction Level of Customization*

Firm Origin Type	A44A	A45A	Satisfaction level of Customization
Pure-play ASP	4.21	4.68	4.45
Infrastructure-Provider-turned ASP	4.6	4.88	4.74
ISV-turned ASP	4.25	4.75	4.5

Accordingly, through some intermediate effects (e.g. the better customization service), the existing expertise of these types of ASPs give them have a higher level of performance and capacity than the pure-play ASPs. This finding is supported by the qualitative results; for example, some of the respondents' comments show that they considered that their ASPs lacked in capacity. Respondents also complained that their ASP vendors only offer a hosted service and, as such, could not even index information on their intranet. Some users had terminated the service due to low usage or the performance not being good enough to accommodate the business's needs. Selected comments are displayed below which describe some users' experiences of utilizing ASP services.

*We terminated the service in early 2003 due to low usage.*

*It kept us waiting; we got sick of the performance loss...*

*They provide little beyond that ... no applications, no implementation, no training, no customization.*

All of these comments that refer to the poor performance and low capacity were made by the users of pure-play ASPs, and their complaints prove that the pure-play ASP received less satisfaction than the type 2 and type 3 ASPs in terms of capacity and performance. In contrast, when the users of the type 2 and type 3 ASPs expressed their dissatisfaction, they emphasized that it was the result of some other reasons such as change in pricing structure or the feeling of being neglected, rather than capacity or performance.

On the other hand, having been formed by the integration of a system integrator, IT consultants, or value-added resellers, pure-play ASP has its

superior aspects. For example, this type of ASP obtains a higher satisfaction level than the ISV-turned ASP for system integration service; although the significant correlation between integration and capacity/performance (Pearson  $r = .362$ ,  $P = 0.000$ ) is less than that between customization and capacity/performance (Pearson  $r = .538$ ,  $P = 0.000$ ). The result shows that the effect of technical expertise existing in pure-play ASP causes less impact on capacity/performance than on the other two types of ASP.

In conclusion, the findings infer that one of the mechanisms for path-dependence - expertise has an intermediate effect on customer perception of satisfaction via capacity and performance.

In addition, the well-known brands of these transformed ASPs can impress the users and make them satisfied with the stability of the application system. For example, some respondents noted that they switched to a small ASP for a lower price. Although they complained about the expensiveness of the previous supplier which has been a famous ISV-turned ASP for some time, they were still impressed by its good performance. To elucidate this issue, the researcher examined the items regarding respondents' perception about business status, such as the perceived efficiency of system, the brand of application, the market share, and the stability of the business (see Appendix A), as these could imply the respondents' expectation and perception about the capability and performance of a business. Table 8-17 illustrates that the lowest level of perceived expertise by the users of pure-play ASPs resulted in the lowest satisfaction level of capacity and performance. In contrast, the ISV-turned

ASPs received the highest perceived expertise by their users, and also the highest level of satisfaction with capacity/performance.

Table 8-17

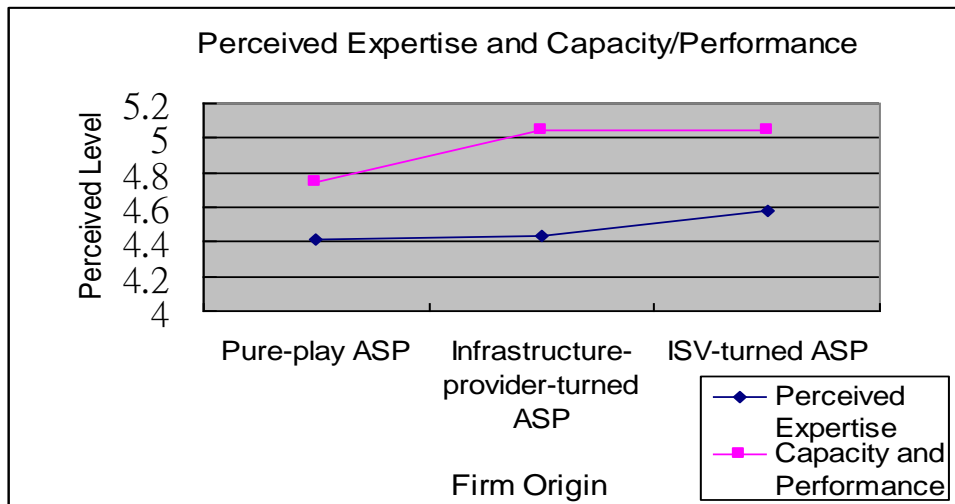
*Perceived Expertise and Capacity/Performance of each Type of ASP*

Firm Origin	Perceived Expertise	Capacity and Performance
Pure-play ASP	4.41	4.74
Infrastructure-provider-turned ASP	4.43	5.04
ISV-turned ASP	4.58	5.08

The results show that perceived expertise is another mechanism which can impact on customer perception through capacity and performance. Figure 8-14 demonstrates this relationship clearly.

Figure 8-14

*Relationship between Perceived Expertise and Capacity/Performance*



Based on the relationship between firm origin, and capacity and performance, an analysis regarding the market strategy model is conducted below.

### 8.3.4.2 ASP Firm Origin and Market Strategy Model

Adapted from the Ansoff's product / market growth matrix, the ASP firm origin and market strategy model (Figure 4-2) displays the relationship between ASP firm origin and its appropriate marketing strategies. By consolidating this model with the analysis results stated in the previous subsection more findings can be examined.

Before an elaborate discussion about the marketing strategies model is conducted, the criteria for deciding the strategy dimension of ASP vendors is briefly illustrated. As the initial of the ASP industry was about 1998, the researcher used 1998 as a determinant time point to define the strategy type of these ASP vendors. The criteria are illustrated in Figure 8-15.

Figure 8-15

#### *Criteria of Defining Strategy Dimension for ASP Vendors*

	Present Products	New Products
Present Customers	Vendors founded before 1998 and respondents receiving services before 1998	Vendors founded after 1998 and respondents receiving services before 1998
New Customers	Vendors founded before 1998 and respondents receiving services after 1998	Vendors founded after 1998 and respondents receiving services after 1998

Based on these criteria, the data collected from the survey and documentary study were examined. Demographic data refer to the period of the respondents' adopting services from their ASP vendors, and also the founding year of these ASPs.



Table 8-18

*Frequency and Percentage of Service Adoption Period*

<b>Service Using year</b>	<b>Frequency</b>	<b>Valid Percent</b>
1994	2	1.7
1996	2	1.7
1997	1	.8
1998	1	.8
1999	9	7.4
2000	10	8.3
2001	41	33.9
2002	32	26.4
2003	21	17.4
2004	2	1.7

Table 8-18 shows that 1.7% of the respondents have been employing services from their service provider since 1994, 1996, and 2004; 33.9% of the respondents have employing services since 2001; 26.4% since 2002, and 17.4% since 2003.

Table 8-19

*Frequency and Percentage of ASP Vendors' Founding Year*

<b>Founding year</b>	<b>Frequency</b>	<b>Valid Percent</b>
1977	9	7.3
1980	10	8.1
1990	2	1.6
1993	3	2.4
1995	1	.8
1996	5	4.1
1997	11	8.9
1998	35	28.5
1999	34	27.6
2000	13	10.6

Table 8-19 shows that among the respondents' ASP vendors, 7.3% were founded in 1977, 28.5% in 1998, 27.6% in 1999, and 10.6% in 2000.

A cross tabulation generated from SPSS description analysis was derived to display the relationship between the firm origin of respondents' ASP and the strategy dimension. Table 8-20 shows that twenty-four pure-play ASPs and nineteen infrastructure-provider-turned ASPs are considered as adopters of strategy dimension 4 (i.e., diversification involving new products and new markets); twenty two ISV-turned ASPs can be considered as adopters of strategy dimension 3 (i.e., extending market using existing products); and three infrastructure-provider-turned ASPs are adopters of strategy dimension 2 (i.e., product development for the existing market). This is consistent with the proposition in Chapter 4 (4.1.2, Figure 4-2). Only two ASP vendors are adopters of strategy dimension 1 (i.e. growth in existing product markets), however, these two vendors happen to be the ISV-turned ASPs, so this is consistent with the assertion in Chapter 4 as well.

Table 8-20

*Strategy Type \* Firm Origin Cross Tabulation*

Strategy Dimension	Firm Origin			Total
	Pure-play ASPs	Infrastructure-provider-turned ASPs	ISV-turned ASPs	
1			2	2
2		3	1	4
3	6	12	22	40
4	24	19	31	74
Total	30	34	56	120

Furthermore, the Pearson correlation shows a statistically significant (.023) correlation between firm origin and strategy type.

According to the analysis above and the findings in Chapter 7 regarding the correlation between firm origin and competitiveness assessment factors (see 7.4.3.1 and 7.5), the ASP firm origin can impact on the satisfaction level of capacity and performance. A more elaborate diagram based on Figure 4-2 is presented below to illustrate the relationship between an ASP firm’s strategies and its capacity and performance.

Figure 8-16  
*Advanced ASP Firm Origin and Market Strategy Model*

	Present Products	New Products
Present Customers	<ul style="list-style-type: none"> <li>● ISV-turned ASP (<b>Most</b> capacity/performance)</li> </ul> <p>[1]</p>	<ul style="list-style-type: none"> <li>● Infrastructure-provider-turned ASP (<b>Second</b> capacity/performance)</li> </ul> <p>[2]</p>
New Customers	<ul style="list-style-type: none"> <li>● ISV-turned ASP (<b>Most</b> capacity/performance)</li> </ul> <p>[3]</p>	<ul style="list-style-type: none"> <li>● Pure-play ASP (<b>Least</b> capacity/performance)</li> <li>● Infrastructure-provider-turned ASP (<b>Second</b> capacity/performance)</li> </ul> <p>[4]</p>

Adapted by Liang for this research

Figure 8-16-[1] [3] (the left quadrants of the diagram) show that when adopting a strategy of promoting present product (e.g. increasing product usage or developing new segments such as Web-based delivery), ISV-turned ASPs received a high satisfaction level in capacity and performance. When new and present customers accept the strategy, despite the concerns about security, because of the benefits of having well-designed software which are able to efficiently operate under the Web-based platform, this benefit is very helpful for market promotion.

Since the provision of software application was their core service, it is easier for the ISV-turned ASP to expand its specialty service based on the present products to provide user-friendly, high capacity and performance Net-exploitive based applications than the ASPs with other firm origins. It is also possible to provide cross-platform user-interface standards for the existing users and potential users.

On the other hand, from the consumer's point of view, it can be a problem to change the existing application software to another once the consumer has become familiar with the product as a long learning period may be required. Besides, the concerns of compatibility between different systems may keep the existing users with the same product while the success of data transfer to new system might be a worry. Furthermore, changing software may cause problems for those users who need to communicate with their business partners who also use the same products (e.g. operation system). That is why very few users of Microsoft PC like to transfer to Apple Macintosh and vice versa.

The above proposition justifies the strategy of this model, and implies that the impact of some mechanisms of path-dependence (i.e. network effect, network externality, and lock-in effect) makes it a more profitable strategy for the ISV-turned ASP to focus on promoting present products.

If the marketing promotion strategy is focused on new products, two categories of customers are involved - the present and the new. Figure 8-16 [2] (the top-right quadrant of the diagram) illustrates the former situation and 8-16 [4] (the bottom-right quadrant of the diagram) explains the latter.

In this paradigm, the analysis result proves that product development strategy and diversification strategy are largely adopted by infrastructure-provider-turned ASP.

Before immigrating to the ASP industry, infrastructure providers are professionals in data center and communication infrastructure management. When extending their service into ASP business by adding new products (e.g. application software provided by ISVs), their specialty should be helpful in improving the performance of application usage (e.g. tuning the operation of infrastructure software/ hardware). According to the analysis result on Table 8-15, infrastructure-provider-turned ASPs receive a reasonably high satisfaction level (5.036 out of 6) in capacity and performance, even though this is not as high as that for the ISV-turned ASPs (5.081 out of 6), the difference is minute.

Compared to the service or product provided by ISV-turned ASP, the offerings from infrastructure-provider-turned ASP have less network effect and network externality, as these services have been considered more as backstage support that does not directly cope with end users. Therefore, the lock-in effect is also less. All of these effects, plus the fast growth of IT technology, drive this facilities-based ASP into focusing on new product development instead of existing product.

Pure-play ASPs, the start-up businesses in the ASP industry, offer new products/ services for new customers. According to Figure 8-13, this type of ASP attained the lowest satisfaction level in capacity and performance. As the characteristics of pure-play ASPs are offering best-of-breed services

through a single window, they have to coordinate with a variety of partners (e.g. ISV, ISP, MSP, AIP...etc.). As they do not have expertise in business applications or infrastructure applications, it is more difficult for them to sort out the capacity and performance problems without the cooperation or support of their partners.

The discussions conclude that the advanced ASP firm origin and market strategy model provides a valuable insight into the relationship between firm origin and the satisfaction level of capacity/performance in terms of the marketing promotion strategy.

#### 8.3.4.3 ASP Firm Origin and IT Adoption Services

The findings in section 7.4.3.2 show an ASP's firm origin has an influence on the utilization of IT adoption services. Table 8-21 shows the descriptive statistics data between firm origin and IT adoption services. Figure 8-17 shows that the users of ISV-turned ASPs adopted the greatest number of IT adoption services (mean=1.717 out of 3); whereas the users of infrastructure-provider-turned ASPs adopted the least (mean=0.853 out of 3).

