

Exploring the Roles of Core and Peripheral Service Qualities in IT Services with Implications for Future Smart Work*

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Abstract

Recently, firms begin to adopt smart work practices including telecommuting and flexible time. This trend is triggered by recent rapid advent of smart devices with common connectivity through the Internet. As smart work infiltrates our society, IT service is now becoming more of a norm rather than exception for business firms, aiding business users to work smarter. In IT services in which knowledge professionals are involved, the quality of services determine the perceived value of the service while this value perception contributes to the service users' satisfaction and intention to continue to use the service. Using notions of core and peripheral services commonly used in traditional service research, a hypothesized research model is built for this study, relating core and peripheral service quality, perceived service value, service satisfaction, and intention to continue use of IT services to each other. Structural equation modeling (SEM) was used to analyze 295 data points collected through a survey of global electronics company employees who are extensively using IT services. Findings indicate that the quality of the core services had a positive impact on both the IT satisfaction and IT service value, while peripheral services had a positive impact on the IT satisfaction only. Furthermore, no relationship was found between IT service value and IT satisfaction. However, the value of and satisfaction with IT services were found to have a positive influence on the intention to use the IT services.

Keywords: *Core Service, Peripheral Service, Work Smart, IT Value, IT Satisfaction, Continuous Intention to Use*

1. Introduction

Recently, businesses are seeking to realize “smart work” in their organizations in order to promote work efficiency and improve the quality of life. In general, the concept of smart work is understood as what enables a work-life balance to be achieved through IT devices or IT services. In smart work, therefore, how IT services will be used and applied by individuals and businesses has become a primary matter of interest. From a business perspective, each IT services is a set of tasks, processes and principles for business. Accordingly, businesses try to continue innovation by means of IT services to realize smart work and promote work efficiency [1]. From a personal perspective, the use of IT services has to do with way to work through an information system [2]. In other words, it is a process of redesigning how to use IT resources to perform a task in a more intelligent manner. It is therefore very important both for businesses and individuals to increase the availability of IT services and measure their quality for continued service improvement [3].

IT services have some unique characteristics that distinguish them from usual commercial transactions. First, they are highly-advanced knowledge-based services which have to rely on professionals for problem solving. Second, they are provided through the sharing of business knowledge and IT knowledge. Therefore, if any change in IT services is made to resolve a problem at work, it is essential for business and IT professionals to work together. Third, it is difficult to have definite criteria for service quality corresponding to user levels. The nature of services varying with users' needs makes it difficult to apply, service level criteria simultaneously to different IT services. That's why more emphasis is being placed on classifying and measuring the quality of IT services [4].

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Research studies in the service sector emphasize that the types of user-perceived service quality make differences in quality perceptions. Like in financial markets, the more diverse and complex the range of service commodities, the more likely the differences in customers' perceptual knowledge or experience are to lead to differences in perceptions of service quality [5]. These differences in service quality perceptions are also present with respect to targeted core services and their peripheral services which support the core services [6]. In a service environment where direct contact with customers is emphasized, peripheral services such as tea or something else to drink are offered in a comfortable atmosphere, in addition to good-quality commodities as core services. A variety of such services and commodities are provided to achieve high customer satisfaction and trust and build up customer loyalty [5]. Hume and Mort [7] distinguish between core and peripheral services by defining the customer-perceived core services as the set of important capabilities to create new value and the peripheral services as those that assist and facilitate the provision of core services.

IT services available in an organization take complex forms requiring technical knowledge and consume a lot of resources. Therefore, it is important to differentiate the services and build their capacity in order that long-lasting value and satisfaction are delivered to service users. However, when it comes to IT services, it is not easy to distinguish between core and peripheral services. Some studies attempt to elicit the key competencies of IT organizations [8] or argue that the primary goals of IT services are to ensure data reliability, meet user requirements and improve work efficiency [9], but they simply make inferences about core IT services. Therefore, the present study divided the IT services provided by IT service organizations into two categories—core and peripheral services—and examined how the level of service quality is associated with user-perceived IT service value and satisfaction.

