

2008

System Development Service Quality: A Comparison of the In-House Development and the Application Outsourcing Environment

Man Kit Chang

Hong Kong Baptist University, mkchang@hkbu.edu.hk

Louisa Lui

Manulife (International) Limited, luilouisa@yahoo.edu

Follow this and additional works at: <http://aisel.aisnet.org/icis2008>

Recommended Citation

Chang, Man Kit and Lui, Louisa, "System Development Service Quality: A Comparison of the In-House Development and the Application Outsourcing Environment" (2008). *ICIS 2008 Proceedings*. 36.

<http://aisel.aisnet.org/icis2008/36>

This material is brought to you by the International Conference on Information Systems (ICIS) at AIS Electronic Library (AISeL). It has been accepted for inclusion in ICIS 2008 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.

SYSTEM DEVELOPMENT SERVICE QUALITY: A COMPARISON OF THE IN-HOUSE DEVELOPMENT AND THE APPLICATION OUTSOURCING ENVIRONMENT

*Qualité de service du développement des applications: comparaison des
développements maison et de l'externalisation*

Completed Research Paper

Man Kit Chang

Department of Finance and Decision
Sciences
School of Business
Hong Kong Baptist University
Kowloon Tong, Hong Kong
mkchang@hkbu.edu.hk

Louisa Lui

Manulife (International) Limited
(luilouisa@yahoo.com)

Abstract

Very few studies have investigated the service quality of the system development process. In this study, an instrument based on SERVPERF's service quality dimensions, i.e., tangibles, reliability, empathy, responsiveness, and assurance, was developed to study the service quality for in-house and outsourced system development process. Analysis of the data collected from 152 system users who had also involved in the development of those systems supported the validity and reliability of the newly developed measures. The relative contribution of the individual service quality dimensions to the overall system development service quality was found to vary between the outsourcing and in-house group, so as the impact of the overall system development service quality on the perceived usefulness and perceived ease of use. These results suggest that users may evaluate the services provided by outsourcing vendors and in-house IT personnel differently.

Keywords: Application Development Outsourcing, SERVPERF, System Development Service Quality

Résumé

L'étude traite des processus de développement de systèmes en tant que la réalisation d'un service. L'échelle SERVPERF apparaît utile pour mesurer la qualité de service du développement d'un système. Cette qualité de service affecte l'utilité perçue et la facilité d'utilisation perçue du système résultant. De plus, l'effet des dimensions de la qualité de service varie selon que l'on considère les groupes de développement interne ou d'externalisation.

Introduction and Research Framework

IS researchers have always been interested in the success of outsourcing of IS functions as increasing numbers of firms are using external providers. It has been studied from a number of perspectives such as transaction cost theory (Grover, et al. 1996; Whitten & Leidner 2006), social exchange and power-political perspectives (Lee & Kim 1999; Whitten & Leidner 2006), and psychological contract (Koh & Ang 2004).

One important factor that has been suggested by various perspectives is service quality of the service providers (Grover, et al. 1996; Whitten & Leidner 2006). Firms not only consider cost when making sourcing decisions, other factors come into the scene. It has been identified in a comprehensive review of the outsourcing literatures that the key role the relationship plays in outsourcing has been recognized across all research streams (Dibbern, et al. 2004). Providing better service quality by increasing customer orientation, balance between the user needs and development resources, have been cited as one of the reasons why firm would like to outsource their IS functions (Reponen 1993).

As pointed out by Whitten and Leidner (2006), the satisfaction of the outsourcing arrangement will be affected by the perception of the relationship. This is consistent with the social exchange theory (SET) view on long-term relationship (Emerson 1981). Based on the theory, Whitten and Leidner posit that service quality is an important predictor of a sustained outsourcing relationship and the empirical result collaborate with the prediction. Moreover, from the transaction cost perspective, poor service quality will increase the need of monitoring the performance of the service providers, which will effect on the increase in the cost of outsourcing (Whitten & Leidner 2006).

Service quality can be defined as a global judgment of attitude relating to the superiority or excellence of service (Parasuraman, et al. 1985). The perception of service quality results from the comparison of expectations with performance (Parasuraman, et al. 1985). The most widely known scale for measuring service quality is SERVQUAL developed by Parasuraman et al. (1988). SERVQUAL identifies five dimensions of service quality, namely, tangibility, reliability, empathy, responsiveness, and assurance. In marketing literature, service quality has been found to have positive and significant relationship with willingness of recommend the company and customer satisfaction (Parasuraman, et al. 1988; Parasuraman, et al. 1991). In the IS area, IS service quality has found to have a positive effect on user satisfaction and other success measure such as usefulness (Jiang, et al. 2000; Kettinger & Lee 1995; Pitt, et al. 1995; Watson, et al. 1993).

Although there are only few studies on the effect of service quality of the outsourced vendors, they general support the importance of service quality in maintaining the long-term outsourcing arrangement. Grover et al. (1996) examined the effects of service quality and partnership on the relationship between IT outsourcing and its success. SERVQUAL was adopted in this study and the dimensions of tangibles and reliability were selected to be included into the measurement instruments because they were particularly relevant to outsourcing practice. The study found that service quality of the provider in general was related to outsourcing success directly. A study of fourteen outsourcing cases has found that firm decided to backsource the IS operation because the vendor could not provide the required quality standard (Hirschheim & Lacity 2000). Another study also found that service quality help firms maintain trust in the suitability of outsourcing in general but not trust in a particular vendor. Therefore, firms experiencing low service quality will choose backsource, whereas firms experiencing high service quality but encountering other problems will choose to switch to another vendor (Whitten & Leidner 2006).

