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Angelos Pantouvakis

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The relative importance of service features in explaining customer satisfaction

A comparison of measurement models

Angelos Pantouvakis

Department of Maritime Studies, University of Piraeus, Piraeus, Greece

Abstract

Purpose – The purpose of this paper is to assess the relative importance of various service-quality dimensions in explaining customer satisfaction; and to examine whether this assessment is affected by the measurement instrument that is used.

Design/methodology/approach – A new (“servicescape”) model for directly measuring the physical and the interactive features of a service is proposed and tested against the SERVQUAL measurement model and Nordic conceptualisation. Data are collected from a structured questionnaire survey of 434 passengers at the port of Piraeus in Greece.

Findings – The findings reveal that the widely used SERVQUAL instrument fails to fully capture the role of “tangibles” in determining overall customer satisfaction in the service under examination. The new proposed “servicescape model” attaches more importance to the role of physical environmental attributes than has been reported in most previous studies.

Practical implications – Service providers should pay more attention to the physical environment in which they are operating. They should also note that different measurement instruments provide different results.

Originality/value – This paper proposes and tests a new (“servicescape”) measuring instrument that has not been previously developed or operationalised.

Keywords SERVQUAL, Quality management, Transport industry, Greece

Paper type Research paper

1. Introduction

In today’s competitive business environment, the paramount issues in the management of service quality are:

- how quality can best be measured; and
- how a firm’s scarce resources can best be deployed to ensure improved service quality.

The identification of the service-quality attributes that are most valued by customers, and an accurate assessment of their relative importance, is required for any effective deployment of resources. However, the literature on service-quality metrics and strategies provides conflicting evidence regarding the relative importance of service-quality dimensions in producing overall customer satisfaction. In particular, the literature is ambiguous on two issues:

- (1) the conceptualisation and measurement of service quality, especially with regard to the so-called “tangible” dimensions (physical environment, physical quality, or “servicescape”); and



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- (2) the relative importance of various service-quality dimensions in predicting overall service quality and/or customer satisfaction.

With regard to these issues, it has been suggested that the quality dimensions of the widely used SERVQUAL instrument (Parasuraman *et al.*, 1988) might be inadequate for three reasons. First, the “tangibles” dimension in SERVQUAL does not include all aspects of the physical environment; such attributes as noise, odour, space, cleanliness, and technological systems might also be relevant to “tangibles” in particular services (Reimer and Kuehn, 2005). Second, the presumed influence of “tangibles” on service quality might be misleading; perhaps satisfaction (rather than perceived service quality) should be the real focus of consideration when assessing the influence of “tangibles” (Grönroos, 2001). Third, the generic applicability of the SERVQUAL instrument for measuring overall service quality (and/or satisfaction) in all service sectors has been questioned (Sachdev and Verma, 2004; Sureshchandar *et al.*, 2002).

This study responds to calls for research on simultaneous consumer judgements of subsequent consequential variables, with the use of similar composite models, including servicescape (Cronin *et al.*, 2000), as well as the identification of more service quality dimensions (Sachdev and Verma, 2004). Against this background, it would seem that no previous study has evaluated the relative importance of service-quality dimensions on customer satisfaction with more than one measurement instrument – except perhaps that of Reimer and Kuehn (2005), who did examine the impact of servicescape on service quality. The purpose of the present empirical study is, therefore, to explore the relationship between service dimensions and customer satisfaction by comparing three measurement models, each of which adopts a different approach to the issue. In brief, the three models are:

- (1) the SERVQUAL/SERVPERF model;
- (2) a modification of the SERVQUAL/SERVPERF model in which the five dimensions are collapsed to two second-order factors (“physical quality” and “interactive quality”) (the Nordic model); and
- (3) a new (“servicescape”) measurement model proposed by the present study to directly assess the physical and interactive elements of particular services.

Evidence is drawn from the transport sector.

The remainder of the paper is organised as follows. The next section presents the conceptual framework and hypotheses for the study. The following section describes the methodology of the empirical study. The results of the empirical study are then presented. The paper concludes with a summary of the main findings, implications, and limitations of the study.

2. Conceptual framework and hypotheses

2.1 Relationship between service quality and satisfaction

“Service quality” and “customer satisfaction” are conceptually distinct (albeit closely related) constructs (Parasuraman *et al.*, 1988, 1994; Sureshchandar *et al.*, 2002), with the former leading to the latter (Cronin *et al.*, 2000).

In the service-management literature, “satisfaction” has commonly been posited as an affective post-purchase evaluation of the total experience of a service encounter, with an antecedent role being played by the more cognitively oriented construct of

“service quality” (Cronin *et al.*, 2000; McDougall and Levesque, 2000; Lee *et al.*, 2000). However, given that customer satisfaction is a complex human process of psychological and physiological factors, it is not merely an affective phenomenon but is also a cognitive process (Oh and Parks, 1997). As several authors have noted, the constructs of “satisfaction” and “service quality” can both be examined at the transaction-specific level and the global level (Parasuraman *et al.*, 1994; Bitner and Hubert, 1994).

