Satisfaction evaluation of customers with multi-phase perspectives on application service providers

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Abstract

Due to the fast pace of business evolvement, many industries keep trying to sustain their strategic advantage by employing state of the art information technology (IT). But most of them outsource this kind of requiring IT to their strategic partners in order to ease the possible burden of tremendous investment. Application Service Providers (ASP), cultivated from the outsourcing concepts, could help fulfill this growing demand of strategic outsourcing. The business model of ASP vendor is on rental and network basis to deliver applications hosting and management services for its customers. From our survey of ASP markets, it reveals most of them are focused on the issues about strategic concept, selecting decision-making process, determinants of applications, and customers' perceptions.

However, because ASP is an emerging concept, it could be found not much literature studies to survey customers' satisfactions, and no appropriate model could be applied to evaluate the success of ASP services with customers' perspectives. Under such manners, this research will base on three phases, which are preparation, application and operation phase to propose a customer satisfaction evaluation model. By applying the proposed model with questionnaires, customers' satisfaction of employing ASP was explored and evaluated. Three corresponding propositions about ASP customers' satisfaction were carefully inspected and some insights were raised based on the analyzed results, which could help ASPs recognize the ways of improving services.

1. Introduction

The concepts of outsourcing information technology (IT) had been recently extended to cloud computing, offering the infrastructure required to deliver the IT solutions on a very low cost base. However, the basic business models of cloud computing are to offer services on demand, which is the extension of IT outsourcing via internet infrastructures. As defined by Adeleye et al. (2004), the general model of IT outsourcing is to commit parts of industrial processes to the third parties [1]. Such outsourcing strategy can help reallocate limited resource within enterprises and leverage the performance overall with exterior resource. Since its advent of this concept, IT outsourcing has experienced numerous generations of evolvement along with the innovations of information technology. In the surveys of Currie and Seltsikas [8], before the early of 1960, the employment of information technology outsourcing was mainly employed in large size enterprises, and the contents of service were almost technology- driven.

However, from 1980s, the growth and maturity of IT outsourcing market was continuously witnessed, wherein outsourcing concepts evolved to be business-driven, and consisted of system development and maintenance, business process modules, relative consultancy, etc. This wave of evolvement also created a lot of new opportunities for independent software vendors (ISVs). Since then, business processes were widely outsourced, which was considered to be more cost-effective than in-house development. Even though outsourcing strategy continued gaining its

momentum, those small-to-medium enterprises (SMEs) with relative limited IT budgets, were considered unable to afford this kind of service ([5], [22], [31]). However, such situation had changed in recent years due to the pervasiveness of Internet applications, which enable SMEs to acquire outsourcing of business applications and consultancy at a more affordable price. Afterwards, IT outsourcing was shifted to be industry- driven, and from traditional centralization to remote management via distributed computing. Since then, ASPs behaved as the main roles in the outsourcing partnership and could deliver services to customers on the basis of rental or pay-as-you-go. Based on the above perspectives, although ASP concepts were originated from outsourcing strategies, both of them quite differed. The difference is mainly because ASPs' services are based on one-to-one and distributive rental modes ([2], [4]).

There is a lot of literature trying to define the service of ASP with various perspectives. Among them, ASP was defined to host numerous applications for their customers, ranging from simply stand-alone applications to integrated solutions. By the ways of remote hosted and managed applications from ASPs, their customers can then be offered desired functionalities via internet anytime and anywhere. With such business model, the customers are not required to have tremendous investment for installing software and hardware. They can have alternative ways for renting and paying through the services of ASPs, based on the utilities.

