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ASP system utilization: customer satisfaction and user performance

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Abstract

Purpose – This paper seeks to understand effects of ASP utilization on organization performance measured in terms of satisfaction and educational effectiveness on the part of the customer firm.

Design/methodology/approach – This study follows the positivist approach. After a research framework was developed and hypotheses defined, based on a thorough ASP literature review, data were collected from small firms which use ASP services. Results were discussed to suggest strategic directions of ASPs.

Findings – The results show that when customer firms perceive good service at a reasonable fee, they exhibit a high level of satisfaction with the service provider. Customer satisfaction is found to be significantly related to organizational performance. Also, the education content of training programs significantly influences educational effectiveness, which in turn contributes to organizational performance by impacting customer service.

Research limitations/implications – The results of the study would help practitioners and researchers better understand ASP customers. The scope of this study is limited to leading IT adoption countries.

Originality/value – Based on the customer perspective, this paper delineates factors of ASP services that support small firms to be more successful.

Keywords Outsourcing, Small enterprises, Information systems, Service delivery, Technology led strategy

Paper type Research paper

Introduction

Application service provider (ASP) markets have been growing and this trend is expected to continue in the near future. International Data Corporation (IDC) forecasts ASP markets to swell from $3.2 billion in 2002 to $19.9 billion by 2006. ASPs are expanding in number and stabilizing their infrastructures through building their knowledge on successes and failures in the field; and they continue to increase the scope of applications.

ASPs represent business-to-business (B2B) e-commerce and they are especially helpful for small and medium size enterprises (SMEs) which generally cannot afford expensive and complicated information systems (IS) implementation (Heart and Pliskin, 2002). ASPs can be viewed as a type of IS outsourcing, offering business

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solutions to customer firms through a rental or leasing arrangement rather than purchasing a system (Dibbern *et al.*, 2004). Thus, customer firms of ASPs can use IS at a low and fixed cost with more options, and systems can be upgraded as needed. As the number of providers increase and the services offered expand, SMEs are more intrigued by the available options (Ekanayaka *et al.*, 2003). One major benefit is that ASP services become less risky than traditional IS outsourcing and insourcing (Pons, 2003). Furthermore, the nature of services may provide increased mobility and flexibility to customer firms since most ASPs provide their services via the internet (Smith and Kumar, 2004).

The purpose of this study is to investigate the relationships between ASP utilization and organizational outcomes such as user satisfaction and performance of small firms. Experts in many industries predict ASPs to play increasingly important roles in IS outsourcing (Terdiman, 2000), yet little empirical research has focused on ASPs (Jayatilaka *et al.*, 2003; Rohde, 2004). While research on IS outsourcing has mainly examined large firms (Seddon *et al.*, 2002; Choudhury and Sabherwal, 2003), researchers studying the ASP model should pay greater attention to SMEs as they are the target market for ASP services.

Some characteristics of SMEs make them excellent candidates to benefit from ASP services. These characteristics include: relatively simple and centralized decision-making systems based on short-term plans (Levy and Powell, 2003); a lack of resources such as finances, practical knowledge of information technology (IT) and IS, time, and planning; and a lack of shared IS/IT capacity among horizontal departments because they usually do not have a well-structured IS (Kishore *et al.*, 2005).

Issues related to IT in small firms have not received a similar level of attention as in large firms. Thus, IS research for small-sized enterprises (SEs) must address different issues and attributes than those of large firms. Previous ASP research has focused on the providers' point of view rather than the customers' (Jayatilaka *et al.*, 2003). It is not appropriate to infer the results for the user based on such studies (Rohde, 2004). Therefore, this study examines major customer firms of ASPs by focusing on SEs.

Literature review

ASP services for small enterprises

Ang and Straub (1998) suggested that IS outsourcing can help customer firms save production costs, yielding greater efficiency than internal IS departments. Outsourcing suppliers can gain economies of scale by reusing applications and distributing fixed costs among many customers. Outsourcing users benefit from specialized quality services; however, they must monitor and control supplier activities, which may lead to sizable costs.

Although outsourcing may invoke some customer risks, the benefits outweigh them. Some of the risks include potential security problems, inadequate supplier knowledge of customer business, and excessive dependence on service providers (Bahli and Rivard, 2005). The benefits often include reduced labor costs, delegation of routine work, ability to focus on core competencies, minimization or elimination of issues with IT such as hardware/software updates, and exploitation of external expertise (Baldwin *et al.*, 2001; Tayntor, 2001). The number of outsourcing service providers is increasing and this further reduces monitoring costs.

Because SEs have limited resources, they have a strong incentive to allocate those resources efficiently, and to be flexible and reactive (Raymond and Croteau, 2006).

Thus, SEs are more inclined to use strategic outsourcing options than large enterprises. Rather than total sourcing, SEs sometimes employ selective sourcing where 20-80 percent of IS functions are developed internally and the rest are outsourced (Lacity and Hirschheim, 1995). Selective sourcing tends to be more successful because it gives customers improved control of suppliers and flexibility in their IS strategy (Lacity and Willcocks, 1998).

