Application Service Provider (ASP) in China: An Empirical Study of System and Service Satisfaction

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Abstract

ASP outsourcing is one promising business activity and efforts have been done to investigate the critical factors which improve clients' satisfaction level in developed countries. However, no efforts have been made to investigate the contributing role of functional capability of ASP to the increase of clients' satisfaction in China, one of the biggest SMEs market to develop ASP business. The results indicate that functional capability of ASP has negative effects on clients' satisfaction. This result is different from existing findings in a U.S. based study. Meanwhile, the ASP-client coordination is examined to have positive influence on the improvement of clients' satisfaction.

1. Introduction

IT outsourcing has been one of the most important jobs for many firms to develop and to maintain competitive advantage during the last fifty years. It is believed that during this period of time, there are three waves of IT outsourcing activities happened: (i) technology-oriented IT outsourcing in the 1960s, (ii) business-centric IT outsourcing in both 1980s and 90s, and (iii) application-centric IT outsourcing in the 21st century [13]. Application service providers (ASPs), defined as an organization that "manages and delivers application capabilities to multiple entities from a data center across a wide area network" by Application Service Provider Consortium, are believed to take critical roles in the era of application-centric IT outsourcing for the sake that ASPs have created the opportunities to use the modern information systems in a reasonable and affordable price and, hence, have been further introduced to small and medium-sized enterprises (SMEs) [39, 8].

Efforts have been done on ASP outsourcing to investigate critical factors which improve clients' satisfaction level on using ASP service in developed countries. Some studies explored the ASP effectiveness in the developed countries [7, 1]. Susarla et al. [41] studied the service components of ASP which improve customer satisfaction based on 256 American samples. Kim and Kim [26] conducted

another exploratory study to identify factors which lead to ASP success in a survey work consisting of 52 Korean companies. These studies showed the SMEs' perception of customer satisfaction on the use of ASP services in the developed countries. Then, how about the use of ASP in the developing countries?

China, as one of the most influential developing countries, is a promising market for the development of ASP outsourcing. There are more than 10 million registered SMEs in China in May 2010 [50]. These firms have limited knowledge and resources to internally develop or externally purchase the required application packages for their business operations. Since 80% of Chinese SMEs have the access to internet, ASP outsourcing would be an economical and affordable alternative to acquire the needed systems. However, ASP services are not widely used for Chinese SMEs. One plausible reason is that it is not a rare case that many previous success contracts for IT outsourcing ended up into a failure in China [49]. From the observation, it shows that although ASP service is a success in developed countries, this business model may not be necessarily successful in China or other developing countries.

Limited efforts have been made on ASP in China. An extensive keyword search using "ASP satisfaction" and "China" was made but no research works was identified. Among other publications related to Chinese ASPs, Lin [31] concluded that most of recent researches merely aimed to introduce the concept of using ASPs and probe the expected future development. Lu [32] identified 11 critical factors to ASP acceptance after considering the ASP value expectations and Chinese IS implementation uniqueness on 147 survey questions of current Shanghai ASP clients. Identifying the gap for research and the importance for the development of ASP model in China, we, therefore, propose our first research objective to examine whether the similar causal relationships and findings stated in Susarla et al. [6] and Kim and Kim [7] apply to Chinese ASPs and system users.

Our second research objective is to investigate the relationship between the development of ASP-client coordination and clients' satisfaction. ASPs provide customized services to the clients from a set of

standard software packages. It is important for the clients and the ASPs to conduct frequent communication so that both parties can better coordinate and integrate the business processes to achieve better performance. This coordination behavior develops the trust and knowledge sharing between ASP clients and ASPs, according to social network theory, and thus improves the system performance and customer satisfaction.

The contribution for this work is twofold. First, we examine the relationship between functional capability of ASP and clients' satisfaction in China. To the authors' best knowledge, this work is the first one in the field to demonstrate such a relationship in China. Our second contribution is to explore the influence of coordination between ASPs and ASP clients to the improvement of clients' satisfaction by using social network theory.

In the following section, we will first review agency theory, social network, coordination, and ASP satisfaction and then present our research hypotheses and research model. In section 3, the research methodology including data source is presented. The discussion about survey results are provided in section 4. Next, we provide discussion and the implications for the results in section 5. Finally, the conclusion, limitation, and future research are offered in the last section.

