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The hierarchical structure of service quality: integration of technical and functional quality

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Abstract

Purpose – To extend understanding of service quality by empirically examining the conceptualisation of service quality (both technical and functional).

Design/methodology/approach – Because the popular service-quality instrument, SERVQUAL, concentrates on functional quality, a model incorporating both technical quality and functional quality is employed here. Structural equation modeling (SEM) is utilised to examine empirically a two-components model of service quality.

Findings – A two-component model yields better fit than a model concentrating on functional quality alone (such as SERVQUAL).

Research limitations/implications – Because the present study tests the model using a single service industry, an exhaustive description of technical quality could not be provided. This could be overcome in future studies by employing multiple service industries.

Practical implications – A useful foundation whereby practitioners can appreciate the importance of technical service quality (in addition to functional quality).

Originality/value – This paper fulfils an identified information and resources need, and offers practical assistance to academics and practitioners in the field.

Keywords Service quality assurance, SERVQUAL

Paper type Research paper

Introduction

Service quality has been frequently studied in the services-marketing literature, and much of the research has focused on measuring service quality using the SERVQUAL instrument (Parasuraman, Zeithaml, and Berry, 1985; 1988). Research on the instrument is commonly cited in the literature, and it has been widely used in industry (Asubonteng *et al.*, 1996; Buttle, 1996). Although this work has improved understanding of service-quality measurement, a criticism of SERVQUAL has been that the instrument focuses on the service-delivery process, but excludes service-encounter outcomes (Mangold and Babakus, 1991; Richard and Allaway, 1993; Grönroos, 1990).

Grönroos (1982; 1990) noted that the quality of a service as perceived by customers has two dimensions: a functional (or process) dimension and a technical (or outcome) dimension. Functional quality focuses on "how", and considers issues such as the behaviour of customer-contact staff and the speed of service, whereas technical quality focuses on "what" and considers such issues as the end result of service provision. Several authors have suggested that evaluation of service quality should include both sets of attributes (Baker and Lamb, 1993; Grönroos, 1982, 1990; Mangold and Babakus, 1991). Indeed, Richard and Allaway (1993) argued that utilising only functional-quality

This work was supported by the Soongsil University Research Fund.

Managing Service Quality
Vol. 16 No. 1, 2006
pp. 37-50

0960-4529
DOI 10.1108/09604520610639955

attributes to explain and/or predict consumers' behaviour is a misspecification of service quality that has low predictive validity.

Despite these concerns, much of the previous service-quality research has concentrated on the SERVQUAL instrument, and has thus focused on the functional-quality dimension. Few, if any, efforts have been made to test a two-components model of service quality that includes both technical quality and functional quality. The purpose of the present study is therefore to extend understanding of service quality by empirically examining a conceptualisation of service quality that includes both technical quality and functional quality.

Theoretical background

Understanding service quality

The construct of quality in the services literature focuses on perceived quality, which is defined as a consumer's judgment about an entity's overall excellence or superiority (Zeithaml, 1987). This approach differs from that of objective quality, which involves an objective assessment of a thing or event. Perceived quality is a form of "attitude", resulting from a comparison of expectations with perceptions of performance. However, despite the emphasis in the literature on this approach, perceived service quality has remained an elusive concept (Brady and Cronin, 2001; Parasuraman *et al.*, 1985).

Many have suggested that quality results from a comparison of perceived performance with expected performance – based on the so-called "disconfirmation paradigm". Indeed, this notion was the basis for the SERVQUAL model, which views service quality as the gap between the expected level of service and customer perceptions of the level received (Parasuraman *et al.*, 1988). SERVQUAL identified five determinants of service quality:

(1) reliability;

(2) assurance;

(3) tangibles;

(4) empathy; and

(5) responsiveness.

Conceptually, these constructs address, respectively, performance standards, expertise and physical elements of the facility, employees' willingness to assist in a timely manner with their knowledge, and sensitivity. Although SERVQUAL has been extensively used in assessing services quality, it has also been subject to criticism in various respects – including its use of the "difference score", its dimensionality, its applicability, and so on (Asubonteng *et al.*, 1996; Buttle, 1996; Cronin and Taylor, 1992; Carman, 1990; Babakus and Boller, 1992).