Despite the important of service quality to the success of outsourcing, outsourcing literature is full of anecdotes of unsatisfactory service quality such as slow response to users request, misunderstanding of user requirements, not doing what has promised, and redeploying the best employees to other projects to attract new customers. (Hirschheim & Lacity 2000; Lacity & Hirschheim 1993)

It is thus important to understand what contributes to good service quality. This understanding not only allows vendors to develop better ways of serving their customers, it also reduces the chance that the customers discontinue the outsourcing arrangements.

The degree of outsourcing varies widely, running from outsourcing the whole IT operations, to selective outsourcing, and to totally insourcing, i.e., none of the IT operations is outsourced (Dibbern, et al. 2004). The current study focuses on the application development outsourcing. The area of selective outsourcing has resurged recently as offshore development to India and other countries increase (Whitten & Leidner 2006). Although Grover et al. (1996) has found that service quality was positively relate to outsource success in general, the level of

application development outsourcing was not related to outsourcing success. Moreover, it has found that the average value of service quality for all companies doing application development and maintenance outsourcing was the lowest of all IS functions, i.e., the service providers did not provide the level of service expected on facilities and reliability of service. The authors contend that application development is difficult to be satisfactory handled by external service providers because the development process is full of uncertainty. They also suggest that improving the service quality could improve the chance of this type of outsourcing success (Grover, et al. 1996).

In recent years, a large body of literature has been published on service quality of information system functions. Some scholars have examined the conceptual and measurement aspects of IS service quality (Kettinger & Lee 1997; Kettinger & Lee 2005; Pitt, et al. 1997; Van Dyke, et al. 1997; Van Dyke, et al. 1999; Watson, et al. 1998), while others have investigated the importance of IS service quality to an organization. Relationships between IS service quality and such variables as user satisfaction, trust in the IS department, and satisfaction with the IS department have been studied (Carr 2006; Grover, et al. 1996; Jiang, et al. 2000; Jiang, et al. 2003; Kettinger, et al. 1995; Landrum, et al. 2007; Pitt, et al. 1995). These studies have generally focused on the quality of the service provided by the IS function as a whole, especially the support provided by IS personnel during operations.

However, there has been little research examining the information system development process from the perspective of service quality. After exploring over 1000 studies for their meta-analysis study of IS success, Sabherwal et al. (2006) could find only one article that discussed the relationship between the quality of an IS development team, facilitating conditions and user experience. We contend that a major component of the system development process is actually services provided by the development team, and these exhibit the essential service characteristics of intangibility, heterogeneity, and inseparability (Bateson 1989; Lovelock 1992; Shostack 1987). Service quality in this context involves, in particular, responsiveness, empathy, reliability, and assurance. These dimensions cover important aspects of the system development process, such as user-developer communication and involvement (Hunton & Beeler 1997; McKeen, et al. 1994; Tiwana & Keil 2006) and developer responsiveness (Gefen & Keil 1998b), that have been investigated separately in prior studies. Studying the system development process from a service quality perspective thus promises to offer fresh insights into the process. We have thus conceptualized the system development process as service and attempt to investigate what contribute to the system development service quality (SDSQ) in the application development outsourcing situation. The five dimensions of service quality, i.e., tangibility, reliability, empathy, responsiveness, and assurance, identified in SERVQUAL were used as the basis of our investigation.

We have also compared the contribution of individual service quality dimensions to the overall SDSQ between the in-house and outsourced projects in the current study. As suggested by Dibbern et al. (2004), there is general lack of comparative studies on IS outsourcing. Although the authors did not specially mention the comparison between in-house and outsource behavior, we believe that by comparing these two contexts, we can establish the baseline for assessing the external service providers. We have assessed the relative importance of the service dimensions by analyzing their impact on the overall perception of the service quality of system development process.

In a comparison study of in-house and outsourced personnel, outsourced IS workers were found to be perceived as less trustworthy and was rated lower in their performance by their supervisor as well as other personnel. (Ang & Slaughter 2001). From the trust literature, three characteristics of a trustee -- ability, benevolence, and integrity -- affect the trustworthiness (Mayer, et al. 1995). As dimensions of service quality correspond closely to the benevolence and ability of the trustees, the user may expect higher of the outsourced IS worker than the in-house colleagues.

In order to understand the usefulness of the system development service quality construct, we have treated the overall SDSQ as an external variable to the Technology Acceptance Model, and has tested its impact on perceived usefulness (PU) and perceived ease of use (PEOU) of the information systems. Gefen and Keil (1998b), in studying the adoption of an expert system using an extended TAM, have found that developer responsiveness had positive impact on both PU and PEOU. Since responsiveness is only one aspect of system development service quality, the current research posits that system development service quality is positively related to PU and PEOU.

In sum, there are three objectives of the current study:

1. Conceptualize the system development process as a service delivery process and investigate what contributes to the system development service quality
2. Compare the relative contributions of the individual service quality dimensions to the overall system development service quality between the in-house project group and the outsourcing group.

3. Investigate the impact of system development service quality on system success, more specifically, on PU and PEOU

The research framework (with results) is shown in Figure 1.