Selective sourcing has a similar boundary as ASP service, but the focal points are somewhat different. While selective sourcing focuses on delivery of IS, ASP focuses on an individual application and its efficient use (Jayatilaka *et al.*, 2003). Data handling, service quality, and compatibility of the application are critical issues for a decision to adopt ASP service, and suppliers must be able to handle these issues.

According to Bennett and Timbrell (2000), while IS outsourcing deals with all IS areas such as hardware, software, and human resources; ASPs allow the users to concentrate on the application they are leasing. To illustrate, the ASP industry consortium defines ASP service as a service that offers application capacity from a data center to many users through a Wide Area Network (WAN). Boyle (2002) defined an ASP as "a company that offers a shared, hosted software solution on a transaction or subscription pricing basis usually through the Internet." Meanwhile, other ASP researchers have suggested more specific definitions. Smith and Kumar (2004) suggested that an ASP service is a single contract on all kinds of communication, hardware, software, and consultation needed to utilize, execute, and maintain networked applications. ASP is also defined as a kind of selective outsourcing where a third party lends packaged software applications and service that can be used by numerous customers (Bennett and Timbrell, 2000).

Currie and Seltsikas (2001) categorized the evolution of IT outsourcing into three stages. The first stage lies in the 1980s in which technology-based outsourcing is used by large firms. These firms contracted with suppliers for relatively simple functions or accommodations such as education, consultation, and system integration (Loh and Venkatraman, 1992). The second stage occurred in the 1990s and was characterized by customers wanting both effective and efficient outsourcing for their business strategy. They outsourced system development, testing, and maintenance as well as ERP systems to respond to rapidly changing business requirements (Willcocks and Lacity, 1998). In stage three, target markets shifted from large firms to SMEs and providers offer one application to many customers. As computing trends have shifted from the mainframe to distributed computing, the stream of IS outsourcing is derived from technology growth and increasing demand for new services (Kern *et al.*, 2002).

Since, SMEs have financial and managerial constraints in acquisition, application, and maintenance of IS, ASP service is quite pertinent to them (Fulford and Love, 2004). SEs seem to use ASP services for practical use in their specific environment. While ASPs offer applications and services, the actual business processes are managed by the customer firms (Dewire, 2000). Rapidly growing ASP services that satisfy SEs' needs would change the rules in the IT industry. It is assumed that the advent of ASP might have brought the tendency that ASP partners are consolidated to form new ASPs (Smith and Kumar, 2004), which in turn have had a big impact on the ASP model.

However, risk factors associated with ASP services should not be overlooked. Previous research identified the following risk factors: underestimation of costs, contract development and management costs, relationship management costs, capacity

loss, flexibility loss, service response time, integration problems with other systems, and system recovery (Bennett and Timbrell, 2000; Barthelemy, 2001). Hence, prospective ASP service users should carefully consider how they can manage such risks before they make a decision to adopt ASP services.

Previous research found the following determinants of IS outsourcing success: fit between services and customers' strategic goals; fit between supplier capability and customer needs; top management support and involvement; the degree of supplier interest in customers' unique business challenges; cooperation and confidence among partners; and proper contract processes.

Education factors

In some cases, the financial and human resource constraints of SEs lead to a more broad use of ASPs to meet all IT requirements (Smith and Kumar, 2004). There still exists the challenge in terms of a significant gap in understanding the client's business on the part of the ASP, and a gap in understanding the ASP capability on the part of the client. From the user's perspective, one element in decreasing the gap is for the customer to learn how to use ASP services. The customer's attitude toward ASP services is affected by the firm's experience and attitude toward new IS architecture (Smith and Kumar, 2004). This study examines the role of educational factors such as educational content and education formalization for successful adoption of ASP.

Research model and hypotheses

Figure 1 shows the research model of this study. The variables and hypotheses in the research model are discussed in subsequent sections.

System utilization

According to Lee *et al.* (1995), system utilization is defined as "the amount of effort expended by users interacting with information systems." They found that system utilization impacts IS satisfaction. Research by Delone and McLean (1992) showed that quality of systems and information affect the utilization and satisfaction. In turn, the utilization and satisfaction affect personal and organizational performance. Measuring utilization through self-evaluation can generate discrepancies because self-evaluation stems from individual perception (Straub *et al.*, 1995). This gap arises because it is difficult to correctly recall the degree of utilization from the past, and researchers have a tendency to lose rationality and exaggerate the degree of utilization (Devaraj and Kohli, 2003). Szajna (1996) concluded that self-evaluated utilization might not be an appropriate measure of actual utilization. While recognizing such challenges, there still is no better method to estimate utilization of ASPs by SEs. Therefore, the self-evaluation method is adopted for this study. Utilization is examined through technical effectiveness, perceived ease of system use, system information, service and maintenance, ASP price, and security and risk.