In addition, SERVQUAL has also been criticised for focusing solely on the service-delivery process (Grönroos, 1990; Mangold and Babakus, 1991; Richard and Allaway, 1993). In this respect, it is of interest that one of the underlying themes of SERVQUAL was that: "Quality evaluations are not made solely on the outcome of service; they also involve evaluations of the service delivery process" (Parasuraman *et al.*, 1985). However, despite this, it is difficult to find an explanation for their failure to address outcome (technical) quality in the SERVQUAL instrument. It would seem that technical quality has been neglected in SERVQUAL's measurement of service quality.

Service-quality dimensions

Although there is general agreement that service quality has many dimensions (Grönroos, 1982, 1990; Berry *et al.*, 1985; Parasuraman *et al.*, 1985), there is no consensus on the exact nature and content of these dimensions (Brady and Cronin, 2001).

Lehtinen and Lehtinen (1982) defined service quality in terms of physical quality, interactive quality, and corporate (image) quality. Physical quality relates to the tangible aspects of a service. Interactive quality refers to the two-way interaction between a customer and a service provider (or the provider's representative), including both automated and animated interactions. Corporate quality refers to the image attributed to a service provider by its current and potential customers.

As noted above, Grönroos (1982) identified two service-quality dimensions – a technical aspect ("what" service is provided) and a functional aspect ("how" the service is provided). Technical (outcome) quality involves what a customer actually receives from a service or a service encounter. Functional (process) quality concerns the way a service is delivered to a consumer – that is, the customer's perception of the interaction that takes place during service delivery. For some services, the "what" (or technical quality) might be difficult to evaluate. For example, in health care, it might be difficult for a patient to evaluate a service provider's technical competence and the immediate result of treatment. If they lack the ability to assess technical quality, consumers rely on other measures of quality – such as attributes associated with the process ("how"). In the case of health-care delivery, these attributes might include reliability and empathy.

Lehtinen (1983) viewed service quality in terms of "process quality" and "output quality". Process quality is judged by a customer during a service, whereas output quality is judged by a customer after a service has been performed. For example, a barber's conversation and apparent skill during a haircut involve process quality; whereas the appearance of the hair after the haircut involves output quality.

Berry *et al.* (1985) and Parasuraman *et al.* (1985) suggested that quality evaluations are not made solely on the outcome of service, but also involve evaluations of the service-delivery process. Although the dimensions of these evaluations are related, the difference depends upon when the evaluation occurs. For process quality, the evaluation occurs while the service is being performed; whereas, for outcome quality, evaluation occurs after service performance, and focuses on "what" service has been delivered.

Swartz and Brown (1989) attempted to synthesise the dimensions of service quality in the works of Lehtinen and Lehtinen (1982), Grönroos (1982), and Berry *et al.* (1985). On the basis of this literature review, Swartz and Brown (1989) categorised the dimensions into "what" (evaluated after performance) and "how" (evaluated during performance).

Figure 1 summarises the preceding discussion by schematically presenting a categorisation of the dimensions of service quality as suggested by various authors.

A more recent conceptualisation of service-quality dimensions has been proposed by Rust and Oliver (1994), who suggested a three-component model for a customer's evaluation of a service encounter:

(1) the customer–employee interaction (functional or process quality);

(2) the service environment; and

(3) the outcome (technical quality).

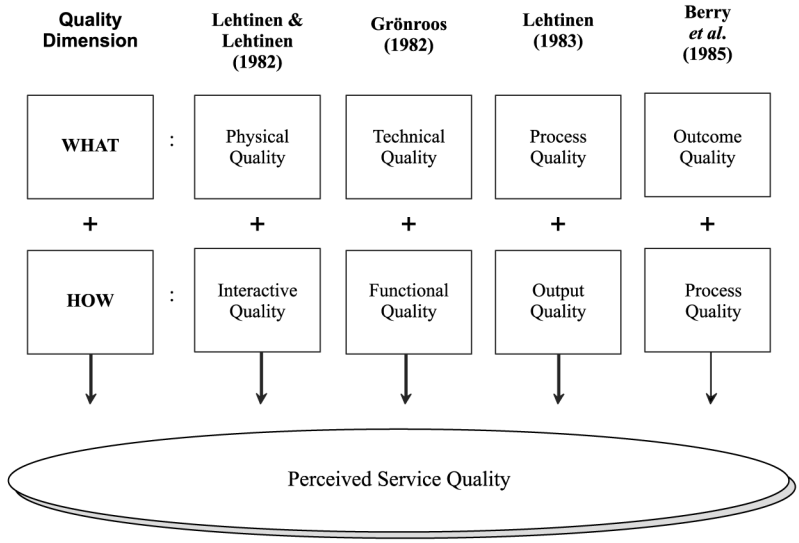

Figure 1.
Dimensions of service quality

Although Rust and Oliver (1994) did not test their conceptualisation for the service-quality dimensions, Brady and Cronin (2001) later stated that support has been found for similar models in retail banking and offered empirical confirmation in their research (2001).

