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Electronic Perceived Service Quality: Results from a Cross-National Study in the Context of Mobile Internet Services

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1 **PERCEIVED ELECTRONIC SERVICE QUALITY: SOME PRELIMINARY**
2 **RESULTS FROM A CROSS-NATIONAL STUDY IN MOBILE INTERNET**
3 **SERVICES**

4
5 **ABSTRACT**

6 Work on how consumers evaluate electronic service quality is both topical and important
7 due to the well accepted criticality of electronic channels in selling products and services.
8 However, most of the relevant research on electronic research quality is preoccupied with
9 the web site Internet context and most of the studies are single-country studies, inhibiting
10 conclusions of generalizability. Theoretically rooted in the Nordic Model of perceived
11 service quality, this exploratory study uses an e-service quality scale to measure mobile
12 Internet service quality in different national settings. Consistent with the available e-
13 service quality literature, results indicate that e-service quality is a second-order factor,
14 with three reflective first-order dimensions: *efficiency*, *outcome*, and *customer care*. Most
15 importantly, cross-validation investigations using samples drawn from Korean, Hong-
16 Kong and Japanese mobile Internet user populations, support the factorial structure
17 invariance of the construct. Following Cheung and Reynolds' (2002) suggestions, we
18 tentatively examine factor means differences between the three countries contributing to
19 the scarce cross-national electronic service quality literature. These initial empirical
20 findings imply that though consumers in different countries use the same dimensions in
21 order to evaluate mobile Internet services, importance weightings assigned on these
22 dimension are probably not the same.

23 **KEYWORDS** Perceived Electronic Service Quality, Mobile Internet, Cross-National,
24 Multi-Sample Analysis

26 INTRODUCTION

27 *Perceived electronic service quality* constitutes a well-established construct in the e-
28 commerce literature (Wolfenbarger & Gilly, 2003). According to Zeithaml, Parasuraman,
29 & Malhotra (2002) electronic service quality can be defined “*as the extent to which a web*
30 *site facilitates efficient and effective shopping, purchasing and delivery*”.

31 Research on e-service quality has just started gaining a momentum and the main research
32 question that all relevant studies try to address pertain to the factorial structure of the
33 construct and measurement issues (Wolfenbarger & Gilly, 2003). However, though
34 research on measurement issues is quite advanced, cross-national considerations of the
35 electronic service quality construct are scarce in the literature. Wolfenbarger and Gilly
36 (2003) explicitly recognize this research gap and call for more research in the
37 investigation of electronic service quality vis-à-vis international populations.
38 Additionally, discussions in the service quality literature questioning the generalizability
39 of service quality dimensions across different countries (Tsikriktsis, 2002) render the
40 investigation of the stability of the e-service quality dimensionality in different countries
41 as topical and important.

42 This initial research attempt aims to contribute to the available e-service quality in two
43 ways: First, addressing the call of Wolfenbarger & Gilly (2003), it investigates e-service
44 quality in a cross-national context aiming to explore whether the factorial structure of the
45 construct is the same across different nationalities. If this is the case, do consumers in
46 different countries assign the same rankings of importance on different e-service quality
47 dimensions? Second, in order to further enhance the external validity of the e-service
48 quality literature the study investigates the above mentioned research questions in the

49 context of an alternative electronic channel of services provision, namely the wireless
50 mobile phone Internet channel. To this end, an online survey serves as the empirical
51 vehicle of the study, while exploratory and confirmatory factor analyses (CFA) are used
52 to tackle the research questions under investigation.

53

54 **BACKGROUND**

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

66 It should be clarified that we do not formally hypothesize a priori propositions relating
67 service quality dimensions with the countries under investigation. However, building
68 from the scarce cross-national e-service quality literature (Tsikriktsis, 2002), suggesting
69 culture as influencing e-service quality dimensions, we hypothesize the existence of
70 cross-national differences in service quality perceptions. This is consistent with the
71 available traditional service quality literature (Furrer, Liu, & Sudharshan, 2000).

72 Arguably, the theoretical foundation for proposing cross-national electronic service
73 quality is not strong enough. Therefore, we view the potential for cross-national
74 differences as a tentative position that may be explored with the data at hand. If the
75 results are promising, researchers may be encouraged to theorize these cross-national
76 differences more rigorously.

77 Besides the main aim of the paper to contribute to the scarce cross-national e-service
78 quality literature, this article contributes to the emerging mobile commerce literature in
79 that it uses the e-service quality construct to measure perceptions of service quality in the
80 context of mobile Internet services.

81 Mobile internet, defined as the wireless access to internet content via mobile devices,
82 such as mobile phones and personal digital assistants, has advanced astonishingly both in
83 terms of user population and technology developed (Gao, Rau, & Salvendy, 2009; Lee,
84 2009; Tan & Chou, 2008; Xiaowen, Chan, Brzezinski, & Shuang, 2005). Wireless
85 Internet services via mobile phone devices became available in Japan, Korea and Hong-
86 Kong in 1998 (Kim et al., 2004) and debuted in Europe in 2002, mainly through NTT
87 DoCoMo's *i-mode* and Vodafone's *Live!*, and are rapidly gaining end-user acceptance
88 throughout the world.