Technical effectiveness

Outsourcing provides client firms the opportunity to secure necessary technical knowledge and expertise (Gonzalez *et al.*, 2005). The technical capability of an ASP will be defined as "the ability to deliver promised applications," and is the fundamental requirement of any service (Yao *et al.*, 2003). Some of the elements that are often a part

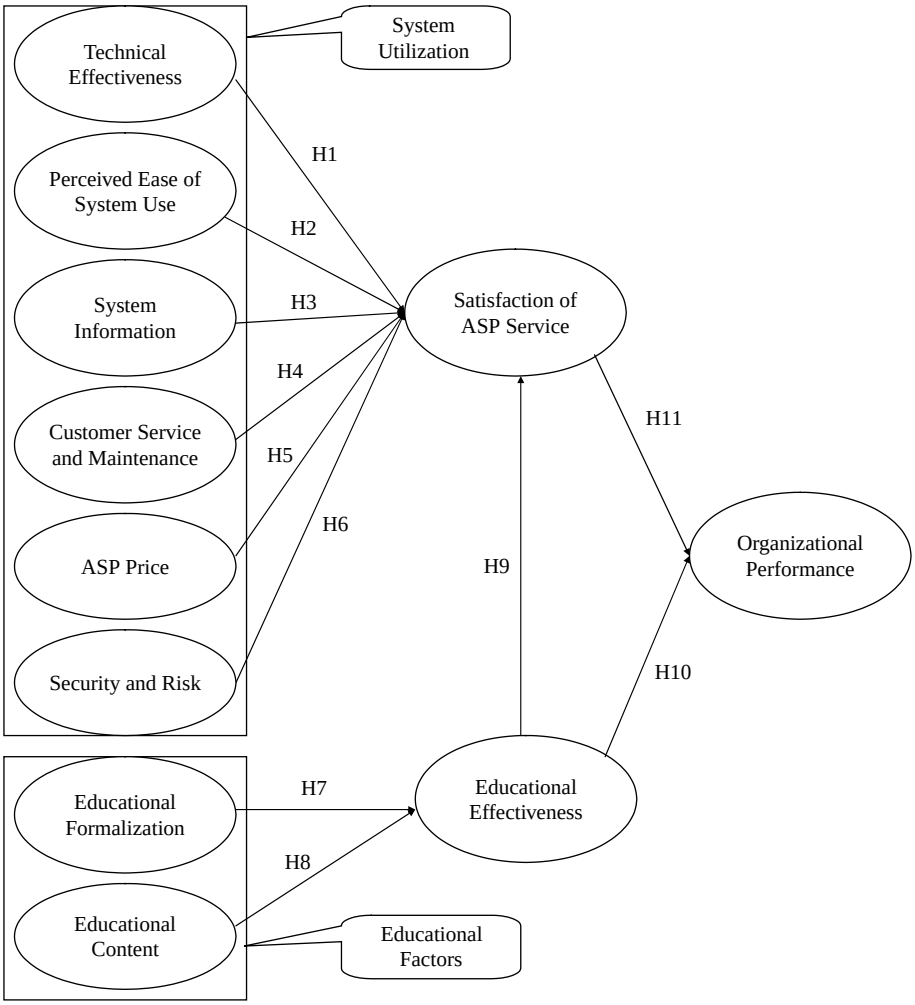


Figure 1.
A research model

of the promised service include quick implementation, quality-of-service, and availability of service. Quick implementation refers to the ability of the provider to get the service operational for the customer. Quality of service for ASP refers to the "latency of web page rendering during a customer session" (Pons, 2003). Availability of service refers to when the service is available, and more specifically the uptime of the web site through which service is provided. Most applications offered by ASPs can be effectively used through high speed internet connections. This enables employees of customer firms to work anytime at any location (Smith and Kumar, 2004).

The last element, availability of service defines the ASP's reliability level. Caulfield (2001) suggested that customer firms establish specific requirements for service reliability and security. He recommended that uptime should be more than 95 percent for important applications. He also suggests that customer firms require a list of the

provider's personnel who have access to the client company's business information through the service application. Security and reliability are among the most important issues. Customer satisfaction is expected to be strongly influenced by these factors (Walsh, 2003). Poor service reliability is a major reason some potential customers have not adopted ASP services (Sharma and Gupta, 2002). Thus, it is proposed that perceived technical effectiveness is related to customer satisfaction with ASP services.

H1. When a customer firm perceives its ASP has high technical effectiveness, the firm is satisfied with ASP services.

Perceived ease of system use

Theories of IS use have been examined through theory of reasoned action (TRA) and theory of planned behavior (TPB), which have proven successful in predicting and explaining behavior across business areas (Davis, 1989). Based on TRA, Davis (1989) introduced the technology acceptance model (TAM) which provided an explanation of the determinants of computer acceptance by end-users. TAM theorizes that perceived ease of use determines actual intention and usage behavior.

With regard to online training, ease of use would be determined by how well the system facilitates communications between physically and geographically separated trainers and trainees, sharing of training material and debates among participants. A technical design format including chat rooms and multimedia functions enable trainees to easily access the web site. Leidner and Jarvenpaa (1995) suggested simulations, three-dimensional virtual reality and debate rooms for ease of interaction. Smith and Kumar (2004) argued that ASP users prefer using easy applications. This leads to the following hypothesis.

H2. When a customer firm perceives it is easy to use applications offered by an ASP, the firm is satisfied with the services.