2. Research Model and Hypotheses

2.1. Core and Peripheral Services

Services are present in a wide variety of forms, from simple ones to complex ones. Also, they are diverse in type and scope, from widely-applicable standardized services to customized ones for individuals or small groups. Accordingly, several definitions and classification systems for the services have been presented in the literature [7]. Grönroos [10] classified the services according to their purposes and processes. Schmenner [11] used a service matrix to divide the services into four types: service factories, service shops, mass services and professional services. Hume and Mort [7] classified the services as core and periphery in terms of the importance of services perceived by customers.

Core services refer to the basic services that help a company to perform business activities in the marketplace or a team to create value in its organization [12]. They represent essential functions of services which play a pivotal role in maintaining high levels of quality across the services and are supported and boosted by their peripheral services [7]. In the literature, the core services appear in slightly different but concrete forms. In the performing arts, the core services are defined as displays, performances or performing skills according to performance characteristics [7]. Iacobucci and Ostrom [13] argue that a lawyer's advice in the field of law or a meal in a restaurant constitutes a core service in itself. Lemon and Wangenheim [14] state that the core services of airlines are the activities of selling air tickets and their peripheral services are geared towards increasing ticket sales; for example, there may be a loyalty program that allows customers to use other affiliated services with their mileage points earned from ticket purchases. If the quality of core services is considered poor or if customers feel dissatisfied with the services, they will switch to one of other service providers [15]. Peripheral services work to support and facilitate the provision of core services [7]. Lovelock [16] argues that although the peripheral services intended to support core services act as a catalyst for seamless provision of such services, they have no intersection with the core services and have some increased attributes supplementary to the core services. Typically, in the performing arts, peripheral services are represented by performing places' characteristics, manners and attitudes, comfortableness and accessibility especially for parking and public transport [7].

However, in the IT service area, it is relatively unclear how to distinguish between core and peripheral services available to users. Usually, the competencies of IT departments or managers are classified as core and general and the distinctions between core and peripheral IT services can be inferred by connecting and analyzing their duties based on such competencies. Lee et al. [8], in their

analysis of key competencies of IT organizations perceived by IT practitioners, found that the IT organizations worked to control IT processes, ensure a certain level of information quality, introduce new IT innovations, and apply such innovations to business practice. Consequently, their key competencies can be characterized as providing business-supporting IT services to users and ensuring information quality. Dhillon and Lee [9] argue that the primary goals of IT services are to ensure data reliability, satisfy user needs and improve work efficiency. In this context, the core IT services can be defined as the services that are provided by IT systems themselves, whereas the peripheral IT services refer to those activities that help to keep the core services seamless and support the access to IT systems. In this study, the research model was developed to define the relationships among the quality and value of IT services, the satisfaction with the services, and the intention to use the services, as shown in Figure 1.

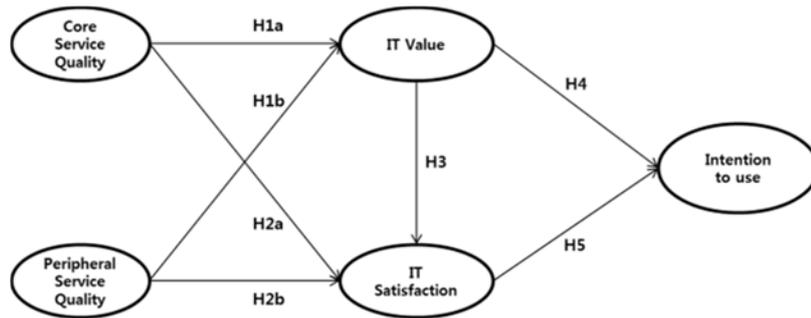


Figure 1. Research Model

2. 2. IT Service Quality and IT Service Value

The expectation-confirmation theory suggests that if a higher level of service quality is provided, the user-perceived service value will also be equally higher [17]. Hume [18] concludes that in the performing arts, the audience's perceived value of a performance is significantly influenced by the core services such as performances and displays as well as the peripheral services such as the theater's characteristics, comfortableness and transportation. Anderson and Narus [19] report that peripheral services have an impact on perceived value and emphasize that the peripheral services are provided as differentiated services in the way that they can hold creative value distinguishing them from other services. This implies that there is a positive relationship between peripheral services and perceived value, and as demonstrated in previous studies, the perceived value can act as a moderator between service quality and customer satisfaction [7]. This indicates that the value of IT services may depend on the level of service quality. Kettinger et al. [3] demonstrate that the user-perceived value of IT services is influenced by the level of confirmed IT service quality.