2. Theory and model building

In using ASP service, the system user, SMEs in our case who outsource the IT function to a third party, the ASP, is showing a principal–agent relationship. Agency theory used to explain the agency problem that arises when (i) the desires or goals of the principal and agent conflict and (ii) it is difficult or expensive for the principal to verify what the agent is actually doing [16]. Contract and governance mechanism together direct the expected project outcomes and relationship between principals and agents, and further affect agent performance and principal satisfaction. Agent theory has been used to analyze outsourcing risks by many studies to explain outsourcing strategy (e.g., [4, 22]).

ASP contract, in addition to being an analysis unit for agency theory, is also a form to analyze outsourcing social relationship which is a business connection between the system providers (ASPs) and system users. This relationship falls into the research of social network which explains and directs individual behaviors [9]. Social relationship enriches the mutual understanding and information sharing between two parties. Therefore, the enhanced relationship improves ASP performance to carry out

customer requirements on both clients' system satisfaction and clients' service satisfaction.

We are going to review the agency theory and social network theorem in the following paragraphs. At the same time, we will also propose our research hypotheses which are developed from the observations and the theorem.

2.1. Agency theory and ASP outsourcing objectives

Rooted in information economics, agency theory has formed two lines: positivist and principle-agent [24]. Positivist researchers spotlight the situations in which the principal and agent are likely to have conflicting goals and then describe the governance mechanisms that limit the agent's self-serving behavior. It is argued that outcome-based contracts are more effective to fight against agent opportunism since contract aligns the preferences of agents with those of the principal's targets because revenues depend on the same actions. Also, when the principal has information and channels to verify agent's behavior, contract will be more stable and trustworthy [16]. Therefore, the agent is more likely to behave in the interests of the principal and is more possible to build customer satisfaction with project quality in the end.

For agents, first task is to make clear what the principal wants and also it is compliance with basic project management principles to set attainable project goals, including finance-based, technique-based, business-based, and political-based. Among four types of goals, acquiring financial savings is the most popular motivation and is the major cause to outsource IT function [30] based on transaction cost economics [46]. Besides, another benefit to use ASP platform is to efficiently utilize ASPs' technical resources which consist of the access to new technologies and professionals in an affordable price. Finally, Bennett [7] suggested that IT investment, including IT outsourcing and ASP outsourcing, is beneficial to provide competitive strengths to respond to market change efficiently [2, 14].

In building ASP contract and relationship, system providers should understand what the system users want from using the ASP system. This requires ASP users to provide expected results which this system and service aims to attain. Users affirm the basic reasons why to use ASP platform to reach financial, technical, business, or political target(s). If the target is very complex or hard, corresponding expected functional capability on system providers is set at high level. For example, if the system user needs a customized ERP system to satisfy strong economical, technical, business, and political reasons, ASPs should possess not only basic technological knowledge to

support the system working but also the knowledge of system users' business process to increase principal's business value. So we propose the first hypothesis below:

H₁. ASP outsourcing objectives are positively related to functional capability of the ASP.

McFarlan and Nolan [33] compared outsourcing relationship to marriage: "Like marriage, however, these arrangements are much easier to enter than to sustain or dissolve." It is believed that coordination is needed to complete project goal for all types of contract and relationship. For example, coordination in software development is defined as "means that different people working on a common project agree to a common definition of what they are building, share information, and mesh their activities [29]." Motives to cooperation, such as acquire resource, reduce uncertainty, enhance legitimacy, or attain collative goal, are vehicles to better resource advantages and strategic goals [9]. If clients have strong reasons to take ASP platform, they will pay more attention to the whole project contract and governance structure to trace the milestone of certain part or stage of the ASP implementation, following the logic of governance algorism in agent theory [16].

Coordination among project members is one major task for project management. Multiple requirements to system providers need more communications between system users and system providers in order to settle budget assignment and project schedule, and set up the targets [29]. Moreover, coordination aspires to managing interdependencies among multiple parties or activities involved in the overall goal [38]. Hence, system providers and users have to meet more frequently and intensively to discuss the requirements, share project design information and ideas, and engage their business activities and devotion to reach system user's expectation. Therefore, our second hypothesis is as followed:

H₂. ASP outsourcing objectives are positively related to ASP-clients coordination.

