PERCEIVED ELECTRONIC SERVICE QUALITY: RESULTS FROM A CROSS-NATIONAL STUDY IN MOBILE INTERNET SERVICES

ABSTRACT

Work on how consumers evaluate electronic service quality is both topical and important due to the well accepted criticality of electronic channels in selling products and services. However, the extant research on electronic research quality is preoccupied with the web site internet context and most of the studies are single-country studies, inhibiting conclusions of robustness and generalizability. Theoretically rooted in the Nordic Model of perceived service quality the study uses an e-service quality scale to measure mobile internet service quality and most importantly it does so in different national settings. Consistent with the extant e-service quality literature, results indicate that e-service quality is a second-order factor, with three reflective first-order dimensions: efficiency, outcome, and customer care. Most importantly, cross-validation investigations using samples drawn from Korean, Hong-Kong and Japanese mobile internet user populations support the factorial structure invariance of the construct. Following Cheung and Reynolds’ (2002) suggestions, we tentatively examine factor means differences between the three countries contributing to the scarce cross-national electronic service quality literature. Findings imply that though consumers in different countries use the same dimensions so as to evaluate mobile internet services, importance weightings assigned on these dimension are not the same.

KEYWORDS

Perceived Electronic Service Quality, Mobile Internet, Cross-National, Multi-Sample Analysis
INTRODUCTION

Perceived electronic service quality constitutes a well-established construct in the e-commerce literature (e.g., Liao, Palvia and Lin 2006). According to Zeithaml et al. (2002, p.135) electronic service quality can be defined “as the extent to which a web site facilitates efficient and effective shopping, purchasing and delivery”.

Research on e-service quality has just started gaining a momentum and the main research question that all relevant studies try to address pertain to the factorial structure of the construct and measurement issues (e.g. Wolfinbarger and Gilly 2003). However, though research on measurement issues is quite advanced, cross-national considerations of the electronic service quality construct are scarce in the literature. Wolfinbarger and Gilly (2003) explicitly recognize this research gap and call for more research in the investigation of electronic service quality vis-à-vis international populations.

Additionally, discussions in the service quality literature questioning the generalizability of service quality dimensions across different countries (Tsikriktsis 2002), renders the investigation of the stability of the e-service quality dimensionality in different countries as topical and important.

The present research contributes to the extant e-service quality in two important ways: First, addressing the call of Wolfinbarger and Gilly (2003) investigates e-service quality in a cross-national context. Does the factorial structure of the construct is the same across different nationalities? If this is the case, do consumers in different countries assign the same rankings of importance on different e-service quality dimensions? Second so as to further enhance the external validity of the e-service quality literature the
study investigates the above mentioned research questions in the context of an alternative electronic channel of services provision, namely the wireless mobile phone internet channel. An online survey serves as the empirical vehicle of the study, while exploratory and confirmatory factor analyses (CFA) are used to tackle the research questions under investigation.

BACKGROUND

Theoretically, the present study builds from the Nordic Model of traditional services perceived service quality so as to investigate the electronic service quality construct (Brady and Cronin 2001). The Nordic model conceptualizing perceived service quality in traditional people-oriented services differentiates between the “what” (i.e. what the consumer receives as a result of his interaction with a service firm/technical quality) and “how” (i.e. how he/she gets the outcome resulting from his/her interaction with the seller/functional quality) components of the buyer-seller interaction. For example the “what” component of the Nordic Model, is addressed using the notions of aesthetics (i.e., how enjoyable and visually attractive is to use the service), whereas the “how” component is addressed using the notions of ease of use, and customer service among others.

We do not formally hypothesize a priori propositions relating service quality dimensions with the countries under investigation. However, building from the scarce cross-national e-service quality literature (e.g. Tsikriktsis 2002), suggesting culture as influencing e-service quality dimensions, we hypothesize the existence of cross-national differences in service quality perceptions. This is consistent with the extant traditional service quality literature (e.g. Furrer, Liu and Sudharshan 2000). Arguably, the
theoretical foundation for proposing cross-national electronic service quality is not strong enough. Therefore, we view the potential for cross-national differences as a tentative position that may be explored with the data at hand. If the results are promising, researchers may be encouraged to theorize these cross-national differences rigorously.

Besides contributing to the scarce cross-national e-service quality literature this article is novel in that it uses the e-service quality construct so as to measure perceptions of service quality in an alternative e-commerce channel namely the mobile phone internet services channel.

Mobile Internet, defined as the wireless access to Internet content via mobile devices, such as mobile phones and personal digital assistants, has advanced astonishingly both in terms of user population and technology developed (Kim et al. 2002). Wireless Internet services via mobile phone devices became available in Japan, Korea and Hong-Kong in 1998 (Kim et al 2004) and debuted in Europe in 2002, mainly through NTT DoCoMo’s i-mode and Vodafone’s Live!, and are rapidly gaining end-user acceptance throughout the world.

Currently, only few studies have investigated consumers’ reactions to mobile phone internet services. These studies have not directly investigated these consumer reactions in the realms of the e-service quality literature. Chae et al. (2002), employing an on-line survey and structural equation analysis, found four second-order factors of information quality for wireless Internet services: connection quality, content quality, interaction quality and contextual quality. However, their research focuses on perceived information quality rather than perceived service quality, which is a wider construct. Bruner and Kumar (2005), employing the Technology Acceptance Model, proposed and tested an
extended consumer TAM for wireless Internet. The core model constructs are those of usefulness, ease of use and fun. The authors have found that usefulness and fun (directly) and ease of use (indirectly) influence attitudes toward adopting mobile commerce services.

On the other hand the literature pertaining to web site wireline internet service quality is much more advanced. Zeithaml, Parasuraman and Malhotra (2002) suggests that electronic service quality can be decomposed into four dimensions, namely efficiency, fulfillment, privacy and technical reliability. Loiacono et al. (2007) propose twelve dimensions and 3 higher-order constructs, that is ease of use, usefulness and entertainment. Finally, Wolfinbarger and Gilly (2003) conceptualize electronic service quality using four dimensions, namely fulfillment/reliability, website design, privacy/security and customer service.

Admittedly, most research efforts made to measure consumers’ evaluations of electronic service quality, conclude in giving us extended measurement scales that though content valid, are practically difficult to use due to their excessive length (e.g. e-SERVQUAL, consists of 22 items). This is especially the case in the context of the present study namely handheld internet services, where limited input and output resources of access devices inhibit the use of extended consumer evaluation instruments.

The present study proposes an abbreviated consumer evaluation instrument that is practically useful, managerially relevant and psychometrically sound, theoretically building from the well accepted dual-factor model of perceived service quality (Brady and Cronin 2002). The study uses seven measures, so as to measure electronic service quality in mobile internet services. These measures relate to Ease of Use, Usefulness,
Aesthetics, Content, Privacy, Customization and Customer Service (see Table 1). Conceptually these measures, tap the theoretical dimensionality of perceived service quality, namely the functional and technical service quality components proposed by the Nordic Model (i.e. the “what” and “how” components) (Brady and Cronin 2001).