H1a: The perceived quality of core IT services has a positive impact on the value of IT services.

H1b: The perceived quality of peripheral IT services has a positive impact on the value of IT services.

2. 3. IT Service Quality and IT Satisfaction

Carr [20] states that customer satisfaction with IT services is determined by user-perceived service levels. Liu et al. [21] argue that for mobile phone users looking for service alternatives, IT service quality influences customer satisfaction and helps overcome service resistance. Chang and Chen [22] define the quality of IT services in e-commerce as consisting of convenience, interactivity, customization and character and show that the service quality has a significant impact on customer satisfaction. Lee et al. [23] confirm that the quality of IT services is significantly associated with the satisfaction of IT users, by dividing the IT service quality presented by DeLone and McLean [24] into three dimensions: system quality, information quality and service quality. Park et al. [4] emphasizes

that the quality of IT services is a critical factor which encourages service satisfaction and knowledge sharing.

H2a: The perceived quality of core IT services has a positive impact on IT satisfaction.

H2b: The perceived quality of peripheral IT services has a positive impact on IT satisfaction.

2. 4. IT Service Value, IT Satisfaction and Intention to use

Service value is a factor that determines user-perceived service value, service quality and satisfaction; therefore, the levels of service quality and satisfaction get higher when users perceive service as high and lower when it is perceived as low [18]. Service value refers to the rewards or benefits consumers expect from using a product or service and may be a more important determinant than price in their purchasing decisions [25]. Many definitions for service value have been proposed and a wide range of studies have been conducted in terms of service measurement, but in general the service value is defined as the tradeoff between service quality and the amount of time and cost to be spent for the service [26]. Considering that service value is a determinant of customer-perceived service quality and satisfaction, the higher the user-perceived service value, the higher the service quality and satisfaction, and vice versa [7]. Brady and Robertson [27] show that the perceived value of services has a moderating effect between the service quality and the intention to continue using the services, and Petrick [28] demonstrate that service quality serves as a strong argument in the initial purchasing decision and the perceived service value has an impact on the intention to continue using services. Kettinger, et al. [3] found that the perceived IT value in the IT environment had an effect on service satisfaction.

H3: IT service value has a positive impact on IT satisfaction.

H4: IT service value has a positive impact on the intention to use the services.

Higher satisfaction can lead to higher profitability in the way that it is likely to help secure and maintain the loyalty of customers [7], and such satisfaction contributes directly to their intention to use services. Bhattacharjee [29] conclude in his study of online banking users that service satisfaction is a determinant of intention to continue using the services. Studies of the use of e-learning systems [30] or self-service technology users [31] demonstrate that IT satisfaction perceived by IT system users has a positive impact on their intention to continue using the system.

H5: IT satisfaction has a positive impact on the intention to use.

3. Research Methodology

3.1. Data Collection and Characteristics

For data collection, we conducted a questionnaire survey of 458 employees of six electronics companies who filed any IT service request. In total, 315 questionnaires were retrieved and 295 questionnaires with no missing data were used for data analysis. The number of respondents sorted by job category was 55.9% (165) for Research, 22.7% (67) for Manufacture, 10.2% (30) for Sales and Marketing, 8.1% (24) for Accounting, 3.1% (9) for Information systems. Information systems respondents usually used included Human Resource Managed reported from 105 respondents (45.6%), Enterprise Resource Planning from 97 (32.9%), RandD system from 51 (17.3%) and project Management System from 41 (14.2%). At the time of the survey, 83 respondents, or 38.6% of the sample, were found to work for a period of less than 1 year at the job and they represented the largest portion of the sample. Respondents whose period of service was 1-3 years, 3-5 years and more than 5 years were 21.9%, 14.9% and 24.6%, respectively.