Therefore, ASPs were considered a rental based application hosting for multi-users through centralized management networks ([2], [4], [5], [30]). Moreover, Susarla et al. defined ASPs to be a new type of IT service industry, which deliver abilities of applications and network management to users via data centre ([4], [28]). Smith and Rupp observed the recent ASP industries, and regarded ASPs as an integration application hosting consisting of communications, hardware, software, and consultancy, which could be employed to remote deployment, executions and management ([13], [29]). With reviewing literature of ASP definitions, ASP could be defined with specified and generalized perspectives. The specified definition regards ASP as an application service provider, mainly offering hosting and management of applications to their customers on a rental and centralized base. The generalized one defines ASP to be an integrated application provider, consisting of communications, information systems, domain knowledge and consultancy in order to deliver IS applications, centralized management and maintenance services to end-users.

However, in order to provide on-demand solutions, ASPs need to involve various abilities and resources for hosting applications and managing heterogeneous resources. Thus, the service components of ASPs could be mainly classified into four categories, which are network service, infrastructure, software, and solution providers [30]. Moreover, from the perspective of technology oriented, Leem and Lee considered the elements of a comprehensive ASP should consist of network, data center, application hosting, continuous customer supporting, hardware and software [19]. However, because the customers employing ASPs often request more service contents than any ASP could offer alone, they usually tend to launch vertically or horizontally integration. Under such manner, many ASPs started to develop alliance with others ([8], [10], [13]). Therefore, the ability and resource that ASPs can offer and support would have significant impact on customers' satisfaction, which is depicted as Table 1. Table 1 lists various service components and roles played that are regarded as essential parts ASP should offered in the following respective literature.

Table 1. ASP service components

Network	Data Centre	Application Management
Telecommunication Providers	Internet Service Providers(ISPs)	Pure ASPs
Network service Providers	Platform providers	End solution operators

ISP/VPN	Software infrastructure partners	Software and technology partners
Network service Providers	Service and infrastructure	Service and infrastructure
IT infrastructure	IT infrastructure	
Telecommunication		
Customer support	**Hardware**	**Software**
IT service providers		ISV
		Applications providers
ASP co-locators	Software infrastructure partners	ISV
Service and infrastructure	Service and infrastructure	Software structure
Customer support and service		application
Consultancy support	Hardware support	Software support

ASP concepts were extended from traditional IT/IS outsourcing service, much literature considered the theoretical process of ASP choice are very similar to IT/IS outsourcing. Despite ASPs can definitely offer an integrated solution for outsourcing, they really exhibit several similarities. Thus, many researches employ various traditional outsourcing theories to explore ASPs' performance. Patnayakuni and Seth tried to structurally compare between traditional IT outsourcing and ASP based on three structures: production cost theory, transaction theory and resource based theory [27]. Yao et al. explored the relationship development between ASPs and their customers, and then also compared the difference between traditional outsourcing and ASP services [32]. Another researches also based on the environmental determinants to compare outsourcing information systems traditionally with using ASP services [29]. Leem and Lee proposed development of certification and audit processes of ASPs for IT Outsourcing, which was designed to evaluate the usability of software package and the stability of hardware and network infrastructure [19]. They then compare traditional IT/IS outsourcing with ASP on the base of auditing perspectives as depicted in Table 2.

Table 2. Traditional IT/IS outsourcing vs. ASP with auditing perspectives

	Traditional IT/IS outsourcing	**ASP**
Outsourcing application targets	Enterprise-wide application system, network infrastructure, data base	Data centre, Network infrastructure, Applications, Security, Stable supporting
Main concerns	Organizational target consistency, system compatibility	System efficiency, Stability, Information Security
Auditing tasks	Deployment, maintenance, modification, operation	Preparation Stage：Planning and Analysis Application Stage：Purchase, Construction, Evaluation and Installation Operation Stage：Customer Support and Supervision
	ISP/VPN	Software infrastructure partners

Despite ASP is extended from traditional IT/IS outsourcing, it reveals many differences between them. Since traditional outsourcing strategies are intended to outsource the developing process of information system application with respect to particular demand, such as application development, operations and administration, it then requires much more customization. After the whole system had been developed, it turns out to be managed in house rather than continue to outsource from suppliers. Contradictorily, ASPs not only offer customers various applications, IT infrastructures, but also guarantee to deliver service supports and get in charge of the efficiency and maintenance for each service on rental base. Under such manners, the customer satisfaction evaluation models for traditional outsourcing strategies cannot be

appropriately applied in ASP fields. Therefore, in this research, the evaluation model for customer satisfactions of ASP is then proposed in order to appropriately observe the feedbacks of customer to ASP service throughout service processes.