2.2. Social network and ASP satisfaction

Satisfaction has been defined as "a judgment that a service provided a pleasurable level of consumption-related fulfillment [36]." Susarla et al. [41] developed a conceptual model of satisfaction with using ASP and drew upon the consumer satisfaction paradigm employed to analyze post-usage satisfaction with ASP services. In addition, some researches outlined ASP satisfaction on two directions: one is system quality and the other is service quality [26, 41].

Capability is identified as one major factor affecting application service quality with the

functionality of product [43] and service provider performance [44]. Diffusion theorists have proposed that in the early maintenance stage of new system, frustration may lead to temporal discontinuance and, hence, it is essential to regularly examine the customer's satisfaction [41]. On the other hand, it has been believed that service expectations play a critical role in the evaluation of outsourced IT services. System providers' capability is reflected by powerful secured servers, an experienced staff to an ASP to deliver system and service on its promises [27]. In previous researches [41], functional capability of ASP has a significant and positive influence on the performance evaluation of ASPs, and to be exact, capability of a software provider in terms of functionality of the software has been identified as an element gauging satisfaction. Dave Capuano [21], director of product management at the International Computer Security Association, mentioned that out of around 120 companies surveyed and visited by the ICSA, 20% of them had deficit in physical security, especially networking hardware and software installations. Moreover, he also asserted that ASP with secure system would lower the risk of system instability, breaches, and then endow with more potential to customer satisfaction. Therefore, we proposed the following hypothesis:

H₃. Functional capability of ASP is positively related to clients' system satisfaction.

ASP suppliers rely on a variety of technical service guarantees to indicate the quality of their services. Lots of IS research specifies that the importance of the service quality needs to be considered as an additional measure of IS success [36]. Consumer satisfaction research suggests that consumers may gather satisfaction from procedures that are set up to resolve customer problems. ASPs may use service guarantees as reliability, responsiveness, and assurance [41] to inform users that they embrace capability to high level customer satisfaction; the service guarantees can, then, serve to augment user awareness to attribute service success to the ASP [26]. Therefore, we posit our next hypothesis below:

H₄. Functional capability of ASP is positively related to clients' service satisfaction.

Social network focuses on the analysis of interspersion relationship and actors that offers opportunities for or restrict actor behaviors [9]. ASP outsourcing is a business relationship, agreement between the system provider and user [37]. Brass et al. [9] presented an inter-organizational network as a long-term cooperative relationship among various organizational actors in which organizations maintain the total control over their own resources but decide how to use them jointly. In this partnership, problems are usually resolved through discussion, negotiation,

and cooperation. Balasubramanian et al. [5] concluded that coordination activities as a critical success factor for a successful ASP relationship between system provider and user.

A good relationship from coordination between actors, especially in the form of weak ties, elevates knowledge exchange and innovations. The process of knowledge exchange makes the ASP provider able to know about the customer's business and recognize the customer's needs for using the system. Furthermore, new knowledge also improves system provider's ability to better design, test, and implementation the system. It, hence, reduces the tension diversity among the actors through embedding trust-generating networks. Brass [9] suggested that both better knowledge and mutual trust help innovation, firm's survival, and performance. Hence, we hypothesized the relationship below:

H₅. ASP-client coordination is positively related to clients' system satisfaction.

Network relationship owns memory of previous correlation and shapes current network performance [40]. Better coordination improves relationship and trust offering promised service dependably and accurately. "Guanxi" [49], one characteristic of Chinese business relationship, enhances a comprehensive model of satisfaction at the business-to-business level [3]. Such a friendly relationship did make the vendor to be more willingly to offer the help responsively and instantly. Therefore, we propose the following hypothesis:

H₆. ASP-clients coordination is positively related to clients' service satisfaction.

3. Research methodology

The survey data obtained for this research work is part of one governmental project in Fujian province to probe the application of the business model of ASPs by local SMEs. The survey was made in Chinese in China. The survey respondents, who are senior executives in each firm in charge of the IT outsourcing project, were selected because they are participants of the governmental project. These managers are believed to have sufficient seniority to know about their companies and the ongoing ASP project. Hence, though the total number of response is not large, the quality of the survey responses is strongly convincing with the support from the official agency. The surveyed firms' profiles are provided in Table 1.

Table 1: Respondent demographic

Number of Employees	Number of Firms	Total Assets (in million RMB)	Number of Companies
Missing	5	Missing	6
1-49	18	Below 5	25
50-99	17	5-20	19
100-199	11	20-35	15
200-499	15	35-50	3
500 and more	12	Above50	10
Total	78	Total	78

This study focuses on the Chinese SMEs. From Table 1, it is obvious that about 50% of the respondents whose company either hires less than 100 full-time employees or holds an asset less than 20 million RMB. The authors believed that the sample is well presented the targeted study group.