It is arguable that the notion of “service quality” effectively replaces the missing product in services, and that, by analogy, the so-called “service concept” seeks to define how quality-generating resources function to provide customer satisfaction (Grönroos, 2001). The dimensions of quality thus approximate to product features, and the customer consumes either outcomes (in products) or processes (in services) (Grönroos, 1998). Moreover, the two contentious constructs of “quality” and “satisfaction” tend to merge, especially in long-term relationships, into an overall concept of “relationship satisfaction” (Leverin and Liljander, 2006), which is directly influenced by perceptions of technical quality (physical or tangible quality) and functional quality (interactive or process quality) (Yap and Sweeney, 2007; Caceres and Paparoidamis, 2007). In this regard, Grönroos (2001, p. 151) made the following interesting observation:

... service quality dimensions ... could and should be measured with customer satisfaction with the service. Quality as such should not be measured ... I should probably have used the terms technical and functional features of services instead of technical and functional quality....

In view of the above discussion, the following hypothesis is therefore proposed:

H1. Service-quality features are directly and positively related to satisfaction with the service provided.

2.2 Servicescape dimensions

The concept of servicescape was defined by Booms and Bitner (1982, p. 36) as:

... [the] environment in which the service is assembled and in which seller and consumer interact, combined with commodities that facilitate performance or communication of the service.

Bitner (1992) identified three primary dimensions of “servicescape”:

- (1) ambient conditions;
- (2) spatial layout; and
- (3) signs, symbols, and artefacts.

These three dimensions of the physical environment are described in greater detail below.

2.2.1 Ambient conditions. A plethora of factors have been examined for their effects on sensory perceptions of a particular environment (Baker *et al.*, 1988; Areni and Kim, 1993; Mattila and Wirtz, 2001). From this plethora of potential factors, three items were selected for inclusion in the new (“servicescape”) measurement model proposed in the present study to capture the ambience of services that are conducted in “open-air” settings (which is the particular focus of this empirical study):

- (1) *Lighting*: which was adapted from Turley and Milliman (2000) and Hightower *et al.* (2002), is important in:
 - forming consumer perceptions of form, colour, and texture (Ching, 1996);
 - influencing emotions of comfort and arousal (Lucas, 2003; Ryu and Jang, 2007);
 - enhancing physical, emotional, and spiritual awareness (Kurtich and Eakin, 1993); and
 - reducing the fear of (and incidence of) aggressive or destructive behaviour (Woolfarth, 1984).
- (2) *Level of security/safety felt when in servicescape's area*. Coherence and order act as magnifiers of positive evaluations by the customer (Kaplan, 1987) and allow the senses to interact freely with the environment. As a background condition, a hygiene factor, the feeling of security, prevails below the level of immediate awareness and is typically significant only when absent or distinctly unpleasant (Aubert-Gamet, 1997).
- (3) *Cleanliness*. Which was adapted from Harris and Ezeh (2008), refers to dust, stains, or smells; this has been identified as an important aspect of the servicescape (Stern and Stern, 2000) that is implicitly associated with perceptions of quality (Wakefield and Blodgett, 1996; Lucas, 2003).

2.2.2 Spatial layout. According to Bitner (1992), the second of the dimensions of servicescape, spatial layout, refers to the spatial relationship of machinery, equipment, and furnishings in a service setting. This spatial layout creates “personal space” for customers and determines their “comfort zone” (Newman, 2007). When service areas are spacious and accessible, customers spend more time enjoying the main service offering (Wakefield and Blodgett, 1996). In contrast, crowded conditions increase stress and discomfort, and have an adverse influence on interpersonal interactions (Aylott and Mitchell, 1998).

In accordance with Newman (2007), who emphasised the social importance of personal space and spatial density, three elements of spatial layout have been included in the new (“servicescape”) instrument proposed by the present study:

- (1) size and aesthetics of lounges for waiting/embarkation/disembarkation;
- (2) size and convenience of short-term parking lots; and
- (3) size and convenience of long-term parking lots.

2.2.3 Signs, symbols, and artefacts. Signs, symbols, and artefacts in the servicescape provide cognitive guidance in locating specific areas and physical features (Sommer and Aitkens, 1982). The clarity and number of such signs, symbols, and artefacts are among the many characteristics that assist consumers’ cognitive activity and facilitate browsing and ease of transit through the servicescape, thus minimising feelings of “lostness” (Newman, 1995).

Three elements adapted from Fodness and Murray (2007) were included in the new proposed instrument with respect to this dimension:

- (1) *Quality of signage to gates/exit*. This provides guidance and reduces frustration (and even desperation) (Newman, 2007).

- (2) *Ability to communicate (telephone, internet, etc.)*. This refers to the ability of a lost passenger to contact others for guidance and support.
- (3) *Adequacy of number of departure/arrival electronic displays and equipment*. This provides customers with ancillary and/or entertaining means of enhancing their overall perception of the offering.

On the basis of the above discussion, the following hypothesis is proposed:

- H2. The dimensions of the physical elements of the servicescape are: (i) the ambient conditions; (ii) the spatial layout; and (iii) signs, symbols and artefacts.

2.3 Relationships among service features

The underlying factor structure of the SERVQUAL model (Parasuraman *et al.*, 1988, 1991) assumes that the five dimensions of service quality are independent of each other. However, correlations between the constructs have been identified by oblique rotations and have been recognised as being of importance in conceptualising service quality (Parasuraman *et al.*, 1994).