Table 8-21

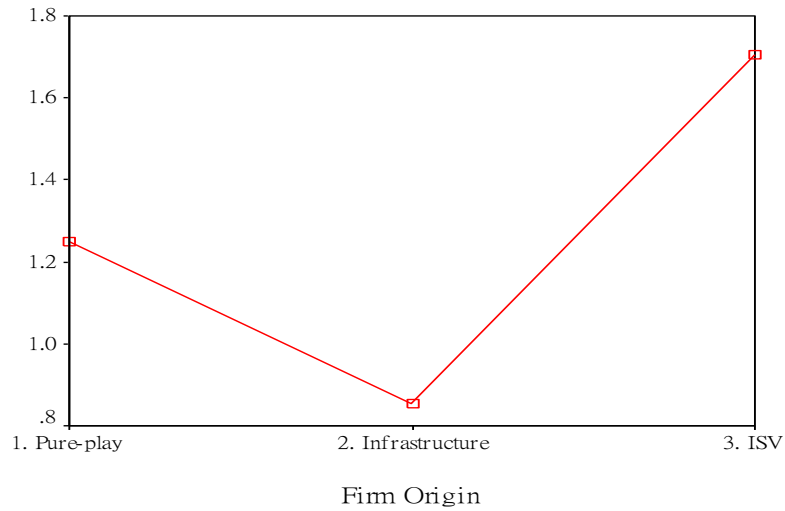
#### *Estimated Marginal Means of Firm Origin and IT Adoption Services*

Firm Origin	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1. Pure-play ASPs	1.250	.202	.850	1.650
2. Infrastructure-provider-turned ASPs	.853	.196	.465	1.241
3. ISV-turned ASPs	1.707	.150	1.410	2.004

Dependent Variable: IT Adoption Services

Figure 8-17

Profile Plots of IT Adoption Services Affected by Each Type of Firm Origin



**Analysis**

The IT adoption services include software implementation, user training, and IT consulting.

Table 8-22

The Cross Tabulation between Firm Origin and IT Adoption

Firm Origin	IT Adoption						Summary		
	Software implementation		User training		IT consulting		Sum	Mean	%
1. Pure-play	15	25%	14	23%	11	23%	40	1.25	24
2. Infrastructure	12	20%	9	15%	8	17%	29	0.85	17
3. ISV	33	55%	37	62%	29	60%	99	1.71	59
Total	60	100%	60	100%	48	100%	168		100

Table 8-23

The Usage Rate of IT Adoption

Firm Origin	IT Adoption					
	Software Implementation		User training		IT consulting	
1. Pure-play	15	47%	14	44%	11	34%
2. Infrastructure	12	35%	9	26%	8	24%
3. ISV	33	57%	37	64%	29	50%

Table 8-22 shows that 59% of these services were adopted by the users of ISV-turned ASP. Within the services of IT adoption, user training is the item that was applied most by these users (62%).

In the aspect of usage rate of each item within IT adoption category, the content in Table 8-23 displays a consistency with the results in Table 8-22. According to Table 8-23, for the users of ISV-turned ASP, user training had the highest usage rate (64%); this indicates that this service has been utilized by 64% of these users (if the usage rate is 100%, it means that all users of ISV-turned ASP adopt this service). This usage rate was followed by the software implementation (57%). Unsurprisingly, since the software application was developed by this type of ASP, they should be more professional in providing satisfactory implementation and training services for their own products.

Furthermore, pure-play ASP also has a very high usage rate in software implementation (47%). Some respondents indicated that to avoid the harassment of application, software implementation is the main reason for outsourcing their IT business to an ASP; for example, the fifth comment in Section 8.3.2.2, which was given by a user of the pure-play ASP, explicitly mentioned this issue. When considering the members of forming pure-play ASPs (e.g. the IT consultants, system integrator, and value-added resellers), it is understandable why IT adoption has a high usage rate by the customers of this type of ASP, because the items that make up IT adoption services such as application implementation, IT consulting, and continuous support are usually the core business, or in other words the strong point, of these members of pure-play ASP.



**8.3.4.4 ASP Provider Type and Affordability**

Table 8-24 and Figure 8-18 display the descriptive data about provider type and affordability. Because of the limitations of collected data, only three types of providers have been investigated in this study: Enterprise ASPs; Volume Business ASPs; and Specialist ASPs.

Table 8-24

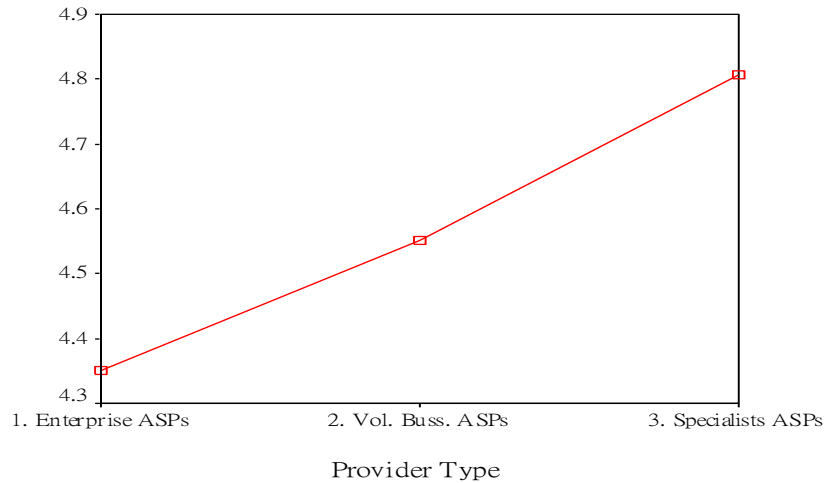
*Estimated Marginal Means of Provider Type and Affordability*

Provider Type	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1. Enterprise ASPs	4.350	.120	4.113	4.587
2. Volume Business ASPs	4.551	.149	4.256	4.846
3. Specialist ASPs	4.807	.124	4.562	5.052

Dependent Variable: Affordability

Figure 8-18

*Profile Plots of the Affordability Affected by Each Provider Type*



**Analysis**

With respect to the ASP’s provider type, Table 8-24 shows that the specialist ASPs have the highest satisfaction rate (4.807 out of 6) in affordability whereas the enterprise ASPs have the lowest (4.350 out of 6) of

the three types of ASPs. Furthermore, some statements by the respondents noted the experience of receiving ASP's services in terms of affordability. These comments are listed below.

*Still cost effective to continue with ASP. (From a user of a specialist ASP)*

*We are nearing the end of our contract term and therefore are reviewing other ASP vendors. We must review other bids, since the pricing structure has changed (favorably) in the past 3.5 years - not because we are unhappy with XXX [ASP name]. (From a user of an enterprise ASP)*

*TOO expensive, we left. (From a user of an enterprise ASP)*

As explained in the beginning of this thesis, a specialist ASP delivers a single category of application. In this research, a large percentage of this type of ASP has provided CRM or Human Resource (HR) as the main products. When they have large numbers of users for the same kind of products/services, these products/services are likely to be standardized. There is an advantage of economies of scale, which means that the unit cost will be lower. In addition, since there have been many users adopting such specific types of application, it is not difficult for the potential consumers to obtain information about this product/service; in other words, they will pay a lower transaction cost and therefore can better afford to adopt the products or services.

Conversely, where the enterprise ASP delivers broad spectrum solutions or the best-of-breed applications, it is difficult to lower the unit cost but very easy to decrease the affordability to customers.

The analysis above depicts that both standardization and transaction cost

have an effect on affordability.

### 8.3.4.5 ASP Provider Type and Facility Supporting Services

Section 7.4.2.4 reveals how an ASP’s provider type has an influence on the facility supporting services. Table 8-25 shows the descriptive statistics data between these two variables.

Table 8-25

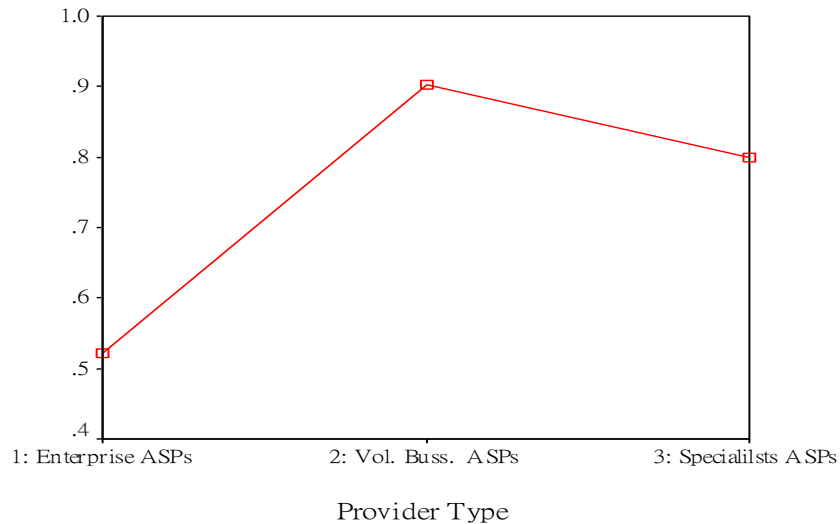
*Estimated Marginal Means of Provider Type and Facility Supporting services*

Provider Type	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1. Enterprise ASPs	.521	.103	.316	.725
2. Volume Business ASPs	.903	.128	.649	1.158
3. Specialist ASPs	.800	.107	.589	1.011

Dependent Variable: Facility supporting services

Figure 8-19

*Profile Plots of the Facility Supporting services Affected by Each Provider Type*



### Analysis

The facility supporting services include two items: Internet facilities and data center.

Table 8-26

*The Usage Rate of Facility Supporting Services*

Provider Type	Facility supporting services			
	Internet facility		Data center	
1. Enterprise ASPs	14	30%	11	23%
2. Volume Business ASPs	16	52%	12	39%
3. Specialists ASPs	25	56%	11	24%

Table 8-25 and Figure 8-19 show that the users of volume business ASPs received the highest usage rate (mean = .903 out of 2) in the facility supporting services, whereas the enterprise ASP received the lowest (mean = .521 out of 2).

More specifically, Table 8-26 displays the usage rate of each item in the facility supporting services category. According to this table, the users of specialist ASPs reported that the Internet facility had the highest usage rate (56%) which means that this service has been utilized by 56% of them. This service also been used by 52% of the customers of volume business ASPs. The customers had the highest usage rate (39%) of data center. These results reveal that both the users of volume business ASPs and the specialist ASPs have adopted more facility supporting services compared to the users of enterprise ASPs,. This can be explained by the fact of that enterprise ASPs generally focus on the management of high-end business applications rather than facility support. In contrast, volume business ASPs mainly serve small or medium-sized businesses with prepackaged applications; and it is quite common for SMEs to not have IT facility or in-house IS support. Thus they need to adopt this type of service (i.e., facility supporting services) from their ASPs more than the other users. While this type of ASP targets a big number of small businesses, it is likely to increase

the network externality effect, and this effect can subsequently impact on usability. The provision of prepackaged software implies that standardization can increase usability.

### 8.3.5 Analysis of the other Factors and Customer Perception

Besides the factors already discussed, some other factors were found that can also impact on customer perception. These are software applications, brand of applications, and intensity of service used. Although not the main constructs of this issue, these factors are still worth exploring as they might provide some insights into ASP business model. In the following sections, further data extracted from the questionnaire are discussed.

#### 8.3.5.1 Software Applications

In early 2005, a wide range of applications were developed for the ASP model. This included the free and simple applications, such as Yahoo-Calendar, Yahoo-Notepad, and business solutions provided by Salesforce.com which was one of the first companies to rely on this model. These traditional applications and the e-commerce applications were adopted by the ASP before this model had been completely developed.

Table 8-27 illustrates the most popular applications in this survey; CRM is the most adopted application followed by ERP. Sales force automation, supply chain management and accounting are the third, fourth and fifth applications in order of popularity.

Nevertheless, “most popular” does not equate to “most efficient”. Some of the most adopted software does not satisfy its users. Table 8-28 shows the

ranking of software applications that give the most satisfaction to the customers.

Table 8-27  
*Most Frequently Adopted Applications*

Name of Software Applications	Count	Percentage	Rank of Popularity	Top 5 Satisfaction
Customer service (CRM)	18	10	1	Y
ERP	15	9	2	N
Sales force automation	14	8	3	Y
Supply chain management	12	7	4	Y
Accounting	11	6	5	Y
Financial	9	5	6	N
Knowledge/ Exchange management	9	5	7	Y
Scheduling	9	5	8	N
E-mail	7	4	9	Y
Remote application management	7	4	10	N

Table 8-28  
*Software Applications with Top Satisfaction Rankings*

Satisfaction Level	Software Applications	Count	Percentage	Rank*
6 (Most satisfied)	Customer service (CRM)	7	18	1
6	Sales force automation	5	13	2
6	e-Commerce (B to C)	3	8	3
6	Knowledge/ Exchange management	3	8	3
6	Supply chain management	3	8	3
5 (fairly satisfied)	Customer service (CRM)	9	14	1
5	Sales force automation	7	11	2
5	Accounting	6	9	3
5	Supply chain management	6	9	3
5	E-mail	5	8	4

\* It means the rank of popularity in a specific satisfaction level

## **Analysis**

1. In terms of the users being extremely satisfied with the ASP services, 18% were using CRM and this was the most popular application.
2. In terms of the users extremely satisfied with the ASP services, 13% were using sales force automation, the second most popular application.
3. In terms of the users feeling extremely satisfied with the ASP services, 8% were using e-Commerce (B to C), knowledge/exchange management, and supply chain management which were the third most liked.
4. In terms of the users who were fairly satisfied with the ASP services, 14% were using customer service (CRM), the most popular application.
5. In terms of the users being fairly satisfied with the ASP services, 11% were using sales force automation, the second most popular application.
6. In terms of the users who feel fairly satisfied with the ASP services, 9% were using accounting and supply chain management which were the third most popular applications.

### **8.3.5.2 Brand of Applications**

Chou (2004) asserted that brand is a principal criterion for businesses when choosing applications. In the future, the application brand will be replaced by the general public impression about the competitiveness of an ASP's service. Therefore, an ISV has to collaborate with an ASP by strategic alliance or some other approach.