RESEARCH METHODOLOGY

The work presented in this paper is part of a wider research project conducted by a worldwide research consortium, known as the Worldwide Mobile Internet Survey (WMIS). This paper reports results from WMIS in Korea, Japan and Hong Kong.

First, we develop the service quality scale in the Korean sample employing a split-sample analysis procedure. We explore the structure of the service quality construct employing exploratory factor analysis (in the first split sample) and then validate this structure in the second split sample using confirmatory factor analysis. So as to investigate the generalizability of the findings we then move on to investigate the stability of the service quality dimensionality in two fresh samples collected in two additional Asian countries, namely Hong-Kong and Japan. We selected these three Asian countries for two reasons: due to high penetration rates of mobile phone devices in these countries, (77.2% in Hong Kong, 79.3% in Japan, and 39.8% in Korea) and due to high penetration rates for mobile internet services usage (e.g. Japanese and Korean markets accounted for 73% and 23% of the total mobile internet market in Asia, respectively (Kim et al 2004)).
Korean Sample

To collect data efficiently and increase the validity of the empirical data, we constructed a research consortium consisting of every mobile operator in Korea, major Internet portals and mobile Internet application developers. Mobile operators verified the survey data and provided funding to our project.

Data were collected employing a large scale online survey and potential respondents were given participation incentives. Two major concerns in Internet-based surveys are the respondents filling out the survey multiple times and “random walk-ins” (Deutskens et al., 2004; Ilieva et al., 2002). Mobile operators checked whether the phone numbers self-reported were legitimately registered and whether the owners of the phone numbers had accessed the mobile Internet at least once in the past.

A total of 15,516 people participated in the survey. Those who did not pass the test were deleted from the data set. The number of the final effective respondents was 8,912. This data-collection procedure increases the external validity of the results, since participants belong in the actual customer base of large mobile operators. The sample is almost split between men and women, though women are slightly more represented than men. The age of respondents ranged from 12 to 80 years, with a median of 24 years. Most of the respondents were in their early 20s (50.3%). In terms of gender, age, and occupation distributions, our sample may be considered as representative of mobile Internet users in Korea (Sir et al. 2003).

Hong-Kong Sample

So as to collect data from the Hong-Kong sample we employed an online survey methodology-as was the case with the Korean sample. The questionnaire was
administered on a non-profit public website run by the Hong Kong government. An e-mail soliciting participation in the survey was sent to registered members of the website. Also, a banner advertisement of the survey was made available on the website over a period of four weeks. To reduce the possibility that a respondent participated in the survey more than once, each respondent was required to provide his/her mobile phone number in the survey. To encourage participation, incentives of the latest models of mobile phones and MP3 players were offered as lucky draw prizes. A total of 1826 valid responses were collected from the current user group. In total, there were 8941 respondents who successfully completed the questionnaires; of which 7045 were potential users and 1826 were current users. 817 respondents were males (44.7%) and 1009 were females (55.3%). The age of respondents ranged from 13 to 76 years, with a median of 25 years. Most of the respondents were in their 20s (53.1%) and 30s (18.0%). The length of experience with using mobile Internet ranged from 1 to 44 months, with 15 months as the median, and 17.2 months as the mean.

**Japanese Sample**

A research center administered the data collection process in Japan. Online panel members were solicited via email requests. More specifically the questionnaire was uploaded on the homepage of MIN\(^1\), and e-mails were sent to ECOM\(^2\) members-along with requests to other relevant parties through ECOM- and to MIN monitors (e.g., i-mode monitors), asking to access the questionnaire page.

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\(^1\) Marketing Interactive Network—a marketing website that enables the creation of online panels consisting of mobile internet (e.g. MIN i-mode monitors) and stationary internet users. MIN is an official research partner of the Electronic Commerce Promotion Council (ECOM) of Japan.

\(^2\) Electronic Commerce Promotion Council of Japan
A total of 3,310 people participated at the survey. The effective number of respondents was 2,151 (number of respondents self-reporting currently using mobile internet services). The length of experience with using mobile Internet was 79 months (median value), indicating Japanese respondents as quite experienced with mobile internet services. The sample was somewhat balanced between men (47%) and women (53%) and the age of respondents ranged from 14 to 73 years old with a median of 34 years. Three out of ten respondents reported being less than 30 years old. Therefore compared to the Korean and Hong-Kong data sets, Japanese respondents reported belonging in older age groups.

METHOD OF ANALYSIS

Internal Analyses

A random split-sample approach was employed (Babakus et al. 2004; Diamantopoulos and Siguaw 2000). In the first half sample (N= 4,456) Exploratory Common Factor Analysis was used as a first step in identifying the factor structure of the electronic service quality construct. Then, in the second half of the sample alternative first-and second-order factor models were tested through Confirmatory Factor Analysis to examine which model of perceived electronic service quality is superior in fitting the sample data.

Measurement Invariance

Measurement invariance determines if items used in survey-type instruments mean the same things to members of different groups (Cheung and Rensvold 2002). We conduct tests for both category 1 and category 2 invariance (Cheung and Rensvold 2002). We conduct configural, metric, scalar and invariance tests so as to investigate the
generalizibility of the results found in the Korean sample, in two more samples and then tentatively examine the existence of latent mean differences in these three countries employing mean structure analysis procedures (MACS) (Arbuckle and Woethke 1999)

Issues in Assessing Measurement Invariance

An important issue in measurement invariance tests relates to the choice of criterion to be used so as to assess measurement invariance. Two categories of criteria exist (Chen, Sousa and West 2005): the first one utilizes purely statistical criteria namely the $\chi^2$ difference test—whereas the second criterion involves practical criteria namely fit indices.

Currently the most widely used criterion is the $\chi^2$ difference test. However the likelihood ratio test is sensitive to non-normality and has substantial power in large samples to detect small discrepancies between groups that may be of no practical importance (Chen, Sousa and West (2005).

Currently the best available guidelines for the usage of practical fit indices in testing for measurement invariance are those proposed by Cheung and Rensvold (2002). They concluded that a difference of larger than .01 in CFI would indicate a meaningful change in model fit when testing for measurement invariance.

RESULTS

Power Analysis

Statistical power is the probability of rejecting a false model when it is false (McQuitty 2004). If models do not have adequate power, then their contribution to knowledge is uncertain. In general an accepted level of power is 0.80 (McQuitty 2004). So as calculate statistical power we used a stand-alone DOS program called NIESEM
written by Paul Dudgeon\textsuperscript{3}. The NIESEM program is based on the work of MacCallum, Browne and Sugawara (1996). Power is close to unity, indicating almost zero probability of conducting type II error.