The survey instruments were developed by an extensive literature review which was conducted to identify scales used in the past that were shown to have strong validity and reliability. To establish content validity, the survey questionnaire was constructed based on questions derived from past studies. The survey questions were originally built up in Chinese for the survey respondents who may not be excelled in using English. For the purpose of submission, the survey questions provided in Appendix are translated by the authors. To secure the accuracy of the translation process, a standard approach of double translation was applied. The authors do not identify any significant differences for the translation.

The specific questions for each variable, the sources for these questions and the anchors for these questions for the final survey instrument are provided in the Appendix. In addition to items relating directly to the major research constructs, questions for the contextual factors were selected to serve as control variables in the study. A 7-point Likert scale was used to measure all latent constructs for the study, with two different schemes: extremely low to extremely high, and extremely disagree to extremely agree, as shown in the Appendix.

The empirical analysis was carried out utilizing the partial least squares (PLS) technique of structural equation modeling (SEM). PLS analysis was chosen over regression-based analyses because it can analyze all paths at once [6, 18], handle formative, single-item and summated scales, and does not require a large sample size [20].

To run PLS, SmartPLS 2.0 was used to assess the measurement model and structure model. All measurement items were standardized. All missing values were replaced by using regression estimation function in SPSS to examine the causal relationship, validity, reliability, and statistical power. To derive more reliable results, the bootstrapping method was

used, which approximates the sampling distribution of an estimator by re-sampling with replacement from the original sample [45, 34], to simulate the sample distribution and form a larger sample size. The size of subsamples to run the bootstrapping technique followed the suggestions in [15](p.52). To test the second-order construct in the model, a repeated indicators approach, also known as the hierarchical component model in [48], was used. This technique is widely used to estimate higher order constructs with PLS [51, 47]. The impacts of each factor were presented by the path coefficient and the corresponding level of significance.

4. Results

In this section, we will present the analysis results about the validity and reliability tests and the causal influence of the research model. We will first examine the validity and reliability for the variables. Then, we will provide the results for the testing structure.

4.1. Measurement model

Figure 1 provides the conceptual model for the study. A good model fit in using PLS is seen when there are significant path coefficients, acceptable R^2 values, and good construct reliability [19].
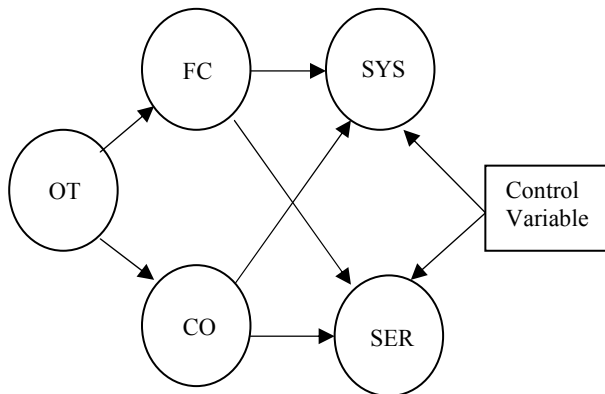

Figure 1. Conceptual research model
Note: OT presents ASP outsourcing objectives; FC means functional capability of ASP; CO means ASP- client coordination; SYS means clients' system satisfaction; and SER means clients' service satisfaction.

4.1.1. Reliability. Table 2 shows the results of the reliability assessment of the scales using Cronbach's α. A threshold value above 0.7 is widely considered to be acceptable while a value above 0.6 is deemed appropriate [35]. The values shown in Table 2 are seemed to be consistent with this requirement.

Supplier's capability is the lowest with a value of 0.671 which meet the lower bound.

Table 2. Reliability & R^2

	Cronbach's α	R^2
OT	0.740	
FC	0.671	0.087
CO	0.750	0.443
SYS	0.742	0.473
SER	0.770	0.222

In addition to Cronbach's α, composite reliability and average variance extracted (AVE) are two additional, widely applied measurements for assessment of reliability. Unlike Cronbach's α, composite reliability does not assume that all indicators are equally weighted [11]. It implies that the measure of composite reliability is more appropriate to measure the whole scale reliability. The benchmark value for the composite reliability is recommended to be larger than 0.7 [6, 17]. On the other hand, the AVE measure denotes the amount of variance that a construct captures from its indicators relative to the amount due to measurement error [11]. The recommended minimal critical value for AVE is 0.5 [23]. The composite reliability and AVE values shown in Table 3 are seen to meet these criteria.