89 Currently, only few studies have investigated consumers' reactions to mobile phone
90 Internet services. Chae, Kim, Kim, & Ryu (2002b) employing an on-line survey and
91 structural equation analysis, found four second-order factors of information quality for
92 wireless Internet services: *connection quality*, *content quality*, *interaction quality* and
93 *contextual quality*. However, their research focuses on perceived information quality
94 rather than perceived service quality, which is a wider construct. Bruner and Kumar

95 (2005), employing the Technology Acceptance Model, proposed and tested an extended
96 consumer TAM for wireless Internet. The core model constructs are those of *usefulness*,
97 *ease of use* and *fun*. The authors have found that usefulness and fun (directly) and ease of
98 use (indirectly) influence attitudes toward adopting mobile commerce services. More
99 recently, Tan & Chou (2008) examined the effect of mobile service quality on users'
100 perceived playfulness toward mobile Internet services. These authors considered mobile
101 service quality as a multidimensional construct covering both extrinsic and intrinsic
102 service attributes. In another study, Lee (2009) suggested that consumer perception of
103 service quality is critical for identifying consumer preferences, attitudes, and
104 predispositions toward innovative mobile services. This same study provided empirical
105 results indicating that there exist differences in preferences and attitudes toward mobile
106 Internet services among consumers by age, by service categories, and by service format.
107 Similarly, Baek, Paik, & Yoo (2009), investigated how customers perceive 3G mobile
108 services. They found that picture messaging, navigation, and mobile Internet are critical
109 elements of customer satisfaction among the various 3G mobile services. Based on their
110 results they suggested that telecommunication companies need to measure and improve
111 the perceived quality of these services. Finally, Queiroz & Ferreira (2009) suggested a
112 multidimensional approach for the evaluation of mobile application user interfaces
113 further noting the importance of including user subjective satisfaction measures in such
114 evaluative endeavors.

115 On the other hand, the literature pertaining to web site wireline Internet service quality is
116 much more advanced (e.g., Akinci, Atilgan-Inan, & Aksoy, 2010). Zeithaml et al.,
117 (2002) suggest that electronic service quality can be decomposed into four dimensions,

118 namely *efficiency, fulfillment, privacy* and *technical reliability*. Similarly, Wolfinbarger
119 & Gilly (2003) conceptualize electronic service quality using four dimensions, namely
120 *fulfillment/reliability, website design, privacy/security* and *customer service*. In another
121 study, Loiacono, Watson, & Goodhue (2007) propose twelve dimensions and 3 higher-
122 order constructs, that is *ease of use, usefulness* and *entertainment*.

123 Admittedly, most research efforts made to measure consumers' evaluations of electronic
124 service quality, conclude in giving us extended measurement scales that though content
125 valid, are practically difficult to use due to their excessive length (for example e-
126 SERVQUAL, consists of 22 items). This is especially the case in the context of the
127 present study, namely handheld Internet services, where limited input and output
128 resources of access devices (Gao et al., 2009) likely inhibit the use of extended consumer
129 evaluation instruments.

130

131 -Insert Table 1 about here-

132

133 Elaborating on the available theoretical knowledge and relevant research insights, the
134 present study proposes an abbreviated consumer evaluation instrument that promises to
135 be practically useful, managerially relevant and psychometrically sound, theoretically
136 building from the well accepted dual-factor model of perceived service quality (Brady &
137 Cronin, 2001). Specifically, the study uses seven measures-anchored from 1(=not
138 important at all) to 7 (=very important) to measure the importance of different electronic
139 service quality dimensions in mobile Internet services. These measures relate to *Ease of*
140 *Use, Usefulness, Aesthetics, Content, Privacy, Customization* and *Customer Service* (see
141 Table 1). Conceptually, these measures attempt to tap the theoretical dimensionality of

142 perceived service quality, namely the functional and technical service quality components
143 proposed by the Nordic Model (i.e., the “what” and “how” components) (Brady & Cronin,
144 2001).

145

146 **RESEARCH METHODOLOGY AND SAMPLING**

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

150 First, we develop the service quality scale in the Korean sample employing a split-sample
151 analysis procedure. We explore the structure of the service quality construct employing
152 exploratory factor analysis (in the first split sample) and then validate this structure in the
153 second split sample using confirmatory factor analysis. In order to investigate the
154 generalizability of the findings we then move on to investigate the stability of the service
155 quality dimensionality in two fresh samples collected in two additional Asian countries,
156 namely Hong-Kong and Japan. We selected these three Asian countries for two reasons:
157 a) due to high penetration rates of mobile phone devices in these countries and b) due to
158 high penetration rates for mobile Internet services usage (Kim et al., 2004). According to
159 the Telecommunications Management Group (2004) Japan and South Korea lead the
160 world in mobile multimedia usage. For example, Japanese and Korean markets accounted
161 for 73% and 23% of the total mobile Internet market in Asia, respectively (Kim et al.,
162 2004). Similarly, approximately 39% of the total population of Korea subscribes to
163 mobile Internet services through major mobile telecommunication service carriers
164 (National Internet Development Agency of Korea, 2005). Finally, the number of mobile

165 service subscribers in Hong-Kong represents one the highest penetration rates in the
166 world at about 169 per cent (Office of the Telecommunications Authority, 2009).
167 Importantly, more than 41% of Hong-Kong mobile service subscribers are 3G service
168 customers (Office of the Telecommunications Authority, 2009).

169 **Korean Sample**

170 We constructed a research consortium consisting of all mobile operators in Korea, major
171 Internet portals and mobile Internet application developers. Mobile operators verified the
172 survey data and provided funding to our project.

173 Data were collected employing a large scale online survey and potential respondents were
174 given participation incentives. Two major concerns in Internet-based surveys are the
175 respondents filling out the survey multiple times and “random walk-ins” (Deutskens,
176 Ruyter, Wetzels, & Oosterveld, 2004; Ilieva, Baron, & Healey, 2002). To address these
177 concerns mobile operators checked whether the phone numbers self-reported were
178 legitimately registered and whether the owners of the phone numbers had accessed the
179 mobile Internet at least once in the past.

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

188 Korea (Lee, 2009; Sir, Yoo, Cho, & Yang, 2003). Furthermore, according to the study of
189 Lee (2009) consumers in their 20s and 30s can provide more insight for future directions
190 of mobile Internet services.