A hierarchical structure of service quality

In addition to the notion of a multidimensional perspective, Dabholkar *et al.* (1996) proposed that perceptions of service quality are also multilevel. They identified and tested a hierarchical conceptualisation of retail service quality that proposed three levels:

(1) a customer's overall perception of service quality;

(2) primary dimensions; and

(3) subdimensions.

Thus, under the higher-order concept of "overall perception of service quality", they proposed a level of five dimensions – "physical aspects", "reliability", "personal interaction", "problem-solving", and "policy". On the next level, they further proposed that some dimensions are more complex in that they have subdimensions. For example, two subdimensions – "appearance" and "convenience" – were suggested for the dimension of "physical aspects".

The present study proposes a framework for service quality on the basis that service quality is multidimensional and has a hierarchical structure. Developing such a framework involves identification of the dimensions of service quality (both technical and functional), and the components thought to make up each dimension.

Marketing scholars have yet to identify the attributes of technical quality, although it is accepted that technical quality significantly affects customers' perceptions of service quality (Grönroos, 1982, 1990; Rust and Oliver, 1994). Attempts to measure

technical quality have generally involved the use of qualitative methods (Richard and Allaway, 1993; Powpaka, 1996; Brady and Cronin, 2001). Brady and Cronin (2001) administered open-ended surveys that asked respondents to complete a questionnaire about the specific attributes they perceived regarding the service experiences. Richard and Allaway (1993) and Powpaka (1996) employed in-depth interviews to discover relevant determinants of technical quality. Various studies have used different items to measure technical quality. The findings suggest that there is no underlying latent variable associated with the technical-quality dimension.

With respect to measuring functional quality, several authors have utilised SERVQUAL (Richard and Allaway, 1993; Powpaka, 1996). Brady and Cronin (2001, p. 36) suggested that " ... the SERVQUAL model uses the terms that describe one or more determinants of a *quality service encounter*" [emphasis added].

On the basis of the preceding discussion, a hierarchical structure of service quality is proposed, as shown in Figure 2. While the Figure 2 only depicts the second-order factor structure, the full structure of higher-order factor model for service quality should be the three-order factor structure. In the full structure, there has to be a latent variable (i.e. service quality perception) having a direct effect on both technical and functional quality dimension. Given that there is a lack of precedent for simultaneously analyzing a third-order factor model and the technical difficulties accompanied by the analysis, the current study does not attempt to fully analyze the third-order factor model. Rather, an alternative method to estimate the relationship between service quality perception and technical/functional quality dimension was employed.

Methods

Sample

The sample consisted of cell-phone (mobile-phone) users in Korea who were recruited by direct interception in a shopping mall. A total of 19 undergraduate business-administration students (13 male and six female) from a large university in Seoul were trained for data collection. Cell-phone (mobile-phone) users were selected as participants because the outcome quality of this service is easily discernible by

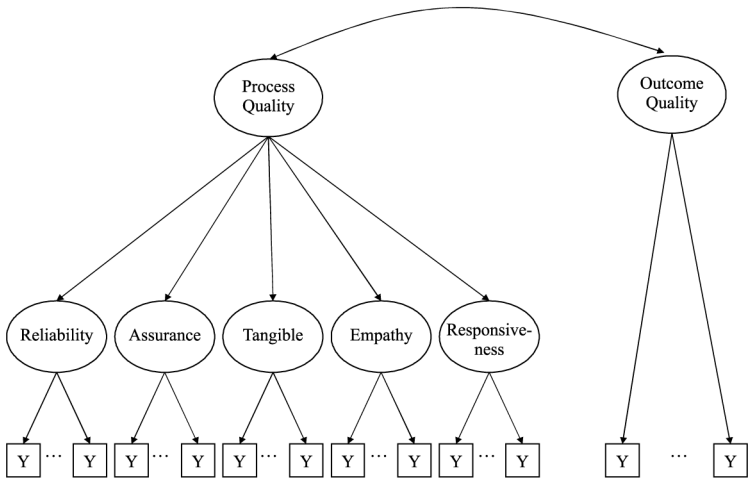

Figure 2.
The proposed hierarchical structure of service quality

consumers. The trained interviewers approached customers who were asked if they were cell-phone users; current users were then asked the names of their service providers. Only current customers of two specific service providers (Company A and Company B) were asked to participate in the project. Personal interviews were conducted with those who agreed to participate. Respondents were recruited until the interview quota for each interviewer was met. Although each interviewer was initially expected to interview 30 respondents, data collection yielded a final usable sample of 464 completed surveys (Company A: 228; Company B: 236). The sample consisted of 345 men and 119 women; and the majority (54.7 per cent) of the participants were aged 20-29 years.