2. Satisfaction evaluation determinants for Traditional IT/IS

In concepts, evaluations of information technology are often based on numerous managerial perspectives, such as cost- saving, productivity- leveraging, decision- optimizing and competition advantage. Moreover, in practice, the common evaluation method employed is based on IT users' satisfaction ([7], [13], [25], [26], [28]). Two major study streams of IT outsourcing are performance evaluations and adoption determinants while employing ASP service, where customer satisfaction evaluation is the most important way for observing the success of IT outsourcing ([14], [16], [28], [31]). Much literature had conducted with case studies and had revealed significant relationship among satisfaction, repurchasing rate, royalty and maintenance of customers. Customer satisfaction is generally regarded as the evaluations of utility after purchasing and using products [24].

Moreover, Satisfactions of Information technology system had been widely discussed by much literature ([11], [9], [15], [26], [21], [6], [12], [23], [28], [7], [19]). In Table 3, the evaluation constructs for IT/IS users' satisfactions are listed. However, though ASP service is extended from IT/IS outsourcing, traditional satisfaction evaluation models of outsourcing are not quite employable. In addition to evaluate the system employed, satisfactions on ASP should encompass pre-information and after-sale customer service offered. Under such manner, this research takes into account not only traditional IT/IS satisfaction evaluation methods but also factors which should be considered while employing ASP service.

Table 3. Customer Satisfaction and performance evaluation determinants

	Evaluation Determinants
Ives et al. (1983)	1. System perspectives: system reliability, correctness, accuracy, integrity 2. Organizational perspectives: relationship with project members, project members' manner towards ASPs, intercommunication between ASPs and project members, educational training, customers' involvement
Doll and Torkzadeh(1988); McHaney et al. (2002)	1. Content: offering information on demand, consistent with customers' demand, offering evaluation reports for customers 2. Correctness: correctness of system output, satisfaction of system accuracy 3. Form: dimensionality of output form, clearness of information 4. Interface: friendly user interface, easy for use 5. Realtime: realtime fulfillment for information requirement, up-to-date information
Kettinger and Lee (1994)	1. Information product: reliability, adequateness, correctness, accuracy 2. Service team members: efficient intercommunication 3. Understanding and involvement: educational training, understanding of application system, sense of participation
Palvia and Palvia (1999)	1. Industry-relative perspective: category of industry, enterprise scale, total sales, region 2. User attributes: gender, age, department, education, computer skill 3. Information technology: adequateness of software, software maintenance, information content, information correctness, information forms, easy for use, realtime, security and integrity, documentation, supplier support, education training, entirely assessment
Chang et al. (2003)	1. Information content, realtime, information aggregation

Negash et al. (2003)	1. Information quality: comprehensiveness, beneficial, entertainment 2. System quality: interaction, ability of retrieval 3. Service quality: tangible reliability, responding time, guarantee, service content
Susarla et al. (2003)	1. Experience before employing ASP: experience of employing internet, maturity of current IT, integration of legend system 2. Experience of employing ASP service: ability of ASP, guarantee of technology performance 3. Expected performance of employing ASP service 4. Disconfirmation
Caldeira and Ward (2003)	1. IS/IT ability: IT/IS technology, managers' IT/IS skills 2. Managers' perspectives and manners
Leem and Lee (2004)	1. Functionality: system functions, integration, reliability 2. Performance: security, effectiveness, stability, management, flexibility, extendibility, responsibility, consistency