System information

The process capability of an ASP can be defined or interpreted as the degree to which it understands the business of the client firm (Yao *et al.*, 2003). Customer firms require ASP services to address their business processes, thus requiring ASPs to understand their business as well as the industry (Focacci *et al.*, 2003). Swinarski *et al.* (2001) categorized process capability into engineering, management, quality, and organizational capabilities and proposed that these capabilities may enhance service quality of ASPs. Likewise, process capabilities of ASPs must have similar effects. ASP process capability is evaluated by whether the information offered and generated by the implemented applications are relevant to the customer's business. Based on the importance of process capability, it is proposed that there is a positive relationship between fit of information from ASP services and customer satisfaction.

H3. When a customer firm perceives an ASP offers relevant applications to its business processes, the firm is satisfied with its ASP services.

Customer service and maintenance

Potential customer firms consider the ASP option when they wish to be free from the following: maintaining hardware and software; employing IT specialists; or upgrading systems as needed (Cisco Systems, 2001). ASPs upgrade their applications frequently

as they recognize new functions that would be helpful for their customers (Caulfield, 2001). Since, ASPs upgrade and maintain their solutions, customers consider such solutions as helpful (Boyle, 2002). One of the obligations of vendors in IT outsourcing relationships is similar to this responsibility. Customer firms using IT outsourcing want the vendors to control and maintain the systems independently and they want to be free from technical quagmire (Koh *et al.*, 2004). Customer firms will likely be satisfied with ASPs when they perceive a high level of service maintenance through upgrades.

Many ASPs have lost business due to poor service. Research shows it is important to provide good customer service and support, especially for firms providing services online (Sharma and Gupta, 2002). One research framework recommends evaluating whether ASPs notify customer firms of scheduled maintenance (Ekanayaka *et al.*, 2003). Other research recommends that client firms should require extensive customer support after system implementation (Focacci *et al.*, 2003). Therefore, the perceived level of customer service and maintenance may have a positive impact on satisfaction.

H4. When a customer firm perceives its ASP as providing quality customer service and maintenance, the firm is satisfied with its ASP services.

ASP price

While every customer desires cost-efficient services, SEs are particularly price sensitive due to limited financial resources. The main advantage of the ASP model is low costs. Cost benefits in ASP models represent the difference between internal production costs and external costs (Devaraj and Kohli, 2003; Yao *et al.*, 2003). Customer firms can reduce capital expenses and convert variable costs of IS functions to fixed costs that are predictable (Dewire, 2000). ASP models list benefits under five types of costs: end-user hardware, software, software installation/maintenance, server hardware, and data storage costs (Walsh, 2003). ASP service is expected to be less expensive than IS outsourcing (Trimi *et al.*, 2005). Even though major critical success factors of IT outsourcing involve production and transaction cost reduction (Gottschalk and Solli-Saether, 2005), capital investments in consultants and technical experts, licensing fees, purchases of expensive hardware and software, and unexpected maintenance fees present a huge financial burden to outsourcing users (Aubert *et al.*, 1999). Cisco Systems (2001) expected that customer firms will look for ASP service when it is difficult to handle expensive IT costs. Therefore, user perception of cost savings may be related to ASP satisfaction.

H5. When a customer firm perceives the ASP service fees are reasonable, the firm is satisfied with its ASP services.

Security and risks

The nature of application service requires the provider to have access to client firm data and information. In fact the service provider generally has physical control of the data as it is frequently stored on servers owned and maintained by the ASP at its site. Thus, the client firm assumes some risk when using the ASP. Researchers and practitioners have cautioned that customer firms should not entirely rely on the ASP to consider every aspect of security issues (Smith and Kumar, 2004), but rather take a proactive approach to minimize and control risks.

To evaluate ASP security, Currie and Seltsikas (2001) recommended examining four areas. Since, physical security is a key concern of client firms (Sharma and Gupta, 2002), ASPs should prove their physical data centers are secure by employing alarm systems and continuous monitoring. Second, applications and data should be protected from external threats by security technology such as firewalls, antivirus software, and secure socket layering (SSL). Third, the ASP should provide backup and restoration services. Finally, the ASP should provide recovery systems in case of disasters.

Customer firms want their vendors to guarantee the security and confidentiality of their data (Ekanayaka *et al.*, 2003). Security issues related to ASP service are some of the factors that affect decisions on service adoption (Smith and Kumar, 2004). Many firms have avoided application services because of lack of trust (Sharma and Gupta, 2002). Therefore, customer firms may be satisfied if their service and critical data are secure and safe.

H6. When a customer firm perceives ASP services and data handling are secure and safe, the firm is satisfied with its ASP services.

Education formalization

According to institutional theory, over time habitual work practices such as ways of supervisor support, coordinating a meeting, or evaluating an employee eventually become institutionalized, forming the structural properties of the organization (Orlikowski, 1992). These structural or institutionalized properties, called "structure," are drawn on by humans in their ongoing interactions which in turn reinforce the structure.

Though the success of training relies primarily on program design itself, the maximum training effectiveness cannot be achieved without subjective elements such as organization support. Noe (1986) in particular argued that knowledge interaction between senior managers and employees has a great impact on the work-site application rate. In other words, although trainees may be properly trained, they cannot fully apply their new knowledge and skills to the workplace if there is insufficient support or if the work environment is not conducive.