Research Methodology

Measuring System Development Service Quality

A modified version of SERVPERF (Cronin & Taylor 1992) was used to measure the perceived service quality of the whole information system development process. SERVPERF is a version of SERVQUAL that only rate on the performance but not the expectation of service quality. It was used in the current study to provide a better predictive power (Kettinger & Lee 2005; Kim, et al. 2005). The 22 items constituting SERVPERF were carefully scrutinized for their suitability for measuring system development service quality. Previous IS studies on the refinement of SERVQUAL were also considered in refining the scale. Three items were removed from the original instrument: "Materials associated with the service (such as pamphlets or statements) is visually appealing at XYZ", "You feel safe in your transactions with XYZ", and "XYZ has operating hours convenient to all its customers". In the context of the service provided in the IS development process, these items did not seem applicable. Moreover, these same items were removed in Kettinger and Lee's (1997) study to obtain a more valid scale. Therefore, the resultant instrument contained 19 items covering the five dimensions of responsiveness, reliability, assurance, empathy and tangibles.

The wording of the 19 items was slightly modified to fit the context of IS development. For example, the statement of "when XYZ promises to do something by a certain time, it does so." in the original SERVPERF was modified to "when IT staff/outside vendor promised to do something in the system development process within a certain time, they did so." (See Appendix for the measurement items.)

The respondents were required to rate each statement on a 7-point scale ranging from strongly disagree (1) to strongly agree (7). This scale was used for all constructs unless stated otherwise.

Responsiveness, reliability, assurance, and empathy were modeled as reflective constructs. The tangibles dimension was modeled as formative construct because after carefully scrutinized the items we found that they does not need to covary with one another (Jarvis, et al. 2003). For example, an IT vendor can have an up-to-date hardware and software but its office can be disorganized.

Measuring Overall System Development Service Quality, Perceived Usefulness, and Perceived Ease of Use

Three items were used to measure the overall system development service quality. For example, respondents were asked, "Overall, how would you rate the quality of service provided by your IT staff in the system development process?" The respondents were required to rate each statement on a 7-point scale ranging from very dissatisfied (1) to very satisfied (7).

Five items adopted from Gefen and Keil (1998a) and Venkatesh and Davis (1996) were used to measure Perceived Usefulness. Items asked the respondents about such thing as whether the system improves their job productivity or effectiveness

Four items were adapted from Gefen and Keil (1998a) and Venkatesh and Davis (1996) to measure the Perceived Ease of Use. For example, respondents were asked "I would find it easy to use the system to do what I what to do".

Sample and Data Collection Procedure

This study targeted users of information systems who had also been involved in the system development process. Such respondents were chosen because they could provide valid information concerning both the system development process and the quality of the final system.

A number of steps were necessary to identify an adequate pool of suitable respondents. First, companies were selected from the Directory of Key Decision-Makers in Hong Kong Businesses based on the criteria that they had more than 100 employees in Hong Kong and they had an IT department. Second, phone conversations with the company's IT department representatives introduced the study's objectives and invited appropriate candidates from each company to participate in this study. The reason for contacting the IT department representatives was that they were considered the people best placed to know which employees had participated in both system development and using the system. After receiving the cooperation of IT department representatives, sets of questionnaires, cover letters explaining the purpose of the study, and return envelopes were mailed to the IT department representatives. The IT department representatives then passed on the materials to the appropriate respondents. Two weeks after the questionnaires were sent a follow-up call was made to the IT representative.

Totally 655 questionnaires were sent to 182 companies. Finally, 74 and 78 usable questionnaires from the outsourcing and in-house group respectively were returned, yielding an effective response rate of 23.2%. Among the respondents, 58.6% of them were males, with 67.3% of all respondents in the 20-29 age group, 27.3% belonged to the age group 30-39, and the remaining 5.4% between 40 and 49 years old. Most of the respondents, around 79.6%, had a polytechnic diploma or above.

Respondents came from various departments of the companies, such as the purchasing department, accounting department, finance department, warehousing, and customer service. No personnel from the information system or computer department were surveyed. The positions held by the respondents included clerk, departmental officer, manager, etc. Their firms came from a wide range of industries, including banking, insurance, manufacturing, telecommunications, logistics, trading, and retailing.

The information systems used by the respondents included accounting, forecasting, credit control, purchasing, order delivery, and customer information systems. Most were described as supporting the operations of the department, aiming to improve the users' job performance and increase the effectiveness of the organization.

All the systems rated had been in use for more than one year, and had been developed within the past 3 years from the delivery of the questionnaire. This was to ensure relative accurate recall of the performance of the system developers during the development process.

Analysis and Results

Partial Least Square (PLS) was used to analyze the data. PLS is a component-based structural equation model technique that allows the test of the measurement and path models simultaneously (Gefen, et al. 2000). Bootstrap resampling with 500 sub-samples were used to estimate the parameter means and standard errors. PLS-Graph Version 3.0 was used (Chin 2003). To test the homogeneity of the two sub-samples, Chi-square test of contingency table was applied to gender, education level, and age. No significant different was found. Moreover, independent sample t-test was used to test the means of the 31 measurement items in the model. No significant different was found for the means; significant different were found in the variance of only 3 items.