3.2. Operational Definitions of Variables

In this study, we employed a questionnaire survey to verify the proposed research model and adapted existing questionnaire items—whose validity was verified—for use in this study. Each questionnaire item was measured on a 7-point Likert scale (1 = strongly disagree; 4 = neutral; and 7 = strongly agree). The questionnaire consisted of 23 items. The operational definitions of measures and measurement items are as follows: First, IT service quality was measured with core service quality and peripheral service quality which based on Hume and Mort [7] study. Core service quality, meaning the outcome of IT services based on DeLone and McLean [32], was defined as the degree of users' perception of IT service performance; and Peripheral service quality was defined as the degree of supplementary service for assessment and was measured with two items by DeLone and McLean [32] and three items by development as IT professional interview. Second, IT service value was measured with four items presented by Kettinger et al. [3]. Third, satisfaction was also measured with three items presented by Kettinger et al. [3]. Finally, the intention of continuous use as an outcome variable was measured three items regarding the personal intention to continue the use of IT services by Wang et al. [33]. Table 1 provides a detailed list of measurement items used in this study.

4. Analysis and Results

A partial least squares (PLS) analysis, one of structural equation models, was performed to test the research model. The PLS analysis is a component-based approach and thus has not strict requirements for sample size and residual distribution [34]. Another advantage of the PLS analysis is that it can evaluate a theoretical structural model and a measurement model at the same time [35].

4.1. Measurement Model

The PLS analysis consists of two steps: measurement model analysis and structural model analysis. According to Gefen and Straub [36], the PLS analysis is required to assess convergent and discriminant validity to determine whether the constructs of observed variables are properly loaded.

Convergent validity means that theoretically closely-related constructs have statistically significant correlations. This suggests that the observed variables for individual latent constructs should be loaded with significant t-values. For the PLS-based analysis of convergent validity, we carried out a confirmatory factor analysis and investigated the size of factor loadings for relevant variables of individual measurement items. If the loading value between a measurement item and its related variable is more than 0.7 and greater than cross loadings with other variables, the measurement item is deemed conceptually valid [35]. In order to identify the reliability of individual items, the study investigated the factor loadings between each measurement item and its related variable after a PLS analysis. As shown in Table 1, the final results indicate that every related loading was 0.7 or more. In order to identify the internal consistency of measurement items, we examined their composite reliability, Cronbach's α and average variance extracted (AVE). The measurement items are deemed reliable when they have a composite reliability of 0.893 or more and the value of Cronbach's alpha and AVE is above 0.7 or more. As can be seen in Table 2, all the factors meet the base values and thus have acceptable reliability.

Table 1. Confirmatory Factor Analysis

Construct	Items		Factor Loading	Mean	S.D.
Core Service Quality	CQ1	Information provided by the IT system is accurate.	0.875	4.725	1.233
	CQ2	Information provided by the IT system is useful	0.856	4.976	1.217
	CQ3	Information provided by the IT system is trustworthy	0.874	4.769	1.241
	CQ4	IT system is easily accessible and usable.	0.867	4.427	1.336
	CQ5	IT system is easy to use	0.854	4.644	1.218
Peripheral Service Quality	PQ1	Work Procedures related to IT service is well organized	0.892	4.220	1.415
	PQ2	IT service manual is well done.	0.870	4.115	1.541
	PQ3	Principal and rule related to IT service is well organized	0.873	4.183	1.523
	PQ4	Network (Internet and Access point) speed is fast	0.906	4.220	1.464
	PQ5	IT System speed is fast	0.894	4.105	1.527
IT Service Value	VA1	Compared to what I had to give up, the overall ability of IT services to satisfy my wants and needs is very high	0.901	4.966	1.288
	VA2	Compared to other IT service, the value of the IT services is very high	0.913	4.993	1.251
	VA3	The value of the IT services in functional terms is very high	0.922	5.227	1.224
	VA4	Overall, the value of the IT services to me is very high	0.913	4.939	1.324
Satisfaction		How do you feel about your overall experience of using our IT services?			
	SA1	1. Very dissatisfied...Very satisfied;	0.890	4.678	1.341
	SA2	2. Very displeased...Very pleased;	0.875	4.424	1.532
	SA3	3. Absolutely terrible...Absolutely delighted.	0.808	5.075	1.289
Intention to Use	IN1	I intend to continue using IT service rather than discontinue using it.	0.915	4.739	1.154
	IN2	My intentions are to continue using IT service than use any alternative means.	0.882	4.593	1.152
	IN3	If I could, I would like to continue using IT service as much as possible.	0.849	5.125	1.141