191 **Hong-Kong Sample**

192 In order to collect data from the Hong-Kong population, we employed an online survey
193 methodology-as was the case with the Korean sample. The questionnaire was
194 administered on a non-profit public website run by the Hong Kong government. An e-
195 mail soliciting participation in the survey was sent to registered members of the website.
196 Also, a banner advertisement of the survey was made available on the website over a
197 period of four weeks. To reduce the possibility that a respondent participated in the
198 survey more than once, each respondent was required to provide his/her mobile phone
199 number in the survey. To encourage participation, incentives of the latest models of
200 mobile phones and MP3 players were offered as lucky draw prizes. A total of 1,826 valid
201 responses were collected. In total, there were 8,941 respondents who successfully
202 completed the questionnaires; of which 7,045 were potential users and 1,826 were current
203 users. 817 respondents were males (44.7%) and 1,009 were females (55.3%). The age of
204 respondents ranged from 13 to 76 years, with a median of 25 years. Most of the
205 respondents were in their 20s (53.1%) and 30s (18.0%). As previously mentioned there is
206 empirical evidence suggesting that consumers in their 20s should be the focus of studies
207 examining mobile internet services usage (Lee, 2009). Finally, the length of experience
208 with using mobile Internet ranged from 1 to 44 months, with 15 months as the median,
209 and 17.2 months as the mean.

210

211 **Japanese Sample**

212 A research center administered the data collection process in Japan. Online panel
213 members were solicited via email requests. More specifically, the questionnaire was
214 uploaded on the homepage of MIN¹, and e-mails were sent to ECOM² members-along
215 with requests to other relevant parties through ECOM- and to MIN monitors (e.g., i-mode
216 monitors), asking to access the questionnaire page.

217 A total of 3,310 people participated at the survey. The effective number of respondents
218 was 2,151 (number of respondents self-reporting currently using mobile Internet
219 services). The length of experience with using mobile Internet was 79 months (median
220 value) indicating Japanese respondents as quite experienced with mobile Internet
221 services. The sample was somewhat balanced between men (47%) and women (53%) and
222 the age of respondents ranged from 14 to 73 years old with a median of 34 years. Three
223 out of ten respondents reported being less than 30 years old. According to recent
224 empirical evidence (Lee, 2009) the age distribution characterizing the Japanese sample
225 seems to be the most appropriate for studies examining mobile internet services usage.

226

227 **METHOD OF ANALYSIS**

228 **Internal Analyses**

229 A random split-sample approach was employed ((Babakus, Beinstock, & Van Scotter,
230 2004; Diamantopoulos & Siguaw, 2000). In the first half (of the Korean) sample (N=
231 4,456) *Exploratory Common Factor Analysis* was used as a first step in identifying the

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

232 factor structure of the electronic service quality construct. Then, in the second half of the
233 sample alternative first-and second-order factor models were tested through *Confirmatory*
234 *Factor Analysis* to examine which model of perceived electronic service quality is
235 superior in fitting the sample data.

236 **Measurement Invariance**

237 We conducted tests for both category 1 and category 2 invariance (Cheung & Rensvold,
238 2002). We conduct configural, metric, scalar and invariance tests to investigate the
239 generalizability of the results found in the Korean sample, in two more samples and then
240 tentatively examined the existence of latent mean differences in these three countries
241 employing mean structure analysis procedures (MACS) (Arbuckle & Wothke, 1999).

242 **Issues in Assessing Measurement Invariance**

243 The most widely used criterion for examining measurement invariance is the χ^2 difference
244 test. However, the likelihood ratio test is sensitive to non-normality and has substantial
245 power in large samples to detect small discrepancies between groups that may be of no
246 practical importance (Chen, Sousa, & West, 2005).

247 Along these lines, the best available guidelines for the usage of practical fit indices in
248 testing for measurement invariance are those proposed by Cheung & Rensvold (2002).
249 They concluded that a difference of larger than .01 in CFI would indicate a meaningful
250 change in model fit when testing for measurement invariance.

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254

255 RESULTS

256 Exploratory Factor Analysis (Korean Sample)

257 *Common Factor Analysis with varimax rotation* was employed to determine the factor
258 structure of the perceived electronic service quality construct (Gorsuch, 1990).

259 We tested a two-, three-, and four-factor model. Based on the percentage of variance
260 criterion (Hair, Anderson, Tatham, & W.Black, 1998) the analysis revealed the three
261 factor solution as more appropriate, explaining 52.5 percent of the total variance (see
262 Table 2). All measures load clearly to the three factors extracted.

263

264 -Insert Table 2 about here-

265

266 The first factor, explaining 23 percent of the total variance, constitutes the *Efficiency*
267 *Quality* dimension and is related to the ease of use and the usefulness of the wireless
268 Internet service. Zeithaml et al., (2002) suggest that efficiency constitutes a dimension of
269 electronic service quality, defining efficiency as “*the ability of the customers to get to the*
270 *web site, find their desired product and information associated with it and check out with*
271 *minimal effort*”. In the human-computer interaction literature, efficiency quality refers to
272 whether the consumer perceives that the task is performed without making mistakes or
273 putting too much effort (Sing 2003). In both definitions, it is suggested that efficiency has
274 to do with ease of use and usefulness.

275 The second factor, accounting for 16 percent of the total variance, is *Outcome Quality*.

276 This factor encompasses emotional benefits (i.e., enjoyment), visual attractiveness (i.e.,
277 aesthetics) and content variety (i.e., functional benefits) provided by the use of wireless

278 Internet services. Outcome quality reflects the “product” of the service act itself, or in
279 other words what the customer receives in the service encounter (Brady & Cronin, 2001).
280 The third factor, *Customer Care Quality*, explains 13 percent of the total variance.
281 Customer care quality relates to adapting the wireless service to user preferences (level of
282 personalization), to minimization of personal data provided (privacy issues), and to the
283 customer service provided, especially when consumers experience a problem while using
284 wireless Internet services. Gounaris and Dimitriadis (2003) suggested the customer care
285 construct as an important dimension of customer-perceived service quality in business-
286 to-consumer Internet portals. They found that this dimension encompasses issues like
287 privacy of shared information and customer service.

288

289 -Insert Figure 1 about here-

290

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

297 **Confirmatory Factor Analysis (Korean Sample)**

298 Following the methodology employed by Doll, Xia, & Torkzadeh (1994) and Somers,
299 Nelson, & Karimi (2003), we tested the proposed second-order factor model against three
300 other possible alternative factor structures (see Figure 2). More specifically, we tested the

301 proposed research model against a one first-order factor model, a three-factor model with
302 orthogonal factors, and a three-factor model with correlated factors.