Baldwin and Ford (1988) insisted that senior management support and the organization atmosphere have a direct impact on the training effectiveness and application rate. According to their argument, training effectiveness affects the application rate, and senior management support and the working atmosphere are directly linked to the application rate.

The relationship between the educational formalization and training effectiveness under the traditional training atmosphere applies in the same way to the online training environment.

H7. When a customer firm perceives training for ASP services is formalized well, the firm believes that the training is effective for its business.

Educational content

Research on the content of corporate training in the US seems to focus on changes in the management function, knowledge and skills with the dramatic surge in computer education (Milkovich and Boudreau, 1996). In this study, the content of training is examined. Ford and Wroten (1984) suggested evaluating the work relatedness of

a training program by validating the contents and using the evaluation results to redesign the program. Using this method, they argued, organizations could enhance trainee motivation levels to improve learning performance.

Bramley (1991) found that, to be successful, a training program should be done in a similar environment to the actual work environment, and further the more common factors there are between training and work, the more enhanced job performance becomes after training. He argued that giving trainees questions on how to apply the contents of the ongoing training to their real work during training was effective. Alliger *et al.* (1997) also argued that when trainees recognized that the contents were practical, they applied knowledge and skills from the training to their real work.

Research in the traditional vocation training circumstances discussed above found that the contents of training impact the effectiveness of a training program. These results could be applied to online training situations as well.

H8. When a customer firm perceives that training contents for ASP services are adequate and reliable, the firm believes that the training is effective for its business.

Educational effectiveness

Training services of ASPs are important because the customer firm would have a small size of IT department (Gupta and Herath, 2005). Ekanayaka *et al.* (2003) included a training factor in their research framework for evaluating ASPs. Many scholars who studied traditional vocation training pointed out the challenge and importance of training effectiveness evaluation (Alliger *et al.*, 1997). Most companies fail to evaluate their training systematically, or if they do, they rely mostly on trainee responses. Only about 10 percent try to evaluate changes in trainee behavior, indicating the inadequacy of corporate training evaluations (Saari *et al.*, 1988).

Most research on training evaluation has focused on measuring trainee reactions to the training program and the degree of learning from the program (Tracey *et al.*, 1995). Reaction to the training program refers to measurement of trainee attitudes toward the contents, methods and trainers. The degree of learning refers to the amount of learning as measured by improvement or changes in abilities including knowledge, skills and attitudes.

Reaction and learning are studied as major indicators of training but these evaluation and measurement variables are not the ultimate goals of training programs. Rather a more meaningful indicator is the transfer of knowledge and skills gained in training to job performance. As well, it is important to assess whether learning goals were achieved (Kreiger *et al.*, 1993).

Implementation of a training program is supposed to contribute to improved performance of the corporate organization. However, this may not be achieved if the trainees do not have the will to apply the skills and knowledge they learned to their work. Also, organizational factors can hinder the application of newly learned skills or knowledge. Baldwin and Ford (1988) presented an integrated model that includes learning performance, which is the outcome of training, and transfer performance, which is the achievement of work application. The effectiveness of training may impact both satisfaction and organizational performance in our model.

H9. When a customer firm perceives training for ASP services is effective for actual application, the firm is satisfied with the services.

H10. When a customer firm perceives training for ASP services is effective for actual application, the firm perceives its IS performance has been improved.

Satisfaction with ASP service

User satisfaction of IS has been used as an alternative indicator of IS success (Bailey and Pearson, 1983; Delone and McLean, 1992; Takala *et al.*, 2006). Small firms play several roles in an ASP service environment. They are the final users of ASP services as well as providers of technical and organizational information (Palvia, 1996). Therefore, other types of satisfaction besides overall satisfaction should be included in the construct. Two elements suggested are continuous use intention and recommendation intention (Grigoroudis and Siskos, 2004).

Satisfaction is considered as an outcome construct in the ASP model because this has an effect on success factors such as profitability, brand equity, and long-term relationships (Susarla *et al.*, 2003). Susarla *et al.* (2003) investigated antecedents of satisfaction of ASP customers. While ASPs try to offer good service to their customer firms, the number of unsatisfied customers has increased. Another study suggested that ASPs provide the expected benefits and should enhance service quality (Chow-Chua and Komaran, 2002). Parasuraman *et al.* (1985) maintained that the SERVQUAL measurement has a direct relationship with satisfaction. Sigala (2004) developed the ASP-Qual model in which SERVQUAL is applied to ASP services.

In this study, we define user satisfaction as the extent of sufficiency based on the expectation level of users. The service quality impacts the ASP's success (Sharma and Gupta, 2002). Therefore, satisfaction may have an effect on IS performance of user firms.

H11. When a customer firm is satisfied with its ASP services, the firm perceives its IS performance has been improved.