**Exploratory Factor Analysis (Korean Sample)**

*Common Factor Analysis with varimax rotation* was employed to determine the factor structure of the perceived electronic service quality construct (Gorsuch 1990). However, Component Analysis with varimax rotation was also tested to confirm the emerging factor structure.

We tested a two-, three-, and four-factor model. Based on the percentage of variance criterion (Hair et al. 1998), the analysis revealed the three factor solution as more appropriate, explaining 52.5 percent of the total variance (see Table 2). All measures load clearly to the three factors extracted. Component analysis revealed the same factor structure, explaining 73 percent of the total variation, while all seven factor loadings were greater than .75.

-Insert Table 2 about here-

The first factor, explaining 23 percent of the total variance, constitutes the *Efficiency Quality* dimension and is related to the ease of use and the usefulness of the wireless Internet service. Zeithaml et al. (2003, p.365) suggest that efficiency constitutes a dimension of electronic service quality, defining efficiency as “*the ability of the customers to get to the web site, find their desired product and information associated with it and check out with minimal effort*”. In the human computer interaction (HCI) literature, efficiency quality refers to whether the consumer perceives that the task is

performed without making mistakes or putting too much effort (Sing 2003). In both definitions it is suggested that efficiency has to do with ease of use and usefulness.

The second factor, accounting for 16 percent of the total variance, is *Outcome Quality*. This factor encompasses emotional benefits (i.e. enjoyment), visual attractiveness (i.e., aesthetics) and content variety (i.e., functional benefits) provided by the use of wireless Internet services. Outcome quality reflects the “product” of the service act itself, or in other words what the customer receives in the service encounter (Brady and Cronin 2002).

The third factor, *Customer Care Quality*, explains 13 percent of the total variance. Customer care quality relates to adapting the wireless service to user preferences (level of personalization), to minimization of personal data provided (privacy issues), and to the customer service provided, especially when consumers experience a problem while using wireless Internet services. Gounaris and Dimitriadis (2003) propose the dimension of customer care in their work related to service quality in business-to-consumer Internet portals. They found that this dimension encompasses issues like privacy of shared information and customer service.

Based on these findings, the proposed research model is depicted in Figure 1. Perceived wireless Internet electronic service quality is suggested to be a second-order factor, with three first-order factors, namely *efficiency quality, outcome quality*, and *customer care quality*. The proposed research model is strengthened by the growing stream of evidence conceptualizing perceived service quality as a multidimensional construct of hierarchical nature (Brady & Cronin 2001, Dabholkar, Thorpe and Rentz et al. 1996).
Confirmatory Factor Analysis (Korean Sample)

Following the methodology employed by Doll, Xia and Torkzadeh (1994) and Sommers et al. (2003) we tested the proposed second-order factor model against three other possible alternative factor structures (see Figure 2). More specifically, we tested the proposed research model against a one first-order factor model, a three-factor model with orthogonal factors, and a three-factor model with correlated factors.

We used the Maximum Likelihood (ML) estimation method to estimate the parameters of the models, since ML-based fit indices outperform those obtained from other methods (Hu and Bentler 1998). Based on this guideline, the CFI, Delta 2, RMSEA, chi-square and standardized RMR fit indices for all four alternative factor structures are reported in Table 3 (Schumacker and Lomax 2004, Hu and Bentler 1999).

Based on the fit indices, the one first-order factor model is far from being acceptable. The uncorrelated three-factor model is also not supported by the data covariance matrix. Finally, the correlated three-factor model has the same fit indices with the second-order factor model, indicating adequate fit. However, theory in the domain of perceived service quality suggests the existence of a second-order factor that accounts for the common variance of the first-order factors. This model seems to be theoretically more
interesting than the correlated three-factor model\textsuperscript{4} Doll, Xia and Torkzadeh (1994). With the exception of the chi-square statistic, the proposed second-order factor structure fits the data reasonably well ($\chi^2 (11) = 223.91$ and $p=0.00$, CFI=.97, Delta 2=.97, SRMR=.03 and RMSEA=.066).

The internal structure of the proposed model was also examined. First, we examined the parameter estimates and the accompanying tests of significance (Bagozzi and Yi 1988). Convergent validity is implied by the magnitude of the factor loading of each measure on its suggested latent variable (Mathwick et. al 2001; Dabholkar, Thorpe and Rentz 1996). All $\lambda$’s are greater than the .60 level proposed by Bagozzi and Yi (1988), except $\lambda_{42}$ (aesthetics measure) which is marginally below .60. Moreover, all $\lambda$’s are significant since all t-values are above the |2.00| level suggesting convergent validity. The results are summarized in Figure 3.

-Insert Figure 3 about here-

Discriminant validity can be demonstrated by calculating covariance confidence intervals (plus or minus two standard deviations) around the factor covariances. In our case all confidence intervals computed do not include the value of 1.00 suggesting discriminant validity (Mathwick et. al 2001; Dabholkar, Thorpe and Rentz 1996).

Regarding measurement model fit, we used the Composite Reliability ($\rho_c$) and Average Variance Extracted (AVE) criteria. Bagozzi and Yi (1988) propose that $\rho_c$ and AVE should be greater than 0.6 and 0.5 respectively. These cut off points hold for the

\textsuperscript{4} Further support for the superiority of a second-order factor model can be found in the structural equation modeling literature. Chen, Sousa and West (2005) point to the next set of advantages: (a) a second-order model can test whether a hypothesized second-order factor can actually account for the pattern of relations between the first-order factors, (b) puts a structure on the pattern of covariance between the first-order factors, (c) separates variance due to specific factors (these specific factors are represented by the disturbance of each first-order factor), leading to a theoretically error-free estimation of the specific factors and (d) can provide useful simplification of complex multitrait-multimethod models
three constructs, except from the Outcome Quality construct with an AVE of .44. The composite reliability of Outcome Quality is .61 exceeding the suggested cut-off point (see Table 4)

-Insert Table 4 about here-

Confirmatory Factor Analysis (Japanese and Hong-Kong Samples)

**Japanese Sample**

CFA results for the Japanese sample indicate acceptable fit indices values with the exception of the RMSEA index (see Table 4). More specifically $\chi^2 (11) = 284.41$ ($p<.00$, CFI and Delta 2 equal .945, marginally less than the cut-off criterion of .95 suggested by Hu and Bentler (1999)(see Table 5). SMRS is .045 less than the established .05 level. RMSEA equals .11 indicating poor fit\(^5\).