Table 1 Factor Loadings and Weights for the Latent Constructs

Factor	Outsourcing			In-house		
	Composite Reliability	AVE	Loadings/ Weight*	Composite Reliability	AVE	Loadings/ Weight*
Reliability	0.93	0.74		0.92	0.71	
REL1			0.83			0.83
REL2			0.85			0.84
REL3			0.90			0.83
REL4			0.85			0.89
REL5			0.86			0.78
Responsiveness	0.94	0.79		0.91	0.73	
RES1			0.91			0.92
RES2			0.89			0.93
RES3			0.85			0.94
RES4			0.91			0.95
Empathy	0.92	0.74		0.93	0.76	
EMP1			0.87			0.88
EMP2			0.85			0.80
EMP3			0.86			0.89
EMP4			0.87			0.85
Assurance	0.95	0.84		0.92	0.78	
ASSU1			0.93			0.88
ASSU2			0.91			0.85
ASSU3			0.92			0.88
Tangibles						
TAN1			0.77			0.60
TAN2			0.30			0.35 [#]
TAN3			0.28			0.37 [#]
Overall System Development Service Quality	0.96	0.89		0.96	0.89	
SDSQ1			0.94			0.86
SDSQ2			0.94			0.86
SDSQ3			0.95			0.94
Perceived Usefulness	0.95	0.81		0.94	0.77	
PU1			0.92			0.92
PU2			0.88			0.89
PU3			0.94			0.91
PU4			0.92			0.89
PU5			0.85			0.74
Perceived Ease of Use	0.95	0.82		0.96	0.86	
PEU1			0.92			0.93
PEU2			0.92			0.91
PEU3			0.91			0.92
PEU4			0.87			0.95

*All figures shown are factor loadings, except those for the tangibles dimension, for which item weights are shown.

All factor loadings and weights are significant at alpha level of 0.05 except for the weights marked with “#”.

Measurement Model

The psychometric properties of the measures were first evaluated. For the reflective constructs, convergent validity was assessed based on the criteria that the indicator's estimated loadings must be significant on its posited underlying construct, composite reliability should be higher than 0.7, and the average variance extracted (AVE) should be higher than 0.5. Discriminant validity was assessed by the criteria that the square root of AVE should exceed that construct's correlation with other constructs (Chin 1998).

Table 1 shows the AVE, composite reliability, and loadings/weights of the indicators on their respective constructs. All factor loadings were fairly high and significant. Table 2 and Table 3 show the square root of the AVEs and the correlations among latent constructs (except tangible) for the outsourcing and in-house group respectively. As shown in the Table 1, the composite reliabilities of the constructs were higher than 0.7 and the AVEs were higher than 0.5, which implied that the scales were reliable. All the item loadings were quite high and significant at .05 levels; together with the fact that the square root of AVEs were higher than the construct's correlation with other constructs (as shown in Table 2 and 3), it indicated adequate discriminant validity.

For the formative construct, i.e., the tangibles dimension, the methods of determining construct validity with reflective constructs that focus on common variance cannot be applied because there is no requirement that the correlations among indicators within a construct need to be higher than correlations between indicators of different constructs (Petter, et al. 2007). VIF was used to determine whether the indicators have serious multicollinearity. The VIF value of all the indicators for the tangibles dimension were less than 3.3 which indicated that there was no serious multicollinearity (Diamantopoulos & Siguaw 2006). We also looked at whether the items weight was significant. The item weight for the indicators of the tangibles dimension for the outsourcing group were all significant, however, only the weight of first indicator for the in-house group was significant. However, we decided to retain the non-significant items (Bollen & Lennox 1991) so that the models for the in-house group and the outsourcing group were more comparable.

The Structural Model

Figure 1 presents the standardized structural path coefficients along the arrows of the proposed structural model. The numbers without a bracket are for the outsourcing group while the numbers enclosed in square bracket are for the in-house group. For the outsourcing group, reliability ($\beta = .31$), responsiveness ($\beta = .18$), assurance ($\beta = .26$), and tangibles ($\beta = .17$) were significantly positively related to the overall service quality of the system development process. In all, 79% of the variance in overall quality was accounted for. However, empathy did not have a significant impact on the overall SDSQ. The overall SDSQ had a significant positive impact on the PU ($\beta = .54$), and PEOU ($\beta = .67$), it accounted for 29% and 45% of the variance of PU and PEOU respectively.

For the in-house group, reliability ($\beta = .25$), responsiveness ($\beta = .34$), and assurance ($\beta = .29$) were significantly positively related to the overall service quality of the system development process. In all, 57% of the variance in overall SDSQ was accounted for. However, empathy and tangibles did not have a significant impact on the overall service quality. The overall SDSQ had a significant positive impact on the PU ($\beta = .38$), and PEOU ($\beta = .58$), it accounted for 14% and 34% of the variance of PU and PEOU respectively.

Table 2 Square Root of AVE and Correlations among Latent Constructs for Outsourcing Group

		1	2	3	4	5	6	7
1	Assurance	0.93						
2	Empathy	0.75	0.86					
3	Reliability	0.67	0.76	0.85				
4	Responsiveness	0.74	0.74	0.73	0.89			
5	Overall SDSQ	0.72	0.77	0.79	0.79	0.94		
6	PU	0.66	0.56	0.64	0.53	0.54	0.90	
7	PEOU	0.69	0.53	0.53	0.57	0.67	0.45	0.90

Note: The diagonal elements are the square roots of AVE.