Measures

Two constructs – functional quality and technical quality – were operationalised to test the proposed model. The instruments were developed in Korean, and were reviewed by two experts to ensure that the content of items was appropriate.

Functional quality

A modified set of the original 22-items of SERVQUAL was used to measure functional quality. Such modification of the instrument for different service settings has been recommended by the developers of SERVQUAL (Parasuraman *et al.*, 1994). In accordance with the recommendations of Parasuraman *et al.* (1994), only the perceptions of functional quality (and not the expectations) were measured.

Technical quality

No measures have been developed to assess the technical quality of cell-phone service providers. Unlike services in which the outcome is difficult to discern (for example, health care), the outcome of a cell-phone service should be easy to discern. In view of the lack of available measures of technical quality, the present study conducted in-depth interviews with 20 cell-phone users and four service providers to generate suitable items. Parasuraman *et al.* (1985) used a similar interviewing method (of both users and service providers) to identify dimensions for their SERVQUAL model.

All interviewees in the present study were asked to express their thoughts on the outcomes of cell-phone services. All ideas expressed by participants were recorded. Content analysis of the responses was then undertaken by the present author. Two reviewers (graduate students) undertook separate content analysis. No major discrepancies were noted. Three technical-quality items were thus identified:

(1) success in making calls;

(2) success in completing calls; and

(3) interference experienced during calls.

These three items were measured using seven-point Likert-type scales from 1 ("strongly disagree") to 7 ("strongly agree").

Analysis of scale properties

The psychometric properties of the constructs of the present study were evaluated for validity by confirmatory factor analysis (CFA) using LISREL 8.52. The model fits were evaluated using the Tucker-Lewis (1973) goodness-of-fit-index (TLI), Bentler's (1990)

comparative fit index (CFI), and the goodness-of-fit index (GFI). The root-mean-square residual (RMR) and the chi-square values were also calculated for model fit. Construct reliability was evaluated using the procedures suggested by Fornell and Larcker (1981), including parameter estimates and their associated *t*-values, and assessment of the average variance extracted for each construct. The coefficient alphas were also calculated to evaluate the reliability of each construct.

The individual items were also evaluated on the basis of error variance and residual value. McDonald (2002) has suggested that residual values lower than 0.10 are good, and that values ranging from 0.11 to 0.15 are acceptable.

Both Sample A (customers of Company A) and Sample B (customers of Company B) were used for analysis of the scale properties. Sample A was utilised to purify the scales; an initial CFA was computed to evaluate the model fit; modifications were then made on the basis of evaluation of the fit, and additional confirmatory analyses were computed with Sample A until satisfactory results (which included acceptable fit indices and no outstanding residual values) were obtained (see Figure 3). Sample B was utilised to verify the psychometric properties of the purified scales. The items retained from the final assessment of Sample A were analysed using a CFA with Sample B to confirm the factorial structures (see Figure 3).

Results

Unidimensionality – functional quality (SERVQUAL)

Initial assessment of functional quality involved the validity and reliability of the 22-item, five-factor structure of SERVQUAL.

The results of the initial CFA using Sample A indicated moderate data fit, but with room for improvement. In all, six items that undermined the factorial structure were eliminated – largely on the basis of the residual value associated with CFA and semantic considerations among the items. With respect to semantics, the items that addressed the reliability dimension ("providing service as promised", and "providing services at the promised time") were found to have unacceptable residual values larger than 0.16). Although these were presented as being distinct from each other in the original SERVQUAL scale, there seems to be overlap in the meaning.

Accordingly, with the additional consideration of residual value and factor loading, it was decided to eliminate the item "providing service as promised". Similar methods for item purification were applied to other items. Through several iterations for scale purification using Sample A, the initial results of CFA retained 16 items. The final CFA computed with Sample A indicated that the data fitted the model reasonably well (GFI = 0.92; CFI = 0.94; TLI = 0.93). The item loadings for functional quality based on Sample A were significant, and ranged from 0.53 to 0.87. Evidence of internal consistency was demonstrated through the composite reliability and coefficient alpha scores, ranging from 0.69 to 0.87 (see Figure 3).