3. Analyzing model for satisfaction with ASP

Field research found that the ASP ecosystem was a complex and dynamic phenomenon that incorporated with many different types of companies within the software and computer services industry ([8], [14]). Many of these companies were seeking their major roles, with some actively developing ASP offerings from their existing businesses, whereas others were start- up ASPs, or companies seeking an enabling role within the ASP industry as IT services companies, co-locators, ASP aggregators, network service providers, and security specialists. Other key players in the ASP ecosystem were Independent Software Vendors (ISVs), systems integrators, data center equipment manufacturers, telecommunications companies. The customer satisfaction differs from various service contents, and then, is tedious to figure out with respective to ASP ecosystem. From the perspectives exhibited by the interviews of ASP officers, literature review and comparisons with traditional outsourcing, an integrated customer satisfaction model is proposed in this research. Three key quality auditing items are involved, and contribute to customer satisfaction while employing ASP outsourcing strategies, which are information, system and service qualities, as depicted in Figure 1. These auditing processes will go through three phases, which are preparation, application and operation phases, respectively. Due to ASP is still on its early stage and need to clarify the potential market, exploring the result in higher customers' satisfaction will produce major hints for improving and developing ASP service in the future. Therefore, evaluating determinants will be designed with respect to these auditing phases.

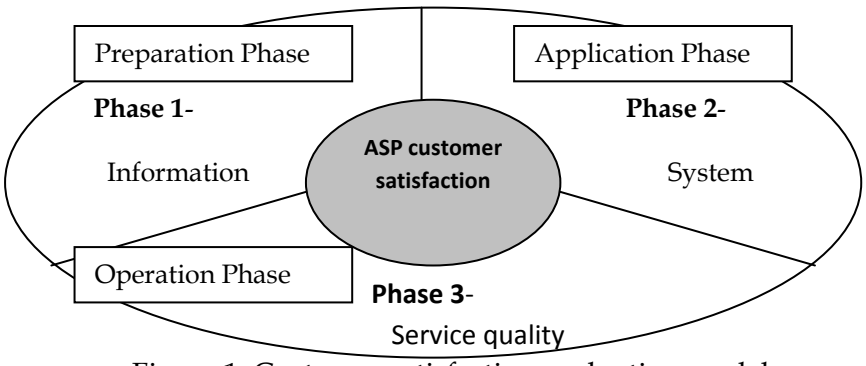

Figure 1. Customer satisfaction evaluation model

3.1 Preparation phase satisfaction evaluation

While ASPs prepare to deliver services to customers, the first tasks are to review their current status of IT/IS employed and to deploy their service technologies. Thus, at this phase, the customer satisfaction evaluation should be focused on information quality, which devotes to offer sufficient information in order to help customers recognize current enterprise-wide status, critical requisitions and interactions involved. As conducted with successful case studies and literature review, it reveals that first critical strategies of ASP have to be developed along with specialist knowledge for particular industry. With sufficient particular industry knowledge, ASPs can then well interact with their customers and deliver high value-added activities. Moreover, for the reasons of customers' uncertainties exhibiting in both the purposes and contents of electronization, it would result in frequent demand specifications' change and increase ASPs' entire cost. Thus, both the dominated research organizations and trends of ASP recognize that help customers to confirm their current demand and plan the appropriate electronization roadmap are significantly critical. It follows that in the first phase of ASP service, i.e. information quality centric phase, ASPs should collect sufficient domain knowledge, abilities for consultancy, efficient ways for interaction, and clarification for service specifications for their customers. Thus, the first proposition should conduct with is as follows.

Proposition 1: Information qualities of ASP, such as domain knowledge, interaction with customers, abilities of consultancy can positively influence customer satisfactions

3.2 Application phase satisfaction evaluation

After initializing the first ASP service phase, it should then be emphasized on analyzing how to clarify service demand, application employment, customer support and educational training with respect to particular industries [19]. At this application phase, the system quality ASP offered should be regarded as the customer evaluation focus, which is devoted to directly evaluate the quality of information technology system. With the factorial analysis, Ives et al. found there are three main factors to help evaluate information system, which are information system output quality, support and user involvement (user participate in developing knowledge of information system employed) [11]. The tasks that ASP should pursuit are devoted to refine dimensionality and content of application systems, developing application service on-demand and maintain the system performance.