Altogether these results suggest that the measures used are unidimensional. All $\lambda$’s are greater than the .60 level (Bagozzi and Yi 1988). Moreover, all $\lambda$’s are significant since all t-values are greater than the |2.00| level indicating convergent validity (see Table 6). Additionally covariance confidence intervals computed do not include the value of 1.00 indicating discriminant validity\(^6\) (Schumacker and Lomax 2004). Composite Reliability, and AVE are greater than 0.6 and 0.5 respectively with the marginal

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\(^5\) Regarding the high RMSEA value, we follow Parasuraman, Zeithaml and Malhotra (2005) and the structural equation modeling literature and point that the interpretation of any fit index in isolation could be problematic because trade-offs between Type I and Type II errors call for the interpretation of combinations of indexes in various model contexts. Another related issue is statistical power which have to be taken into account when interpreting fit indices. In studies where power is overly great (i.e., > 0.9-as is the case with the present study may require a more relaxed interpretation of fit than is typical. Conversely, a more stringent interpretation of fit statistics is required when power is low (McQuitty 2004). The high statistical power of the present study and the acceptable values for the CFI and SRMR indices, seem to mitigate the somewhat high root mean square error of approximation (RMSEA) values (Parasuraman, Zeithaml and Malhotra 2005)

\(^6\) We also checked for discriminant validity employing the most stringent criterion of Fornell and Larcker (1981) namely we tested whether AVE from each latent is greater than its shared variance with the other two latents ($\gamma^2$). Results indicate that for each pair of latents AVE$>\gamma^2$, though the AVE of “customer care” quality is marginally greater than squared correlation of “customer care” quality and “efficiency”.
exception of the “customer care” factor (AVE=.49) (see Table 6). Figure 4 depicts the standardized, second-order mobile internet perceived service quality path diagram for the Japanese sample.

-Hong-Kong Sample-

Confirmatory factor analysis results for the Hong-Kong sample indicate a unidimensional and reliable measurement model (see Table 4). Fit indices are in the established acceptable ranges indicating adequate fit between the model and the data at hand ($\chi^2$ (11) = 148, 21 (p<.00), CFI=.97, Delta 2=.97, SRMR=.039) (see Table 5), with the possible exception of the RMSEA index, which is marginally greater than the .08 criterion indicating reasonable fit Schumacker and Lomax (2004). Pertaining to the somewhat high RMSEA value, the acceptable values of CFI and SRMR in association with the high statistical power of the present study seems to mitigate this problem (Zeithaml, Parasuraman and Malhotra 2005). Altogether these results indicate acceptable unidimensionality.

The composite reliability index for the three first-order factors is greater than .70 surpassing the .60 criterion suggested by Bagozzi and Yi (1988) and AVE is greater than the established .50 cut-off value. Additionally correlation confidence intervals (plus or minus two standard deviations) computed for the three first-order factors do not include the value of 1.0 indicating discriminant validity. Altogether these results are indicative of reliability, convergent and discriminant validity (see Table 6). Figure 5 depicts the second-order mobile internet service quality construct for the Hong-Kong sample.
Measurement Invariance

So as to test for the measurement invariance of the second-order service quality model across the three countries we follow the general procedures suggested by Byrne (2004) and Chen, Sousa and West (2005), essentially testing for a series of increasingly constrained hierarchical nested models.

**Configural Invariance (Model 1)**

Testing for this form of invariance requires the specification of an unrestricted baseline model. The simultaneously estimated model provides the baseline value against which all subsequently specified (increasingly constrained models) are compared. This multi-sample analysis yields only one set of fit statistics (Byrne 2004). Altogether fit indices for this unconstrained model indicate acceptable fit ($\chi^2 (33) = 650.390 (p<.00)$, CFI=.97, Delta 2=.97, RMSEA=.047, SRMS=.028). These results support the validity of the hypothesized three-factor service quality model across Korea, Japan and Hong-Kong.

**Invariance of first-order loadings (Model 2)**

In testing for this level of factorial invariance, all first-order loadings were constrained to be equal across the three countries. This model is nested within the fully unconstrained model (model 1). The chi-square difference test is significant ($\Delta\chi^2 (\Delta df=8) =56.320 (p=.00))$, indicating non-invariance of the first-order factor loadings across the three countries. However, given that the test was based on a large sample size, and due to no substantial difference in CFI ($\Delta$CFI=.003, .966 vs. .963) we concluded that there was no appreciable difference between the unconstrained model and the first-order
measurement weights constrained model (Chen, Sousa and West 2005; Cheung and Rensvold 2002).

**Invariance of second-order factor loadings (Model 3)**

Testing for this level of invariance necessitates that all first-order and second-order factor loadings to be constrained to be equal across the three groups. This model is nested within model 2. The chi-square difference test is significant ($\Delta \chi^2 (\Delta df=4) = 18,622$ (p=.00)), indicating non-invariance of the second-order factor loadings across the three countries. However, the difference in CFI was not substantial ($\Delta$CFI=.001, .963 vs. .962), therefore we concluded that there was no appreciable difference between model 2 and 3.

**Invariance of intercepts of observed variables (Model 4)**

In model 4, in addition to the constraints imposed on first-order and second-order factor loadings in model 3 the intercepts of the observed variables were constrained to be equal across the three countries. This is a prerequisite for comparing latent means across groups Chen, Sousa and West (2005). The fit of this model is not good ($\Delta \chi^2 (\Delta df=14) = 2626,280$ (p=.00), $\Delta$CFI=.146). Following Steenkamp and Baumgartner (1998) and Ueltchy et al. (2004) we examined for partial scalar/intercept invariance. We do so examining each pair of the three participating countries. As Steenkamp and Baumgartner (1998, p. 81) point: “…at least one item besides the marker item has to have…invariant intercepts in order for cross-national comparisons of factor means to be meaningful”.

**Japan- Hong-Kong**

The specific strategy employed so as to test for partial scalar invariance is the one suggested in Byrne (2004, p. 285). Tests for scalar invariance pertaining to these two
countries indicate partial scalar invariance based on Steenkamp and Baumgartner (1998). More specifically we find partial scalar invariance for the “customer care” and “outcome quality” factors (for both factors only one intercept of an observed variable-customization and content correspondingly-is found to be invariant). The comparison of the model having constraints for the first-order and second-order factor loadings with the model further imposing invariance constraints on two intercepts indicates a .01 difference in CFI ($\Delta \chi^2 (\Delta df=2) = 94.183$ (p=.00), the level Cheung and Renvold (2002) suggested as indicative of practical invariance. These results indicate that we are entitled to test for difference in factors means between these two countries but only for the customer care and outcome quality constructs, since we do not find partial scalar invariance for the efficiency factor.