303

304 -Insert Figure 2 about here-

305

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

311

312 -Insert Table 3 about here-

313

314 Based on the fit indices, the one first-order factor model is far from being acceptable. The
315 uncorrelated three-factor model is also not supported by the data covariance matrix.
316 Finally, the correlated three-factor model has the same fit indices with the second-order
317 factor model, indicating adequate fit. However, theory in the domain of perceived service
318 quality suggests the existence of a second-order factor that accounts for the common
319 variance of the first-order factors. This model seems to be theoretically more interesting
320 than the correlated three-factor model³ (Doll et al., 1994). With the exception of the chi-

³ Further support for the superiority of a second-order factor model can be found in the structural equation modeling literature. Chen et al., (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

321 square statistic, the proposed second-order factor structure fits the data reasonably well
322 ($\chi^2(11) = 223.91$ and $p=0.00$, CFI=.97, Delta 2=.97, SRMR=.03 and RMSEA=.066).

323 The internal structure of the proposed model was also examined. First, we examined the
324 parameter estimates and the accompanying tests of significance (Bagozzi & Yi, 1988).
325 Convergent validity is implied by the magnitude of the factor loading of each measure on
326 its suggested latent variable ((Dabholkar et al., 1996; Mathwick, Malhotra, & Rigdon,
327 2001). All λ 's are greater than the .60 level (Bagozzi & Yi, 1998), except λ_{42} (aesthetics
328 measure) which is marginally below .60. Moreover, all λ 's are significant since all t-
329 values are above the |2.00| level suggesting convergent validity. The results are
330 summarized in Figure 3.

331

332 -Insert Figure 3 about here-

333

334 Discriminant validity can be demonstrated by calculating covariance confidence intervals
335 around the factor covariances. All confidence intervals computed do not include the
336 value of 1.00 indicating discriminant validity (Dabholkar et al., 1996; Mathwick et al.,
337 2001).

338

339 -Insert Table 4 about here-

340

341 Regarding measurement model fit, Bagozzi & Yi (1988) propose that composite
342 reliability (ρ_c) and AVE should be greater than 0.6 and 0.5 respectively. These cut-off
343 points hold for the three constructs, except from the *Outcome Quality* construct with an
344 AVE of .44. The composite reliability of *Outcome Quality* is .61 exceeding the suggested
345 cut-off point (see Table 4).

346 **Confirmatory Factor Analysis (Japanese and Hong-Kong Samples)**

347 *Japanese Sample*

348 CFA results for the Japanese sample conform to accepted reliability, convergent, and
 349 discriminant validity⁴ standards (see table 4) with the exception of the RMSEA index
 350 (see Table 3). RMSEA equals .11 indicating poor fit⁵ (Schumacker & Lomax, 2004).

351

352 -Insert Figure 4 about here-

~~353~~
 354

355 Figure 4 depicts the standardized, second-order mobile Internet perceived service quality
 356 path diagram for the Japanese sample.

357 *Hong-Kong Sample*

358 CFA results for the Hong-Kong sample conform to accepted reliability, convergent, and
 359 discriminant validity standards (see Table 4), with the possible exception of the RMSEA
 360 index (see Table 3), which is marginally greater than the .08 criterion indicating
 361 reasonable fit (Schumacker & Lomax, 2004). Pertaining to the somewhat high RMSEA
 362 value, the acceptable values of CFI and SRMR in association with the high statistical
 363 power of the present study seems to mitigate this problem. Figure 5 depicts the second-
 364 order mobile Internet service quality construct for the Hong-Kong sample.

⁴ We also checked for discriminant validity employing the most stringent criterion of Fornell and Larcker (Fornell & Larcker, 1981). We tested whether AVE from each latent is greater than its shared variance with the other two latents (γ^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”.

⁵ Regarding the high RMSEA value, we build from 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 has 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. 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 (see Zeithaml et al., 2002).

-Insert Figure 5 about here-

365

366

367 **Measurement Invariance**

368 In order to test for the measurement invariance of the second-order service quality model
369 across the three countries, we follow the general procedures suggested by Byrne (2004)
370 and Chen et al., (2005) essentially testing for a series of increasingly constrained
371 hierarchical nested models.

372 *Configural Invariance (Model 1)*

373 Testing for this form of invariance requires the specification of an unrestricted baseline
374 model. Altogether fit indices for this unconstrained model indicate acceptable fit (χ^2 (33)
375 = 650,4 ($p < .00$), CFI=.97, Delta 2=.97, RMSEA=.047, SRMR=.028). These results
376 support the validity of the hypothesized three-factor service quality model across Korea,
377 Japan and Hong-Kong.

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

379 In testing for this level of factorial invariance, all first-order loadings were constrained to
380 be equal across the three countries. This model is nested within the fully unconstrained
381 model (model 1). The chi-square difference test is significant ($\Delta\chi^2$ ($\Delta_{df}=8$) =56,3
382 ($p=.00$)), indicating non-invariance of the first-order factor loadings across the three
383 countries. However, given that the test was based on a large sample size, and due to no
384 substantial difference in CFI (Δ CFI=.003, .966 vs. .963) we concluded that there was no
385 appreciable difference between the unconstrained model and the first-order measurement
386 weights constrained model (Chen et al., 2005; Cheung & Rensvold, 2002).

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

388 This model is nested within model 2. The chi-square difference test is significant ($\Delta\chi^2$
389 ($\Delta_{df}=4$) =18,6 (p=.00)), indicating non-invariance of the second-order factor loadings
390 across the three countries. However, the difference in CFI was not substantial
391 ($\Delta CFI=.001$, .963 vs. .962), therefore we concluded that there was no appreciable
392 difference between model 2 and 3.

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

394 The specification of this model is a prerequisite for comparing latent means across groups
395 (2004).The fit of this model is not good ($\Delta\chi^2$ ($\Delta_{df}=14$) =2626,3 (p=.00), $\Delta CFI=.146$).
396 Following Steenkamp & Baumgartner (1998) and Ueltschy, Laroche, Tamilia, &
397 Yannopoulos (2004)we examined for partial scalar/intercept invariance. We do so
398 examining each pair of the three participating countries. As Steenkamp & Baumgartner
399 (1998) point: “...at least one item besides the marker item has to have...invariant
400 intercepts in order for cross-national comparisons of factor means to be meaningful”.