From the available literature, evaluation for system quality ASP offered includes real time ([5], [6], [17], [18], [20], [21], [23], [26]) , security, and integration ([5], [6], [23], [26]), user-friendly ([20], [21], [23], [26]), reliability ([5], [11], [18], [20], [23]), correctness ([11], [26], [21], [23]), appropriateness of function and content ([11], [18], [26], [21]), output form ([20], [21], [26]), flexibility ([6], [17], [18], [20], [26]). Followed by the above literature, the second proposition for evaluating system quality is depicted as follows:

Proposition 2: System quality exhibiting various attributes which ASP offered has significant impact on customer satisfactions

3.3 Operation phase satisfaction evaluation

After ASP services employed, the focus of customer satisfactions evaluations shift to the final phase, which is emphasized to monitor ASP service applications, management implementation and customer service support. Because the evaluations within the first two phases are system perspectives, customer would regard continuous customer support and value-added service to be most critical points in this phase since they had experienced ASP service for a longer time. Moreover, because ASPs deliver service on a rental basis, their responding time and commitment for realtime service are critical evaluation items also.

In this evaluation phase, much literature had conducted the relative observations, which include education training ([19], [30]), system responding time, economic benefit ([3], [5], [30], [29]), service guarantee and performance, up-to-date edition [3], core ability concentration ([3], [29]), and fast deployment ([3], [30], [29]). Thus, the third proposition for evaluating service quality is depicted as follows:

Proposition 3: Continuous customer support and guaranteed service achievement which ASP offered has significant impact on customers' satisfactions

4. Analysis and results

In this research, questionnaires are designed to construct the research models and test propositions, which consist of two parts. The first one is based on the ASP satisfaction evaluation and the other one is on characteristics of companies and users. Five point Likert scale is employed to describe the strength of agreements, i.e. 1 stands for "very disagreed", 2 for "disagreed", 3 for "no comment", 4 for "agreed", and 5 for "very agreed".

Because of the ASP applications are still at its early age, there are indeed fewer industries acquainted with the details they could offer. Thus, in order to explore the real customer satisfactions resulted, this research retrieved sample industries from those listed in the digitalized guidance plans for small-to-medium enterprises (SMEs), which is hosted by small-to-medium enterprise administration (SMEA) in Taiwan. By the SMEs' definition of SMEA, SMEs shall refer to enterprises which have completed company registrations or business registrations in accordance with the requirements of the law, and which conform to the following Criteria:

1. In the manufacturing, construction, mining and quarrying with paid-in capital less than NT$ 80 million or the numbers of regular employees less than 200.
2. In the agriculture, forestry and fisheries, water, electricity and gas, commercial, transportation, warehousing and communications, finance, insurance and real estate, industrial and commercial services or social and personal services which in the last year have sales revenue less than NT$100 million or the numbers of regular employees are less than 50.

By the auditing items through ASP phases, the samples are separated into two groups based on whether employing ASP service over 6 months. Users under 6 months can only experience the first two auditing phases, which can just evaluate information and system qualities. For users over 6 months, they are supposed to employ ASP for sufficient time and be able to answer the evaluating items in all phases. Thus, the surveys were conducted with 300 ASP customers in Taiwan. 44 among customers over 6 months, and 36 among the other groups replied. After deleting invalid replies, there are 21.66% responders in this survey.

1.1 Auditing customer satisfaction

In order to analyze the customers' satisfactions based on the above three propositions, questionnaires are respectively designed along with three phases, i.e. information quality/preparation phase, system quality/application phase, and service quality/operation phase. The details of auditing items in the questionnaires are depicted in table 4.