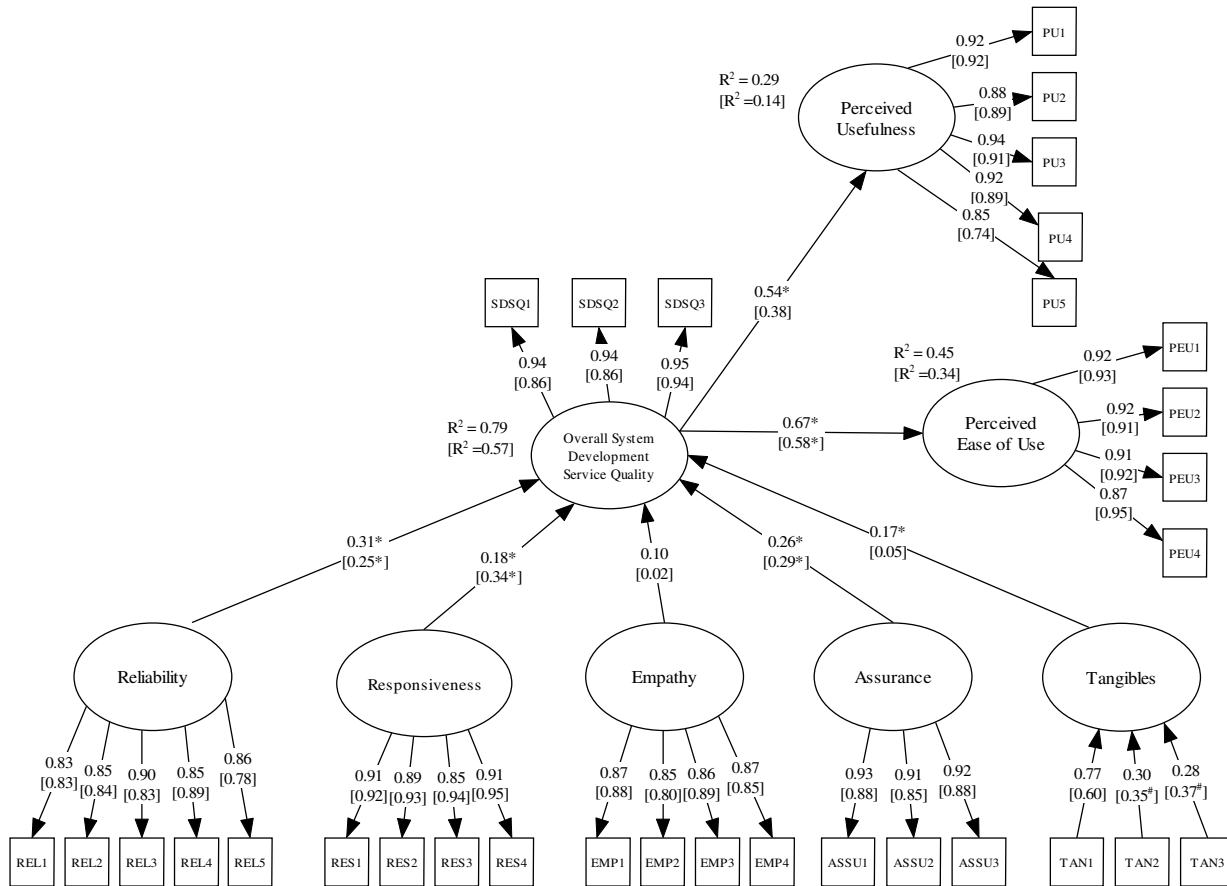
Off-diagonal elements are correlations between latent constructs.

Table 3 Square Root of AVE, and Correlations among Latent Constructs for In-house Group

		1	2	3	4	5	6	7
1	Assurance	0.89						
2	Empathy	0.58	0.87					
3	Reliability	0.60	0.55	0.84				
4	Responsiveness	0.61	0.47	0.49	0.85			
5	Overall SDSQ	0.65	0.46	0.60	0.65	0.94		
6	PU	0.35	0.39	0.30	0.31	0.38	0.87	
7	PEOU	0.64	0.53	0.48	0.37	0.58	0.27	0.93

Note: The diagonal elements are the square roots of AVE.

Off-diagonal elements are correlations between latent constructs.



#All loading and weights are significant at 0.05 level except the ones marked with "#"

*Path coefficients are significant at 0.05 level

Figure 1 Results of the Analysis for the Research Model

Discussion and Conclusion

Applying the concept of service quality to the systems development process, this study shows that system development service quality is useful in understanding and predicting the success of information systems as measured by PU and PEOU of the resultant systems. The concept of service quality allows the identification of important aspects of the system development process and the synthesis of factors such as the developer’s perceived responsiveness (Gefen & Keil 1998b) and expertise (Weitzel & Graen 1989) which have previously been studied separately.

The relative contribution of the individual service quality dimensions to the overall system development service quality is different for the in-house and outsourcing groups. Table 4 is a side-by-side comparison of the path coefficients of the service quality dimensions for the two groups. As shown, reliability is the most important dimension for the outsourcing group, followed by assurance and responsiveness, while the order of importance for these three dimensions is in reverse for the in-house group, i.e., responsiveness is most important followed by assurance and reliability. Tangibles is significant for the outsourcing group but not for the in-house group. Empathy is not significant for both groups.

Table 4 Comparison of the Path Coefficients of the Service Quality Dimensions for the Outsourcing and In-house Groups

	Outsourcing	In-house
Reliability	0.31*	0.25*
Assurance	0.26*	0.29*
Responsiveness	0.18*	0.34*
Tangibles	0.17*	0.05
Empathy	0.10	0.02

**Path coefficients are significant at 0.05 level

As discussed before, outsourced IS workers has been found to be perceived as less trustworthy and was rated lower in their performance (Ang & Slaughter 2001). However, direct observation of the action of the developer is harder for the outsourced project especially if the vendor is remotely located (Nicholson & Sahay 2001) and more time and effort are required to monitor the vendor's behavior (Choudhury & Sabherwal 2003). Therefore, performing the job reliably (doing the job right at the first time) becomes a very important criterion for judging the service quality as it can be time-consuming and tedious to interact with the outsourcing developer if a lot of mistakes need to be rectified.

Responsiveness ranks number one for the in-house group and number 3 for the outsourcing group. The path coefficient for the in-house group is much higher than the outsourcing group. Users may expect colleagues within the same company to response more quickly to their requests than the staffs of outside companies. If the internal developers are more responsive, even if there are errors, they can be rectified very quickly.