However, before the ASP model is widely accepted, the brand of application can still affect the satisfaction level of users. This study has investigated the

relationship between brand and customer perception. There is an item about brand of application in Part One of the questionnaire, the statement is: *Our ASP vendor supplies applications with famous brands.* The respondents were requested to rank their attribute performance level (agreement level) and importance level in response to this statement:

The results show that more than half the respondents considered that the brand is important to different degrees. For example, 27% of the respondents stated that brand is highly important and 30% of them thought brand is moderately important. More details are shown in Table 8-29.

Table 8-29

*Percentage of Importance Level of Brand of Application*

<b>Importance Level</b>	<b>Percentage</b>
Extremely important	16%
Highly important	27%
Moderately important	30%
Slightly important	14%
Not important at all	13%

When asked if the ASP vendor supplied applications of famous brands, 84% (23%+40%+21%, see Table 8-28) of the respondents agreed. Comparing the agreement level of this question with their overall satisfaction level, the results show that the higher the former, the higher the latter. More details are shown in Table 8-30.



Table 8-30

*Brand and Satisfaction Levels*

<b>Agreement Level</b>	<b>Percentage</b>	<b>Satisfaction Level (Mean)</b>
Strongly agree	21	5.53
Agree	40	5.15
Somewhat agree	23	4.78
Somewhat disagree	6	4.6
Disagree	8	4.5
Strongly disagree	3	4.5

**8.3.5.3 Intensity of Service Used**

This section will discuss the effect of “intensity of service used” on affordability. “Intensity of service used” or simply called “service intensity” means the number of jobs received from the ASP vendor. Table 8-31 indicates that service intensity has a statistically significant correlation with the variables – capacity/performance, affordability, and customization/integration. Table 8-32 illustrates the corresponding service intensity and the mean of these significant correlation variables.

Table 8-31

*Pearson’s Correlation between Service Intensity and the Five Service Competitiveness Assessment Factors*

<b>Assessment Factors</b>	<b>Intensity of Service Used</b>	
	Pearson Correlation	Sig.
Capacity/Performance	.229*	.015
Reliability/Trustworthiness	.176	.062
Affordability	.200*	.034
Customization/Integration	.214*	.023
Lock-in	-.069	.467
Satisfaction Level (In general)	.137	.147

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

The service intensity in this study can range from 1 to 8, with 1 meaning the customers only contracted one job type from the ASP vendor, while 8 means that eight different job types have been contracted by the customers.

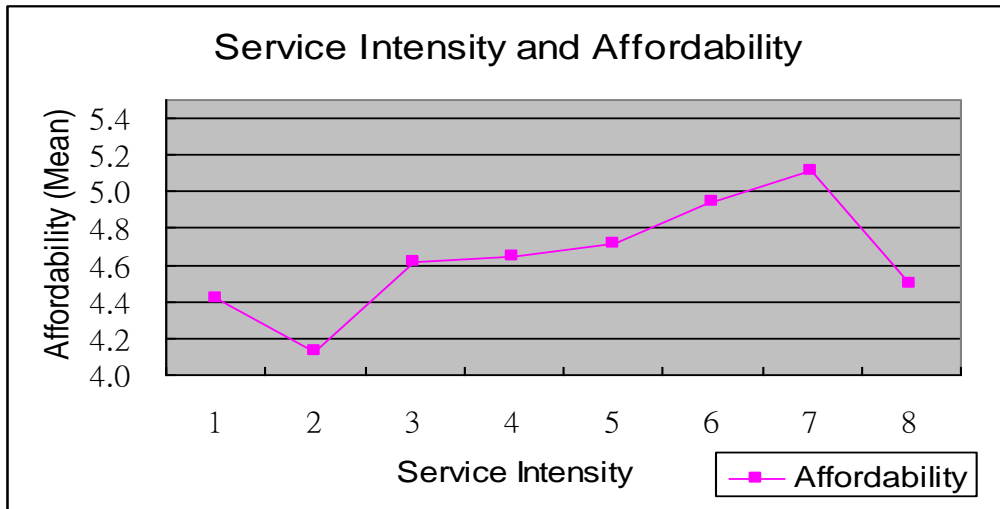
Table 8-32

*Relationship between Service Intensity and Capacity/Performance, Affordability, and Customization/Integration*

Service Intensity	Affordability (Mean)	Capacity/Performance (Mean)	Customization/Integration (Mean)
1	4.42	4.77	3.98
2	4.13	5.06	3.94
3	4.62	4.69	3.70
4	4.65	4.89	4.20
5	4.72	5.15	4.33
6	4.94	5.23	4.37
7	5.11	5.08	4.55
8	4.50	5.36	4.63

Figure 8-20

*Service Intensity and Affordability*



## **Analysis**

From the linear trend of Figure 8-20 and Table 8-32, it can be seen that, in general, the higher the service intensity the customers adopted, the higher the affordability level of the service. This correlation applies for intensity between 3 and 7, and it indicates that the more services adopted, the lower the average cost. However, when the number of jobs utilized is more than seven, the total cost would be fairly high, and this might reduce affordability.

The companies that received eight different types of services from the ASP attained the highest level of satisfaction of capacity/performance (5.36 out of 6) and customization/integration (4.63 out of 6) amongst all of the respondents although their satisfaction level with affordability is comparably low (4.50 out of 6). After further study of the background of these companies, it reveals that 62.5% have 1000-10000 employees; and 25% have 500-1000 employees. They are the second and third largest firms in this study. It is presumed that these companies would be big customers of their ASPs, and they accordingly have received considerable attention and are well looked after. Therefore, compared with other customers, their satisfaction level regarding the capacity/performance and customization/integration is higher.

Considering both the low affordability and high capacity/performance and customization/integration for these firms outsourcing more than eight tasks to their ASP vendors, withdrawing part of the outsourcing jobs and having them managed by their in-house IT staff might be a more effective strategy.

## 8.4 Chapter Summary

This chapter has aimed to clarify and extend survey findings by examining descriptive data and qualitative data. The issues such as the ASP business position, the service utilized, the users' perception of service competitiveness, and the other factors (e.g. software applications, brand of applications, and service intensity) have all been discussed in depth. The results are summarized in the following sections.

Section 8.3.2.1 explored the effect of capacity/performance satisfaction on overall satisfaction level. In principle, the higher the satisfaction with capacity/performance, the higher the customer perception of satisfaction with the ASP services.

Section 8.3.2.2 indicated that the satisfaction level goes up very slowly after the level of reliability/trustworthiness exceeds its mean. A very high level of reliability/trustworthiness has little effect on ASP customer's perception.

Section 8.3.2.3 stated that affordability is the main concern in adopting ASP services. The result shows that even though customers might be satisfied with the capacity and performance of the service of their ASPs, if they consider the service is not cost effective, they will try to change their ASPs sooner or later.

Section 8.3.2.4 showed that customization/integration is a difficult area in which to satisfy users. The survey result shows that off-shelf packaged software is the most adopted customization mode for those users who reported the most satisfaction level. Furthermore, "the higher customization

adoption, the higher the customer satisfaction” is not supported when cost concerns are included.

Section 8.3.2.5 pointed out that 27.3% of the respondents considered that they have been locked-in. The cost concerns, in both money and high dislocation cost, are the main reasons for users remaining with the same ASP vendors.

Section 8.3.3.1 discussed the services utilized and service competitiveness. The outcome shows that the utilization of system development services is related to the satisfaction level of customization and integration; and amongst the component items of this service, application development has the highest percentage of usage.

Section 8.3.3.2 referred to the service utilized and customer perception. This subsection shows that software implementation, user training, and IT consulting are the top three services adopted by the respondents. Furthermore, user training, Internet facility, and software implementation are most utilized by those customers who expressed the highest level of satisfaction.

Section 8.3.4.1 discussed the firm origin and its relationship to capacity/performance. It shows that Infrastructure-provider-turned ASPs and ISV-turned ASPs give a very similar level of satisfaction in capacity and performance, whereas pure-play ASPs have the lowest. Furthermore, two mechanisms for path-dependence – expertise and perceived expertise were examined. The findings show that they have impact on capacity and performance through firm origin.

Section 8.3.4.2 discussed the ASP firm origin and market strategy model. Consolidating the analysis results pertaining to capacity/ performance and the feature of each type of ASP firm origin, this model provides a framework for an in-depth understanding of the effect of firm origin via promotion strategy.

Section 8.3.4.3 covered the firm origin and service utilized. It concluded that the users of ISV-turned ASPs adopted the highest number of IT adoption services whereas the users of infrastructure-provider-turned ASPs adopted the lowest number.

Section 8.3.4.4 discussed ASP provider type and affordability. Specialist ASPs obtained the highest satisfaction level in affordability, whereas the enterprise ASPs obtained the lowest level.

Section 8.3.4.5 considered ASP provider type and the service utilized. The findings indicate that the users of volume business ASPs showed the highest usage rate in facility supporting services, whereas the users of enterprise ASP showed the lowest rate.

Section 8.3.5.1 studied the relationship between customer perception and the software applications utilized by customers. It showed that CRM was the most popular application, followed by ERP. In addition to CRM, sales force automation, e-commerce (B to C), knowledge/exchange management, and supply chain management are also very popular for those users who expressed high satisfaction with the ASP services.

Section 8.3.5.2 discusses the influence of applications brands on customer perception. The result showed that more than half of respondents to different degrees considered that the brand is important, and this factor also related to customer perception of satisfaction.

Section 8.3.5.3 studied the intensity of service utilized. The descriptive data showed that generally the higher the service intensity the customers adopted, the higher the affordability level. In addition, in terms of the big service intensity companies, their satisfaction level regarding the capacity/performance and customization/integration was also higher than the smaller companies.

Chapter 9 concludes the findings, the research's contributions, limitations, and some suggestions for further research.

# Chapter 9

## Discussion of Research Findings and Conclusion

In this final chapter, the research findings are reviewed followed by a discussion with some suggestions for practitioners and academics. The contributions of this research, its limitations, and the implications for future investigation are also presented.

### **Chapter Contents**

- 9.1 Review of Findings
- 9.2 Practice-Relevant Discussion and Suggestions
- 9.3 Research Contributions and Implications
- 9.4 Limitations and Directions for Future Research
- 9.5 Concluding Summary

### 9.1 Review of Findings

The findings of this research show that customer perception is affected by the factors in three clusters of constructs – ASP business position, service utilized, and service competitiveness.

#### ***ASP business position***

The results show that the ASP business position can impact on customer's perception of satisfaction through some intermediate effects, that is, the interaction between some mechanisms for path-dependence and the factor of service competitiveness (i.e., capacity and performance) as well as



factors of service utilized (i.e., IT adoption services). (For more details see subsections 7.4.3.1 and 8.3.2.1.)

In respect of firm origin, ISV-turned ASP has the greatest effect on capacity and performance, infrastructure-provider-turned ASP has slightly less effect, and pure-play ASP has the least effect. The reason for this result is that ISV-turned ASPs have strong expertise and experience in application software development and management; and infrastructure-provider-turned ASPs possess superior technological knowledge in infrastructure facilities. This prior strength and expertise makes these types of ASP receive a high level of satisfaction in capacity and performance. Pure-play ASP also has existing technology (i.e., specialty in system integration), but this has less impact on capacity/performance.

This study also concludes that the perceived expertise related to the brand of the ASP vendors can affect users' feelings toward the system's operational stability and efficiency which are the components of capacity and performance. Accordingly, it verifies that consumers' definite views about service/product are the basis for making their evaluations. In all, the two mechanisms for path-dependence – existing expertise and perceived expertise - can affect the satisfaction level of capacity and performance of ASP services, and then have intermediate effects on their customer's perceived satisfaction.

The findings from the ASP firm origin and market strategy model show that the ISV-turned ASP is suitable to conduct an innovation strategy focus on existing products because its prior knowledge in application software

enables it to more easily and efficiently improve performance and enlarge the capacity of the existing application system. Similar to ISV-turned ASP, infrastructure-provider- turned ASP also possesses high-expertise, but this is related to facilities-based network equipment. Because these services have less direct association with end-users, this back-stage support expertise causes less network effect and network externality, and consequently less lock-in effect on the users. This phenomenon explains why the ASP firm origin and market strategy model is an ideal promotion strategy for Infrastructure-provider-turned ASP targeting new product and service spectrum innovation.

Another finding of the study is that firm origin can affect the use of IT adoption services (see subsection 8.3.4.3). The results show that the users of ISV-turned ASP employ the highest amount of IT adoption services, and that the users of pure-play ASP utilize the second highest amount of this service category. Having an existing knowledge base of software, ISV-turned ASPs can be more flexible and efficient in delivering IT adoption services. Owning the speciality of system integration, the pure-play ASP can also attract numerous users to employ this service. This result shows expertise also has an effect in the services utilized cluster.

In respect of the ASP provider type, the results indicate that this factor has an influence on customer's perception of affordability (see subsection 8.3.4.4). A more elaborate investigation indicated that the specialist ASP received the highest satisfaction level for affordability, whereas the enterprise ASP received the lowest. A qualitative analysis of this finding

showed that another two mechanisms for path-dependence - transaction cost and standardization - have an effect on affordability.

Provider type also has effect on a component of the service utilized cluster, that is, the use of facility supporting services (see subsection 8.3.4.5). Analysis results prove that volume business ASPs received the highest usage rate; whereas the enterprise ASP received the lowest. This is because the volume business ASPs mainly serve a large number of small or medium-sized businesses with prepackaged low-end, generic standard software applications in volume. These characteristics are likely to cause network externality and to promote standardization of service/ product, and these two mechanisms for path-dependence help to achieve greater usability.