401 *Japan- Hong-Kong*

402 Tests pertaining to these two countries indicate partial scalar invariance (Steenkamp and
403 Baumgartner 1998). We find partial scalar invariance for the “customer care” and
404 “outcome quality” factors. The comparison of the model having constraints for the first-
405 order and second-order factor loadings with the model further imposing invariance
406 constraints on two intercepts indicates a .01 difference in CFI ($\Delta\chi^2$ ($\Delta_{df}=2$) =94,2 (p=.00),
407 the level Cheung & Rensvold (2002) suggested as indicative of practical invariance.
408 These results indicate that we are entitled to test for difference in factors means between
409 these two countries but only for the *customer care* and *outcome quality* constructs, since
410 we do not find partial scalar invariance for the *efficiency* factor.

411 *Japan- Korea*

412 Assuming model 3 to be correct (invariance of first-order and second-order factor
413 loadings) the model with constraints on the full list of measured variables invariance do
414 not fit the data ($\Delta\chi^2$ ($\Delta_{df}=7$) =2117,9 (p=.00), $\Delta CFI=.161$). Again we start investigating
415 for partial invariance. Tests for the “customer care” subscale are not good ($\Delta\chi^2$ ($\Delta_{df}=3$)
416 =1083,4 (p=.00), $\Delta CFI=.082$). Following these results we started relaxing intercept
417 invariance constraints. Results are not good for the “customer service” observed variable
418 ($\Delta\chi^2$ ($\Delta_{df}=2$) =624,59 (p=.00), $\Delta CFI=.047$), though the results for ΔCFI are less than the
419 benchmark (<.05) suggested by Little (1997), but high above the suggestions of Cheung
420 & Rensvold (2002). Increasingly relaxing constraints do not improve the ΔCFI criterion
421 to be less than the Cheung & Rensvold (2002) cut-off. Therefore, results indicate that we
422 are not entitled to conduct a means difference test for the customer care latent in this pair
423 of countries, following Cheung and Rensvold (2002) but we can do so if we rely on Little
424 (1997). Results for the *outcome quality* construct indicate partial scalar invariance.
425 Constraining both observed variables indicate intercept invariance following Little
426 (1997), since $\Delta CFI=.024<.05$. Relaxing one of the observed variables indicates a ΔCFI
427 less than .01. Results for the *efficiency* factor suggest a ΔCFI equal to .013 marginally
428 greater than the Cheung & Rensvold (2002) criterion.

429 *Hong-Kong- Korea*

430 Results for fully constraining intercepts of measured variables for this pair of countries
431 indicate non-invariance ($\Delta\chi^2$ ($\Delta_{df}=7$) =265,3 (p=.00), $\Delta CFI=.02$). However, ΔCFI equals
432 .02, which is greater than the Cheung & Rensvold (2002) criterion ($\Delta CFI<.01$) but much
433 less than Little’s (1997) suggestion (<.05). Results for subscales indicate partial scale

434 invariance for the *customer care* factor ($(\Delta\chi^2 (\Delta df=2) =77,347 (p=.00), \Delta CFI=.006)$ and
435 the *outcome quality* ($\Delta\chi^2 (\Delta df=4) =98,9 (p=.00), \Delta CFI=.008$). Results for the *efficiency*
436 factor are marginal ($\Delta\chi^2 (\Delta df=5) =139,4 (p=.00), \Delta CFI=.011$)

437 *Summary*

438 Results for the invariance of measured variables intercepts (along with results pertaining
439 to first-order factor loadings) indicate that we are entitled to compare all factor means in
440 the Hong-Kong –Korea pair, *outcome quality* and *customer care* means for the Japan-
441 Hong-Kong pair and the *outcome quality* means for the Japan-Korea pair. Whatsoever, in
442 the latter pair, due to the marginality of results we will tentatively report the means
443 differences tests for the *efficiency* factor too.

444 **Means Structure Analyses**

445 Means structure analyses are required in order to investigate latent mean differences
446 between groups. In order to directly compare first-order factor means between pairs of
447 countries we specified a correlated first-order factor model of perceived service quality.
448 As Chen et al., (2005) note: “the first-order factors means are conditional on the higher-
449 order factor mean (s) in a hierarchical model, and thus cannot be directly compared.” We
450 considered the possibility of second-order mean comparisons, but such a test was
451 inappropriate due to non-invariant second-order intercepts. Results are reported in Table
452 5.

453 ***Hong-Kong- Korea***

454 There was a significant mean difference between the two countries in all three factors.
455 More specifically, results indicate that Hong-Kong scores lower on the importance of

456 *efficiency* (-.24, $z=-8.43$) $p\leq .00$), *outcome quality* (-.32, $z=-9.90$, $p\leq .00$), and *customer*
457 *care* (-.23, $z=-6.30$, $p\leq .00$).

458 ***Japan- Hong-Kong***

459 Factor means difference tests for this pair of countries was conducted for the *customer*
460 *care* and *outcome quality* constructs. There was a significant mean difference between
461 the two countries only in the *customer care* factor. Results indicate that Hong-Kong
462 scores higher on the importance of *customer care* (.42, $z=9.74$, $p\leq .00$). There was no
463 difference observed on the *outcome quality* factor (.02, $z=0.50$, $p\leq .62$).

464 ***Japan- Korea***

465 Factor means difference tests for this pair of countries was conducted for the *outcome*
466 *quality* construct. Results indicate that Koreans -compared to Japanese- believe the
467 *outcome quality* factor as being more important when experiencing mobile services (.12,
468 $z=.40$, $p\leq .00$). Due to the marginal results obtained when investigating intercept
469 invariance for the efficiency factor, we tentatively report the means difference results for
470 this factor too. It seems that Koreans assign significantly less important than Japanese in
471 the efficiency factor (.13, $z=-6.58$, $p\leq .00$)

472

473 -Insert Table 5 about here-

474

475 To summarize, Table 5 reports, that mobile Internet consumers in Korea seem to be more
476 demanding compared to mobile Internet consumers in Hong-Kong, since they score
477 higher on all three service quality dimensions (efficiency, outcome quality and customer
478 care). Furthermore, consumers in Japan compared to those in Hong-Kong seem to differ
479 only in the customer care dimension. The former compared to the latter do not seem to

480 assign the same importance to customer service elements. This pair of countries seems to
481 be the most homogeneous compared to the remaining pairs of countries. Finally, mixed
482 results are found in the Japan-Korea pair. Japanese assign greater importance to
483 efficiency, whereas Koreans assign greater importance to outcome quality.