Table 4. Auditing items of questionnaires for customers' satisfaction

Auditing phases	Auditing items
Phase 1. Information quality auditing (Preparing phase)	1.ASP exhibits excellent domain experience and can offer particular industry information
	2.ASP has well consultancy and can help to launch the digitalized plan
	3.ASP presents excellent alliance ability and can help to satisfy digitalized demand
	4.Can you entirely recognize all digitalized demand of your company

	5.Can you entirely involved in acquiring ASP service
	6.Does the excellent mutual communication exist among ASPs and your company while acquiring ASP service
	7.All the developing progress of system and service that ASP is offering currently are clearly recognized
Phase 2. System quality auditing (Application phase)	8.Application system is easy to use
	9.Application system is stable enough
	10.System outputs are very suitable and correct
	11.System outputs are presented with clear and applicable formats
	12.Functions of application system are sufficiently integrated
	13.Respoding or processing time are satisficing
	14.Reliability and security of network are acceptable
	15.Systems offered by ASP are consistent with legend system and perform well while delivering data
	16.Adaptable to new demand or environmental change
Phase 3. Service quality auditing (Operation Phase)	17.Can ASP offer excellent education training
	18.Can ASP offer solution on-time while confronting problems
	19.Can ASP offer tracking tools or systems to prove the achievement of committed service
	20.Help to achieve low cost of system setup and maintenance
	21.ASP can help to obtain and apply the state of the art technology
	22.Can specialist management, maintenance and information technology offered by ASP
	23.ASP can help to deploy information system faster

1.2 Regression Analysis

Regression model is employed to analyze the relationships between predictive variables (information quality, system quality and service quality) and dependent variables (ASP service satisfaction). The data to be analyzed is separated based on whether customers use ASP service over 6 months. The observations are discussed as follows:

1.2.1 Satisfactions of ASP customers over 6 months

From the observations of ANOVA (Analysis of Variance) table given in table 5, the evidence generated is significant, which represents the strong relationship between predictive and dependent variables. On the other hand, since R-square in table 6 is only 0.39, it presents no significant interdependence among predictive variables and validates the resulted linear regression model.

Moreover, the coefficient of service quality owns the largest positive value and the p-value has significant level. That is to say, customers over 6 months concern about service quality and more satisfaction generated while ASP deliver more services. Because users over 6 months generally has experienced ASP service for a period of time, they can have better mutual communications, require more information needed and more acquainted with the system employed. Thus, customer satisfaction will mainly affected by whether ASP can offer sufficient service quality.

Table 5. ANOVA result for ASP customers over 6 months

Source	SS	df	MS	F
Regression	12.275	3	4.092	7.474*
Residual	19.161	35	0.547	
Total	31.436	38		

*p-value <= 0.1

Table 6. Linear Regression analysis for satisfactions of ASP customers over 6 months

Regression Model	Coefficient	Standard deviation	t-ratio	p-value
constant	0.639	0.741	0.863	0.394
Information quality	0.117	0.214	0.546	0.588
System quality	0.271	0.206	0.195	0.195
Service quality	0.406	0.234	0.091	0.09*
R-square	0.39			
F	7.474			

*p-value <= 0.1

1.2.2 Satisfactions of ASP customers under 6 months

The results of ANOVA table and regression model analysis are given as table 7 and table 8, respectively. Also, from the evidence observed, the system quality is most significant with respective to satisfactions since it has the largest regression coefficient 0.58 and the smallest p-value. The positive coefficient of system quality reveals customers under 6 months will increase satisfaction if ASP offered more appropriate systems for use. Moreover, because such users employ ASP services only at the preliminary stage, they care about the system performance more than other perspectives. Thus, ASP should enhance customers' training education of the application systems and help them to be acquainted with the interfaces and functionalities.