A second CFA was then undertaken using Sample B to confirm the results of the initial CFA using the remaining 16 items. The results indicated that the data fitted the model well (GFI = 0.93; CFI = 0.95; TLI = 0.94). The item (indicator) loadings for functional quality using Sample B were significant, and ranged from 0.52 to 0.89. Evidence for internal consistency was also sought through the composite reliability and coefficient alpha scores – ranging from 0.69 to 0.85 (see Figure 3). The CFA with Sample B confirmed that the SERVQUAL measure had a distinctive 5-factor structure.

Factor	Items	Factor loading[a]		Uniqueness[a]	
		Sample A	Sample B	Sample A	Sample B
Reliability	Performing services right the first time	0.78(0.04)	0.76(0.04)	0.40(0.04)	0.42(0.04)
	Providing services at the promised time	0.79(0.05)	0.81(0.04)	0.38(0.04)	0.35(0.04)
	Dependability in handling customers' service performed	0.63(0.05)	0.68(0.05)	0.61(0.05)	0.55(0.04)
Responsiveness	Prompt service to customers	0.57(0.05)	0.52(0.05)	0.68(0.05)	0.73(0.05)
	Willingness to help customers	0.85(0.04)	0.86(0.04)	0.28(0.03)	0.27(0.03)
	Readiness to respond to customers' requests	0.85(0.04)	0.89(0.04)	0.28(0.03)	0.21(0.03)
Assurance	Making customers feel safe in their transaction	0.53(0.05)	0.57(0.05)	0.72(0.05)	0.68(0.05)
	Employees who are consistently courteous	0.82(0.04)	0.78(0.04)	0.33(0.03)	0.39(0.03)
	Knowledgeable employee to answer customer questions	0.84(0.04)	0.81(0.04)	0.31(0.03)	0.35(0.03)
Empathy	Giving customers individual attention	0.71(0.04)	0.67(0.04)	0.50(0.04)	0.56(0.04)
	Employees who deal with customers in a caring fashion	0.85(0.04)	0.81(0.04)	0.28(0.03)	0.34(0.03)
	Having the customer's best interest at heart	0.87(0.04)	0.83(0.04)	0.25(0.02)	0.31(0.03)
	Employees who understand the needs of their customers	0.72(0.04)	0.72(0.04)	0.48(0.04)	0.48(0.04)
Tangible	Modern equipment	0.66(0.05)	0.62(0.05)	0.57(0.05)	0.61(0.05)
	Visually appealing facilities	0.58(0.05)	0.64(0.05)	0.66(0.05)	0.60(0.05)
	Employees who have a neat, professional appearance	0.71(0.05)	0.69(0.05)	0.49(0.04)	0.53(0.05)
Technical quality	Success in calling	0.79(0.05)	0.37(0.05)	0.75(0.05)	0.45(0.06)
	Interference during a call	0.74(0.05)	0.46(0.05)	0.61(0.05)	0.64(0.06)
	Completeness	0.68(0.05)	0.54(0.05)	0.68(0.05)	0.54(0.06)

		Functional quality					**Technical quality**
		Reliability	Responsiveness	Assurance	Empathy	Tangible	
Construct validity	Sample A	0.78	0.81	0.78	0.87	0.69	0.78
	Sample B	0.79	0.81	0.77	0.85	0.69	0.72
AVE	Sample A	0.54	0.59	0.55	0.62	0.43	0.54
	Sample B	0.56	0.60	0.53	0.58	0.42	0.46
Cronbach alpha	Sample A	0.77	0.78	0.76	0.87	0.69	0.78
	Sample B	0.79	0.77	0.75	0.85	0.69	0.71

Factor correlation for functional quality[b]

	REL	RES	ASS	EMP	TAN
REL	---	0.78	0.66	0.63	0.56
RES	0.75	---	0.79	0.78	0.63
ASS	0.62	0.76	---	0.91	0.71
EMP	0.63	0.78	0.89	---	0.78
TAN	0.64	0.71	0.72	0.85	---

Fit indices for functional quality

Sample A	Chi-square= 323.20 d.f.=94 GFI=0.92, CFI=0.94, RMR=0.05, TLI=0.93
Sample B	Chi-square= 281.77 d.f.=94 GFI=0.93 CFI=0.95, RMR=0.05, TLI=0.94