### ***Service utilized***

As stated above, the use level of the IT adoption service is related to the type of ASP firm origin; and, according to the result of a GLM analysis, the use of this service can directly affect customer's perception of satisfaction. Therefore, the ASP firm origin can indirectly affect customer perception through the use of this service.

In addition, the use of the system development service has direct effects on customization/integration (see subsection 8.3.3.1). Application development, one of the component items of this service (i.e. system development), has the highest percentage of usage for those customers who have a high satisfaction level for customization/integration; this is

because customization/integration is likely to be applied more efficiently on the development of application than on the other services. More broadly, it means that service utilized can also indirectly affect the customer's perception of satisfaction through the customization/integration.

In terms of the most used services, the descriptive analysis shows that user training, Internet facility, and software implementation are the top three popular services utilized by ASP customers.

### ***Service competitiveness***

The research outcome shows that the customer's perception of the five service competitiveness factors has a direct influence on the customer's perceived satisfaction. Except lock-in, all of the other factors have a positive effect (see subsection 7.4.2). The order from the most to the least influence is the capacity and performance, reliability and trustworthiness, customization and integration, affordability, and lock-in effect. More details on these factors and suggestions for improving their satisfaction levels are presented in next section.

## **9.2 Practice-Relevant Discussion and Suggestions**

In the following subsections, the effect of ASP firm origin on the service competitiveness is discussed first, followed by the influence of ASP provider type and service utilized on customer perception and finally users' perception of service competitiveness, coupled with the overall perceived satisfaction will be the last issue dressed. Some empirical suggestions are made in this discussion.

### 9.2.1 ASP Firm Origin and Service Competitiveness

As ASP firm origin can directly affect users' perception of service competitiveness in capacity and performance, each type of ASP should realize its strengths and weaknesses associated with these dimensions, and then adopt correct strategies to enhance their competence.

Some respondents expect ASPs to be a full service offering. However, the survey showed not all ASPs are the same and none of them are able to exhibit optimum capabilities in every situation. In other words, none of them can offer enough functionality to cover all of the users' needs. For instance, since they do not usually produce their own software, the pure-play ASPs need to coordinate with the software vendors. In addition, pure-play ASPs usually try to offer single window and sole vendor services to their users, but because of their lack of expertise in IT software development or infrastructure implementation, a number have to outsource the hosting elements to other service companies; therefore multiple outsourcing occurs fairly frequently in this type of ASP. Any problems in dealing with these multiple relationships can put both the provider and customer at risk. Likewise, some of the ISV-turned ASPs, which transformed from software companies into the ASP delivery model, were merely changing the financial arrangements with their customers (i.e. pay as you go vs. upfront license fees), but not changing their service models enough to make a big difference to their services. Moreover, some ISV-turned ASPs offer point solutions that are not integrated with other enterprise applications. Most importantly, they do not have enough technical expertise to operate the infrastructure

facility. On the other hand, many of the infrastructure-provider-turned ASPs do not have competence in application software development and management. In order to overcome these problems, pure-play ASPs need to collaborate with their partners, and other types of ASPs need to ally with various other players to leverage expertise. Thus, a good partnership of business strategic alliances becomes important in this industry. Besides effective cooperation and managing a solid relationship with the supporting companies, other suggestions for ASPs with different firm origin are presented below.

In general, pure-play ASP is better known in niche markets, thus brand promotion is needed for these start-up companies until the businesses become more popular. Moreover, since a large percentage of pure-play ASPs are immigrants from these businesses, (e.g. solution providers, IS consultants, or system integrators) strengthening and improving their original core competencies and skills would be a good strategy for increasing competitiveness.

In respect of infrastructure-provider-turned ASPs, it is essential to enhance the hosting or delivery expertise, and extend their infrastructure to interact more effectively with their customers, partners and suppliers. However, the lack of compatibility of infrastructure facilities and software is a serious concern that must be addressed. Concentrating on providing infrastructure software to assist the provision of only very limited products which are easy to manage is recommended as a worthwhile strategy to satisfy customers

with high performance and reliability. In other words, expending a large effort on offering a variety of products is very likely to reduce effectiveness.

In respect of ISV-turned ASPs, it is necessary to design Net-exploitive based applications instead of Web-enabled client-server applications; in other words, the new application should be developed from the ground up in a Net-native manner in order to increase the efficiency when these applications are running and delivering via the network. For the purpose of increasing customization, their services could be improved by enabling customers to bolt on modules rather than offer an entire product. The compatibility of software and hardware is also a key factor to take into consideration to meet the requirement of integration. To achieve economy of scale, ASPs should avoid providing many different types of enterprise applications so that they can maximize customer service at a lower average cost.

In conclusion, it is suggested when planning an innovation strategy, ASPs should concentrate on developing new technologies or services based on their businesses' existing expertise or specialty. In addition, managing a long-term secure relationship with strategy alliance partners is necessary for the purpose of expanding market share and providing quality customer services.

### **9.2.2 ASP Provider Type and Service Competitiveness**

According the findings, the enterprise ASPs gain the lowest satisfaction level with affordability. While the enterprise ASPs provide high-end applications

(e.g. ERP), and even though these applications are utilized under a one-to-many model, these high end applications are more expensive compared to the application software supplied by the other types of ASPs. Targeting these luxury applications, a large group of software vendors spare no effort on developing similar software with more functions and at a much lower price level. Because some people still prefer to own application software instead of renting or subscribing, these software vendors have become the major competitors of enterprise ASPs. Therefore, more attention should be paid by the ASP vendors to address competition.

According to the result, specialist ASPs are most popular. This finding proves the assertions of Phillips (2000) who indicated that generally users only transfer a few special applications to an ASP vendor until the software, the licensing, and usage of this model is widely accepted. This situation reveals that while the ASP model is still immature, customers will hesitate to outsource too much business to ASPs. The suggestion is that if they can focus on developing one product/service or single application backed up by professional support, this is a more efficient strategy to extend market share.

### **9.2.3 Service Utilized and Customer Perception**

The influence of service utilized on satisfaction level depends on the breadth and depth of customer's requirements. Sometimes the potential problems or dilemmas can be explored through analyzing the service utilized. A better understanding of this issue enables ASP vendors to efficiently promote their business by putting more effort into the services that receive high levels of



satisfaction. According to the findings, only two categories of service have an influence on customer perception: IT adoption service (direct effect) and system development service (indirect effect). Some suggestions are presented in relation to these services.

### **9.2.3.1 IT Adoption Service**

In this study, IT adoption services consist of user training, IT consulting, and software implementation. Of the three, user training is the most popular service with high levels of satisfaction. Since the lack of IT professional manpower in a business gives the opportunity for the development of the ASP model, user training is considered as one of the most important services in helping ASP users to operate IS smoothly. The provision of appropriate user training is likely to enhance a positive relationship between users and ASP vendors; and it can also create stronger customer loyalty.

Software implementation is another service with a high usage rate and high satisfaction level. A number of customers mainly used ASPs for high-end applications. Because these products typically involve integration with other systems and deployment to a broad and varied user community, it requires complicated expertise to successfully implement the enterprise-class solutions. Therefore, to ensure that these applications are correctly configured to deliver in the expected level of integration is a real challenge. The study outcome shows that software implementation is the top adopted service that can highly satisfy users (see Table 8-23). Since the respondents of this research have been the customers of the top fifty

ASPs, this service can be regarded as one of the key services determining the popularity of an ASP.

IT consulting is one more component of IT adoption services. Usually, this service is continually needed for an IT solution, and it is accordingly regarded as the critical service for an ASP to sustain a long-term relationship with its customers. Thus, it is worth making continuous efforts to maintain high satisfaction levels.

### **9.2.3.2 System Development Service**

In this study, system development service consists of application development, application integration, and hardware installation. The results indicated that this category, in terms of the service utilized, does not have a direct influence on customer perception. However, it has indirect effects through customization and integration.

According to the characteristics of these service items, application integration and hardware installation are associated more with the requirement of integration whereas application development is connected more with customization. The results indicate that application development has the highest percentage of usage in system development service, and most of the respondents requested the service of customization more than that of integration. However, customization is in conflict with one important feature of typical ASP model, i.e., one-to-many (see section 3.3.2), thus how to balance the requirement of customization and the strength of the ASP model is another challenge.

## 9.2.4 Service Competitiveness and Customer Perception

In terms of the users' perception of service competitiveness, the respondents rated reliability and trustworthiness the highest, followed by Performance and capacity, and then customization and integration. The last dimension is the lock-in effect. More details can be found in Section 8.3.2.

### 9.2.4.1 Capacity and Performance

Network applications and servers need the ability to scale performance to handle large volumes of client requests without creating unwanted delays. Holt (2001) considered that the server configuration used for hosting applications has an effect on the performance. He suggested that clustering load-balancing is needed for high capacity and high quality performance. Wu (2000) pointed out that high availability (HA), a system or component that is continuously operational for a desirably long length of time, should be adopted to prevent interruption to the system. As the life cycle of application software no longer has the duration previously enjoyed, an ASP has to make a greater effort to application upgrading to ensure performance.

Lately, an increasing number of software developers are preferring to develop hosted software rather than desktop software. This change has improved the performance of applications delivery and operation. So, it can be summarized that web applications are the future of software development. Giving this outcome, ASPs should consider coding a

successfully hosted software application program which can be more flexibly linked to the data center, and providing an interface which is friendly and enables users to speedily access that application from the data center.

In addition, to ensure their capacity and performance, ASP vendors should compensate users for poor response and down time, especially when these failures happen to the applications that are mission-critical.

#### **9.2.4.2 Reliability and Trustworthiness**

In adopting an ASP model, customers might have their core business data hosted and under the management of a relatively in experienced ASP vendor. However, up to now, there is little evidence to show the potential customers are ready to trust the Internet-based data delivery approach and outsource their core business.

Since reliability and trustworthiness are still the biggest concerns of many corporations, these factors will impede ASP business growth unless they are addressed. These worries include operation reliability, security issues and the continued existence of ASP.

To assure operation reliability, Durán (2000) argued that it is necessary to create a unique blend of technical solutions, structured thinking, workforce motivation and organizational development for improving ability in this field. In addition, researchers suggested that a low-risk solution is essential for customers, for example, Holt (2001) recommended failover as the vital element of a high level service. Failover is a backup operation used to

deal with the situations such as the primary system failing or being temporarily shut down for servicing. This system will then automatically switch to a standby database, server or network. By involving the use of clusters or a backup system in a geographically separate location, the failover mechanism seems able to offer a reliable service. However, ASPs need to make sure they have failover expertise to properly set up and maintain the system, because this task requires a great deal of technical knowledge.

To address the issue of security, vendors must have mechanisms in place that assure customers of the safety and confidentiality of their hosted data. These mechanisms include firewalls, VPN, virus scanning, Anti-spyware, authorization, encryption techniques, and on-time passwords.

With regard to passwords, Mansfield (2004) indicated that sometimes it is the customers themselves who present a risk to the ASP business as they could potentially abuse password sharing. Therefore, he recommended the installation of a biometric fingerprint sensor as an ideal approach to resolve this problem. In addition, from the results of this research, the ASPs that employ two-factor authentication, a system where each end user accessing a server must have a password generation device to obtain entry, received a very high satisfaction level. A test report from a third party is helpful in proving that the ASP's security policies are effective, and ideally can be used to encourage potential customers.

The concern of small firms about whether an ASP would be available for their customers around the clock is another finding in this study. The respondents indicate that when some urgency arises, ASP may not be as suitable as the paid employees of the company. Alternatively, at times of manpower shortage of ASPs, they may prioritize their big customers and neglect their small clients. This inequality of service confirms the assertion of Smith and Kumar (2004) regarding the large organizations seeming to be more comfortable using ASPs for niche applications than small firms. In this research, the study pertaining to company size and customer perception discussed in subsection 8.3.1 also revealed that the large sized firms have a high level of satisfaction with the ASP model, while the smallest size firms have the lowest. Accordingly, it is suggested that the services be defined in the contract to the satisfaction of the client. For example, the SLA that enables customers to choose different levels of outsourcing service and security by different charges, is considered a good solution for these concerns.

Customers may be cautious about their ASPs going out of business or being acquired by another vendor as a result of which the details of the contract may change. The documentary study result indicated that seven out of the twenty-eight vendors selected as part of the top fifty leading ASPs in the world had been acquired by the other bigger ASP companies (see Appendix D). To address the issue of sustainability, it is important to select a financially healthy ASP vendor. In addition, before signing the contract, it is necessary to check the ASP's business model and its plan for staying in

business until it is profitable. After outsourcing to an ASP, it is essential to ensure the application is always up and running. For the sake of preventing complete record loss in case the ASP closes its doors due to financial difficulties, and also for addressing the concern regarding the electronic records housed in active systems, an in-house archive of all active records that could be accessed during vendor system failure is needed.

#### **9.2.4.3 Affordability**

Many SMEs view IT as a luxury rather than a necessity. Some researchers (Levinson, 2003; Paul, 2000; Smith & Rupp, 2003) contended that using an ASP is easier and more profitable for small companies to access high-end packages that used to be too expensive to afford. Nevertheless, other researchers (Rubens, 2002a; Ekanayaka, 2003) indicated that the service of supporting large enterprise applications is still too expensive and complicated for SMEs; only those companies with large IT budgets can afford it. Holt (2001) also suggested that until infrastructure costs are reduced to a manageable level, small companies will continue to be prohibited from adopting an ASP model for corporate-style applications. These viewpoints are supported by the findings from the survey of this study. Although many ASP vendors are looking to SMEs as a potential source of business, the price of subscription software has not yet fallen to a level to justify its adoption by many of these companies. Even many years after the birth of ASP model, this situation has not changed much. In fact, up to now, a number of SME users of ASPs still consider that such a service is too expensive, even when they have been offered a large discount.