Reimer and Kuehn (2005) found that the “tangibles” dimension has a significant influence on the intangible dimensions of service quality; moreover, they found that the total effect of tangibles on perceived service quality is significantly greater than the direct effect, which suggests that the intangibles have a mediating role on tangibles. A diverging opinion on the mediating role of interactive feature on the physical dimension was expressed by Bateson (1995), who argued that the physical elements of an organisation form behaviours on the way to the service encounter. Wirtz *et al.* (2000) contended that the influence of the servicescape on the service episode can be positive or negative, depending on the environment.

In accordance with Namasivayam and Lin (2004), the present study adopts the view that an inadequate servicescape or physical service feature requires a higher level of intangible services if a certain level of customer satisfaction is to be achieved. This assumes that tangibles have a mediating effect on intangibles. The following hypothesis is therefore proposed:

- H3. The interactive features of a service influence overall perception of satisfaction both directly and indirectly (through physical factors); that is, physical features mediate the effect of interactive ones to produce a combined impact on overall satisfaction.

2.4 Relative importance of service dimensions

The relative importance of the various dimensions of service quality and/or satisfaction remains unclear; as a consequence, the optimal allocation of resources to these dimensions is also unclear.

Some researchers have found that the intangible environment, as described by dimensions of SERVQUAL, in terms of “responsiveness”, “assurance”, and “empathy”, play a more significant role in quality/satisfaction than does the dimension of “tangibles” (Parasuraman *et al.*, 1991; Cronin and Taylor, 1992; Dabholkar *et al.*, 1996; Zeithaml *et al.*, 1990); indeed, Zeithaml and Bitner (2000) have stated that “reliability” has consistently been shown to be the most important dimension.

Several authors have suggested that the relative importance of various dimensions might vary in accordance with the nature of the service under consideration (Bergman and Klefsjo, 2003; Chowdhary, 2000). For example, Olorunniwo *et al.* (2006) identified intangibles as being of particular importance in the hotel sector, although these authors acknowledged that tangibles do play a significant role in determining satisfaction for hotel guests. Pantouvakis and Lympelopoulou (2008) showed that the physical factors are of greater importance than interactive service features in determining customers' evaluations of overall satisfaction in the coastal shipping sector. Lee *et al.* (2000) suggested that "tangibles" represent a more important dimension in facility/equipment-based industries, whereas "responsiveness" is more important in people-based industries. However, this view was not supported by Chowdhary and Prakash (2007), who examined 16 services and concluded that the dimension of "tangibles" was important for certain "tangible action" services (such as hotels and hospitals) whereas "reliability" was more important for "intangible service acts" (such as telephone services and education); "responsiveness" was not identified as important in any of the industries examined.

By introducing a direct servicescape evaluation based on SERVQUAL dimensions, Reimer and Kuehn (2005) claimed that the impact of servicescape (tangibles) on service quality is of greater significance than is generally supposed. These authors also called for more research on the development of a valid instrument for measuring servicescape because their instrument had failed to fit well with certain services (in particular, those in the banking and restaurant sectors).

In contrast to the above, Sachdev and Verma (2004) employed a variety of measurement methods and reported that no definite order of importance of dimensions was found in four sectors using a two-dimensional taxonomy of services, which included "tangible-dominance" and "degree of physical involvement". The authors questioned the applicability of the SERVQUAL dimensions to this analysis.

With regard to the question of which service features play an important role in directly influencing satisfaction (as distinct from service quality), Stafford *et al.* (1998) contended that intangible quality determinants influenced satisfaction more than the tangible dimensions. In accordance with this view, Yap and Sweeney (2007) found that process service quality exerted a greater impact than the tangible quality on service satisfaction.

It is apparent from the above discussion that opinion is divided on the relative importance of the service dimensions in producing quality/satisfaction in any given sector, and that these differences appear to be due, at least in part, to the methods of measurement that are used. On the basis of the above discussion, the following "null hypothesis" is therefore proposed:

- H4.* Within any given service sector, the relative importance of physical service features (servicescape) and interactive service features in producing satisfaction is consistent – irrespective of the measurement instrument that is used.

2.5 Competing measurement models

There is a divergence of opinion in the literature regarding the operationalisation of the dimensions of service quality. Some authors favour the American (SERVQUAL) five-dimensional structure (Parasuraman *et al.*, 1985), whereas others support a more

parsimonious European or Nordic perspective of “physical quality” and “interactive quality” (Grönroos, 1982), which has been introduced conceptually but not operationally (Grönroos, 2001). Several scholars have provided modified versions of either the five-dimensional SERVQUAL instrument or the Grönroos’ (1982) two-factor model (Rust and Oliver, 1994) in an attempt to synthesise and integrate the two approaches.