Organizational performance

Profit indicators and financial ratios are often used to measure firm performance. However, these measures may not appropriately identify the firm's IS performance. Therefore, research is needed to find a proper measurement of IS performance (Delone and McLean, 1992). This study measures firm performance using both financial and non-financial indicators such as: the number of customers (Tran-Gia and Mandjes, 1997), revenue (Bryant *et al.*, 2004), administration cost (Bryant *et al.*, 2004), competitive advantage (Davis and Schoorman, 2000), customer service (Liljander and Strandvik, 1995), productivity (Griffis *et al.*, 2004), ease of information exchange with partners (Griffis *et al.*, 2004), and ease of information exchange within a company (Griffis *et al.*, 2004).

Methodology

Data were collected both offline and online in cooperation with the Korea National Computerization Agency which is accountable for the general implementation and support of information technology in Korea. The use of the Korean SE sample is significant for this study as Korea is a leading IT application country in the world

(Lee, 2003). Data were first collected from 273 small firms which use ASP service and participated in the "Small Firm Networking Project" in Korea. They were interviewed and surveyed through a paper-based questionnaire. In addition, an online survey was conducted using a popup window in a number of ASP web sites, resulting in additional 466 responses. These surveys were conducted with 739 respondents for 30 days.

Every response firm is classified as a small firm with less than 50 employees, and has used an ASP service for less than two years. Most firms (94 percent) did not have trouble using ASP services because most of them had been trained from 1 to 10 hours. With respect to industrial classifications, 46 percent of the firms were in the service industry, almost 16 percent in distribution, about 14 percent in manufacturing, and 13 percent in electronics and communications.

IT knowledge and communication methods are measured by 12 and 16 items, respectively. Organizational performance of SEs is measured by ten items. A 5 point Likert scale response scheme is used in this study.

It is important to verify that questionnaire items explain defined ideas through analysis of reliability and validity. We investigated reliability and validity using Cronbach's α and exploratory factor analysis as shown in Table I. Cronbach's α values for all factors were much higher than 0.7, which represents a minimal reliability.

Nunnally and Vernstein (1994) recommended that all of the primary factor loadings should be greater than 0.5 in order to assess the fit between the items and their construct. In this test, all factor loadings were higher than 0.6, demonstrating a good fit between each factor and related items. Exploratory factor analysis (EFA) was performed to verify conceptual validity of the ASP generic perspective, educational perspective and organizational performance perspectives, and the factor loadings of each factor were higher than 0.6.

A path analysis was performed to test the hypotheses. The analysis results with LISREL 8.53 show a goodness of fit in the research model ($\chi^2 = 2570.20$, $p = 0.000$, degrees of freedom = 780, $\chi^2/df = 3.295$, GFI = 0.86, AGFI = 0.84, NFI = 0.93, NNFI = 0.95, RMSEA = 0.056).

When the model is correct but its conditions may not be correct, the χ^2 value is likely to appear larger than it should be. This indicates a weakness in using χ^2 as an indicator of a goodness of fit since the χ^2 value decreases as the sample size gets larger. From this perspective, it is advisable to use the χ^2 value in conjunction with other fitness indices (Jöreskog and Sorbom, 1993). Medsker *et al.* (1994) suggested that χ^2/df ratios of less than 10 can be interpreted as indicating a good fit to the data with ratios less than 2 indicating over-fitting. The current model may be reasonable since the ratio of χ^2/df is 3.236.

Results of analysis

All hypotheses were supported in the analysis except *H6* which described the relationship between the perceived level of security and risk and satisfaction of ASP services. Out of six factors in utilization, system information and customer service and maintenance factors had significant effects on satisfaction of ASP services with a p-value of 0.001 (*H3* and *H4*); and price also had a significant effect on satisfaction with a p-value of 0.05 (*H5*). Educational formalization and educational content had significant effects on educational effectiveness with p values of 0.05 (*H7*) and 0.001 (*H8*), respectively.

Table I.
The results of reliability and validity

Variable	Number of factors	Factor name	Number of questions	Questions	Factor loading	Eigen value	Cronbach's α
System utilization	6	Technical effectiveness	3	The processing speed of the ASP services appropriate	0.764	2.428	0.9183
				The ASP services technically reliable	0.654		
				The ASP services accessible everytime we need to use it	0.706		
		Perceived ease of system use	3	It is easy to use the ASP service	0.642	2.411	0.9151
				Functions are well disposed in the interface (screens) of the ASP service	0.727		
				It is easy to understand how the applications are operated	0.729		
		System information	4	Information generated by the applications is accurate	0.690	3.285	0.9216
				It is easy to find information you need in the interface of the ASP service	0.675		
				The application offer proper information for our task	0.756		
				The applications provide us with information at a right time	0.756		
		Customer service and maintenance	3	When we have a problem on the ASP service, our ASP offers a fast customer service	0.767	2.716	0.9310
				Our ASP offers proper solution on a existing or potential problem	0.724		
				The customer service on phone is helpful and service person is thoughtful	0.758		
		ASP price	2	Network fee for the ASP service is reasonable	0.811	2.670	0.8993
				ASP service fee is reasonable	0.809		

(*continued*)