Notes: [a] Significance $p<0.01$

[b] Sample A correlations are in lower triangle and Sample B correlations are in upper triangle

Figure 3.
Summary statistics of the CFA for Sample A and Sample B

In addition, a single-factorial structure composed of all five SERVQUAL components was analysed to assess the unidimensionality of functional quality. The single-factorial structure provided a significantly poorer fit, indicating that the SERVQUAL instrument is not unidimensional. It is important to note that the assessment of functional quality discussed to this point included only the five constructs (with the corresponding manifest variables). The proposed hierarchical structure of service quality (see Figure 2), suggests that the unidimensional nature of functional quality might be captured through a second-order latent variable. Support for a second-order latent variable was also found in the correlations among the SERVQUAL factors. The correlations among the five factors were high-ranging from 0.62 to 0.85 for Sample A and from 0.56 to 0.91 for Sample B. In view of the high correlations among the five factors it is reasonable to expect that functional quality is a unidimensional construct having several distinctive sub-components.

Unidimensionality – technical quality

CFA was also used to assess the unidimensionality of technical quality. Because the model for technical quality was saturated, the model was identified and no fit indices were provided. For sample A, the composite reliability and AVE for technical quality were 0.78 and 0.54 respectively. The item (indicator) loadings for technical quality were significant, and ranged from 0.68 to 0.79 for Sample A (see Figure 3). No problematic items were found in the initial CFA using Sample A. Accordingly, no changes were deemed necessary for the structure of technical quality. A second CFA was computed using Sample B – for which the composite reliability and AVE were 0.72 and 0.46 respectively. The item (indicator) loadings were significant and ranged from 0.61 to 0.75 for this sample (see Figure 3).

Higher-order factor analysis for service quality

Whereas the unidimensionality for each construct was assessed in the previous section, that for functional quality was not fully assessed (although high correlation among the five latent variables was suggested in the CFA). It was therefore necessary to undertake an additional analysis to ascertain the unidimensionality of the functional-quality dimension. At the same time, it was also necessary to confirm the structure of technical quality and functional quality empirically to verify the complete structure of service quality. In assessing another higher-order factor for the two components, it is possible to develop a third-order factor model. However, the present study did not explore such a model because of its complexity. Nevertheless, it is still possible to capture the relationship between the second-order factors (technical and functional quality) and the third-order factor (service-quality perception) without a full assessment of the third-order factor model. That is, the correlation between technical quality and functional quality (ϕ^{12}) would offer a clue in understanding the path between service-quality perception and construct of technical/functional quality.

Analysis of second-order factor model – functional quality only

The presence of distinct factors and high correlations among factors (at least 0.56) indicated that functional quality might be multilevel and multidimensional. That is, functional quality was believed to have a second-order factorial structure as shown in the left part of Figure 1. To test this, a second-order factor model was tested using Sample B. The results indicated that the data provided an adequate fit to the model (GFI = 0.91; CFI = 0.97; TLI = 0.97; RMR = 0.05) (see Table I). The results show that the second-order factor model for functional quality provides better fit compared with the results of the CFA for SERVQUAL (functional quality). These findings suggest that functional quality is a unidimensional construct having several distinctive sub-components.

Analysis of second-order factor analysis – technical and functional quality

To test empirically whether service quality does consist of two components, the model shown in Figure 2 (which fully considers technical quality and functional quality) was analysed. The results indicated that the data fitted the model well (GFI = 0.89; CFI = 0.98; TLI = 0.98) (see Table II). Although GFI was lower than the "rule of thumb" (that is, acceptable at greater than 0.90), there is no reason to believe this model is inadequate given that the other fit indices (CFI, TLI) satisfied the "rule of thumb" for

these indices (that is, good at greater than 0.90). In particular, Bentler (1990) has suggested that the Tucker-Lewis (1973) goodness-fit-index (TLI) and Bentler's (1990) comparative fit index (CFI) are appropriate to assess the fit of a model – given that they are the least sensitive to sample size. Considering the relatively large sample size employed in the current study, it is appropriate to determine the model fit on the basis of TLI and CFI. For the current study, the values were both 0.98, indicating that the fit of model was adequate. It is therefore safe to say that service-quality perception consists of two components, as depicted in Figure 2.

As noted earlier, rather than implementing a third-order factor model to address the relationship between service-quality perception and technical/functional quality, an alternative method of assessing those relationships was employed. That is, using the correlation between technical and functional quality (ϕ^{12}), it is possible to estimate the path between service-quality perception and technical/functional quality, even though the relative influence of each dimension on the service quality perception could not be estimated. The results show that the magnitude of correlation (ϕ^{12}) was 0.61.