Discriminant validity refers to the low correlations that should exist between different measurements designed to measure different constructs. The correlation coefficients of latent variables should show an appropriate pattern of factor loadings, and observed variables should be highly loaded onto allocated factors. In PLS, the discriminant validity can be deemed adequate when the square roots of AVE values are greater than inter-variable correlation coefficients. In Table 2, the values on the right hand are the correlation coefficients of individual variables and the values in the diagonal are the square roots of AVEs. As indicated in the table, square-rooted AVE values are greater than other correlation coefficients, and thus the requirements for discriminant validity are satisfied.

Table 2. Discriminant Validity Analysis

Construct	Composite Reliability	Cronbach's Alpha	AVE	CQ	PQ	SV	SA	IN
Core Service Quality	0.937	0.916	0.749	0.865				
Peripheral Service Quality	0.949	0.933	0.787	0.668	0.887			
IT Service Value	0.952	0.933	0.832	0.684	0.462	0.912		
Satisfaction	0.913	0.858	0.737	0.596	0.675	0.395	0.858	
Intention to re-use	0.893	0.821	0.832	0.664	0.483	0.605	0.439	0.912

CQ: Core Service Quality, PQ: Peripheral Service Quality, SV: IT Service Value, SA: Satisfaction, IN: Intention to re-use

4.2. Structural Model

Since the analysis of the measurement model revealed that the research model is reliable and valid, we tested the proposed hypotheses using a structural model. The structural model is used to represent a set of dependent relationships between latent variables, or inter-variable correlations. It also indicates measurement coefficients as well as the standard error and t-value for each coefficient. A two-tailed test is performed at a 5% significance level in case of $t\text{-value} \geq 1.96$. As illustrated in Figure 2, our path analysis found that the core service quality of IT services was significantly associated with IT service value ($\beta=0.679$, $t=11.937$) and satisfaction ($\beta=0.281$, $t=4.260$). The peripheral service quality of IT services was found to have a significant impact on satisfaction ($\beta=0.500$, $t=9.442$) but it was not associated with IT service value ($\beta=0.008$, $t=0.119$). Consequently, hypotheses 1, 3 and 4 were only supported but hypothesis 2 was rejected. Meanwhile, there was no significant relationship between IT service value and satisfaction ($\beta=-0.028$, $t=0.399$), and hypothesis 5 was therefore rejected. However, Significant relationships were also found between IT service value and intention of continuous use ($\beta=0.512$, $t=8.487$) and between satisfaction and intention of continuous use ($\beta=0.237$, $t=4.355$). Therefore, hypotheses 6 and 7 were supported. User-perceived IT value explained 45.8% of variance in core and peripheral service quality, and IT satisfaction accounted for 49.4% of variance in core and peripheral service quality of IT and IT Value. Intention to use also explained 41.4% of variance in IT value and IT satisfaction.