Variable	Number of factors	Factor name	Number of questions	Questions	Factor loading	Eigen value	Cronbach's α
Educational perspective	2	Security and risk	3	Internal organizational information of our company is in danger of being leaked out because of ASP services	0.931	2.036	0.9306
				Our customer information is in danger of being leaked out to our competitors	0.952		
				Our business information is in danger of being used for other purpose	0.923		
		Educational formalization	4	Guidelines in advance were well fitted	0.784	3.419	0.9408
				Training program was systematically organized	0.805		
				Trainers were trusty an interested in what trainees are learning	0.807		
				Training was offered on time	0.728		
		Educational content	4	Training content was related to tasks in our organization	0.804	3.419	0.9446
				Training content was consistent from first to last	0.789		
				The degree of difficulty of the training content was pertinent	0.748		
				An amount of information in each session of training was pertinent	0.796		
System outcomes	3	Satisfaction of ASP service	3	We are satisfied with the current ASP services	0.785	2.725	0.9260
				We are going to use the current ASP services	0.737		
				We will recommend our partner companies to use the current ASP services	0.785		
		Educational effectiveness	5	We make effective use of training content to our business	0.821	4.432	0.9583

(*continued*)

Table I.

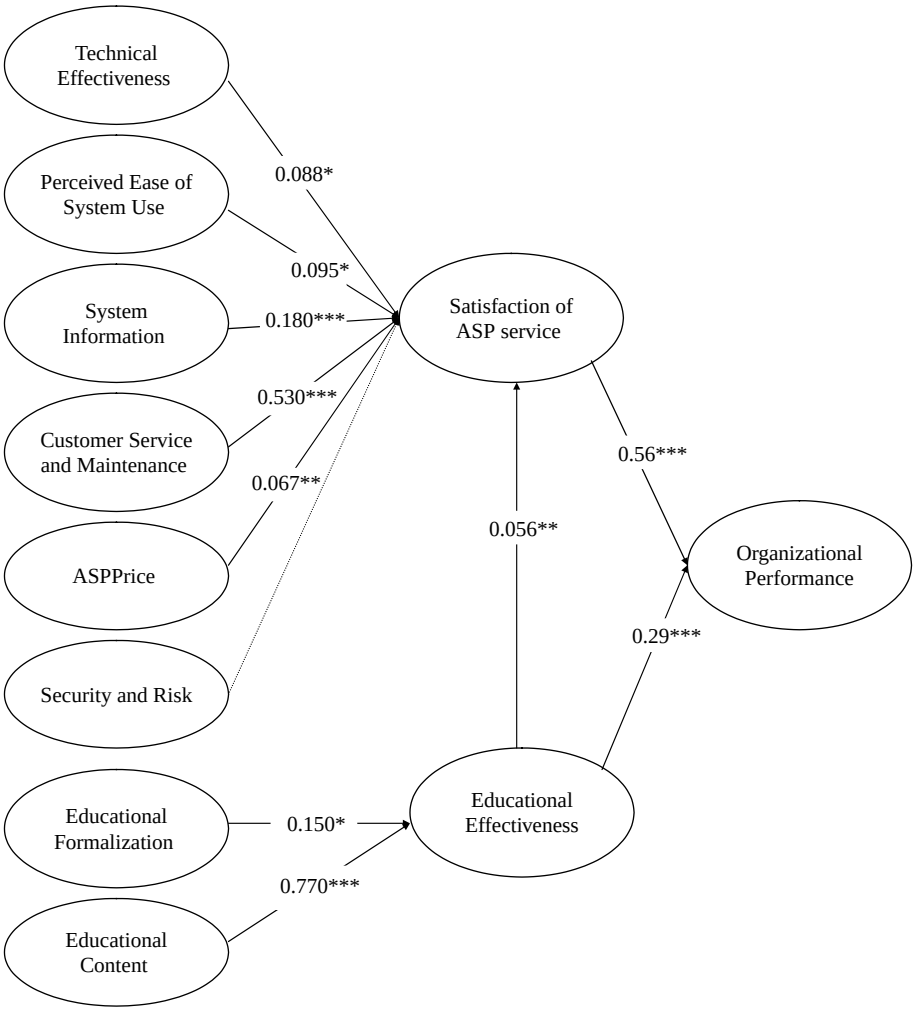
Variable	Number of factors	Factor name	Number of questions	Questions	Factor loading	Eigen value	Cronbach's α
				Training content is frequently applied to our business	0.838		
				Knowledge obtained from education helps practical tasks	0.800		
				Task efficiency has been improved by training	0.807		
				Flexibility on changing business environment has been improved by training	0.811		
		Organizational performance	8	Our revenue is considerably increased because of the ASP services	0.805	5.321	0.9373
				Our productivity is considerably increased because of the ASP services	0.747		
				The number of our customers is considerably increased because of the ASP services	0.835		
				The level of our customer service is considerable increased because of the ASP services	0.812		
				Information transfer with partners becomes handy because of the ASP services	0.701		
				Information transfer within year organization becomes handy because of the ASP services	0.609		
				Competitive advantage is considerably increased because of the ASP services	0.724		
				Labor costs are considerably saved because of the ASP services	0.619		

Table I.

The relationships between outcomes' constructs were also statistically strong. Educational effectiveness had significant effects on satisfaction and organizational performance with p values of 0.05 (*H9*) and 0.001 (*H10*). The effect of satisfaction of ASP services on organizational performance (*H11*) was the most significant among three relationships between outcomes' constructs ($p < 0.001$). Results of the hypotheses are shown in Figure 2.