Although it has been suggested that the SERVQUAL model is a good starting point for measuring quality (Brady and Cronin, 2001), there are concerns about its dimensionality. Empirical studies have indicated a lack of discriminant validity between some dimensions, and studies of content validity have suggested that the conceptual definitions of some dimensions overlap (Buttle, 1996; Lehtinen *et al.*, 1996). For example, Lapierre and Filiatrault (1996) noted that the contents of the dimensions of “empathy” and “reliability” are confusing; moreover, they stated that the operational definition of the “reliability” dimension is inadequate because its items overlap with the conceptual definition of “technical quality” offered by Grönroos (1988). Getty and Thompson (1994) contended that “tangibles” and “reliability” are, indeed, distinct dimensions, whereas the remaining three actually merge into a single dimension. Durvasula *et al.* (1999) suggested that the SERVQUAL model should be modified to a more parsimonious two- or three-dimensional structure. In a similar vein, it has been contended that a two-dimensional perspective is a more appropriate representation of service quality than the five-dimensional perspective because the latter has a limited focus on functional quality (Kang, 2006; Kang and James, 2004).

On the basis of the above discussion, the present study compares three competing models in terms of the overall satisfaction received from a service and the relative importance of the tangible and intangible dimensions in the respective models. For the purposes of the present study, these three models are designated as:

- (1) the “SERVQUAL model”;
- (2) the “Nordic model”; and
- (3) the “servicescape model”.

The first model is depicted in Figure 1. This model retains the five dimensions of the SERVQUAL instrument, which are considered by some authors to be good predictors of overall satisfaction (Bitner and Hubert, 1994).

The second model is shown in Figure 2. In this model, which is both multidimensional and hierarchical, the dimension of “tangibles” as the most clearly identified dimension in all SERVQUAL studies is combined with the dimension of “reliability”, as suggested by Grönroos (1998), to produce a second-order factor that approximates to a dimension of “physical” (or “functional”) service quality. The remaining three SERVQUAL dimensions are merged to form another second-order factor that represents a dimension of “interactive” (or “process”) service quality. According to Caceres and Papparoidamis (2007), these second-order factors developed from the SERVQUAL dimensions can be used to explain satisfaction.

The third model, which is shown in Figure 3, is developed from the literature on servicescape (as described above). This model proposes a new approach to measuring satisfaction.

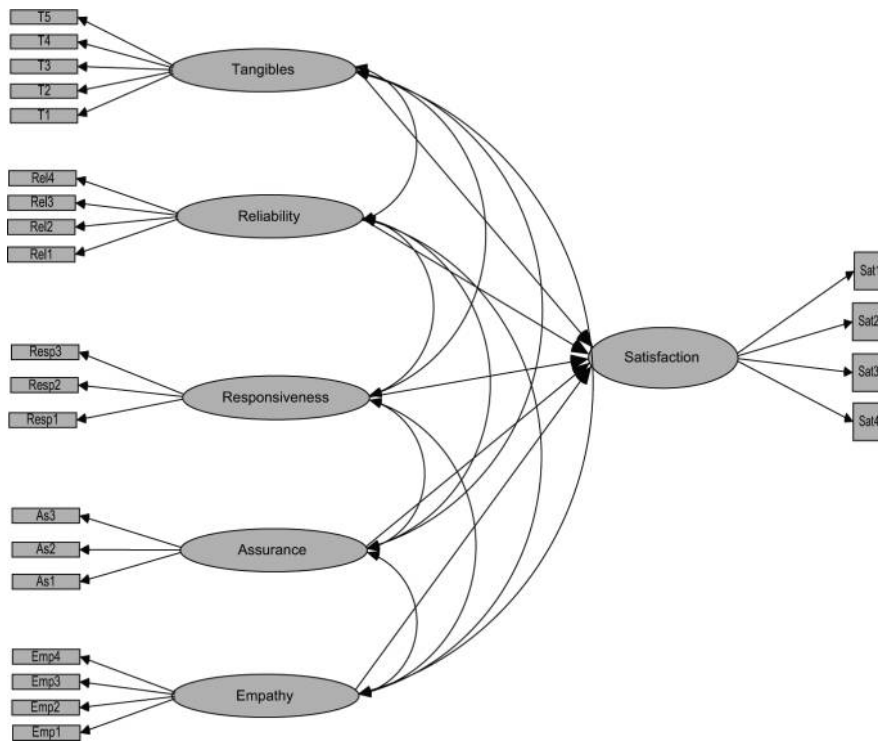


Figure 1. SERVQUAL model

3. Methodology

3.1 Setting

The setting for this empirical study was the passenger port industry of the Port of Piraeus (Greece), which is the largest passenger port in Europe. Approximately 400 million passengers travel annually between major European ports, which are obviously critical transit points and service centres for the Greek and European economies. These ports and their environs can be characterised as “elaborate servicescapes” (Bitner, 1992) which, like hospitals, airports, and stadiums, conduct complex operations in a physical setting of passageways, signs, and mass movement of customers.

3.2 Sample and data collection

The data for the study were obtained from a survey questionnaire through personal interviews with port customers conducted by trained interviewers under the author’s supervision. To enhance the representative validity of the sample, potential respondents were selected according to certain demographic characteristics (age and sex), at intervals (every tenth person), on different days, at different times of the day, and at various locations within the port area. All respondents were required to answer the complete set of questions, representing the three models described above.