Table 3. AVE & composite reliability

	AVE	Composite Reliability
OT	0.558	0.834
FC	0.581	0.804
CO	0.569	0.840
SYS	0.641	0.841
SER	0.587	0.850

4.1.2. Convergent validity. Convergent validity is the ability of items in a scale to converge or load together as a single construct. It is measured by examining individual loadings for each block of indicators. The standardized loadings should be greater than 0.7, implying that the indicators share more variance with their respective latent variable than with error variance. A lower bound of 0.50 may be sufficient [10]. Table 4 provides a list of standardized loadings for each construct, and it is seen that they are above the acceptable minimum requirement in the highlighted zones.

Table 4. Cross loadings among latent variables

	OT	CO	FC	SYS	SER
OT1	0.68	0.40	0.08	0.38	0.18
OT2	0.71	0.32	0.43	0.21	0.07
OT3	0.80	0.51	0.21	0.48	0.22

OT4	0.79	0.68	0.17	0.64	0.17
CO1	0.53	0.69	0.31	0.33	0.28
CO2	0.52	0.80	0.19	0.52	0.15
CO3	0.37	0.73	0.12	0.35	0.17
CO4	0.56	0.78	0.10	0.64	0.21
FC1	-0.02	0.07	0.63	-0.15	-0.21
FC2	0.06	0.01	0.78	-0.16	-0.31
FC3	0.44	0.34	0.86	-0.01	-0.21
SYS1	0.52	0.63	-0.08	0.84	0.54
SYS2	0.55	0.54	-0.09	0.88	0.34
SYS3	0.27	0.16	-0.11	0.66	0.33
SER1	0.04	0.19	-0.23	0.34	0.72
SER2	0.07	0.20	-0.25	0.34	0.84
SER3	0.50	0.39	-0.15	0.59	0.77
SER4	-0.14	-0.09	-0.37	0.20	0.72

4.1.3. Discriminant validity. Discriminant validity represents how well each item factor links to its hypothesized construct relative to others in the model [25, 42]. Discriminant validity is estimated through: (i) cross-loadings, and (ii) the relationship between correlations among latent constructs and the square roots of AVE [11, 17].

The cross-loadings shown in Table 3 exhibit adequate levels of discriminant validity for each construct. Every item factor in the highlighted areas of Table 4 shows strong loadings to the corresponding latent construct and relatively low loadings to other constructs. The relationship between square roots of the AVE values and the correlations among latent constructs support the same conclusion. In Table 5, it is seen that the square roots of AVE (diagonal values) are greater than the correlations among the constructs (off-diagonal values).

Table 5. Correlations of latent variables

	OT	FC	CO	SYS	SER
OT	**0.747**				
FC	0.295	**0.762**			
CO	0.665	0.235	**0.754**		
SYS	0.598	-0.108	0.628	**0.800**	
SER	0.214	-0.304	0.270	0.514	**0.766**

4.2. Structural model

The results from evaluation of the structural model are reported in Figure 1 and Table 5. First, from the PLS model in Table 6, it can be seen that the standardized path coefficient from ASP outsourcing initiatives to ASPs' expected capabilities is insignificant at $p < 0.1$ level (0.295). From the result,

we can only conclude a positive relationship between the two factors but not to confirm the magnitude of the influence from ASP outsourcing objectives to functional capability of ASP. H_1, hence, is inclusive.

The path coefficient from ASP outsourcing objectives to ASP-client coordination is significant (0.665; $p < 0.01$), supporting the notion that ASP outsourcing objectives have a positive impact on ASP-client coordination. Hence, H_2 is supported.

The causal relationship from functional capability of ASP to clients' system satisfaction and clients' service satisfaction are both statistically significant with the standardized path coefficient of -0.262 ($p < 0.05$) and -0.371 ($p < 0.05$), respectively. The results do not support to hypothesis H_3 that strong functional capability of ASP significantly contributes towards clients' system satisfaction nor to hypothesis H_4 that functional capability of ASP leads to higher clients' service satisfaction. Hence, it can be stated that functional capability of ASP negatively influences clients' system satisfaction and clients' service satisfaction.