484

485 **DISCUSSION**

486 Theoretically rooted in the Nordic Model of perceived service quality and the wireline
487 electronic service quality literature the study proposes and tests a scale to measure mobile
488 Internet service quality. Importantly, it does so in different national settings contributing
489 to the scarce cross-national electronic service quality literature as well. The study
490 investigates the stability of the proposed scale in two new samples drawn from different
491 countries. Results imply that the same dimensionality holds for the three countries
492 investigated. Consumers from the three countries seem to conceptualize the construct of
493 e-service quality in mobile Internet services in the same way. On the other hand, findings
494 imply that importance weightings assigned on the e-service quality dimensions are not
495 the same. At this point, it should be noted that the results found in this study should be
496 considered as tentative and be interpreted with caution given that: a) we did not provide a
497 priori hypotheses theoretically supporting the cross-national differences found, b) we
498 employed convenience sampling procedures, and c) our Confirmatory Factor Analyses
499 suggest that our model could use a tune up (i.e., primarily due to the high root mean
500 square error of approximation (RMSEA) values found)

501 Though we did not formally hypothesize a priori specific propositions relating service
502 quality dimensions with the countries under investigation, our preliminary results confirm

503 findings in the scarce cross-national e-service quality literature (Tsikriktsis, 2002),
504 suggesting culture as influencing e-service quality dimension. Our initial empirical
505 empirical results indicate that companies should take into account these different
506 importance weightings when allocating resources for improving service quality in
507 different countries.

508 Even though the services literature suggests information-based services as easier to
509 standardize across nations⁶, our results indicate that this may not be an appropriate
510 strategy. The reader should take into account though, that we did not directly account for
511 the influence of cultural dimensions on perceived mobile e-service quality dimensions
512 which is one of the limitations of this initial research attempt. In the context of this study,
513 countries are considered as cultural characteristics proxies. This logic, is strengthened,
514 however, from the work of Hofstede (1980) and evidence purporting the three countries
515 sampled in this study as scoring differently in three dimensions of national culture,
516 namely masculinity, individualism and uncertainty avoidance (see Kim et al., (2004) for a
517 discussion on these specific scores).

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

523 Nevertheless, we believe that a post-hoc effort to explain differences found on relative
524 importance assigned on different mobile e-service quality dimensions is worthwhile. This
525 strategy has precedence in the literature (Straub & Keil, 1997). Using post-hoc

⁶ Compared to people-processing services and possession-processing services

526 explanations, we build our discussion on the work of Kim et al., (2004), who attempted
527 to explain differences in the usage of mobile Internet services in Japan, Hong-Kong and
528 Korea based on cultural dimensions (i.e., masculinity, uncertainty avoidance and
529 individualism) and economic factors (i.e., gross national income, Internet penetration
530 rates, broadband Internet penetration rates).

531 In this study, in order to provide post-hoc tentative explanations for means differences
532 found, we make use of the *uncertainty avoidance* index and of the reported differences in
533 economic factors characterizing the three countries (Kim et al., 2004).

534 **Post-Hoc Tentative Explanations**

535 We start this post-hoc conjectural discussion with the findings indicating Koreans as
536 assigning more importance in all three factors when compared with Hong-Kong
537 respondents. The initial finding that Koreans assign more importance on ease of use and
538 usefulness issues might be explained by differences found in economic factors (lower
539 income and maturity of the broadband stationary Internet) (Kim et al., 2004). More
540 specifically, this may be explained by the high penetration of broadband Internet in
541 Korea, compared to Hong-Kong, and more specifically on the notion of *relative*
542 *advantage* (Kim et al., 2004). Mobile Internet via handheld devices was less readily
543 adopted in Korea compared to Hong-Kong (and Japan), probably due to the relative
544 advantage of the stationary Internet (i.e., much richer information environment at a less
545 cost). Therefore, one could attempt to hypothesize that Koreans would like to have
546 mobile Internet services that are more easy to use based on the following reasoning:
547 difficult to use services might increase the cost of using such services (at least in the case

548 of a time-based revenue business model) and cost is a much more important factor for
549 Koreans, due to lower gross-national income and the cheaper stationary Internet.

550 Most importantly Koreans, compared to Hong-Kong residents, score higher in the
551 uncertainty avoidance cultural dimension. This may entail ease of use as more important
552 since, easy to use services could reduce the possibility of service failure and therefore
553 underscores higher confidence levels for the service used.

554 In the same vein, Koreans assign more importance on usefulness, probably due to cost
555 reasons (i.e., they are not willing to pay for mobile Internet services with no useful
556 content, since they can alternatively satisfy their needs cheaper using stationary Internet).

557 Generally speaking, one could explain greater importance assigned on all three factors of
558 service quality from Koreans on the fact that they have greater service quality
559 expectations probably due their prior experience with high-speed mature stationary
560 Internet services (e.g., they seem to assign more importance on the *outcome quality* -
561 namely the content depth and width-along with *aesthetic appeal*- when compared to
562 Hong-Kong respondents, something that might be due to their prior experience with a
563 much richer Internet environment both in terms of content variety and visual elements).