	Path	Standardised loading	Uniqueness
γ_{11}	Process quality → Reliability	0.71(0.06)	0.49(0.07)
γ_{21}	Process quality → Responsiveness	0.84(0.08)	0.30(0.06)
γ_{31}	Process quality → Assurance	0.91(0.08)	0.18(0.05)
γ_{41}	Process quality → Empathy	0.96(0.06)	0.09(0.03)
γ_{51}	Process quality → Tangibles	0.86(0.07)	0.27(0.06)
Fit indices	Chi–square = 378.17 d.f. = 99 $p = 0.0001$; GFI = 0.91, CFI = 0.97, TLI = 0.97, RMR = 0.05		

Note: * Significance $p < 0.01$

Table I.
Second-order factor model – functional-quality dimension only

Parameter	Coefficient *	Uniqueness *	Parameter	Coefficient *	Uniqueness *
λ_{x11}	0.74(0.07)	0.45(0.08)	λ_{y114}	0.81(0.08)	0.34(0.05)
λ_{x21}	0.59(0.07)	0.65(0.08)	λ_{y124}	0.83(0.08)	0.31(0.04)
λ_{x31}	0.68(0.07)	0.54(0.08)	λ_{y134}	0.73(0.08)	0.47(0.06)
λ_{y11}	0.76	0.42(0.06)	λ_{y145}	0.66	0.57(0.08)
λ_{y21}	0.81(0.08)	0.35(0.06)	λ_{y155}	0.63(0.09)	0.61(0.08)
λ_{y31}	0.68(0.08)	0.55(0.07)	λ_{y165}	0.66(0.09)	0.57(0.08)
λ_{y42}	0.53	0.72(0.08)	γ_{12}	0.79(0.09)	0.38(0.09)
λ_{y52}	0.86(0.11)	0.26(0.04)	γ_{22}	0.87(0.12)	0.25(0.08)
λ_{y62}	0.89(0.11)	0.22(0.04)	γ_{32}	0.90(0.10)	0.19(0.08)
λ_{y73}	0.67	0.55(0.07)	γ_{42}	0.89(0.10)	0.21(0.06)
λ_{y83}	0.66(0.08)	0.56(0.07)	γ_{52}	0.78(0.10)	0.39(0.12)
λ_{y93}	0.75(0.09)	0.44(0.06)	ϕ_{12}	0.61(0.06)	
λ_{y104}	0.66	0.56(0.06)			
Fit indices	Chi–square = 249.60, d.f. = 146, $p = 0.0000$; GFI = 0.89, CFI = 0.98, TLI = 0.98, RMR = 0.07				

Note: * All significance $p < 0.01$

Table II.
Second-order factor model – technical and functional quality dimension

Discussion

Although debate regarding service quality continues in the literature, it is unusual to see conceptual work on the nature of service quality. Indeed, most of the recent research in service quality has been dominated by measurement issues. Although several authors have published their perspectives on the nature of the service-quality dimension (Lehtinen and Lehtinen, 1982; Grönroos, 1982; Parasuraman *et al.* 1985, 1988; Rust and Oliver, 1994), it is unusual for these to be empirically tested – apart from Brady and Cronin's (2001) study empirically testing Rust and Oliver's (1994) three-component conceptualisation of service quality.

The present study took up the perspective suggested by European scholars in defining service quality in categorical terms (that is, technical quality and functional quality) (e.g., Lehtinen and Lehtinen, 1982; Lehtinen, 1983; Grönroos, 1982; 1990). Indeed, the developers of SERVQUAL referred to these dimensions in their early study (Parasuraman *et al.* 1985). The present study also adopted the view of several scholars who have suggested that SERVQUAL represents only the process dimension of service-quality perception (e.g., Mangold and Babakus, 1991; Powpaka, 1996; Richard and Allaway, 1993). On this basis, the present study empirically tested the two components of service quality among users of cell-phone (mobile-phone) services in Korea. In so doing, several interesting results were revealed.

The data show that SERVQUAL has a distinctive five-factor structure, although only 16 items (rather than the 22 SERVQUAL items) were utilised in the study. It was also found that the five latent variables of SERVQUAL are correlated. This result suggested that SERVQUAL is unidimensionsal; however, a check for unidimensionality did not support this inference.