The standardized path coefficients from ASP-client coordination to clients' system satisfaction (0.714; $p < 0.01$) and to clients' service satisfaction (0.345; $p < 0.05$) are both positive and statistically significant. Hence, H_5 and H_6 are both supported. From the result, we are confident to state that clients' satisfaction is positively influenced by the development of ASP-client coordination.

Table 6. Path coefficients

	FC	CO	SYS	SER
OT	*0.295*	0.665[***]		
FC			-0.262[**]	-0.371[**]
CO			0.714[***]	0.345[**]
Firm size			*-0.033*	*-0.057*
Industry			*0.085*	*-0.070*

Note: *** Significant at 0.01 level; ** Significant at 0.05 level; the numbers in italic are insignificant

The path coefficients for two control variables are all insignificant ($p < 0.1$ level). The values for the path coefficient from firm size to client's system satisfaction and to clients' service satisfaction are -0.033 and -0.057, respectively. The path coefficients from industry type to client's system satisfaction and to clients' service satisfaction are 0.085 and -0.070, respectively. These insignificant path coefficients imply that the two factors do not influence the relationship in the proposed model.

The predictability of the model, reflected by the R^2 values, is another important determinant of the strength of the model [12, 28]. The R^2 values for the

variables in the proposed model are acceptable (8.7% for functional capability of ASP, 44.3% for ASP-client coordination, 47.3% for clients' system satisfaction, and 22.2% for clients' service satisfaction).

5. Discussion and managerial implications

The research results are discussed below in the following order. First, the relationship between ASP outsourcing objectives and functional capability of ASP is discussed. Second, the impact of ASP outsourcing objectives on ASP-client coordination is described. Next, we are going to discuss the relationship between functional capability of ASP and clients' satisfaction. Then, the causal effect from ASP-client coordination to clients' satisfaction is presented. Finally, a short discussion is provided about the influence of controlled variables on clients' satisfaction.

ASP outsourcing, an application-centric type in IT outsourcing by SMEs, has been the latest major tactics to establish competitive advantage and maintain operational efficiency due to multiple purposes. This study considers the motivations to use ASP services from the financial perspective, technical perspective, and business perspective [4]. In other words, an ASP should be able to provide cheaper and better services to the clients than a client's in-house IT unit does. In the study, however, we are not able to conclude such a significant causal relationship between the ASP outsourcing objectives and the level of functional capability of ASP though a certain level of expectation for using ASP service is still determined for the sake of the positive path coefficient. With this observation, the authors proposed the following two possible explanations. The first explanation is that SMEs have limited knowledge about the ASP's business model and what services the ASPs are able to offer and demanded to sustain. The use of ASP service is still in a beginning stage for Chinese SMEs. The SMEs owners purchasing ASP services may merely expect to use some simple and general applications and to save the beginning IT investment cost. Hence, the users may not consider the ASPs' sustainability, etc.

The other possible reason is that the surveyed Chinese SMEs though have certain expectations when using ASP services, their original objectives to participate in this ASP development project may root from the attempt to build Guanxi with government officials. Guanxi is believed to lead to trust; then, stable relationship; finally, better service. One may suspect that this distinct Chinese Guanxi issue may be the major cultural reason leading to the insignificant causal relationship in H_1. The argument is reasonable but plausible. Unfortunately, this study does not have sufficient information to examine the influence of this distinct cultural Guanxi issue on the study to explain the proposed causal relationship. In addition, this study merely intends to serve as a preliminary work to examine the current state of Chinese SME's satisfaction of ASP service. Hence, though the cultural impact is interesting and has strong influence on the adoption of ASP service, the authors do not consider it in this study.

Second, we concluded the existence of a significantly positive influence form ASP outsourcing objectives to ASP-client coordination. ASP, by Application Service Provider Consortium's definition, is an organization that manages and delivers application capabilities to multiple entities from a data center across a wide area network. Clearly, the business model of ASP operation is to provide customized services to many different clients through using a set of standard application software (products). To offer customized services, ASPs have to frequently communicate with the clients to understand the clients' latest demand and to synchronize with the clients' current system. These frequent communications are a basis to establish mutual trust and further develop a closer partnership in which more operational activities are coordinated. Hence, ASP outsourcing objectives may have positive influence on the development of ASP-client coordination.