**Japan- Korea**

Assuming model 3 to be correct (invariance of first-order and second-order factor loadings) the model with constraints on the full list of measured variables invariance do not fit the data ($\Delta \chi^2 (\Delta df=7) = 2117.86$ (p=.00), $\Delta$CFI=.161). Once again we start investigating for partial invariance following Byrne (2004). Tests for the “customer care” subscale (all three intercepts are posed to invariant) are not good ($\Delta \chi^2 (\Delta df=3) = 1083.380$ (p=.00), $\Delta$CFI=.082). Following these results we started relaxing intercept invariance constraints. Results are not good for the “customer service” observed variable ($\Delta \chi^2 (\Delta df=2) = 624.598$(p=.00), $\Delta$CFI=.047), though the results for $\Delta$CFI are less than the benchmark (<.05) suggested by Little (1997), but high above the suggestions of Cheung and Rensvold (2002). Increasingly relaxing constraints do not improve the $\Delta$CFI criterion to be less than the Cheung and Rensvold (2002) cut-off. Therefore results suggest that we
are not entitled to conduct a means difference test for the customer care latent in this pair of countries, following Cheung and Rensvold (2002) but we can do so if we rely on Little (1997). Results for the outcome quality latent, indicate partial scalar invariance. Constraining both observed variables indicate intercept invariance following Little (1997) since $\Delta\text{CFI}=.024<.05$. Relaxing one of the observed variables indicates a $\Delta\text{CFI}$ less than .01. Results for the efficiency factor suggest a $\Delta\text{CFI}$ equal to .013 marginally greater than the Cheung and Rensvold (2002) criterion.

**Hong-Kong - Korea**

Results for fully constraining intercepts of measured variables for this pair of countries indicate non-invariance ($\Delta\chi^2 (\Delta \text{df}=7) =265,335 \ (p=.00), \Delta\text{CFI}=.02$). However $\Delta\text{CFI}$ equals .02, which is greater than the Cheung and Rensvold (2002) criterion ($\Delta\text{CFI}<.01$) but much less than Little’s (1997) suggestion ($<.05$). Results for subscales indicate partial scale invariance for the customer care factor ($\Delta\chi^2 (\Delta \text{df}=2) =77,347 \ (p=.00), \Delta\text{CFI}=.006$) and the outcome quality ($\Delta\chi^2 (\Delta \text{df}=4) =98,923 \ (p=.00), \Delta\text{CFI}=.008$). Results for the efficiency factor are marginal ($\Delta\chi^2 (\Delta \text{df}=5) =139,401 \ (p=.00), \Delta\text{CFI}=.011$).

**Summary**

In summary, results for the invariance of measured variables intercepts (along with results pertaining to first-order factor loadings), indicate that we are entitled to compare all factor means in the Hong-Kong –Korea pair, outcome quality and customer care means for the Japan- Hong-Kong pair and the “outcome quality” means for the Japan-Korea pair. Whateovern the latter pair, due to the marginality of results we will tentatively report the means differences tests for the efficiency factor too.
Means Structure Analyses

Means structure analyses are required so as to investigate latent mean differences between groups. So as to obtain estimates of the differences between the first-order factors in the three groups, in each pair of countries one was chosen as a reference or baseline group and its first-order factor means was set to zero. Then the latent means of the other group was estimated; this value is the difference between the factor means of the two groups/countries. The significance test (z value) indicates whether there is a statistically significant difference in the latent means of the two countries analyzed.

So as to directly compare first-order factor means between pairs of countries we specified a correlated first-order factor model of perceived service quality. As Chen, Sousa and West (2005, p. 485) note: “the first-order factors means are conditional on the higher-order factor mean (s) in a hierarchical model, and thus cannot be directly compared.” We considered the possibility of second-order mean comparisons, but such a test was inappropriate due to non-invariant second-order intercepts. Results are reported in Table 5.

Hong-Kong- Korea

Invariance of first-order factor loadings and intercepts of measured variables was imposed on the Korean and Hong-Kong samples. The Korean sample was chosen as the baseline group and its latent mean was set to zero. There was a significant mean difference between the two countries in all three factors. More specifically results indicate that Hong-Kong scores lower on the importance of efficiency (-.24, z=-8.43)
p<=.00), outcome quality (-.32, z=-9.90, p<=.00), and customer care (-.23, z=-6.30, p<=.00).

**Japan- Hong-Kong**

Based on the invariance test conducted, factor means difference tests for this pair of countries was conducted for the customer care and outcome quality constructs. There was a significant mean difference between the two countries only in the “customer care” factor. More specifically results indicate that Hong-Kong scores higher on the importance of customer care (.417 z=9.74, p<=.00). There was no difference on the outcome quality factor (.02, z=.50, p<=.62).

**Japan- Korea**

Based on the invariance test conducted, factor means difference tests for this pair of countries was conducted for the “outcome quality” latent. More specifically results indicate that Koreans-compared to Japanese-believe the outcome quality factor as being more important when experiencing mobile services (.12 z=.40, p<=.00). Due to the marginal results obtained when investigating intercept invariance for the efficiency factor, we tentatively report the means difference results for this factor too. It seems that Koreans assign significantly less important than Japanese in the efficiency factor (.13 z=-6.58, p<=.00).

-Insert Table 5 about here-

**DISCUSSION**

This study uses the established e-service quality literature so as to measure perceived service quality in the mobile phone internet services context. Next, following discussions in the service quality literature questioning the generalizibility of service
quality dimensions across different countries and that technology acceptance may differ across countries (Straub, Keil and Brenner 1997), it investigates the stability of the proposed dimensionality in two new samples drawn from different countries.

Results imply that the same dimensionality holds for the three countries investigated. Configural invariance results imply that participants belonging in the three countries investigated conceptualize the construct of service quality in the same way. Finally an important contribution of this research effort pertains to the differing relative importance that different countries assign on service quality dimensions in the context of mobile internet services.

Though we did not formally hypothesize, a priori specific propositions relating service quality dimensions with the countries under investigation, our results confirm findings in the scarce cross-national e-service quality literature (Tsikriktsis 2002), suggesting culture as influencing e-service quality dimensions. The results indicate that companies should take into account these different importance weightings when allocating resources for improving service quality in different countries.

Even though the services literature suggests information-based services as easier to standardize across nations\(^7\), our results indicate that this may not be the case. The reader should take into account though, that we did not directly account for the influence of cultural dimensions on perceived mobile e-service quality dimensions. In the context of this study, countries are considered as cultural characteristics proxies. This logic, is strengthened from the work of Hofstede (1980), and evidence purporting the three countries sampled in this study as scoring differently in three dimensions of national

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\(^7\) Compared to people-processing services and possession-processing services (Furrer, Liu and Sudharshan 2000)
culture (1980), namely masculinity, individualism and uncertainty avoidance (see Kim et al. 2004) for a discussion on these specific scores).

Though we expect the relative importance of mobile e-service quality dimensions to be different across the three Asian countries investigated we consider our results as tentative on this matter and call for more research involving strong a priori hypothesis linking specific dimensions as more or less influenced by differing cultural characteristics.