Tangibles dimension is significant for the outsourcing group only but not for the in-house group. Users may judge vendors by the appearance of their offices and the IT staffs as the users may be unfamiliar with the developers. However, for the internal colleagues, the expectation for this aspect may not be as high since users and developers are located in similar physical environment and the tangible aspects should be more alike. This may create the difference in the expectation and importance of the tangibles dimension.

For the empathy dimension, it is insignificant for both the in-house group and outsourcing group. Empathy refers to whether the customers are being provided with individual attention. This dimension is important in some service settings where only one customer is being served. In the system development process, the development team may need to take care of the interest of a large number of users in order to produce a useful system that is acceptable to all; individual users may not expect the IT personnel to overly focus only on their individual interests.

The effect of overall system development service quality on the PU and PEOU of the resultant systems is significant for both groups. This finding illustrates the importance of providing good service during the system development process, in addition to the good service quality of the support stage (Jiang, et al. 2000), for making an information system a successful one. Thus, aside from improving the technical aspect of the system development process, IT managers have to find ways to improve various aspects of the service quality in the system development process. Service quality dimensions can be serve as a good indicator for identifying areas that needs improvement (Jiang, et al. 2000).

As can be seen from the results, overall system development service quality accounts for higher percentage of the variance of PU and PEOU of the outsourcing projects than the in-house ones. This implied that having a high level of service quality is even more important in the outsourcing case than the in-house case. The higher demand on the system development service quality for the outsourcing systems may be due to the uncertainty of the development process which makes it difficult to be handled by external service providers satisfactory (Grover, et al. 1996). External service providers thus need to pay even more attention to this if they want to create successful information systems.

The results of the measurement model raise some issues of the psychometric property of the tangibles dimension. In the information systems area, the tangibles dimension was dropped in two studies (Jiang, et al. 2000; Kettinger &

Lee 1994) and several studies of SERVQUAL also had problems with the tangibles dimension (Cronin & Taylor 1992; Ma, et al. 2005; Parasuraman, et al. 1991). When carefully looking at the items, change in one indicator of the tangibles dimension does not require a change in all other indicators. Thus the conventional common factor analysis cannot extract one factor out of the indicators measuring the tangibles dimension or else multiple dimensions have been extracted. Thus the tangibles dimension should be modeled as formative construct instead of reflective construct. We have tried to see what the result would be if the tangibles dimension was modeled as reflective construct. The AVE and composite reliability were unacceptably low for both groups. On the other hand, although the tangibles dimension has been modeled as a formative construct in the current study, only for the outsourcing group that all the weights of the indicators are significant. For the in-house group, only one out of three indicators is significant. This implies that the indicators for tangibles may vary depending on the context: in-house or outsourcing. Future study may want to identify the appropriate indicators for different contexts and should consider modeling the tangibles dimension as a formative construct which is important for the understanding of theories relating to the service quality (Petter, et al. 2007).

The results of the study should be interpreted in light of a number of limitations. The sample size of each group of respondents is relative small and this will affect the generalizability of the results as well as reducing the power of the tests. This study has collected data from users of information system who have also been involved in the system development of the same system they use. They are the most suitable persons to evaluate the performance of the IT staff during the system development and the quality of the resultant system. However, this contributes to the relatively small sample size and the difficulties of making the follow-up action of the survey because it is difficult to locate those employees. In addition, respondents of this study are system users who have also involved in the system development. This sample may produce an upward-bias to the evaluation of the success measure towards the information system because of the higher level of commitment and ownership to a project.

In the current study, we have conceptualized systems development as a service delivery process. As organization may attempts to achieve different objectives through systems development including process reengineering and organizational transformation (Applegate, et al. 2007), other conceptualizations, such as treating the systems development process as a mutual learning process or an organizational development process, may be useful. As such, in order to assess the quality of the process, evaluation criteria, such as effective knowledge transfer (Koh & Ang 2004), should be added to evaluate the system development process.

One of the characteristics of service is "relative inseparability", i.e., the production and consumption of service happen at the same time (Schneider & White 2004). Thus, the outcome of a service encounter is co-created by the service producer and the customer. In the current study, only the system users were asked to assess the quality of service provided by the system developers. Future studies can also ask the system developers to assess the actions taken by the users and investigate how does this affects the service quality and system success.