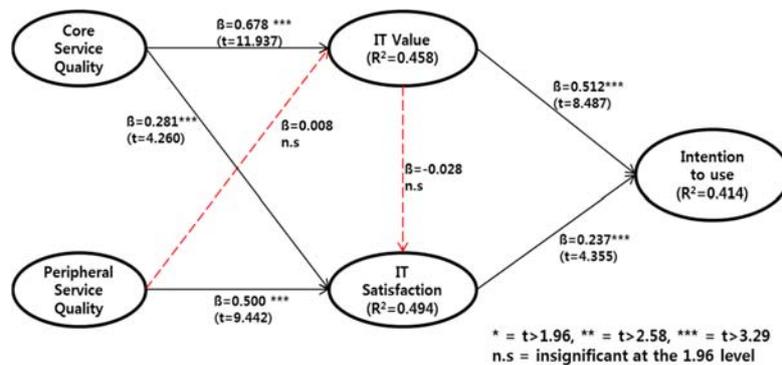


Figure 2. Results of Analysis

5. Discussion and Conclusions

This study intended to investigate the relationships between IT service quality, customer-perceived service value or satisfaction, and intention to continue the use of services. The authors distinguished the quality of IT services between core and peripheral services and examined how the service types are related to each other. In this study, it was revealed that the two types of IT services are complementary

to each other; in the way that core services are relatively more important and peripheral services help facilitate the provision of core services.

First of all, the study findings show that the perceived quality levels of core services are positively associated with IT service value, but the hypothesis of a correlation between peripheral service quality and IT service value was rejected in this study. This differs from the findings of previous studies that the perceived value of services was influenced to an equal degree by core services and peripheral services [7][18]. IT services have apparent objectives for service targets and users are clear about what they want from the services. In the IT services, therefore, the elements that determine whether the quality of core services is satisfied are affected by what information users want or what level of system is involved. In contrast, peripheral services consist of things that support core services, like regulations and manuals for service targets, but these supplementary means are too limited to meet users' needs in full. Hence, in respect of benefits that are sought through IT services, the core services play a direct role in determining the value of IT services. Second, both the core and periphery of IT services were found to have a positive impact on IT satisfaction; The impact of core services was relatively stronger than that of peripheral ones. This is associated with the fact that the concept of satisfaction involves psychological and emotional factors. So to speak, the periphery of IT services consists of elements users can perceive emotionally while experiencing the services. Third, IT service value had no significant impact on IT satisfaction. This result is understandable, given that users perceive the IT services as "being taken for granted." Since service users naturally expect that IT systems will meet their requirements and be helpful when used, they may not be satisfied with the IT services because of their existing expectations, even though IT service value is fully acceptable. Fourth, both IT service value and IT satisfaction were positively associated with the intention to continue using the services. This result confirms that user-perceived service value and satisfaction are antecedent factors that encourage users to continue using IT services. Specially, our finding that the intention to use the services is more greatly influenced by IT service value than IT satisfaction suggests that in an organization the IT services should continue to be used once they give value to business operations, even in case the services are considered unsatisfactory.

This study presents some suggestions for academic and practical work. First, the findings of this study have academic significance in that the study distinguished the quality of IT services between the core and periphery of the services and proposed a more expanded approach to IT service classification. The proposed classification approach raises the likelihood of applying to a wider variety of classification settings, considering DeLone and McLean's [24] classification system which divides IT service quality into three dimensions (i.e., information, system and service) and Park et al.'s [4] service classification limited to functions (like technical service quality). Second, the study findings confirm that IT service users take it for granted that IT services provide vital functions for business and meet user requirements. However, the good availability of IT service functions does not always ensure the satisfaction of service users. The satisfaction of IT service users in an organization can be enhanced by complementing peripheral services, rather than promoting core services or IT service value. The in-house IT services are goal-oriented in that peripheral services have no significant impact on IT service value, and service improvements should be made first in core services in order to enhance IT service value. Third, IT service providers should get service users to perceive the value of IT services as high in order that they continue to use the IT services in their organizations. In this sense, the in-house IT services should be geared to support business-related functions with a focus on organizational capabilities, so that users feel that the IT services are good enough to meet their requirements and are highly helpful to them in work.

The present study which is empirical in nature has several limitations and poses challenges for future research. First, there should be further empirical studies of IT services in terms of core and periphery. Second, since the concepts used in this study are mostly based on foreign literature, there could be errors in translation. Third, this study analyzed a limited range of IT services using a limited amount of sample data. Future studies need to extend the scope of research to more industries.

6. References

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