In terms of pricing models, a rent-to-own model that allows customers to own the software during a specific time and relocate it to a different site (e.g. in-house) could be a new option offered by ASPs. Customers could seriously consider this option if they anticipate high growth that will eventually require software customization.

#### **9.2.4.4 Customization and Integration**

According to the respondents of this survey, no single ASP can cover all the customer's needs without customization, which is costly. Paul (2000) stated that customers must trade the ability to customize for the cost advantages of the ASP model. Thus, they can face the dilemma if trying to weigh up the benefits from both sides. However, it does not mean there is no alternative approach to deal with this issue. Many ASPs that provide small amount of customization have successfully convinced their customers to outsource their core business processes.

In order to meet the requirements of customers who like to create their own virtual suites by linking single Web-native applications together, pre-integrated suites are regarded as out-of-date. Some customers favor best-of-breed applications in each category and integrate them using Dot-net framework. Based on the concept of modular programming and object-orientation, Hultquist (2004) proposed that this enables the creation of more effective and flexible application systems by generating components that focus on a single job and then define standard interactions between any pair of components. Another alternative is mass customization which serves as the ultimate combination of custom-made



and mass production. According to Liechty et al. (2001), mass customization can offer consumers a choice board of various features and options for configuring their own products and services. This approach might be able to satisfy a very specific customer's need at an affordable price through providing individualized mass-market goods and services.

In terms of integration, some respondents who had bought services/products from different ASPs noted the extreme difficulties caused by incompatibility and inefficiency. Consequently, some users prefer to choose the ASP that offers applications from only one vendor for the purpose of eliminating integration hassles, speeding up implementation and receiving better customer service. Thus, the ability to provide integration is one of the determinants of an ASP providing satisfactory customized services/products. Apparently, it is also a key to the future of the ASP model.

To address the integration concern, Layzell et al. (2000) suggested that the future software should be able to reconfigure itself and substitute one component or network of components for another without user or professional intervention. While Parry (2005) predicted that a dramatic change in the development of software is expected, he also thought that the systems should be developed as a "federation" of services which are only bound together at the point of execution. This design would allow other software components to be replaced between each use of a system, offering much finer grained flexibility.

#### **9.2.4.5 Lock-in Effect**

A number of respondents who represent small firms expressed their dissatisfaction with their bargaining power if they only adopted a small part of the vendor's business. If the small firms are not satisfied with their ASP's services, they usually have to wait before they find a replacement approach. Some of the users felt they had been locked-in by an ASP because of the customization of the application. However, with the exception of a few respondents who voiced their dissatisfaction about the lock-in effect, the majority of the respondents expressed the view that they did not feel locked-in, and the following reasons might explain why.

1. Numerous companies still do not really trust the ASP model, thus they do not outsource their core business to an ASP or have mission-critical applications hosted by an ASP. These circumstances reduce the possibility of being locked-in.
2. Compared with the burden (e.g. cost and effort) of IT deployment and maintenance by in-house IT staff, the customers perceived that they obtained more advantages by outsourcing to ASP vendors. It keeps them remaining with the same ASP without the feeling of being locked-in. More specifically, while having an application hosted by a third party instead of the internal IT department, the concern of losing control will be slowly overcome if the customers are using an appropriate ASP which is able to meet their requirements. This finding supports the assertion of Rust et al. (2000) who proposed that the more satisfaction customers received from a service provider, the more loyalty the customers will demonstrate.

In contrast to these explanations, there were still several respondents who declared that in spite of their giving a high level of satisfaction to their ASP vendors, they would consider changing ASPs if they can find a better one. Reichheld (1996) supported this by noting satisfaction is significantly related to loyalty only at extremely high levels of satisfaction. His assertion may explain this correlation.

#### **9.2.4.6 Conclusions about Service Competitiveness**

This research concludes that more companies will adopt ASP under the following conditions.

Firstly, and most importantly, the technology for sophisticated performance and capacity of ASP service must available and increasingly improved;

Secondly, operation reliability has to become more trustworthy;

Thirdly, the ASP services have to become more affordable for the SMEs;

Lastly, the customization and integration has to become more efficient and cost effective.

However, after ASPs have become more acceptable to customers, and when the vendor users' base has reached a certain level, then the lock-in effect might become more obvious.

## 9.3 Research Contributions and Implications

The contribution and implications of this study are presented from two aspects: academic and the practitioner.

### 9.3.1 For Academics

This study investigated the factors which determine the customer perception of ASP business model from a wider point of view, including the effect of path-dependence, the preference of service utilization, and the perception of service competitiveness factors. The theoretical contributions can be seen in several dimensions as presented below.

The ASPs customer satisfaction assessment model and its regression equation (Chapter 7) provides academic information to researchers for more clearly comprehending the influences that affect customer perception in the context of business repositioning. The influences include the determinant factors, the directions (for some constructs), and the correlation intensities. This is the key contribution of the thesis to the substantive literature regarding this issue.

The study of ASP business position is trying to explore the impact of path-dependence on customer perception. According to the result of the GLM (Chapter 7), capacity/performance has significant correlation with firm origin; moreover, the descriptive analysis and qualitative analysis (Chapter 8) shows that the mechanisms for path-dependence (i.e., expertise, perceived expertise, network effect, network externality, and lock-in effect) can

influence this linkage. Although many researchers considered service quality is the major determinant of a successful business, this finding points out that spending too much effort on increasing service quality is not always the best strategy to adopt, as the effect of history might impact on the type and quality of services provided, and in turn impact on customer perception. In other words, this effect existing at the initial stage (or even in the past) might ultimately bring a different outcome to the development of this young industry. More broadly, this result can be applied to any fast-growth firm, rapid-change business, and technology intensive industry.

In all, those findings not only contribute to theoretical understanding about the determinants of ASP customer perception but also provide a new perspective to enhance the current body of research on this topic.

### 9.3.2 For Practitioners

The research regarding the ASP business position, including the firm origin and provider type, presents a rough concept to ascertain the strengths and weaknesses of each type of ASP vendor. In terms of customers, it is necessary to understand the history of an ASP before deciding to employ its services. Thus, applying this concept in accord with the ASP's background information is helpful when selecting a suitable ASP vendor. In terms of practice, the findings contribute to the ASP industry by providing a valuable insight into decision-making in marketing promotion.

The ASP firm origin and market strategy model, a marketing promotion strategy paradigm based on the concept of Ansoff's product/market growth

matrix, is created for each type of ASP vendor for determining whether to use new or existing technology, or to serve new or present customers. This exploratory model provides a framework for selecting suitable innovation strategies to receive a high level of customer satisfaction through a more effective approach.

The results from studying the service utilized by customers, as well as the users' perception of service competitiveness in relation to consumer's perceived satisfaction, appear to be useful as a framework for ASP vendors to understand customers' requirements from diverse aspects. It is helpful for determining the correct strategy to build a long term client-vendor relationship, and also helpful for the growth of the ASP marketplace and the ASP industry.

The findings from exploring the customer perception of the top fifty ASP vendors might provide some ideas and encouragements for those ASP vendors that are struggling for survival in this industry.

In short, these study results are expected to assist with the development of a more feasible and acceptable ASP business model.

#### **9.4 Limitations, and Implications for Future Research**

This research has tried to comprehensively and intensely explore the factors influencing ASP customer's perception. However, it has been constrained by some limitations which should be considered in terms of interpretation and future exploration of the research model. These are

discussed in Section 9.4.1. Section 9.4.2 presents some implication for future research.

### 9.4.1 Research Constraints

Shaughnessy and Zechmeister (2003) argued that there always exists the probability of non-response error if the response rate is not 100 percent. The limitations in the study and they are discussed below.

Firstly, because of the time and financial constraints, the researcher could not collect a larger sample. Thirty two point eight percent of the total number of achievable returns was received from 597 in this research; the response rate is acceptable; however the sample size is not ideal to fully validate the measurement. This constraint limits the depth and breadth of the survey and the data analysis.

Secondly, because of the constraints of geography, the researcher was not able to access the respondents in person, and a self-administered questionnaire had to be used in this study. If some misunderstood the questions, then biased answers may have been provided. These constraints also decrease the depth of explanation for the qualitative research findings which were used to extensively explore the quantitative results.

Thirdly, the evaluation of the satisfaction level regarding perceived quality or competitiveness (scales in Questionnaire Part One) may increase the response bias as some respondents may have overstated or understated

their feedback either intentionally or inadvertently. This bias might also threaten the validity of this research.

Fourthly, a one-item measure was used in the empirical part of this survey (scales in Questionnaire Part Two) for evaluating the overall perceived satisfaction; it may not appropriately reflect the complexity of this variable. When the service competitiveness (i.e. the intermediate variables of this research model) which has been comprehensively assessed by 36 questions (14 were retained); this ultimate variable does not seem to be broadly measured.

Lastly, the research context was constrained to the customers of the top fifty ASP vendors, and most of the respondents are based in North American and the United Kingdom. It may limit the extent to which the findings can be generalized to other areas, for example Asian countries, or African countries, because the sample characteristics such as customer culture and organization culture might influence the cognition of IT outsourcing and the acceptability of Web-based delivery, and end up impacting on the ASP customer perception.

#### **9.4.2 Directions for Future Research**

Targeting the limitation of the present research, the first implication for the future research is that a multi-item measure is recommended for roughly assessing the overall perceived satisfaction. Moreover, a larger size of sample is suggested to increase reliability.



A quantitative approach together with a small portion of qualitative research was conducted in this research to explore the determinants of customer perception. Based on the conceptual model developed in this study, more alternative explanations and investigation such as case studies and longitudinal studies are recommended to more deeply explore the findings.

GLM and Pearson correlation coefficient were conducted in this research for data analysis. The results have explored the constructs and their correlations for the research model, and recovered the relevant influence hiding behind those constructs (e.g., the impact of path-dependence). Some analysis techniques such as path analysis or SEM are recommended in future research for in-depth investigation of the intensity and direction of these constructs.

Due to the lack of existing criteria, the firm origin of each participant ASP vendor has to be defined according to the criteria established by the researcher of the present study (as subsection 6.3.2.1). However, some vendors' firm origins were not able to be ascertained accurately because some of their features were ambiguous. This meant they could be categorized into more than one type of firm origin. Hence, it is suggested that the type of ASP firm origin defined in this research may need to be further validated based on more specific criteria.

Regarding the ASP firm origin and market strategy model that was adapted from Ansoff market growth matrix, only a rough concept has been derived at this stage from investigating the satisfaction level of capacity and

performance which has a statistically significant correlation with firm origin. More precise and deeper exploration for validation is recommended for future study in this context.

Although a wide range of data was collected for this research, some of the data (e.g. respondents' organization size, IT staff population, intensity of service employed, pricing model, and brand effect) discussed were not included in the investigation of the research model. The current research may be extended by a more detailed analysis with these data. In addition, some other considerations such as the culture issue, the IT sophistication of users, and the individual characteristics of users might also be considered as latent variables in further research.

Finally, compared to other means of delivering services, the Internet-based ASP model is largely untested and still evolving. This study has explored the effect of path-dependence on ASP customer perception determinants. Similarly, this effect might also exist in other fast-growth businesses or industries in a dynamic environment. This is worth examining in future research.

## **9.5 Concluding Summary**

Kao and Decou (2003) proposed that Internet-based application software hosting is expected to become a major solution in software services and application delivery management over the next few years. So far, the main concerns about adopting ASP such as the delivery speed, the

compatibility between application and the Web-based platform, have been overcome by the popular utilization of broadband infrastructure (e.g. ADSL, Cable Internet, ISDN, and Direct PC), the rapid development of Web applications, and the increased improvement of N-Tier architecture. The other obstacle that may cause potential customers to hesitate in adopting ASP services ( i.e., security concerns) can also be resolved by the modern IT and Web delivery security techniques. The surviving ASP vendors that have essentially rectified the security and service problems are the best example of a solution for this obstacle.

While a high percentage of the respondents expressed satisfaction with most dimensions of the ASP services, some of them were still waiting for improvement in this industry. Accordingly, some more time is needed before this model is broadly accepted. Shankar (2001) asserted that any new business model takes a decade to stabilize. This implies that although ASP is still an immature model, with some adaptation and adjustments (e.g. SaaS), it is gradually being considered as a viable solution in application service provision and delivery, especially for the SMEs, if ASP can win these entrepreneurs' confidence.

Increasing customer perceived satisfaction is one of the ideal strategies to make the ASP business model more widely accepted. Improving service quality has a positive direct effect for this strategy, and this has been verified by the results of this study. In addition, a suitable pricing model will increase the affordability to SMEs; and a reasonable degree of customization can make the usage more convenient and flexible.

Furthermore, concentrating on some of the customers' favorite services will help to reduce the cost and save the effort for surviving in this industry. All of these issues beyond service quality management have been studied in this research, and the findings show how they are related to the customer's perception.

However, on the other hand, this does not mean firms can successfully satisfy their customers after sparing no effort to address all these concerns, because the effect of path-dependence might confine the latitude of service quality improvement. This study indicates that some of the mechanisms for path-dependence can play a role in either enhancing or diminishing the achievement of hard work and effort for satisfying customers. More succinctly, understanding the constraints on firm innovation in emerging markets can make a strategy more effective in the development of a business or even an industry.

In conclusion, the findings of this research should be helpful to create a more acceptable ASP business model through satisfying the customer's needs, and understanding the existing strength as well as the potential constraint on performance. Although this model keeps transforming and has even been renamed during the process of evolving, its key concept - providing remote management and application services via Internet through the model of IT outsourcing - has never been changed. After continually evolving, ASP has already been the milestone of IT outsourcing development. Sooner or later, this Internet-based software delivery model will be the mainstream in IT outsourcing services.