References

- Ang S. and Slaughter S.A. "Work Outcomes and Job Design for Contract Versus Permanent Information Systems Professionals on Software Development Teams," *MIS Quarterly* (25:3), 2001, pp.321-350.
- Applegate, L.M., Austin, R.D., and McFarland, F.W. *Corporate Information Strategy and Management : Text and Cases*, McGraw-Hill/Irwin, Boston, 2007.
- Bateson, J.E. *Managing Services Marketing*, Dryden Press, London, 1989.
- Bollen K.A. and Lennox R. "Conventional Wisdom on Measurement: A Structural Equation Perspective," *Psychological Bulletin* (110:2), 1991, pp.305-314.
- Carr C.L. "Reciprocity: The Golden Rule of IS-User Service Relationship Quality and Cooperation," *Communications of the ACM* (49:6), 2006, pp.77-83.
- Chin, W.W. PLS-Graph (Version 3.0, Build 1126). 2003. Soft Modeling Inc.
- Chin, W.W. "The Partial Least Squares Approach to Structural Equation Modeling," in *Modern Methods for Business Research*, G.A. Marcoulides (ed.), Lawrence Erlbaum Associates, Hillsdale, NJ, 1998, pp.295-336.
- Choudhury V. and Sabherwal R. "Portfolios of Control in Outsourced Software Development Projects," *Information Systems Research* (14:3), 2003, pp.291-314.
- Cronin J.J. and Taylor S.A. "Measuring Service Quality: A Reexamination and Extension," *Journal of Marketing* (56:3), 1992, pp.55-68.
- Diamantopoulos A. and Sigauw J.A. "Formative Versus Reflective Indicators in Organizational Measure Development: A Comparison and Empirical Illustration," *British Journal of Management* (17), 2006, pp.263-282.
- Dibbern J., Goles T., Hirschheim R., and Jayatilaka B. "Information Systems Outsourcing: A Survey and Analysis of the Literature," *Database for Advances in Information Systems* (35:4), 2004, pp.6-102.
- Emerson, R.M. "Social Exchange Theory," in *Social Psychology: Sociological Perspective*, M. Rosenberg and R.H. Turner (eds.), Basic Book, New York, 1981, pp.31-65.
- Gefen D. and Keil M. "The Impact of Developer Responsiveness on Perceptions of Usefulness and Ease of Use: An Extension of the Technology Acceptance Model," *DATA BASE* (29:2), 1998a, pp.35-49.
- Gefen D. and Keil M. "The Impact of Developer Responsiveness on Perceptions of Usefulness and Ease of Use: An Extension of the Technology Acceptance Model," *DATA BASE* (29:2), 1998b, pp.35-49.
- Gefen D., Straub D.W., and Boudreau M.C. "Structural Equation Modeling and Regression: Guidelines for Research Practice," *Communications of Association for Information Systems* (4:7), 2000, pp.1-76.
- Grover V., Cheon M.J., and Teng J.T.C. "The Effect of Service Quality and Partnership on the Outsourcing of Information Systems Functions," *Journal of Management Information Systems* (12:4), 1996, pp.89-116.
- Hirschheim R. and Lacity M. "The Myths and Realities of Information Technology Insourcing," *Communications of the ACM* (43:2), 2000, pp.99-107.
- Hunton J.E. and Beeler J.D. "Effects of User Participation in Systems Development: A Longitudinal Field Experiment," *MIS Quarterly* (21:4), 1997, pp.359.
- Jarvis C.B., MacKenzie S.B., and Podsakoff P.M. "A Critical Review of Construct Indicators and Measurement Model Misspecification in Marketing and Consumer Research," *Journal of Consumer Research* (30:2), 2003, pp.199-218.
- Jiang J.J., Klein G., and Crampton S.M. "A Note on SERVQUAL Reliability and Validity in Information System Service Quality Measurement," *Decision Sciences* (31:3), 2000, pp.725-744.
- Jiang J.J., Klein G., Tesch D., and Chen H.-G. "Closing the User and Service Provider Quality Gap," *Communications of the ACM* (46:2), 2003, pp.72.
- Kettinger W.J. and Lee C.C. "Perceived Service Quality and User Satisfaction With the Information Services Function," *Decision Sciences* (25:5/6), 1994, pp.737-766.
- Kettinger W.J. and Lee C.C. "Exploring a "Gap" Model of Information Services Quality," *Information Resources Management Journal* (8:3), 1995, pp.5-16.
- Kettinger W.J. and Lee C.C. "Pragmatic Perspectives on the Measurement of Information Systems Service Quality," *MIS Quarterly* (21:2), 1997, pp.223-240.
- Kettinger W.J. and Lee C.C. "Zones of Tolerance: Alternative Scales for Measuring Information Systems Service Quality," *MIS Quarterly* (29:4), 2005, pp.607-624.
- Kettinger W.J., Lee C.C., and Lee S. "Global Measures of Information Service Quality: A Cross-National Study," *Decision Sciences* (26:5), 1995, pp.569-588.