Table 7. ANOVA result for ASP customers under 6 months

Source	SS	df	MS	F
Regression	4.447	2	2.223	2.68*
Residual	19.092	23	0.83	
Total	23.538	25		

*p-value <= 0.1

Table 8. Linear Regression analysis for satisfactions of ASP customers under 6 months

Regression Model	Coefficient	Standard deviation	t-ratio	p-value
constant	1.630	1.284	1.269	0.217
Information quality	-0.092	0.326	-0.281	0.782
System quality	0.58	0.257	2.259	0.034*
R-square	0.2			
F	2.78			

*p-value <= 0.1

4.3 Discussions

The survey was conducted with interviewing field experts and then intended to evaluate customers' satisfaction after their employing ASP services. Two groups were separated based on their time length of usage and questionnaires were designed along with three auditing phases, i.e. information, system and service. From the statistic results, there are some insights discussed in the following sections.

4.3.1 Compare customers' satisfactions based on employing time

Although customers were separated based on their experience with ASP service, both of the two groups have been gone through preparation and application phases for different time lengths. In order to find out whether ASP service is valuable and customers would gain more and more satisfactions in the long-term perspective, data among two groups were compared based on t-testing, which are depicted as table 9 and 10.

Table 9. Comparing customers' evaluation on information quality based on two different employing time lengths

Auditing Item	Over 6 months		Under 6 months		t	p-value
	Mean	Stdev	Mean	Stdev		
Particular domain knowledge	3.59	0.75	3.81	0.75	-1.147	0.26
Consultancy	3.67	0.77	3.85	0.78	-0.912	0.37
Alliance ability	3.87	0.98	3.73	0.83	0.605	0.55
Good customers' recognition	3.85	0.81	3.58	0.76	1.344	0.18
Involvement	3.77	0.90	4.12	0.91	-1.511	0.13
Intercommunication ability	3.87	0.89	3.81	0.63	0.316	0.75
Project recognition	3.54	0.88	3.92	0.98	-1.648	0.10*
Information quality evaluation	3.74	0.72	3.83	0.59	-0.549	0.59

*p-value <= 0.1

Table 10. Comparing customers' evaluation on system quality between two different employing time

Auditing Item	Over 6 months		Under 6 months		t	p-value
	Mean	Stdev	Mean	Stdev		
Friendly interface	3.36	1.20	3.35	1.09	0.044	0.97
Stability	3.23	1.01	3.46	0.99	-0.909	0.37
Correctness	3.15	1.01	3.42	0.90	-1.095	0.28
Output formats	3.44	1.14	3.65	1.13	-0.757	0.45
Integrity	3.38	1.04	3.92	0.93	-2.125	0.04*
Responding time	3.31	1.10	3.50	0.65	-0.800	0.43
Reliability and Security	3.28	1.00	3.62	0.98	-1.327	0.19
Compatibility and data delivering ability	3.23	1.04	3.38	0.75	-0.65	0.52
Adaptability	3.23	1.11	3.19	0.75	0.154	0.88
System quality evaluation	3.29	0.95	3.5	0.75	-0.946	0.35

*p-value <= 0.1

As comparing results shown in the above tables, there are no significant difference existing between these two groups of users, except for the recognitions on ASP service developing projects and the system integrities. Furthermore, under these two auditing items' evaluations, customers under 6 months hold smaller satisfactions than those over 6 months. That is to say, in the long term evaluations, customers will increase their satisfactions and potential benefits will also be generated.

4.3.2 Compare customers' satisfactions on different industries

From the responding samples, the majority of ASP customers are from service and manufacturing industries, which incurs the intentions to compare these two customer sources. Table 11 and Table 12 are depicted with all the auditing items' results along with information and system qualities, respectively.