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# Appendix A

## Scale Items of Perceived Service Competitiveness Measurement

### **Operational reliability**

- 1) Our ASP is capable of solving any problems referring to its products and services.
- 2) We can always receive reasonable compensation from our ASP whenever our business sustains damage caused by the ASP's inappropriate manipulation.
- 3) Our ASP is able to protect our privacy and respect our confidentiality.
- 4) Our ASP provides products and service with fairly stable performance.
- 5) We are satisfied with the network reliability and security while we access the service from our ASP.

### **Usability**

- 1) We are satisfied with the system response time while we access the applications provided by our ASP.
- 2) We are satisfied with the performance of application provided by our ASP.
- 3) The application provided by our ASP vendor is easy to comprehend and use.
- 4) Our ASP provides services that allow us to make easy and rapid adjustments as our business evolves and our needs change.

### **Affordability**

- 1) Our ASP imposes a reasonable charge.
- 2) The charging mode of service fees (e.g. fixed one-off fee, per transaction fee, subscription fee, size of data) for our ASP is reasonable.
- 3) Compared to other types of IT outsourcing expenditure, the ASP services fee is cheaper.
- 4) We have a very low percentage of expenses spent on ASP services.

### **Service availability**

- 1) The scope of service provided by our ASP is big enough to cover all our requirements.
- 2) Our ASP completes functions satisfactorily.
- 3) The application implementation time is reasonably short.
- 4) Our applications and data are well maintained by our ASP.

### **Scalability**

- 1) It is easy to change from one system to another without adversely impacting on the processing of data base.
- 2) The system provided by our ASP is easily integrated with third-party systems.
- 3) When needed, our ASP can add capacity for providing services on a larger scale or with more transactions, or at higher frequencies without changing the architecture of the system.
- 4) Our application can maintain steady performance as the load increases simply by adding additional resources.

### **Supportability**

- 1) Our ASP provides a satisfactory consulting service whenever we need it.
- 2) We can efficiently contact our ASP and express our requirements; likewise our ASP staff can express themselves clearly.
- 3) Our ASP provides educational and training solutions to our companies and individuals when necessary.
- 4) Our ASP can always get the job done in time.

### **Business status**

- 1) Our ASP provides an efficient data communication system between our business partners and us.
- 2) Our ASP has achieved a large market share.
- 3) Our ASP vendor supplies applications with famous brand software.
- 4) We do not have to worry about our ASP's business stability and survival.

### **Lock-in effect**

- 1) We have to collect enough information for selecting a proper ASP vendor, and I am satisfied with what we have done on this job.
- 2) Technically, we can simply switch our ASP vendors without having a major impact on the operation of our outsourced IT system.
- 3) On the money side, it is not costly to switch our ASPs when we have to.
- 4) We are not concerned for dependency on ASPs and loss of control of our information system infrastructure.

### **Customization and Integration**

- 1) Our ASP is capable of appropriately customizing our application to reach our requirements.
- 2) Our ASP provides software that allows us to do functional customizations without touching the source code.
- 3) Our ASP is able to integrate our information systems.

# Appendix B

## Questionnaire of this research

### A. Cover page

In this page, a brief introduction about doing this survey is presented along with the definition of some words used in this questionnaire to give a clear picture for respondents.

*Dear respondents:*

Please fill in the questionnaire to help us understand your satisfaction of adopting your application software or IT services from ASP.

The definition of "**ASP**" in the following questions is listed as below:

*Any company that delivers and manages applications and computer services to subscribers / clients remotely via the Internet or a private network.*

Your response will be used only for this study, and I will absolutely respect your confidentiality.

If you have any queries about this survey, please don't hesitate to contact me via email: [yl10@waikato.ac.nz](mailto:yl10@waikato.ac.nz)

Best Regards,

Amy Liang

PhD student, the University of Waikato, New Zealand

### Part 1. ASP service satisfaction information

"**Agreement level**" is designed for exploring how much you agree with each of the following statements (evaluation items), and "**importance level**" is used to discover how important you consider each of them.

Please click **one** button only for **agreement level** and then click another button for **importance level** of each statement to express your opinions. However, if you don't have any experience of adopting the ASP services so far, please ignore the "Agreement level", and tell us what your opinion is about the "**importance level**" by making an assumption that you are considering to adopt the ASP service.

If the question does not apply to your situation, please just click the button of "**Not applicable**".

**B. Part one of survey questions**

Evaluation items 1	Agreement level					Importance level						
	Strongly disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree	Not important at all	Slightly important	Moderately important	Highly important	Extremely important	Not applicable
Our ASP is capable of solving any problems referring to its products and services.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our ASP provide an efficient data communication system between our business partners and us.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The application provided by our ASP vendor is easy to comprehend and use.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We have a very low percentage of expenses spent on ASP services.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We do not have to worry about our ASP's business stability and survival.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The scope of service provided by our ASP is big enough to cover all our requirements.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Evaluation items 2	Agreement level					Importance level						
	Strongly disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree	Not important at all	Slightly important	Moderately important	Highly important	Extremely important	Not applicable
Our ASP provides a satisfactory consulting service whenever we need it.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The application implementation time is reasonably short.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our ASP provides software that allows us to do functional customizations without touching the source code.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We are satisfied with the performance of application provided by our ASP.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is easy to change from one system to another without adversely impacting on the processing of data base.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our ASP imposes a reasonable charge.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Evaluation items 3	Agreement level					Importance level						
	Strongly disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree	Not important at all	Slightly important	Moderately important	Highly important	Extremely important	Not applicable
The system provided by our ASP is easily integrated with third-party systems.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our ASP has achieved a large market share.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We are not concerned for dependency on ASPs and loss of control of our information system infrastructure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our ASP is able to protect our privacy and respect our confidentiality.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We can always receive reasonable compensation from our ASP whenever our business sustains damage caused by the ASP's inappropriate manipulation.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
On the money side, it is not costly to switch our ASPs when we have to.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Evaluation items 4	Agreement level					Importance level						
	Strongly disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree	Not important at all	Slightly important	Moderately important	Highly important	Extremely important	Not applicable
Our ASP provides services that allows us to make easy and rapid adjustments as our business evolves and our needs change.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our ASP is capable of appropriately customizing our application to reach our requirements.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our ASP can always get the job done in time.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We are satisfied with the system response time while we access the applications provided by our ASP.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our applications and data are well maintained by our ASP.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our application can maintain steady performance as the load increases simply by adding additional resources.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Evaluation items 5	Agreement level					Importance level						
	Strongly disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree	Not important at all	Slightly important	Moderately important	Highly important	Extremely important	Not applicable
Our ASP completes functions satisfactorily.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We are satisfied with the network reliability and security while we access the service from our ASP.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We can efficiently contact our ASP and express our requirements; likewise our ASP staff can express themselves clearly.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our ASP vendor supplies applications with famous brand software.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When needed, our ASP can add capacity for providing services on a larger scale or with more transactions, or at higher frequencies without changing the architecture of the system.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We have to collect enough information for selecting a proper ASP vendor, and I am satisfied with what we have done on this job.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Evaluation items 6	Agreement level					Importance level						
	Strongly disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree	Not important at all	Slightly important	Moderately important	Highly important	Extremely important	Not applicable
Compared to other types of IT outsourcing expenditure, the ASP services fee is cheaper.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our ASP provides educational and training solutions to our companies and individuals when necessary.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Technically, we can simply switch our ASP vendors without having a major impact on the operation of our outsourced IT system.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our ASP provides products and service with fairly stable performance.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The charging mode of service fees (e.g. fixed one-off fee, per transaction fee, subscription fee, size of data.) for our ASP is reasonable.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our ASP is able to integrate our information systems.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



### C. Part two of survey questions

#### Part 2. ASP service information

1. What is the name of your ASP vendor ?

*(If you do not wish to answer this question, please go to question 2)*

2. How long has your company been using your current ASPs' services ? About  years.

3. What service have you received from your ASP ? *(Multiple choice)*

- a. Application development (e.g. designing, selling)
- b. Software implementation
- c. Hardware installation
- d. Internet facility (e.g. Application delivery)
- e. Data centre (e.g. Web site hosting, co-location)
- f. Application maintenance
- g. Application integration
- h. Software upgrading
- i. User training
- j. IT consulting (e.g. technical support)
- k. Other ( Please write down in the box below)

4. What type of **application** does your ASP provide for your company?

*(Please press **Ctrl** key and meanwhile click the **left button** of the **mouse** to select every item applies from the list below.)*

The screenshot shows a multi-select dropdown menu with the title "Please select the type of application that you received from your ASP." The menu is open, showing a list of application types: Accounting, Billing, Communications, and Customer service/CRM. The list is scrollable, and the top item is highlighted in blue.

If any of the applications that you are using are not on the list, please display them here.

5. On average, what level of application customization does your ASP offer to you? *(Please tick the most suitable one.)*

- Off- shelf packaged software
- Standard application with 25% modification
- Nearly 50% modification based on a standard application
- More than 75% modification based on a standard application
- 100% tailor-made software

6. Between application customization / integration and cost, which one of the following do you consider when you use your ASP services? *(Please tick the most suitable one.)*

- Very high degree of customization/ integration and very high cost
- High degree of customization/ integration and high cost
- Medium degree of customization/ integration and average cost
- Low degree of customization/ integration and low cost
- Very low degree of customization/ integration and very low cost

7. What type of pricing model do you use for paying for your ASP service ? *(Please tick the most suitable one)*

- a. A fixed, one-off fee
- b. A per transaction fee
- c. A percentage-of-value fee
- d. A subscription fee (e.g. monthly, annually, etc.)
- e. By size of data managed
- f. By user application
- g. Other ( Please write down in the box below)

8. If you have stopped using the services from your most recent ASP in the past, please give your reasons for doing so, otherwise please go to question 9. *(Multiple choice)*

- They have closed/ bankrupted for some reasons.
- They failed to execute the service agreement.
- Their services level could not meet our new requirements.
- The ASP model is not suitable to our company, we decided to adopt alternative projects to replace this model.
- We have found the ASP vendors which can provide stronger offering of what we need.
- We have found the ASP vendors which can provide the same level of services with lower prices.
- We felt that we might be locked in to the previous ASPs if we kept on adopting its services.
- Other

9. What is the reasons for you to continually adopt the services of your present ASP? *(Multiple choice)*

- We just adopted the ASP services for a short time, and it is not long enough to determine its service quality
- The ASP vendor's services meet all of our requirements
- The ASP vendor's services are not completely satisfactory, but this situation is reasonable and acceptable
- The ASP vendor's services are not completely satisfactory but we can't find any better ones
- The ASP vendor's services are least satisfactory but we prefer to wait for a longer time, hopefully, it will be improved soon
- We have starting to search a better ASP vendor, but it takes time
- If we changed to a different ASP, it would cost a lot more money
- The dislocation cost of changing to a different ASP is too high *(i.e. it cause too much trouble to transfer data into different format)*
- We probably have data compatible problems between the present systems and the new systems
- We probably have data communication problems with our business partners who adopted the same ASP services
- According to the contract, we are not allowed to change our ASP vendor until the near future
- Other ( Please write down in the box )

10 . Overall, how do you evaluate your satisfaction with your ASP ? *(Please tick the most suitable one only)*

- Not at all satisfactory
- Rather unsatisfactory
- Somewhat unsatisfactory
- Somewhat satisfactory
- Fairly satisfactory
- Extremely satisfactory

**D. Part three of the survey questions.**

**Part 3. Respondent's background information - [the last page]**

1. What type of industry does your company belong to?
2. How many employees does your company have?  People
3. How many IT professionals does your company have?  People
4. What department do you work for?
5. What is your position?
6. How long have you been with the company?  Years
7. If you would like to receive the results of this research, please leave your contact details and your **comments** in the box below.  
*(If you don't wish to reveal yourself, then give me a non de plume and an email address that can reach you)*

<b>Your Name:</b>	<input type="text"/>
<b>Email address:</b>	<input type="text"/>
<b>Telephone number:</b>	<input type="text"/>
<b>Your comments:</b>	<input type="text"/>

**Thank you** for completing this questionnaire, please click submit key as below to send it.

# Appendix C

## ASPnews Top 50 Criteria

Since 2001, the ASPnews.com drew the Top 20 world leading ASP and the Top 20 ASP Infrastructure Providers from the ASP Industry Global 200 Directory which was published monthly by ASP News Review. Following are the evolution about the criteria for the world's leading service providers.

### 2001 metric

The candidate had to reach two out of the following requirements:

- Customers: 500
- Users: 30,000
- Revenues: \$25 million

### Criteria for the Top 20 ASPs:

This is the list of companies that, in the view of ASPnews, are the world's 20 leading ASPs. For inclusion, companies must meet the following criteria:

- Have ASP and/or web services as their core business
- Have a substantial and active customer base
- Be able to demonstrate proven revenue streams
- Be innovators within the ASP and/or web services models
- Be recognized as a leader by others within the industry

**Criteria for the Top 20 ASP Infrastructure Providers:**

- Have a substantial and active customer base of ASPs and/or web service providers
- Be active in their support and promotion of the ASP and/or web services model
- Be innovators within the ASP and/or web services models
- Be recognized as a leader by others within the industry

In year 2002, the criteria had some revised. Following is the details.

**2002 metric**

- Customers: 2,000
- Users: 100,000
- Revenues, \$100 million

Beside the difference in above metric, the criteria for the ASPnews Top 25 Providers is remained the same as 2001. However, there were some changes from ASP Infrastructure Providers to the ASP Enablers

According to the ASPnews.com:

*'the ASPnews Top 50 divided the ASP into two halves. The Top 25 Providers are the companies that offer finished services to end-user businesses, while the Top 25 Enablers are companies that provide the building-block components for creating those services'*

## Criteria for the ASPnews Top 25 Enablers

Three main sectors that candidates come from:

1. Application software vendors — Vendors that develop applications for online delivery by providers.
2. Platform vendors — Vendors who develop the software infrastructure products that enable the creation, deployment and delivery of online services, and manufacturers of the computer and networking hardware on which they operate.
3. Web services infrastructure operators — companies that provide software, hosting and network services to the providers of online services.