564 Finally, a possible explanation supporting the greater importance Koreans assign on
565 *customer care* may be found on the higher *uncertainty avoidance* scores of Koreans (Kim
566 et al., 2004). *Uncertainty avoidance* is the extent to which, the member of a culture feel
567 threatened by uncertain or unknown situations (Hofstede, 1980). Therefore, in these
568 cultures uncertainty associated with a possible service failure has to be reduced by the
569 guarantee of a quick solution to the problem (Furrer et al., 2000). This may imply that the
570 existence of a customer service department, though admittedly important in both

571 countries, might be more important for cultures exhibiting higher levels of uncertainty
572 avoidance. The same reasoning might be employed for the *privacy* observed variable.
573 Specifically, one could expect cultures with high uncertainty avoidance, to exhibit higher
574 wariness levels when it comes to privacy concerns. However, all these findings (and the
575 following ones) must be interpreted with caution due to the exploratory nature of this
576 “first start” study.

577 Finally, greater relative importance imposed on *customization* might be also explained by
578 economic factors. Providing customization mechanisms in a mobile Internet services
579 context could be important , since it potentially allow for a more efficient way of
580 fulfilling desired tasks (Cho & Fiorito, 2009) and, therefore, may require less expenses
581 (i.e., in terms of money paid for navigating the service and in terms of system resources,
582 i.e., battery resources). Indicatively, Broeckelmann & Groeppel-Klein (2008) well
583 demonstrated the potential of mobile phones as a customization tool.

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

592 Additionally, Koreans seem to more favorably rate *outcome quality*, probably due to their
593 current mobile services usage pattern. As Kim et al., (2004) point, Koreans (and Hong-

594 Kong residents as well) seem to prefer using mobile services that are more of a hedonistic
595 rather than a utilitarian character. For this kind of services it seems reasonable to say that
596 content depth and width as well as visual elements (aesthetics) are more important. On
597 the other hand, Japanese seem to more frequently use utilitarian mobile services (e.g., e-
598 mail, buying train tickets). In other words, mobile services that seem to be preferred by
599 Koreans (i.e., hedonistic services, for example downloading music content), may be
600 primarily evaluated with criteria like content depth and width and visual/presentation
601 elements, therefore, having a prominent status in Koreans importance weighting schemes.
602 On the other hand, services that seem to be preferred by Japanese, namely utilitarian
603 services (e.g., reading news, stock exchange information sending e-mails and booking
604 train tickets), may be primary evaluated with criteria pertaining to the reliability and
605 accuracy of the information and not that much by presentation issues (2004).

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

613 Further theoretical support for the relationship between uncertainty avoidance and ease of
614 use can be found using transaction cost theory (Devaraj, Ming, & Kohli, 2002).
615 According to the findings of Hwang (2004), uncertainty seems to constitute a form of
616 transaction cost, while ease of use is probably posited as a mechanism for reducing such a

617 transaction cost. Specifically, he found a positive relationship between uncertainty
618 avoidance and ease of use.

619 Pertaining to *usefulness*, it seems that Japanese may view it as more important, probably
620 due to higher masculinity levels. Specifically, in masculine-like societies, performing is
621 highly valued and useful services (i.e., services that enhance one's performance (Davis,
622 1989) seem to be a mechanism for attaining higher performance in everyday life
623 activities.

624 Finally, pertaining to the Hong-Kong- Japan pair, our results imply that Hong-Kong
625 nationals assign more importance on *customer care* than Japanese. Based on the higher
626 uncertainty avoidance scores of Japanese when compared to Hong-Kong nationals, one
627 would expect a different sign in this difference. However, a potential explanation for such
628 a difference might be also found on the higher expectations that Hong-Kong nationals
629 might have for electronic service quality due to their extensive prior experience with
630 likewise stationary Internet services. Additionally according to Kim et al., (2004), Hong-
631 Kong nationals seem to primarily use mobile Internet services for commercial rather than
632 communication exchanges. It is expected, therefore, that due to the potential of economic
633 loss in their transactions, facets of service quality like privacy and customer service are
634 prompted as more important.

635 In concluding this section, we feel urged to repeat that the above-mentioned post-hoc
636 explanations should only be considered as conjectures that require further theoretical and
637 empirical investigation.

638

639

640 **Managerial Implications**

641 Altogether the results of the study present some potential implications for managerial
642 practice. According to this initial empirical evidence managers should consider
643 customizing rather than standardizing cross-country investments in mobile Internet
644 service quality programs. Our findings imply that customized perceived quality programs
645 are more promising in terms of favorable consumer reaction, but this finding must be
646 interpreted with caution due to the exploratory nature of this initial research attempt.
647 Managers of global/international mobile service providers operating in the three Asian
648 countries may be misguided in their service quality investments if they consider the three
649 countries as homogeneous with regard to consumers' mobile Internet service quality
650 reactions. In other words, service managers and communication officers should consider
651 the option of delivering service promises and the core service product not in a
652 standardized but rather in a customized way, since consumers' service quality priorities
653 seem to differ between countries. To illustrate, in Japan service messages (e.g.,
654 communication campaigns) should probably focus on promising efficiency, whereas in
655 Hong-Kong they should probably focus on promising customer care. Service delivery
656 should follow these promises as well. Along these lines, companies should consider the
657 option of providing customized training to their front-office employees focused on
658 improving their service quality delivery skills, in order to reflect the differences in the
659 three countries. Specifically, as far as this option is concerned, customer-contact
660 employees in Japan need training in order to accommodate complaints that will likely
661 focus on problems of efficiency. In Korea, customer-contact employees are likely to face
662 very demanding mobile Internet consumers and, therefore, their training programs should

663 be adjusted accordingly. To this end, training programs and compensation strategies
664 should be customized to meet such needs. To sum up with, it seems that mobile service
665 providers with an active presence in these three countries should examine potential
666 consumer behavior differences when investing resources for improving service quality.
667 Though, all service quality factors may be important so as for consumers to infer high
668 service quality assumptions, the relative importance of these factors could be differential.
669 Therefore, managers should test the option of trying to localize their resource allocation
670 strategies in the quest for high service quality ratings. Standardizing service quality
671 investment programs might be tempting due to cost advantages and strategic marketing
672 planning challenges, but this strategy may not always be on the right track.