Whatsoever, we believe that a post-hoc effort to explain differences found on relative importance assigned on different mobile e-service quality dimensions is worthwhile. This strategy has precedence in the literature (e.g. see Straub, Keil and Brenner 1997). Therefore using post-hoc explanations, we build our discussion on the work of Kim et al. (2004) who tried to explain differences in the usage of mobile internet services in the Japan, Hong-Kong and Korea based on cultural dimensions (masculinity, uncertainty avoidance and individualism) and economic factors (gross national income, internet penetration rates, broadband internet penetration rates).

In this study, so as to provide explanations for means differences found, we make use of the *uncertainty avoidance* index and of the reported differences in economic factors characterizing the three countries (Kim et al. 2004).

We start the discussion with the findings indicating Koreans as assigning more importance in all three factors when compared with Hong-Kong respondents. The finding that Koreans assign more importance on ease of use and usefulness issues might be explained by differences found in economic factors (lower income and maturity of the broadband stationary internet) (Kim et al. 2004). More specifically, this can be explained
by the high penetration of broadband internet in Korea, compared to Hong-Kong, and more specifically on the notion of relative advantage (Kim et al. 2004). Mobile internet via handheld devices was less readily adopted in Korea compared to Hong-Kong (and Japan) due to the relative advantage of the stationary internet (i.e. much richer information environment at a less cost). Therefore, one can hypothesize that Koreans would like to have mobile internet services that are more easy to use based on the following reasoning: difficult to use services might increase the cost of using such services (at least in the case of a time-based revenue business model) and cost is a much more important factor for Koreans, due to lower gross-national income and the cheaper stationary internet.

Most importantly Koreans, compared to Hong-Kong residents, score higher in the uncertainty avoidance cultural dimension. This entails ease of use as more important since, easy to use services reduces the possibility of service failure and therefore underscores higher confidence levels for the service used.

In the same vein, Koreans assign more importance on usefulness (i.e. a service that satisfies given task), due to cost reasons (i.e. they are not that willing to pay for mobile internet in the case it does not provide useful content, since they can satisfy their needs cheaper using stationary internet). Generally speaking one can explain greater importance assigned on all three factors of service quality from Koreans on the fact that they have greater service quality expectations due their prior experience with high-speed mature stationary internet services (e.g., they seem to assign more importance on the outcome quality -namely the content depth and width-along with aesthetic appeal- when compared
to Hong-Kong respondents, something that might be due to their prior experience with a much richer internet environment both in terms of content variety and visual elements).

Finally a possible explanation supporting the greater importance Koreans assign on customer care may be found on the higher uncertainty avoidance scores of Koreans (Kim et al. 2004). Uncertainty avoidance is the extent to which, the member of a culture feel threatened by uncertain or unknown situations (Hofstede 1991). Therefore in these cultures uncertainty associated with a possible service failure has to be reduced by the guarantee of a quick solution to the problem” (Furrer, Liu and Sudharshan 2000, p. 360.

Therefore the existence of a customer service department, though admittedly important in both countries, might be more important for cultures exhibiting higher levels of uncertainty avoidance. The same reasoning might be employed for the privacy observed variable. One could expect cultures with high uncertainty avoidance, to exhibit higher wariness levels when it comes to privacy concerns.

Finally, greater relative importance imposed on customization might be also explained by economic factors. Providing customization mechanisms in a mobile internet services context is important, since it allows for a more efficient way of fulfilling desired tasks and therefore requires less expenses (i.e. in terms of money paid for navigating the service-time based revenue business model-and in terms of system resources, i.e., battery resources)

We now move on to discuss the significant differences found in the Japan-Korea pair of countries. Mean structure analysis indicated Japanese as assigning more importance than Koreans on the efficiency factor, whereas it seems that Koreans assign more importance on the core-product factor. Pertaining to the core-product factor and
continuing the line of reasoning explicated previously, one possible explanation for such a state is the extensive prior experience of Koreans (when compared with Japanese) with stationary broadband internet services. Fast stationary internet connections enable the provision of content services that are wider both in terms of width and breadth.

Additionally Koreans seem to more favorably rate outcome quality due to their current mobile services usage pattern. As Kim et al. (2004) point, Koreans (and Hong-Kong residents as well) seem to prefer using mobile services that are more of a hedonistic rather than a utilitarian character. For this kind of services it seems reasonable to say that content depth and width as well as visual elements (aesthetics) are more important. On the other hand Japanese, seem to more frequently use utilitarian mobile services (e.g., e-mail, buying train tickets). To put it more bluntly, mobile services preferred by Koreans (i.e., hedonistic services, for example downloading music content), are primarily evaluated with criteria like content depth and width and visual/presentation elements, therefore having a prominent status in Koreans importance weighting schemes.

On the other hand services preferred by Japanese, namely utilitarian services (e.g. reading news, stock exchange information sending e-mails and booking train tickets), are primary evaluated with criteria pertaining to the reliability and accuracy of the information and not that much by presentation issues (Chae et al. 2002).

Pertaining to the greater importance assigned on ease of use and usefulness (i.e., the efficiency factor) by Japanese when compared with Koreans, a logical assumption is that such a state holds due to the higher-levels of uncertainty avoidance characterizing Japanese. Hofstede (1980) argued that uncertainty avoidance relates to a general feeling of anxiety when confronted with problems or challenges. Easy to use mobile services
reduce the possibility of confronting problems therefore reducing anxiety levels and
enhancing cognitions of confidence.

Further theoretical support for the relationship between uncertainty avoidance and
ease of use can be found using transaction cost theory (Devarai, Fan and Kohli 2002).
Uncertainty seems to constitute a form of transaction cost and ease of use is posited as a
mechanism for reducing such a transaction cost. Recently, Hwang (2004) found a
positive relationship between uncertainty avoidance and ease of use.

Pertaining to usefulness, it seems that Japanese may view it as more important due
to higher masculinity levels. In masculine-like societies, performing is highly valued and
useful services (i.e., services that enhance one’s performance (Davis 1989)) seem to be a
mechanism for attaining higher performance in everyday life activities.

Finally, pertaining to the Hong-Kong- Japan pair, our results imply that Hong-Kong
nationals assign more importance on customer care than Japanese. Based on the higher
uncertainty avoidance scores of Japanese when compared to Hong-Kong nationals, one
would expect a different sign in this difference. However, a potential explanation for such
a difference might be also found on the higher expectations that Hong-Kong nationals
might have for electronic service quality due to their extensive prior experience with
likewise stationary internet services. Additionally according to Kim et al. (2004), Hong-
Kong nationals seem to primarily use mobile internet services for commercial rather than
communication exchanges. It is expected therefore that due to the potential of economic
loss in their transactions, facets of service quality like privacy and customer service are
promoted as more important.
To sum up with it seems that mobile service providers with an active presence in these three countries should not be guided by simplistic rules when investing resources for improving service quality. Though, all service quality factors are important so as for consumers to infer high service quality assumptions, the relative importance of these factors is differential and managers should try to localize their resource allocation strategies in the quest for high service quality ratings. Standardizing service quality investment programs might be tempting due to cost advantages but this strategy may not be on the right track.