Criteria that candidate must meet:

- Have a substantial and active customer base of providers
- Be active in their support and promotion of network-based applications and services
- Invest in innovation in the online delivery of software-based services
- Be recognized as a leader by others within the industry

# Appendix D

## Summary of the studied ASP vendors

ASP Vendor Name	Established year	Honored Year	Description	Location	Comments
Aspective	1999	2003	Enterprise ASP	Staines, England, UK	
<u>Atomz</u>	1998	2002	Web service vendor. specializes in content management services.	San Bruno, CA	Acquired by WebSideStory in 2005
Appshop	1997	2001	Enterprise ASP	Fremont, CA.	Acquired by USi in 2004
<u>BMC Software</u>	1980	2001	Infrastructure ISV, Infrastructure ASP	Houston, TX,	
<u>Clickability</u>	1999	2004	SaaS, Provide Web Content Management, interactivity, and navigation Software.	San Francisco, CA.	
<u>Concur</u>	1993	2002	Web service vendor, enterprise ISV	Redmond, Wash	
<u>Corio</u>	1998	2001	Enterprise ASP integrated business applications and services.	San Carlos, CA	Predecessor : DSCI Acquired by IBM in 2005
<u>CrownPeak Technologies</u>	2000	2003	Web Service Provider	Los Angeles, CA	

EmailLabs	2000	2003	Web Service Provider, Business Service Provider	Redwood City, CA	a subsidiary of J.L. Halsey Corporation
<u>Employease</u>	1996	2002	Web service vendor, business service provider	Atlanta, GA.	
<u>Intranets.com</u>	1999	2001	Web service vendor	Woburn, MA	Predecessor : <b>INTRANETICS</b> Acquired by Webex in 2005
<u>Jamcracker</u>	1999	2001	ASP aggregator	Santa Clara, CA	
<u>Kintera</u>	1999	2004	Software-as-S ervice Provider	San Diego, CA	
<u>LivePerson</u>	1995	2003	Web Service Provider	New York NY,	
NetSuite	1998	2003	Software-as-S ervice Provider	San Mateo, CA	
Omniure	1996	2004	Software-as-S ervice Provider	Orem, Utah	
OpenAir	1999	2001	Software-as-S ervice Provider	Boston MA	
<u>Oracle</u>	1977	2001		Redwood Shores CA	
<u>PeopleSoft</u>		2001		Pleasant on, CA	Acquired by Oracle in Dec. 2004



<u>RightNow</u>	1997	2003	Web Service Provider, Enterprise ISV	Bozeman, Mont	
<u>Salesforce.com</u>	1999	2001	Web service vendor	San Francisco CA	Funded by Marc Benioff (the ex-CEO of Oracle)
<u>Salesnet</u>	1997	2002	Web service vendor	Boston, MA	
<u>Surebridge</u>	1997	2001	Enterprise ASP	Lexington, Mass	Acquired by NaviSite in 2004
<u>Ultimate Software</u>	<1997	2003	Enterprise ISV, Enterprise ASP	Weston, Fla.	
<u>Upshot.com</u>	<1999	2001	Web service vendor	Mountain View CA	Acquired by Siebel Systems in 2003; then Siebel was acquired by Oracle in Jan. 2006
Usi <u>Usinternetworking</u>	1999	2001	Enterprise ASP, application infrastructure provider	Annapolis MD	
<u>VeriCenter</u>	1999	2004	Managed Hosting Provider	Houston TX	
WebEx	1996	2001	Web service provider	San Jose, CA	

# Appendix E

## Evaluation of the studied ASP vendors

### Meaning of each code:

A: Pure play ASP; B: Infrastructure-turned ASP; C: ISV-turned ASP;

D: Enterprise ASPs; E: Volume Business ASPs; F: Specialist ASPs;

X: Evaluated by this study; Y: Sources from ASPnews;

Z: Sources from ASPstreet.com;

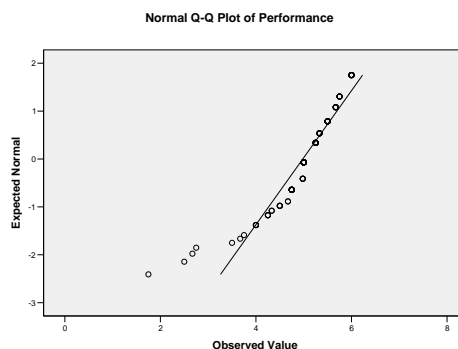
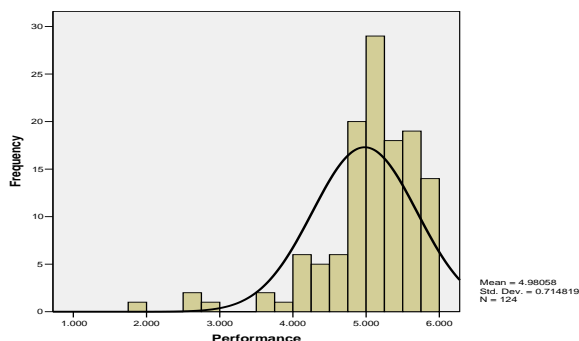
ASPs Code	Satisfy Level	A	B	C	D	E	F
BC	6.0			X			X
BE	4.67			X		X	
BN	5.0	X				X	
BR	5.6		XY				X
CS	4.0		Y	X			Y
CW	4.0	X			Z	YX	
EB	4.75	X			YX		
EJ	5.0		X			ZX	
ER	5.25		XY		X		
ES	6.0			XY			YX
FB	5.25			X	X		Z
FF	5.20	XY				YX	
FJ	4.88			X	YX		
LB	6.0			X			X
LC	5.0	X				ZX	
LJ	5.17			X			YX
NF	5	X			YX		
NL	5	X				YZX	
NS	4.92		X		X		
RF	4.83	X					YZX
RW	6.0			X			YZX
SC	5		XY				X
SJ	6.0		XZ			YX	
SN	6.0		XY		YZX		
WB	5.46			X			ZX
WJ	5.5			X		YX	
WL	6.0			X		ZX	
WR	3.33			X	YZX		

# Appendix F

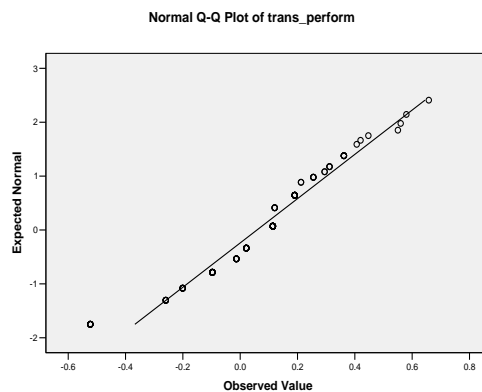
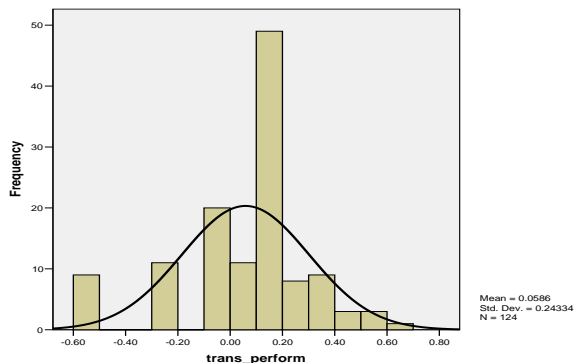
## The Histograms and Normal Q-Q Plots

### Performance

1. Distribution of original data is skewed left.
2. Log transformed\* data is slightly skewed right, more likely to show normal distribution.

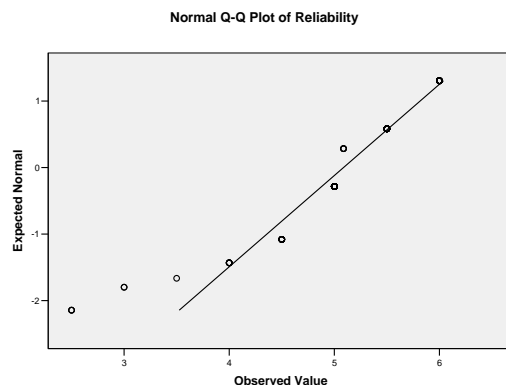
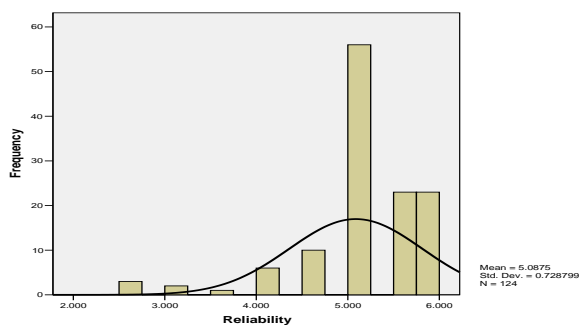


3. According to Tabachnik and Fidell, the transformation is made by  $\text{trans\_performance} = \lg_{10}(6.3 - \text{performance})$

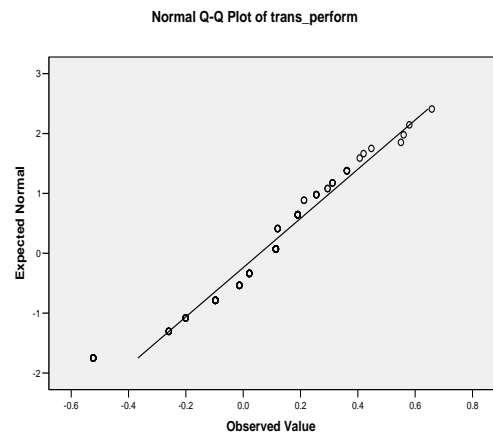
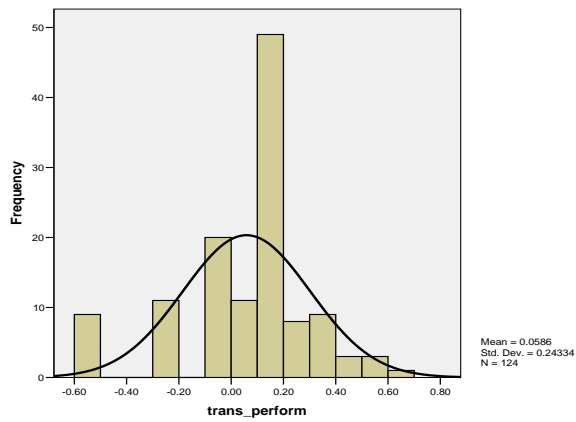


### Reliability

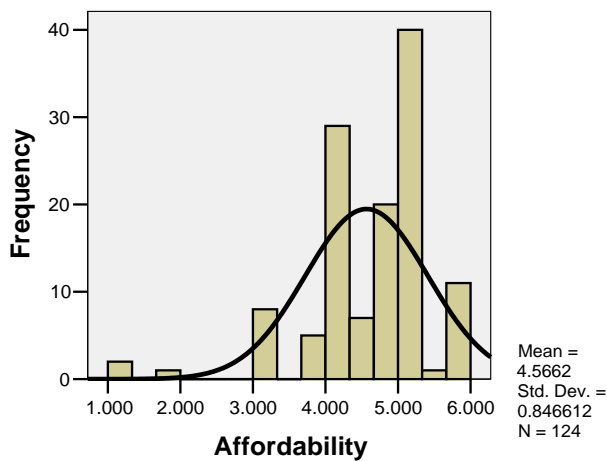
1. Distribution of original data is skewed left.
2. Log transformed\* data is slightly skewed right, more likely to show normal distribution.



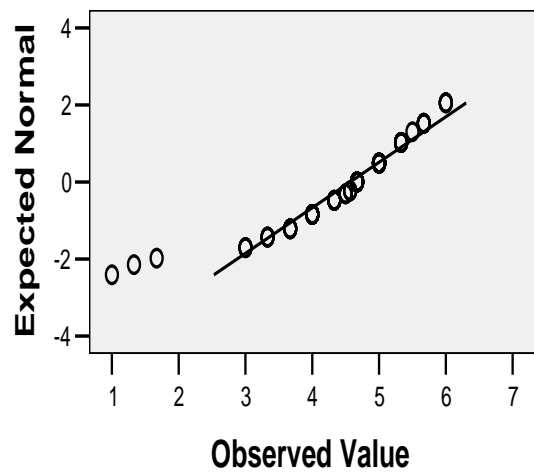
3. According to Tabachnik and Fidell, the transformation is made by  $\text{trans\_performance} = \lg_{10}(6.3\text{-performance})$