673

674 **LIMITATIONS AND FURTHER RESEARCH**

675 This study is not without limitations. However these limitations present opportunities for
676 future research. First, the reader should take into account that our results pertaining to
677 mean structure analysis, and more specifically on measurement invariance, heavily
678 depend on the criterion used to infer measurement invariance. Chen et al., (2005) point,
679 that currently the methodological literature is armed with two measurement invariance
680 criteria, namely the likelihood ratio criterion and the Δ CFI criterion. The former should
681 be considered as too conservative whereas the latter should be considered as a liberal test
682 of measurement equivalence. This research study follows Cheung and Rensvold (2002),
683 who find Δ CFI as the best performing index⁷ for investigating measurement invariance.
684 Whatsoever, test statistics and fit indices should not replace sound judgment and
685 substantive expertise (Bollen & Long, 1993). Prior research on the relationship between

⁷ in terms of not being overly sensitive to small errors of approximation

686 culture and e-service quality (Tsikriktsis, 2002) along with the different patterns of using
687 mobile services in the three countries examined (Kim et al., 2004; Koivumaki, 2002),
688 increase somehow our confidence on the results found employing the Δ CFI criterion:
689 relative weighting schemes pertaining to mobile services quality dimensions are likely
690 different across the three countries investigated.

691 Another limitation of the study relates to Confirmatory Factor Analyses results. Though,
692 most of the results are acceptable when compared to established benchmarks, there is still
693 much room for improvement. For example, high RMSEA values found in all three
694 samples indicate that the instrument presented in this study could use a tune up. Future
695 research should more carefully elaborate on the psychometric properties of the proposed
696 electronic service quality instrument.

697 Another important limitation involves employing an online survey design which
698 introduces self-selection bias problems (Deutskens et al., 2004). Self-selection bias might
699 create problems of sample representativeness. However, we tend to believe that due to
700 the screening procedure employed (e.g., in Korea almost half of the primary respondents
701 were deleted from the data set), our sample is consisted of real and experienced mobile
702 Internet users. Based on respondents self-reported demographics they are representative
703 of the mobile Internet user population in all three countries investigated (Lee, 2009; Sing,
704 2004; Sir et al., 2003). The problem of self-selection bias was somewhat mitigated in the
705 Hong-Kong and Japanese samples where along with banner advertisements of the survey,
706 e-mails were sent to registered users of specific web sites that agreed to participate in the
707 survey. However, though the employed procedures likely mitigate the selection-bias
708 problem the collected data may still not cover the real population. Alternative procedures

709 for dealing with self-selection bias might involve data collection efforts through a
710 netnography study (i.e., through review comments in e-commerce web sites or web query
711 logs) and studies employing random sampling techniques.

712 Furthermore, the convenience sampling methodology employed entails
713 representativeness bias concerns, but this was due to budget constraints and due to the
714 complexity and cost of simultaneously managing data collection in three countries.
715 However, one should take into account the relatively large samples employed, as well as
716 the exploratory nature of the present study, since it is probably one of the first
717 investigating electronic perceived service quality differences in more than one national
718 markets.

719 Another important issue that merits discussion, due to its potential threat to our study's
720 validity is concerns about the content validity of instrument used. We did not employ
721 measures pertaining to the technical reliability of mobile Internet services (e.g. times a
722 mobile Internet site crashes etc.). The dimension of technical reliability, relates to QoS
723 issues (i.e., network performance), and admittedly the measurement of such issues is
724 much more objective than the measurement of other potential service quality dimensions
725 (e.g., perceptions of usefulness). To put it differently, in this research study we consider
726 technical reliability as a given, as a pre-condition for a good mobile Internet service. This
727 has precedence in the stationary Internet service quality literature (Loiacono et al., 2007).
728 Likewise, an important research question that requires investigation is the role of device
729 quality perceptions in overall perceived service quality scores. To put it differently,
730 should device quality be a part of a perceived service quality in a mobile Internet
731 context? Device quality manifestations may pertain to technical features but also to visual

732 elements (feel and look of the device), and one could argue that all these may contribute
733 to the provision of high service quality in a mobile Internet context.

734 Finally, in this study we did not examine for the epistemic relationship between the
735 constructs and their measures. We considered the first-, and second-order variables as
736 reflective in nature rather than formative. This was deemed appropriate given our desire
737 to examine cross-national differences, since the methodological literature on multi-group
738 formative analyses is not yet advanced. On the other hand, given the exploratory nature
739 of this study and the constraints imposed by the WMIS consortium on the size of the
740 questionnaire, there was no room for including constructs materials and methods
741 necessary for the formal investigation of formative versus reflective multidimensional
742 conceptualizations. This is clearly an important limitation that has to be confronted in
743 similar future research projects.

744 Finally, this study uses data from three Asian countries. Future researchers should design
745 similar comparative studies that include data from Western countries as well.

746 Acknowledging these limitations, the results of this study should be viewed as more
747 tentative rather than definitive.

748

749 **CONCLUDING REMARKS**

750 This study attempted to confirm the complexity of managing service quality perceptions
751 by providing some initial empirical evidence for the following: a) the
752 multidimensionality and the hierarchical nature of the electronic service quality construct
753 and, b) the existence of significant cross-national differences in the relative importance
754 assigned on certain perceived service quality dimensions.

755 When considered in the context of the existent electronic service quality literature, our
756 preliminary results indicate that constructs pertaining to electronic service evaluation
757 (e.g., perceived service quality)- either that be a wireline Internet service or a mobile
758 Internet service- may not be that different, at least in terms of factorial structure. It is
759 likely that the electronic service context (e.g., the wireline Internet and mobile Internet
760 contexts) may be better treated as a moderator variable that weakens, strengthens or
761 makes insignificant, structural relationships between service evaluation constructs. For
762 example, one could hypothesize that ease of use - though salient both in a wireline
763 Internet and a mobile Internet context - is perceived as more important in explaining an
764 outcome variable (i.e., intention to use) in a mobile Internet context due to the well
765 known limitations of handheld devices and due to situational characteristics of mobile
766 Internet services consumption (i.e., consumption of mobile Internet services compared to
767 stationary Internet services seems to be an “on the run” activity”). However, these are just
768 conjectures that have to be readily investigated in future research studies.

769

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