As an alternative, a second-order factor model was implemented (see Figure 2), and these results supported the model well. It was thus concluded that, although a structure of five distinctive factors was confirmed, this represented the functional-quality dimension in the perception of service quality.

The study was thus able to provide evidence that customers form perceptions of service quality on the basis of their evaluations of two primary dimensions – technical and functional. In this respect, the present study offers the first empirical evidence for the European perspective of service quality consisting primarily of two components – technical quality and functional quality.

Managerial implications

The confirmation of two components in the service-quality model is of assistance to managers in gaining a clear understanding how customers assess the quality of the service they provide.

First, although the relative influences of technical quality and functional quality on service-quality perception is not clearly addressed here, attention still needs to be paid to their impact on the perception of service quality. By and large, technical quality has been relatively disregarded because it was believed that customers would not be able to discern the technical quality of services with accuracy, and that they would therefore rely on other measures of quality attributes – especially those associated with the process of service delivery (functional quality). Although this might be the case for services that have high-credence properties (such as medical services and law services), the majority of services actually have "search-and-experience" properties. A technical

quality strategy is, therefore, likely to be successful if a firm achieves a technical solution that the competition cannot emulate. However, this is seldom the case; rather, there are usually several firms that can provide (more or less) the same outcome quality. Moreover, creating a technical advantage is difficult because competitors in many industries can introduce similar solutions rather quickly (Grönroos, 1990). The important managerial implication is to recognise that, although it can be difficult for an organization to be first in the delivery of an excellent technical service outcome, consumers will accept this as long as the service that is eventually offered is not inferior.

Secondly, even if an excellent solution is achieved, a firm can be unsuccessful if the excellence in technical quality is negated by a badly managed buyer-seller interaction – that is, by unsatisfactory process quality (Grönroos, 1990). Even if it has a supplementary role to technical quality, functional quality has a significant effect on the perception of overall service quality. The evaluation of "how" the service is being performed is a critical factor in the perception of service quality. The current study has confirmed that SERVQUAL can be used to assess functional quality in service delivery. This study did not assess the individual influence of SERVQUAL's five individual sub-constructs on the perception of service quality. However, the study has confirmed that a check of functional quality should be undertaken by service firms, and that they should use SERVQUAL for this purpose to ascertain the status of each quality subdimension.

Limitations and additional research directions

As with any study, the present research has certain limitations.

First, the present study does not offer a full description of technical quality. Although the structure of functional quality has been extensively studied, and is relatively well understood, the conceptualisation of technical quality appears to be in its early stages. In addressing the issue of technical quality, the present study merely refers to previous studies that have assessed this construct. However, in view of the limited literature on the subject, it has been difficult to offer a full description of the nature of technical quality. Despite this, the study did undertake in-depth interviews to ascertain the content of technical quality in the service being researched – because this was believed to be more useful than relying only on a literature review in this respect. However, the qualitative approach employed here was limited to an item configuration for technical quality. The current study could not produce a multi-level factorial structure for technical quality – although the study did note that service quality is likely to have a hierarchical structure. It might therefore be necessary to complement the results of the qualitative interviews with exploratory factor analysis to discover the underlying factors that constitute technical quality. Given that the current study suggested three items of technical quality, this method was not relevant here; however, a future study could undertake the above-mentioned procedures to configure the factors (dimensions) that underlie technical quality.

Secondly, because the dimensions of technical quality related to a particular services, rather than being generic, the service-quality model proposed and tested here is limited. Although the theoretical foundations for a hierarchical structure for service quality are sound, it is apparent that a complete model for service quality has not been achieved if the generic technical-quality and functional-quality dimensions have not been identified. Given that SERVQUAL (as used in the current study for functional quality) is believed to be generic, greater emphasis needs to be given to identifying the

precise generic make-up of technical quality. Moreover, scholars could investigate the relative influence of technical quality and functional quality on service-quality perception (Richard and Allaway, 1993; Powpaka, 1996).

Thirdly, the results from a single service industry might raise concerns about limited generalisability – even though limiting the study to a single industry does eliminate the problems associated with the effects of industry differences. Different results might have been obtained if the study had investigated different services that had credence properties (for example, health-care services and legal services) and/or experience-and-search properties (for example, banking services).

Finally, the present study simply adopted the findings of previous studies suggesting SERVQUAL could be used to capture the functional dimension of service quality. Although the study assumed that the five sub-dimensions of SERVQUAL could capture the whole picture during the service-delivery process, this might require more thorough scrutiny.

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