A final sample of 500 customer passengers was collected. Of these, 66 were excluded because they provided answers that were uniformly positive or negative (skewed

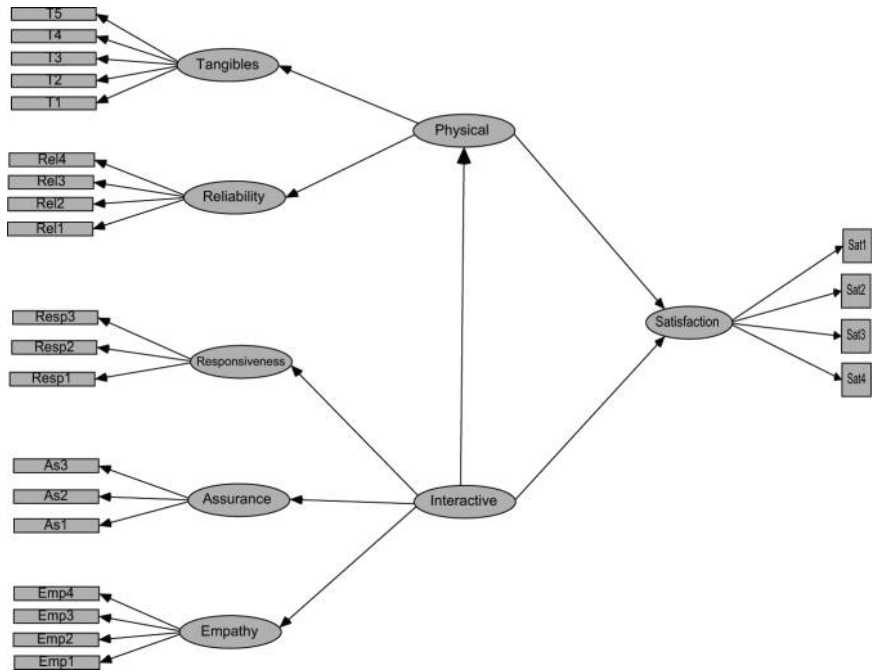


Figure 2.
Nordic model

responses). The proportions of male and female respondents were almost equal. The age of respondents ranged from 15 to more than 65 years, with an average age of 34 years.

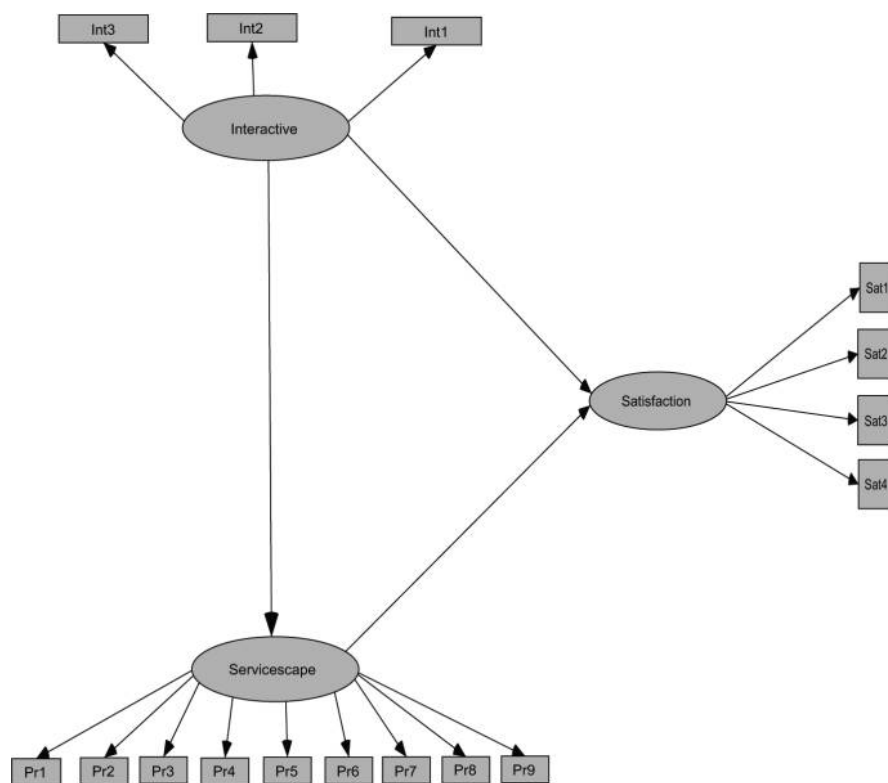
3.3 Measures

For the first model, the 22-item SERVQUAL scale was used to measure the five dimensions of “tangibles”, “reliability”, “responsiveness”, “empathy”, and “assurance”. Only perceptions from the port services were obtained, following the advice given in the literature. The original 22 items were translated into Greek and adapted to the port service industry on the basis of an extensive literature review and a preliminary qualitative assessment. Responses to each item were requested on a seven-point Likert-type scale (1 = “strongly disagree”; 7 = “strongly agree”).

The same instrument was employed for measurement in the second competing model, in which two of the dimensions (“reliability” and “tangibles”) had been collapsed into a second-order factor (“physical”), and the remaining three SERVQUAL dimensions (“responsiveness”, “assurance”, and “empathy”) had been collapsed into a composite second-order factor (“interactive”).

With regard to the third model, no well-grounded or validated measurement instrument was available in the literature. A specific multi-item measurement instrument was therefore developed for this model in accordance with the scale-development procedures for latent constructs suggested by Netemeyer *et al.* (2003) and Hair *et al.* (2006).