**LIMITATIONS AND FURTHER RESEARCH**

This study is not without limitations. However these limitations present opportunities for future research. First, the reader should take into account that our results pertaining to mean structure analysis, and more specifically on measurement invariance, heavily depend upon the criterion used so as to infer measurement invariance. Chen, Sousa and West (2005) point, that currently the methodological literature is armed with two measurement invariance criteria, namely the likelihood ratio criterion and the $\Delta$CFI criterion. The former should be considered as too conservative whereas the latter should be considered as a liberal test of measurement equivalence. This research study follows Cheung and Rensvold (2002), who find $\Delta$CFI as the best performing index for investigating measurement invariance.

Whatsoever, test statistics and fit indices should no replace sound judgment and substantive expertise (Bollen 1993). Prior research on the relationship between culture and e-service quality (e.g., Tsikriktsis 2002) along with the different patterns of using mobile services in the three countries examined (Kim et al. 2004; Lee at al. 2002),

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8 in terms of not being overly sensitive to small errors of approximation
increase our confidence of the results found employing the $\Delta$CFI criterion: relative weighting schemes pertaining to mobile services quality dimensions are different across countries.

Another important limitation involves employing an online survey design which introduces self-selection bias problems (Chae et al. 2002). Self-selection bias might create problems of sample representativeness. However, we are confident that due to the screening procedure employed (e.g., in Korea almost half of the primary respondents were deleted from the data set), our sample is consisted of real mobile internet users, and based on their self-reported demographics they are representative of the mobile internet user population in Korea (Sir et al. 2003). The problem of self-selection bias was somewhat mitigated in the Hong-Kong and Japanese samples where along with banner advertisements of the survey, e-mails were sent to registered users of specific web sites that agreed to participate in the survey.

Once again, a convenience sampling methodology entails representativeness bias concerns, but this was due to budget constraints and due to the complexity and cost of simultaneously managing data collection in three countries. However, one should take into account, the exploratory nature of the present study, since it is probably one of the first rigorously investigating electronic perceived service quality differences in more than one national markets.

Another important issue that merits discussion, due to its potential threat to our study’s validity is concerns about the content validity of instrument used. We did not employ measures pertaining to the technical reliability of mobile internet services (e.g. times a mobile internet site crashes e.t.c). The dimension of technical reliability, relates to
QoS issues (i.e., network performance), and admittedly the measurement of such issues is much more objective than the measurement of other potential service quality dimensions (e.g., perceptions of usefulness). To put it differently, in this research study we consider technical reliability as a given, as a pre-condition for a good mobile internet service. This has precedence in the stationary internet service quality literature (Loiacono, Goodhue and Watson 2007).

Likewise, an important research question that requires investigation is the role of device quality perceptions in overall perceived service quality scores. To put it differently is/or should device quality be a part of a perceived service quality in a mobile internet context? Device quality manifestations may pertain to technical features but also to visual elements (feel and look of the device), and one could argue that all these influence or enable the provision of high service quality in a mobile internet context.

CONCLUDING REMARKS

This study confirms the complexity of managing service quality perceptions and does so by providing theoretical and empirical evidence for a) the multidimensionality and the hierarchical nature of the construct and b) for the existence of significant differences between countries in the relative importance assigned on certain perceived service quality dimensions.

We believe that constructs pertaining to electronic service evaluation (e.g. service quality, satisfaction, value)- either that be a wireline internet service or a mobile internet service- are not that different at least in terms of factorial structure. We suggest that the electronic service context (wireline internet and mobile internet contexts) should be better
treated as a moderator variable that weakens, strengthens or makes insignificant relationships pertaining to structural relationships (i.e. relationships between evaluation constructs). For example one could hypothesize that ease of use—though salient both in a wireline internet and a mobile internet context—is perceived as more important in explaining an outcome variable (i.e. intention to use) in a mobile internet context due to the well known limitations of handheld devices and due to situational characteristics of mobile internet services consumption (i.e., consumption of mobile internet services compared to stationary internet services seems to be an “on the run” activity”).

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Table 1. Definitions of e-SQ Measures/Constructs

<table>
<thead>
<tr>
<th>Measure</th>
<th>Definition</th>
<th>Relevant Studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ease of Use</td>
<td>The extent to which a person believes that using wireless Internet services will be free of effort and easy to learn</td>
<td>Loiacono, Goodhue and Watson (2007); Sing (2003); Wolfinbargaer and Gilly (2003); Cox and Dale (2002); Zeithaml, Parasuraman and Malhotra (2002); Chae et al. (2002); Yang and Peterson (2001); Jun and Kai (2001); Mathwick, Malhotra and Rigdon (2001); Venkatesh and Davis (2000)</td>
</tr>
<tr>
<td>Usefulness</td>
<td>The extent to which a person believes that using wireless Internet services will enhance his or her performance</td>
<td>Zeithaml, Parasuraman and Malhotra (2003); Chae et al. (2002); Liu and Arnett (2000); Venkatesh and Davis (2000)</td>
</tr>
<tr>
<td>Aesthetics</td>
<td>The extent to which wireless Internet services are visually attractive and pleasant</td>
<td>Loiacono, Goodhue and Watson (2007); Chae and Kim (2003); Zeithaml, Parasuraman and Malhotra (2003); Swinder, Trocchia Gwiner (2002); Jun and Kai (2001); Yang and Peterson (2001)</td>
</tr>
<tr>
<td>Content</td>
<td>The variety of content offered (depth &amp; width) through wireless Internet services</td>
<td>Srinivasan, Anderson and Ponnavolu (2002); Kayanama and Black (2001)</td>
</tr>
<tr>
<td>Privacy</td>
<td>The respect of personal information shared through wireless Internet services</td>
<td>Wolfinbargaer and Gilly (2003); Zeithaml, Parasuraman and Malhotra (2003); Koivumaki (2002); Yang and Peterson (2001)</td>
</tr>
<tr>
<td>Customization</td>
<td>The ability to adapt and personalize wireless Internet services to individual preferences</td>
<td>Wolfinbargaer and Gilly (2003); Srinivasan, Anderson and Ponnavolu (2002); Kayanama and Black (2001)</td>
</tr>
<tr>
<td>Customer Service</td>
<td>Responsive and helpful service that responds to customer inquiries quickly</td>
<td>Wolfinbargaer and Gilly (2003); Zeithaml, Parasuraman and Malhotra (2003); Koivumaki (2002); Reibstein (2002); Woo and Fock (1999)</td>
</tr>
</tbody>
</table>
Table 2. Perceived Mobile Internet Services Quality: Exploratory Factor Analysis, N= 4, 456