Table 11. Comparing customers' evaluations on information quality between service and manufacturing industries

Auditing Item	Service industries		Manufacturing industries		t	p-value
	Mean	Stdev	Mean	Stdev		
Particular domain knowledge	3.65	0.75	3.79	0.69	-0.75	0.46
Consultancy	3.77	0.72	3.82	0.67	-0.26	0.80
Alliance ability	3.84	0.86	3.96	0.92	-0.54	0.59
Good customers' recognition	3.71	0.69	3.96	0.74	-1.36	0.18
Involvement	3.94	0.85	4.11	0.79	-0.80	0.43
Intercommunication ability	3.77	0.72	4.11	0.74	-1.76	0.08*
Project recognition	3.94	0.89	3.57	0.84	1.61	0.11

Information quality evaluation	3.80	0.61	3.90	0.56	-0.66	0.51

*p-value <= 0.1

Table 12. Comparing customers' evaluations on system quality between service and manufacturing industries

Auditing Item	Service industries		Manufacturing industries		t	p-value
	Mean	Stdev	Mean	Stdev		
Friendly interface	3.39	1.09	3.54	1.23	-0.49	0.62
Stability	3.55	0.99	3.25	1	1.15	0.26
Correctness	3.52	1.03	3.11	0.88	1.64	0.11
Output formats	3.55	1.06	3.68	1.22	-0.44	0.66
Integrity	3.84	0.86	3.57	1.07	1.06	0.29
Responding time	3.45	0.93	3.46	0.96	-0.05	0.96
Reliability and Security	3.71	1.01	3.29	0.85	1.74	0.09*
Compatibility and data delivering ability	3.45	0.93	3.29	0.94	0.68	0.50
Adaptability	3.35	0.91	3.25	1	0.42	0.68
System quality evaluation	3.53	0.82	3.38	0.88	0.69	0.49

*p-value <= 0.1

From the above results, there are two significant differences between the two surveyed industries, which concern with intercommunication with ASP, and reliability and security of networking systems employed. Because of the demand of coordinative manufacturing, the manufacturers concern more about the intercommunication while employing ASP service. On the other hand, service industries need more security and reliability while serving their customers and coping with their transaction data. In words, satisfactions of industries about ASP service will differ because of their heterogeneous characteristics.

5. Conclusions

The widely growth of employing Internet technologies and all its possibilities have enabled SMEs to acquire business applications and support at an affordable price more effectively and efficiently. Since IT applications outsourcing is industry- centric, and evolves from centralized computing, via distributed computing to remote management nowadays, ASPs play the main roles and continue to deliver utility models to customers where they purchase applications on rental or pay-as-you-go basis. In this research, three auditing phases are proposed and questionnaires are well designed in order to survey customers' satisfactions while selecting ASP services, i.e. information quality (preparation), system quality (application), and service quality (operation) auditing phases, respectively. Valid replied data were statistically analyzed and the results are concluded as follows:

Because Customers over 6 months had been employed ASP outsourcing for a longer time, they had been setup a more adequate intercommunication with ASPs and been more acquainted with the system characteristics. They do not really care about the first two auditing phases, i.e. preparation and application, and concerns almost about whether ASP can continue to offer excellent services, consultancy and performance improvement. In words, proposition 3 established in the former section had been verified where regression analysis revealed that continuous customer support and guaranteed service achievement has significant impact on customers' satisfactions. On the other hand, because only at their preliminary stages, customers under 6 months still try to learn and explore the application systems hosted by ASP, and, then the system characteristics are their critical auditing items. From the regression analysis, evidence shows the second proposition holds where customers' satisfactions are significantly impacted by application systems' qualities of ASP.

Furthermore, the first proposition, i.e. information auditing phases, does not show its significance to both customer groups. This is partially because at this preparation stage, ASPs only offer customers the limited information about products and customers cannot really realize what information and service ASP should offer. Under such manner, customers are not significantly sensitive to ASPs' service content and then, their satisfactions are not obviously impacted since ASPs do not offer distinguished service at such preparation stage.

In this paper, service and manufacturing industries are also selected for satisfaction comparisons since they are the main customers employing ASP services currently. Except for the intercommunication, reliability and security, there is not any significant difference between them. This may be because the applications ASP offered can be easily adapted to customers' basic demand since case companies in this survey are only small-to-medium enterprises.

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