The first step in this scale-development process was the creation of a pool of 30 items to represent the attributes of the service (such as lighting, space, cleanliness, and



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Figure 3.
Servicescape model

so on). The wording of these items was adapted from relevant studies (Kim and Moon, 2008; Wakefield and Blodgett, 1996; Reimer and Kuehn, 2005). These 30 items were then subjected to preliminary qualitative examination (using three focus groups, 20 in-depth interviews, and two expert reviews). The respondents in each focus group were balanced in their demographic characteristics and given guidance as to expressing their opinions on different open air settings (facilities). A football field, an airport, a railway station and a port were discussed in various sessions to generate items measuring service features. Different settings were used to stimulate participants' thinking in different directions. From this phase of the research, 24 items were retained for further evaluation. The aim of this extensive exploratory phase of the study was to develop and select items that were generic (rather than industry-specific).

In accordance with Churchill (1979), a pre-test involving 75 respondents was then conducted, which indicated that the reliability of the scales was high for both the "servicescape" dimension and the "interactive" dimension. The appropriateness of each item to its scale was examined by calculating Cronbach's alpha with individual items removed; as a result, 18 items were retained for analysis.

An exploratory factor analysis (EFA) was then performed by principal component analysis (PCA) with varimax rotation. This revealed six items that loaded on multiple factors; these were subsequently excluded (Hair *et al.*, 2006). A repeat EFA on the

modified model suggested that the three proposed items of the “servicescape” dimension (“ambient conditions”, “spatial layout”, and “signs, symbols, and artefacts”) should be collapsed into one dimension representing an overall holistic perception of the physical environment; this finding was confirmed by CFA. Although this contradicted the three-dimensional structure of the servicescape previously noted in the services literature, studies in the field of environmental psychology have suggested that people respond holistically to a variety of stimuli by forming overall images over time (Bitner, 1992; Schiffman, 2001; Lin, 2004). When combined with other external sources of information (such as word of mouth, advertisements, and so on), these images form an overall impression (*Gestalt*) of a service organisation (Nguyen and Leblanc, 2002; Crane and Clark, 1988). Indeed, it has been claimed that any attempt to decompose a perception into its elementary sensory units can lose sight of the perception itself – because the perception of the whole dominates the perceptions of its parts (Schiffman, 2001). The three items of servicescape that had been proposed for the new instrument were therefore collapsed into one overall dimension, as suggested by the preliminary testing described above, rejecting thus our second hypothesis.

In summary, the development of the new (“servicescape”) measuring instrument led to a final set of 12 questions (nine for the physical elements and three for the interactive elements) being selected for the servicescape model in the comparative study of three models. All items are shown below:

- (1) Tangibles
 - Port has modern-looking equipment.
 - Materials associated with the service (pamphlets or statements) are visually appealing.
 - Port facilities are up to date.
 - Port’s terminal, embarkation/disembarkation area, and hygiene area are adequate and sufficient.
 - Connection to other transportation and parking spaces are adequate.
- (2) Reliability
 - All functions are performed according to specifications.
 - When a passenger or port user has a problem, the port’s procedures are able to solve it.
 - Port provides high-quality services to customers.
 - Port provides reliable services.
 - Port insists on error-free records.
- (3) Responsiveness
 - Personnel in the port tell customers exactly when services are to be performed.
 - Personnel in the port give customers prompt service and solve any problems.
 - Personnel in the port are always willing to help customers.
 - Personnel in the port are never be too busy to respond to customers’ requests.

- (4) Assurance
- Personnel in the port are consistently courteous to customers.
 - Customers feel secure inside the port area.
 - The behaviour of personnel in the port instils confidence in customers.
 - Personnel in the port have the knowledge to answer customers' questions.
- (5) Empathy
- Personnel in the port give passengers individual attention.
 - The port's operating hours are convenient to passengers.
 - The port understands the specific needs and personal requirements of customers.
 - Personnel in the port understand every passenger's individuality.
- (6) Satisfaction
- Overall, with regard to using this port I am ...
 - Overall, with regard to the facilities of this port, I am ...
 - Overall, with regard to the level of service received from the personnel of this provider, I am ...
 - Overall, with regard to the information that I can find regarding departures/arrivals, I am ...
- (7) Servicescape
- The lighting of this facility is appropriate and adequate.
 - The level of security/safety felt when in the port area makes customers feel comfortable.
 - This facility is clean, odourless, and pleasant.
 - The waiting/embarkation/disembarkation lounges are spacious and visually appealing.
 - Short-term car parking is spacious and convenient.
 - Long-term car parking is spacious and convenient.
 - The quality of signage to the gates/exit is good and all paths are clearly marked.
 - The ability to communicate (telephone, internet, etc) when inside the facility is good.
 - The number of departure/arrival electronic displays and equipment is adequate.
- (8) Interactive quality
- The employees of this facility are courteous, polite, and respectful.
 - The employees of this facility are competent, skilful, and available to serve.
 - The employees of this facility are willing and able to provide any assistance required.

4. Results

4.1 Measurement model

An initial distribution analysis of the survey data revealed only minor violations of normality. The sample was then randomly split into two sub-samples:

- (1) a larger sample (250); and
- (2) a smaller sample (184).