<table>
<thead>
<tr>
<th>Factors</th>
<th>Measures</th>
<th>Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>F1: Efficiency Quality</strong></td>
<td>Ease of use (how easily can I learn to use the service)</td>
<td>.66</td>
</tr>
<tr>
<td>(23.2 % of variation)</td>
<td>Usefulness (how useful the service offerings are to me)</td>
<td>.67</td>
</tr>
<tr>
<td><strong>F2: Outcome Quality</strong></td>
<td>Aesthetics (how enjoyable and visually attractive is to use the service)</td>
<td>.63</td>
</tr>
<tr>
<td>(15.8% of variation)</td>
<td>Width/Depth of Content (for example, number of items available to download)</td>
<td>.57</td>
</tr>
<tr>
<td><strong>F3: Customer Care Quality</strong></td>
<td>Privacy (minimization of personal data that I need to disclose to the service provider)</td>
<td>.65</td>
</tr>
<tr>
<td>(13.5% of variation)</td>
<td>Level of personalization (whether I can personalize the service to my tastes)</td>
<td>.66</td>
</tr>
<tr>
<td></td>
<td>Customer service (whether the provider is able to support me effectively in problems I might face)</td>
<td>.75</td>
</tr>
</tbody>
</table>
Figure 1. The Perceived Service Quality Construct
**Figure 2.** Alternative Factor Structures of the Perceived Service Quality Construct

Three first-order factor model (Uncorrelated)

Three first-order factor model (Correlated)

First-order factor model
### Table 3. Model Fit Criteria

<table>
<thead>
<tr>
<th>Cut-off point</th>
<th>Reference</th>
<th>Korea</th>
<th>Japan</th>
<th>Hong-Kong</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>One first-order factor model</td>
<td>Three factor model (uncorrelated)</td>
<td>Three factor model (correlated)</td>
<td>Second-order factor model</td>
</tr>
<tr>
<td>Chi-square</td>
<td>Smaller the better</td>
<td>Schumacker and Lomax (2004)</td>
<td>694.69 (p=.00)</td>
<td>223.91 (p=.00)</td>
</tr>
<tr>
<td>Df</td>
<td></td>
<td></td>
<td>14</td>
<td>16&lt;sup&gt;9&lt;/sup&gt;</td>
</tr>
<tr>
<td>CFI</td>
<td>&gt;0.95</td>
<td>Hu and Bentler (1999)</td>
<td>.61</td>
<td>.70</td>
</tr>
<tr>
<td>Delta 2</td>
<td>&gt;0.90</td>
<td>Bagozzi and Yi (1988)</td>
<td>.41</td>
<td>.70</td>
</tr>
<tr>
<td>Standardized RMR</td>
<td>&lt;0.08</td>
<td>Hu and Bentler (1999)</td>
<td>.09</td>
<td>.23</td>
</tr>
<tr>
<td>RMSEA</td>
<td>&lt;0.06</td>
<td>Hu and Bentler (1999)</td>
<td>.10</td>
<td>.18</td>
</tr>
</tbody>
</table>

<sup>9</sup> This model was unidentified, and based on the suggestions of AMOS 5.0, two parameter loadings were fixed to one.
Figure 3. Standardized Parameter Estimates (Korean Sample)
Figure 4. Standardized Parameter Estimates (Japanese Sample)
Figure 5. Standardized Parameter Estimates (Hong-Kong Sample)
<table>
<thead>
<tr>
<th>Construct/Measures</th>
<th>Korea</th>
<th>Japan</th>
<th>Hong Kong</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Standardized Loadings and t-values</td>
<td>Standardized Loadings and t-values</td>
<td>Standardized Loadings and t-values</td>
</tr>
<tr>
<td></td>
<td>(pc)</td>
<td>AVE</td>
<td>(pc)</td>
</tr>
<tr>
<td>γ11 Service Quality-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Efficiency Quality</td>
<td>.80 (*)</td>
<td>.87 (*)</td>
<td></td>
</tr>
<tr>
<td>γ21 Service Quality-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outcome Quality</td>
<td>.81 (t=20.73)</td>
<td>.75 (t=18.07)</td>
<td>.67 (t=17.97)</td>
</tr>
<tr>
<td>γ31 Service Quality-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customer Quality</td>
<td>.71 (t=19.93)</td>
<td>.80 (t=17.49)</td>
<td>.85 (t=16.15)</td>
</tr>
<tr>
<td>Efficiency Quality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>.70</td>
<td>.54</td>
<td></td>
</tr>
<tr>
<td>y1 Ease of use (how easily</td>
<td>.62 (*)</td>
<td>.78 (*)</td>
<td></td>
</tr>
<tr>
<td>can I learn to use the service)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>y2 Usefulness (how useful</td>
<td>.84 (t=28.53)</td>
<td>.79 (t=28.60)</td>
<td>.78 (t=22.54)</td>
</tr>
<tr>
<td>the service offerings are to</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>me)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outcome Quality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>.61</td>
<td>.44</td>
<td></td>
</tr>
<tr>
<td>y3 Aesthetics (how enjoyable and visually</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>attractive is to use the service)</td>
<td>.74 (t=25.19)</td>
<td>.79 (t=23.45)</td>
<td>.75 (t=25.00)</td>
</tr>
<tr>
<td>y4 Width/Depth of Content (for example,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>number of items available to</td>
<td>.58 (*)</td>
<td>.72 (*)</td>
<td></td>
</tr>
<tr>
<td>download)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customer Care Quality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>.77</td>
<td>.53</td>
<td></td>
</tr>
<tr>
<td>y5 Privacy (minimization of personal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>data that I need to disclose to the</td>
<td>.67 (t=37.31)</td>
<td>.75 (t=23.82)</td>
<td>.75 (t=25.28)</td>
</tr>
<tr>
<td>service provider)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>y6 Level of personalization</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(whether I can personalize</td>
<td>.72 (*)</td>
<td>.61 (*)</td>
<td></td>
</tr>
<tr>
<td>the service to my tastes)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>y7 Customer service</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>provided (whether the provider is able</td>
<td>.80 (t=38.59)</td>
<td>.73 (t=23.60)</td>
<td>.81 (t=26.17)</td>
</tr>
<tr>
<td>to support me effectively in any</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>problem I might have)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 5. Factor Means Comparisons

<table>
<thead>
<tr>
<th></th>
<th>Efficiency</th>
<th>Outcome Quality</th>
<th>Customer Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>Korea- HK</td>
<td>Korea&gt;HK</td>
<td>Korea&gt;HK</td>
<td>Korea&gt;HK</td>
</tr>
<tr>
<td>Japan- HK</td>
<td>n.a.</td>
<td>n.s.</td>
<td>HK&gt;Japan</td>
</tr>
<tr>
<td>Japan- Korea</td>
<td>Japan&gt;Korea</td>
<td>Korea&gt;Japan</td>
<td>n.a.</td>
</tr>
</tbody>
</table>

Notes: n.a. = not applicable due to non-invariance, n.s. = not statistically significant