Discussion

With the analysis of SE data, we found significant paths in our model. The results of the path analysis yield several suggestive points. First, customer service and



Notes: * P < 0.10; ** P < 0.05; *** P < 0.001

Figure 2.
Results of hypotheses test

maintenance had the strongest relationship with satisfaction of ASP services among the utilization factors. Apparently, customers think of ASPs not as simple application providers but as all-embracing managers of ASP services. ASPs require three types of skill sets: application, services, and networking (Heart and Pliskin, 2002). In addition to the purchase of ASP services, customer firms need ASPs to fix current or potential problems on the services and networks.

Second, ASP price is also a strong predictor of customer satisfaction of ASP services. This result is consistent with the supposition that SEs prefer cost-efficient systems. ASPs, whose target market is small firms, should seek to provide the best value to customers in order to enhance satisfaction and help gain and retain customers.

Third, interestingly the security and risk factor was not statistically important for customer satisfaction. There are several plausible reasons for this outcome. First, it may be the culture and advanced IT environment of Korea. Throughout the twentieth century, Korea experienced several crises including the Japanese colonization, Korean War, Asian financial crisis, and the like. It is possible that Korean people have developed much resiliency to national crises which has helped Korea become the 8th largest economy in the world and a leading IT nation (Lee, 2003). This type of spirit could diminish the security issue. It is interesting to note that today almost 80 percent of Koreans use the fastest broad band internet daily. Another reason for this unexpected outcome may be that the subjects of the study are small businesses. They may not be as sensitive to the security risks simply due to the size of their business, whereas large firms have a great deal at stake if data is lost or compromised. Small businesses may be more interested in the conspicuous factors such as price and customer service.

Fourth, an effective training program influences satisfaction of ASP services and organizational performance. Lee *et al.* (1995) maintained that failure in using technology in an organization can be influenced by the lack of proper training programs for end-users. Survey respondents thought education content rather than the training organization produced effective training programs.

Fifth, satisfaction and effectiveness of training had significant impact on organizational performance indicators as expected. When customer firms believe organizational performance is improved by current ASP services, they are likely to continue using the services.

Managerial implication

Based on the results of this study, ASPs can learn more about the perception structure of SME customers for their business strategy. ASPs should satisfy their customers by providing applications at reasonable fees. They are expected to fix or upgrade insecure systems but without increasing service fees. Korean ASPs, who are targeting SEs, deliver technically sound services on demand at reasonable prices, and then focus on further enhancing system reliability and security.

With regard to customer service and maintenance, ASPs can operate their own data mining applications to generate important information regarding the relationships between customer characteristics and specific customer needs. For example, an ASP can gather information that SEs in the manufacturing industry tend to put a priority on the speed of networking. Thus, the ASP can implement its database systems and applications on fast servers for a manufacturer customer by providing unoccupied networks to enhance customer satisfaction.

Conclusion

This study examined SE customers of ASPs and analyzed the relationships between utilization of ASP services, educational factors, and organizational performance. The results showed that customer service/maintenance was the most important construct affecting satisfaction of ASP service. ASP price was the next most significant determinant of satisfaction among system utilization factors. Among educational factors, fit of education content and organization of education were statistically significant influences on educational effectiveness. In three outcome constructs, satisfaction of ASP service and educational effectiveness affect organizational performance and educational effectiveness enhances organizational performance channeled through satisfaction of ASP service.

This study provides several contributions. First, ASPs serving SEs should focus on critical factors affecting customer satisfaction. Channeling resources into factors that increase satisfaction also affect the client firm's performance, which increases the value of the services offered to the client firm. In turn the ASP realizes customer retention, which contributes to its own profitability. Second, potential client firms can use these factors as criteria in selecting a service provider, increasing the likelihood of successful implementation of the application service. Third, previous studies examined system utilization as a single factor (Lee *et al.*, 1995) revealing a marginal relationship with satisfaction. This study breaks down the system utilization factor into several valid sub-factors, revealing varying degrees of relations with satisfaction. Finally, the study provides insight on the value of education and training when employing ASP services. Pertinent training could help client organizations exploit effective but somewhat complicated applications.

The Korean ASP industry was very crowded several years ago because the entrance barrier is not high. However, the number of ASPs has been decreasing for several reasons. The high initial investment requirement for software and hardware, and unstructured and often unproven business strategies have influenced the ASP market. Also, external causes such as the burst of the dotcom bubble and world-wide recession, have impacted the ASP industry. Nevertheless, the Korea Information Strategy Development Institute forecast that the number of customer firms of ASPs will remain stable, and successful ASPs that implemented creative business models would still make profit and be successful.

Since, this study chose customers of ASP services in Korea, the results may not be universal. To increase external validity, vertical or horizontal extensions of this study should be conducted in the future. For example, ASP customers in other countries, such as the US and European nations, should be investigated with the same methods and measures allowing comparisons across countries. In order to study the impact of rapidly changing technologies and users' perception on the technologies, a longitudinal study can focus on the same SEs and compare results across time.

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