An iterated EFA was then performed on all data sets and measurement instruments using PCA. Loadings below 0.40 (absolute value) were suppressed to improve the clarity of the relationships. The Kaiser-Meyer-Olkin (KMO) statistic exceeded 0.90 for both samples and all instruments, which indicated strong relationships among items.

With regard to the SERVQUAL measuring instrument, which was used for the first two models (designated "SERVQUAL" and "Nordic"), two factors with eigenvalues greater than 1 were identified, which explained 69.5 per cent of the total variance. The items associated with the "tangibles" and "reliability" dimensions loaded onto one factor, and the items associated with the other three dimensions loaded onto the other. However, CFA provided a very good fit for the original five-dimensional structure (CFI = 0.963; GFI = 0.914; NFI = 0.949; RFI = 0.932; Delta2 = 0.964; RMSEA = 0.067). The EFA and CFA results supported the contention that, although a five-dimensional structure fitted the data well, the three factors were not conceptually clear and failed to yield a sufficient level of confidence, which suggests the need for a more parsimonious model. The two-dimensional construct ("tangibles" and "intangibles") of the second ("Nordic") model was therefore supported.

With regard to the new ("servicescape") instrument, the results shown in Table I confirmed the proposed two-dimensional structure ("physical" and "interactive") with eigenvalues greater than 1, which explained the 57.23 per cent of the variance extracted. These two dimensions fitted the data well (CFI = 0.994; GFI = 0.979; NFI = 0.976; RFI = 0.963; Delta2 = 0.994; RMSEA = 0.029), and all reliability and validity tests (CR and AVE) met the recommended standards (Hair *et al.*, 2006).

In summary, both instruments (SERVQUAL for models 1 and 2; "servicescape" for model 3) included constructs with at least three items loading on the same factor. All four satisfaction items merged to form a single factor that explained 77 per cent of the total variance, with a KMO index exceeding 0.81.

4.2 Testing of hypotheses

The two main models (SERVQUAL and SERVICESCAPE) represent truly different hypothetical structural relationships, rather than just marginal modifications to a single theory, and are well grounded in the literature. Their fit and predictive accuracies were estimated with structural equation modelling using AMOS software and the results are compared, so as to test the superiority of one as opposed to the other. The results, which are shown in Table II, indicate that the estimates for a set of recommended indices (GFI, NFI, RFI, IFI, TLI, and CFI) were above the accepted threshold of 0.90 and that the RMSEA was below 0.7 (Hair *et al.*, 2006). These results confirmed the good fit for all models. The relative ability of each model to explain variance in satisfaction (as measured by R^2) ranged from 0.83 to 0.93. All path estimates were found to be statistically significant and in the predicted direction, with standardised residuals below the accepted limits. *H1*, which had proposed that

	Servicescape	Interactive quality	The relative importance of service features
Long-term car parking is spacious and convenient	0.759		
Short-term car parking is spacious and convenient	0.757		
The waiting/embarkation/disembarkation lounges are spacious and visually appealing	0.749		
The level of security/safety felt when in the port area makes customers feel comfortable	0.649		
The ability to communicate (telephone, internet, etc.) when inside the facility is good	0.649		
The quality of signage to the gates/exit is good and all paths are clearly marked	0.647		
This facility is clean, odourless and pleasant	0.647		
The lighting of this facility is appropriate and adequate	0.615		
The number of departure/arrival electronic displays and equipment is adequate	0.605		
The employees of this facility are competent, skilful, and available to serve		0.886	
The employees of this facility are courteous, polite, and respectful		0.864	
The employees of this facility are willing and able to provide any assistance required		0.583	

Note: KMO = 0.894

Table I.
EFA for the servicescape model

Fit/path	1st model (SERVQUAL)	2nd model (Nordic)	3rd model (Servicescape)
CMIN/DF	3.154	3.149	2.910
GFI	0.883	0.875	0.934
AGFI	0.850	0.840	0.896
NFI	0.929	0.929	0.941
IFI	0.950	0.950	0.960
TLI	0.941	0.941	0.944
CFI	0.950	0.950	0.960
RMSEA	0.071	0.070	0.066
AIC	800.164	800.194	350.232
ECVI	1.848	1.848	0.809
tan → sat	0.28	–	–
Max(res. emp. rel. ass) → sat	0.22	–	–
phys → sat	–	0.76	–
inter → sat	–	0.22	–
inter → phys	–	0.95	–
servicescape → sat	–	–	0.58
inter → sat	–	–	0.43*
inter → servicescape	–	–	0.83
R ² (Sat)	0.83	0.84	0.93

Note: All paths are statistically significant at the 0.000 level except those indicated with an * that are significant at the 0.05 level

Table II.
Results from the three tested models

service-quality features are directly and positively related to satisfaction with the service provided, was thus confirmed.

The indirect relationships, which reflected partial mediation of physical (servicescape) variables with interactive variables, were found to be significant and positive. A $\Delta\chi^2$ test showed that the fit of the second and third models improved significantly when a mediation of physical features to interactive features was included; moreover, a significant indirect path between interactive features and satisfaction was also found. On the basis of these results, there was support for *H3*, which had proposed that interactive factors of a service influence overall perception of satisfaction from the relevant service features both directly and indirectly (through physical factors).