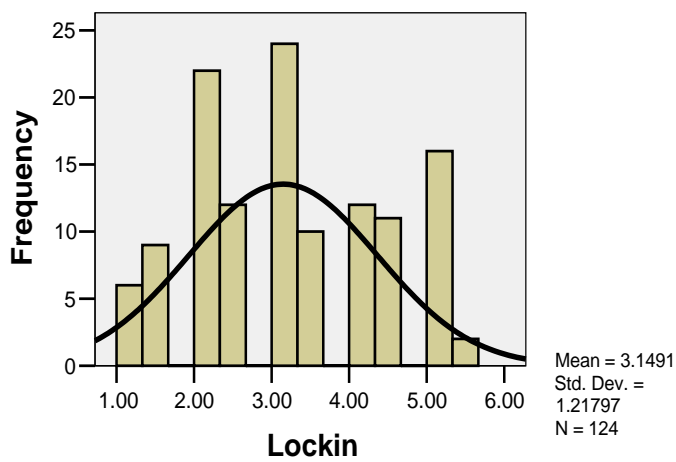
**Affordability**



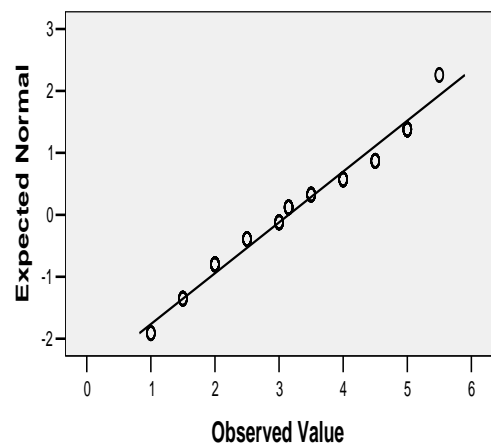
**Normal Q-Q Plot of Affordability**



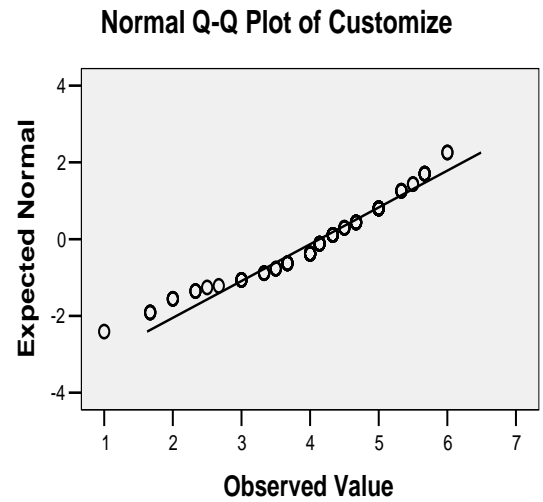
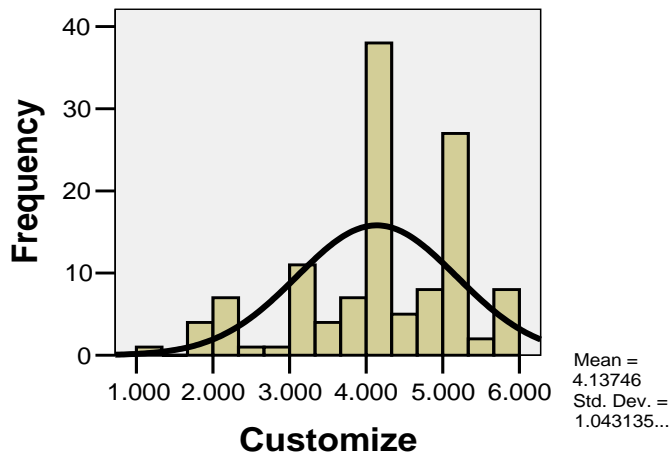
**Lockin**



**Normal Q-Q Plot of Lockin**

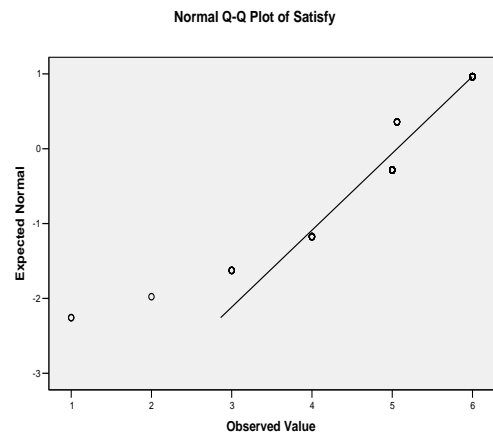
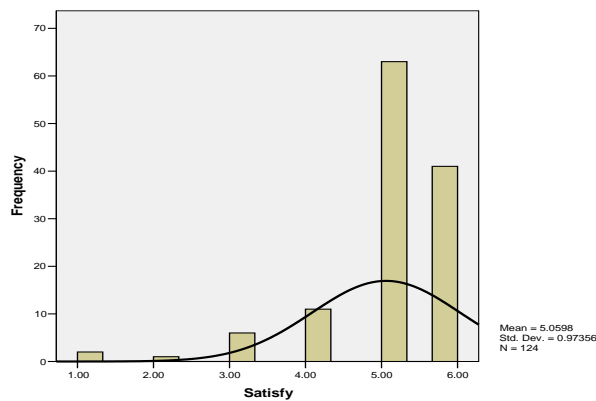


### Customization

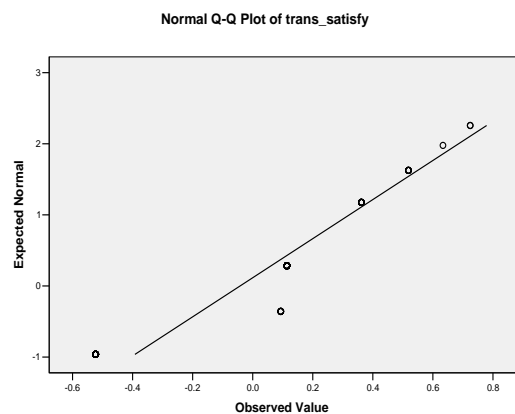
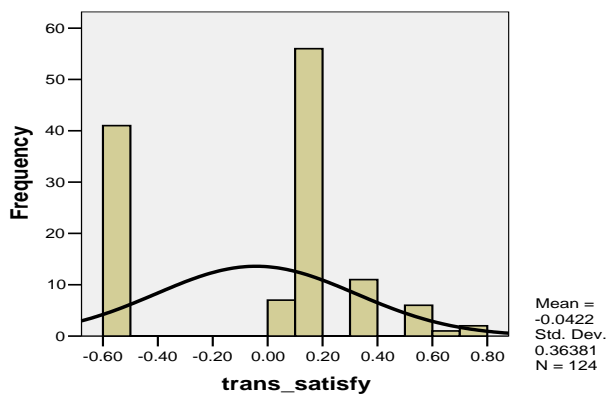


### Satisfaction

1. Distribution of original data is skewed left.
2. Log transformed\* data is slightly skewed right, more likely to show normal distribution.



3. According to Tabachnik and Fidell, the transformation is made by  $\text{trans\_satisfy} = \lg_{10}(6.3 - \text{satisfy})$



# Appendix G

The Scatter and Regression Plot of each Pair's Correlation for the Factors of Competitiveness

Figure X1

*Scatter and Regression Plot of Capacity and Performance between Attribute Performance Level and Importance Level*

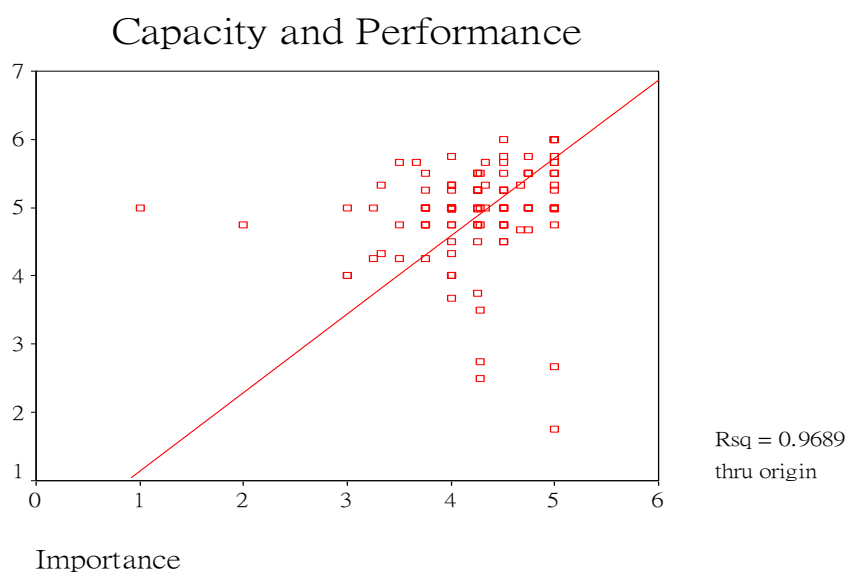


Figure X-2

*Scatter and Regression Plot of Reliability and Trustworthiness between Attribute Performance Level and Importance Level*

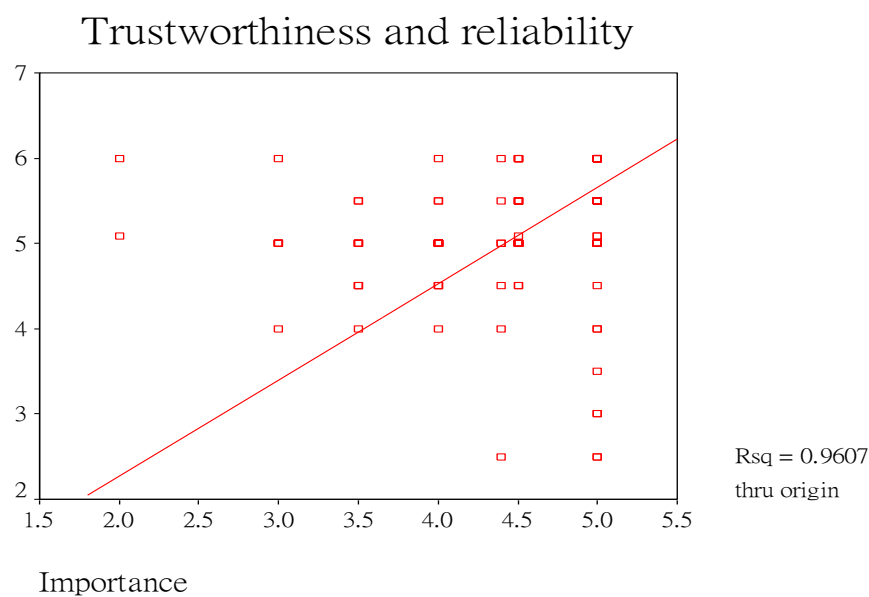


Figure X-3

Scatter and Regression Plot of Affordability between Attribute Performance Level and Importance Level

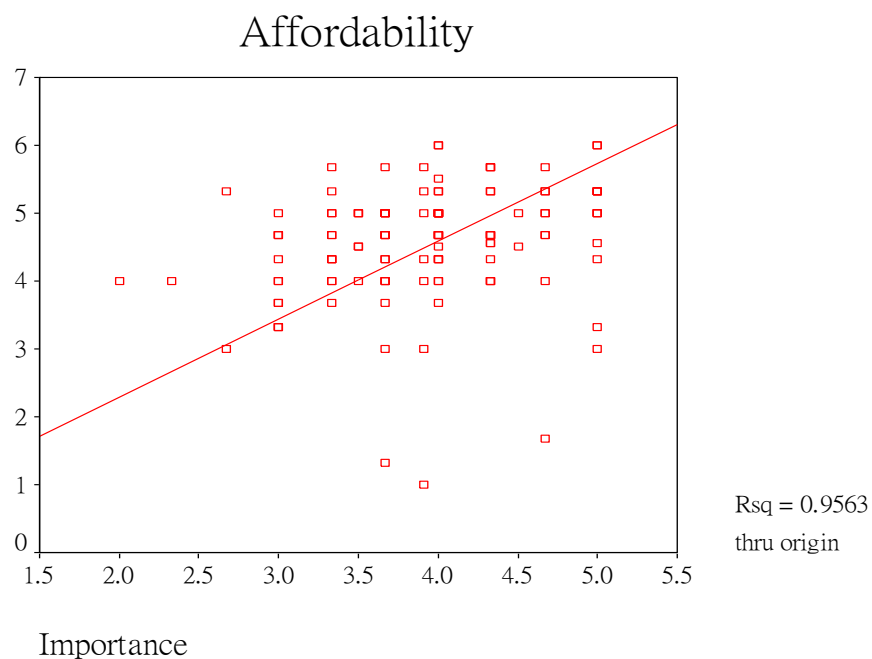


Figure X-4

Scatter and Regression Plot of Lock-in Effect between Attribute Performance Level and Importance Level

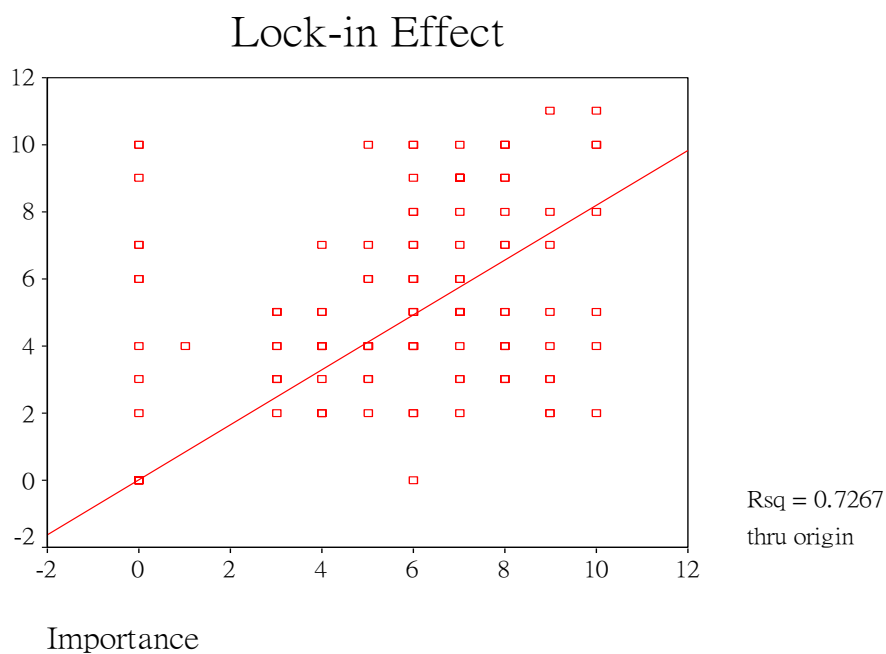


Figure X-5  
*Scatter and Regression Plot of Customization and Integration between Attribute Performance Level and Importance Level*