Third, functional capability of the ASP was examined to have negative impacts on the clients' satisfaction level, either in system satisfaction or in service satisfaction. This finding is in the opposite of what concluded in Susarla et al. [6], that functional capabilities of an ASP are postively related to the satisfaction level. We considered that the opposite results may come from the difference of satisfaction measurements. Susarla et al. [6] measured the satisfaction through the existence of information sharing between ASP and clients and the clients' perception of the security level provided by the ASPs. In this study, clients' satisfaction is measured by two independent factors: clients' system satisfaction and clients' service satisfaction. Clients' system satisfaction measures the comprehensiveness, robustness, and convenience of the system to be used from the clients' remote devices. Meanwhile, clients' service satisfaction measures the level of clients' satisfaction on the ASP's services, including after-sell services and customization. Hence, the difference of the measurements used may be one reason for the diverse results. Furthermore, the negative influences may be partly related to the previous explanation on the inconclusive findings between the ASP outsourcing initiatives and functional capability of the ASP. The limited knowledge of ASP business model

may mislead the clients to setup deceptive objectives because ASPs may boast the possible outcomes.

Forth, ASP-client coordination is examined to have significantly positive impacts on clients' satisfaction level. Coordination between two individual entities may create a strong partnership. This partnership is even stronger in an ASP-client relationship. In such a partnership, problems are usually resolved through discussion, negotiation, and cooperation. With frequent communication and cooperation, clients may not establish deceptive objectives while ASPs could invest the least to necessary resources to provide the services that the clients' require. Hence, the clients' perception on the satisfaction level would get improved as stronger coordination activities implement.

Finally, firm size and industry type do not affect the robustness and the relationships identified in the proposed model.

6. Conclusion

The use of ASP by SMEs is the next promising trend for IT sourcing activities. Given this fact, this work investigates the antecedent roles of functional capability of ASP and of ASP-client coordination development in improving Chinese SMEs' satisfaction. One close study was done in the United States to understand the service components of ASP and the empirical analysis of ASP service satisfaction. Our finding is different from the prior study in that our results showed that the functional capability of ASP does not improve clients' satisfaction. We considered this difference may come from the different measurement used for the satisfaction.

Some common limitations in a survey-based research are inevitably included. For example, the limitations come from the understanding of the survey questions, the data used to assess the various constructs, reliance on key informants, and common methods variance. In addition, the use of ASP is still young in China so that the survey respondents may have limited understanding about the ASP application.

This study examines the relationships between functional capability of ASP and clients' satisfaction and between ASP-client coordination and clients' satisfaction in China. One possible extension is to conduct a similar study in another developing country with strong IT investment and huge number of SMEs. India may be one good candidate to make such a study. In addition, a further examination to investigate the influence of risks in using ASPs may be valuable for senior executives in SMEs to justify the decision making process. Finally, a further study about the

impact of Chinese culture on the ASP service is worth to conduct.

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Appendix

Construct	Item	Factor	Source
ASP outsourcing objectives (OT)	OT1	Reduce IT budgets	[4]
	OT2	Improve technical service	
	OT3	Improve company's competitiveness, for example, quick response to market change and the fulfillment of e-business strategy	
	OT4	Business reasons	
Functionality capability of ASP (FC)	FC1	ASPs should be stable companies.	[6]
	FC2	ASPs should have excellent IT technology knowledge, provide latest IT and secure applications.	
	FC3	ASPs should support our business application outsourcing needs and have experience in client industry.	
ASP-client coordination (CO)	CO1	We can share knowledge with ASPs to reduce uncertainties and improve coordination with long time cooperation.	[15], [21]
	CO2	It is less difficult to coordinate activities if we have strong relationships with ASPs.	
	CO3	We believe that mutual trust improves coordination	
	CO4	We believe that coordination is required for the application of important IT functions.	
Clients' system satisfaction (SYS)	SYS1	Actual performance of ASPs' IT application.	[6], [7]
	SYS2	Applicability of IT (system responsiveness, stability and accessibility).	
	SYS3	ASP meets our business requirements.	
Clients' service satisfaction (SER)	SER1	Results of integration to existing IT applications	
	SER2	ASPs' IT functionality (technology and technique staff capability etc.)	
	SER3	ASPs' security policy	
	SER4	ASP's service (including service attitudes, customization, responsiveness, etc.)	