- Kim Y.J., Eom M.T.I., and Ahn J.H. "Measuring IS Service Quality in the Context of the Service Quality-User Satisfaction Relationship," *Journal of Information Technology Theory and Application* (7:2), 2005, pp.54.
- Koh C. and Ang S. "IT Outsourcing Success: A Psychological Contract Perspective," *Information Systems Research* (15:4), 2004, pp.356-373.
- Lacity, M. and Hirschheim, R. *Information Systems Outsourcing: Myths, Metaphors, and Realities*, John Wiley & Son, Chichester, West Sussex, 1993.
- Landrum H., Prybutok V.R., and Zhang X. "A Comparison of Magal's Service Quality Instrument With SERVPERF," *Information & Management* (44:1), 2007, pp.104-113.
- Lee J.-N. and Kim Y.-G. "Effect of Partnership Quality on IS Outsourcing Success: Conceptual Framework and Empirical Validation," *Journal of Management Information Systems* (15:4), 1999, pp.29-61.
- Lovelock, C.H. *Managing Services: Marketing, Operations, and Human Resources*, Prentice-Hall, NJ: Englewood Cliffs, 1992.
- Ma Q., Pearson J.M., and Tadisina S. "An Exploratory Study into Factors of Service Quality for Application Service Providers," *Information & Management* (42:8), 2005, pp.1067-1080.
- Mayer R.C., Davis J.H., and Schoorman F.D. "An Integrative Model of Organizational Trust," *Academy of Management Review* (20:3), 1995, pp.709-734.
- McKeen J.D., Guimaraes T., and Wetherbe J.C. "The Relationship Between User Participation and User Satisfaction: An Investigation of Four Contingency Factors," *MIS Quarterly* (18:4), 1994, pp.427-450.
- Nicholson B. and Sahay S. "Some Political and Cultural Issues in the Globalisation of Software Development: Case Experience From Britain and India," *Informatics Organization* (11), 2001, pp.25-43.
- Parasuraman A., Berry L.L., and Zeithaml V.A. "Refinement and Reassessment of the SERVQUAL Scale," *Journal of Retailing* (67:4), 1991, pp.420-450.
- Parasuraman A., Zeithaml V.A., and Berry L.L. "A Conceptual Model of Service Quality and Its Implications for Future Research," *Journal of Marketing* (49:Fall), 1985, pp.41-50.
- Parasuraman A., Zeithaml V.A., and Berry L.L. "SERVQUAL: A Multiple-Item Scale for Measuring Consumer Perceptions of Service Quality," *Journal of Retailing* (64:1), 1988, pp.12-40.
- Petter S., Straub D., and Rai A. "SPECIFYING FORMATIVE CONSTRUCTS IN INFORMATION SYSTEMS RESEARCH," *MIS Quarterly* (31:4), 2007, pp.623-656.
- Pitt L.F., Watson R.T., and Kawan C.B. "Service Quality: a Measurement of Information Systems Effectiveness," *MIS Quarterly* (19:2), 1995, pp.173-187.
- Pitt L.F., Watson R.T., and Kavan C.B. "Measuring Information Systems Service Quality: Concerns for a Complete Canvas," *MIS Quarterly* (21:2), 1997, pp.209-221.
- Reponen, T. (1993). *Outsourcing or Insourcing?*, Orland, Florida.
- Sabherwal R., Jeyaraj A., and Chowa C. "Information System Success: Individual and Organizational Determinants," *Management Science* (52:12), 2006, pp.1849.
- Schneider, B. and White, S.S. *Service Quality: Research Perspectives*, Sage Publications, Inc., CA: Thousand Oaks, 2004.
- Shostack G. "Service Positioning Through Structural Change," *Journal of Marketing* (51), 1987, pp.34-43.
- Tiwana A. and Keil M. "Functionality Risk in Information Systems Development: An Empirical Investigation," *IEEE Transactions on Engineering Management* (53:3), 2006, pp.412-425.
- Van Dyke T.P., Kappelman L.A., and Prybutok V.R. "Measuring Information Systems Service Quality: Concerns on the Use of the SERVQUAL Questionnaire," *MIS Quarterly* (21:2), 1997, pp.195-207.
- Van Dyke T.P., Prybutok V.R., and Kappelman L.A. "Cautions on the Use of the SERVQUAL Measure to Assess the Quality of Information Systems Services," *Decision Sciences* (30:3), 1999, pp.877-891.
- Venkatesh V. and Davis F.D. "A Model of the Antecedents of Perceived Ease of Use: Development and Test," *Decision Sciences* (27:3), 1996, pp.451-481.
- Watson R.T., Pitt L.F., Cunningham C.J., and Nel D. "User Satisfaction and Service Quality of the IS Department: Closing the Gaps," *Journal of Information Technology* (8), 1993, pp.257-265.
- Watson R.T., Pitt L.F., and Kavan C.B. "Measuring Information Systems Service Quality: Lessons From Two Longitudinal Case Studies," *MIS Quarterly* (22:1), 1998, pp.61-79.
- Weitzel J.R. and Graen G.B. "System Development Project Effectiveness: Problem-Solving Competence As a Moderator Variable," *Decision Sciences* (20), 1989, pp.507-531.
- Whitten D. and Leidner D. "Bringing IT Back: An Analysis of the Decision to Backsource or Switch Vendors," *Decision Sciences* (37:4), 2006, pp.605-621.

Appendix: Measurement Items

Assurance

- ASSU1: The behavior of IT staff provided confidence to the users in the development process.
- ASSU2: IT staff were consistently courteous with users in the development process.
- ASSU3: IT staff had the knowledge to do their job well in the development process.

Empathy

- EMP1: IT staff gave users personal attention in the development process.
- EMP2: IT staff had the users' best interests at heart in the development process.
- EMP3: IT staff gave users individual attention in the development process.
- EMP4: IT staff understood the specific needs of the users in the development process.

Reliability

- REL1: When IT staff promised to do something in the system development process within a certain time, they did so.
- REL2: When users had problems relating to the system, IT staff showed sincere interest in resolving them.
- REL3: IT staff performed their tasks in the development process reliably.
- REL4: IT staff finished their tasks in the development process at the time they had promised.
- REL5: IT staff provided accurate modifications during the system development process.

Responsiveness

- RES1: IT staff told users exactly when their tasks in the development process would be performed.
- RES2: IT staff were always willing to help users during the development process.
- RES3: IT staff were never too busy to respond to user requests during the development process.
- RES4: IT staff handled user requests promptly during the development process.

Tangibles

- TAN1: The IT department/vendor has up-to-date hardware and software.
- TAN2: The IT department/vendor's office appears organized.
- TAN3: The IT staff was well dressed and neat in appearance.

Overall System Development Service Quality

- SDSQ1 How satisfied were you with the performance of the IT staff in the process of system development?
- SDSQ2 Overall, how would you rate the quality of service provided by your IT staff in the system development process?
- SDSQ3 Your evaluation of the service quality for the system process is:

Perceived Usefulness

- PU1: Using the system improves my work performance.
- PU2: Using the system increases my work productivity.
- PU3: I find the system useful for my work.
- PU4: Using the system enhances my effectiveness in my work.
- PU5: Using the system provides me with information that would lead to better decisions.

Perceived Ease of Use

- PEU1: Learning to use the new system was easy for me.
- PEU2: I find it easy to use the system to do what I want to do.
- PEU3: It was easy for me to become skilful at using the system.
- PEU4: I find the system easy to use.