Comparison of the fit indices of the three SEM models indicated that the third (“servicescape”) model was better than (or at least as good as) the two other models in fitting the data and explaining satisfaction. This was confirmed by the ECVI and AIC indices, which take into account the models’ characteristics and are considered to be most useful in comparing one model to another. These results supported the superiority of the third model.

With regard to the importance of each service feature for overall satisfaction, the path estimates produced inconsistent results. For the path from “tangibles” to “satisfaction” in the first (SERVQUAL) model, a positive standardised coefficient of a 0.28 indicated that overall satisfaction was overwhelmingly explained by the other four dimensions. However, in models 2 and 3, physical features were of greater importance (0.76 and 0.58 respectively) than was the case for “tangibles” in model 1. These physical features in models 2 and 3 were also of greater importance than intangible characteristics in explaining the majority of satisfaction variance within these models themselves. These findings suggest that the three models assessed the importance of each dimension in different ways. These results thus rejected the “null hypothesis” (*H4*), which had proposed that within any given service sector the relative importance of physical service features (servicescape) and interactive service features in producing satisfaction is consistent, irrespective of the measurement instrument that is used.

A predictive analysis test was then performed to test the ability of each model to predict satisfaction. Taking into account the categorical nature of the responses, a multinomial logistic regression method was adopted by transforming the satisfaction variable into a dichotomous measure that indicated whether the respondent was satisfied or not satisfied with the service provided. The results are presented in Tables III and IV.

These results showed that all models appeared to have similar ability to predict overall satisfaction. However, taking into account the results from Table IV, three factors (reliability, assurance, and empathy) in the SERVQUAL model were not statistically significant. The importance of each dimension is denoted by the relevant Exp(B) values. It is apparent that the physical features again had a preponderant

Table III.
Models’ predictive ability

	Overall prediction (%)
1st model (SERVQUAL)	83.6
2nd model (Nordic)	83.4
3rd model (Servicescape)	82.6

Satisfaction	<i>B</i>	Wald	Sig.	Exp(<i>B</i>)	The relative importance of service features
<i>1st model: SERVQUAL</i>					
Intercept	-0.591	15.480	0.000		381
Tangibles	1.389	25.355	0.000	4.011	
Reliability	0.265	0.737	0.391	1.303	
Responsiveness	1.172	13.180	0.000	3.228	
Assurance	-0.150	0.203	0.652	0.860	
Empathy	0.817	6.225	0.013	2.263	
<i>2nd model: Nordic</i>					
Intercept	-0.587	15.931	0.000		
Physical	1.745	31.487	0.000	5.729	
Interactive	1.423	23.286	0.000	4.150	
<i>3rd model: Servicescape</i>					
Intercept	-0.529	15.617	0.000		
Servicescape	1.876	70.412	0.000	6.531	
Interactive	0.713	16.800	0.000	2.040	

Table IV.
Parameter estimates

influence on satisfaction in models 2 and 3. Although the “tangibles” dimension remained the most important in model 1, it failed to explain more than the summated outcome of the remaining SERVQUAL factors.

5. Conclusions and implications

5.1 Main conclusions

The objective of this research was to use different measurement models to assess the relative importance of various service-quality dimensions in producing customer satisfaction. Previous research has shown that it is impossible to generalise about the relative importance of service-quality dimensions; rather, their importance depends on the type of service provided. In particular, the relative importance of the SERVQUAL dimensions varies among different types of services – although the dimension of “tangibles” has consistently been identified as of minor importance in almost all studies that endorsed the importance of the intangible aspects of service provision.

This study has addressed this issue by comparing the ability of various measurement instruments to capture and explain the constructs being measured. In doing so, the study has compared:

- the five-dimensional SERVQUAL instrument;
- a two-dimensional (“Nordic”) model consisting of two-second-order factors (“physical” and “interactive”); and
- a new multi-item (“servicescape”) measurement instrument based on Bitner’s, 1992 notion of the “servicescape”.

Several interesting findings emerged from this approach.

First, this research adds to the literature by exploring the role of the physical and interactive features in customer’s satisfaction formation. Although they have been studied previously within the quality of services literature, this is among the very few efforts that link the service features to the overall satisfaction directly and not through

service quality. Findings confirm that the 5-dimensional (SERVQUAL) model and the two-factor (“Nordic”) higher order factorial perspective fit the data almost equally well. However, the new (“servicescape”) model proposed in the present study appears to outperform both of the other models with respect to fit and explanatory power of the construct of customer satisfaction (at least in the service examined here).

Second, the study shows that the physical environment, when measured by the more comprehensive scale of the new (“servicescape”) model appears to exert a greater influence on the satisfaction construct than that of the SERVQUAL “tangibles” dimension alone. In other words, the items used to conceptualise the servicescape in the new model might be more applicable to the service studied here (and similar “open air” services) than the SERVQUAL items alone. This finding would seem to imply that managers should attach more importance to “servicescape” attributes than before to engender customer satisfaction. This is of great importance as the application of an inappropriate method could lead to misleading interpretations and useless and costly actions in pursuing customer satisfaction, efficient resource allocation and improved business performance.

Third, the study finds that there is an indirect effect on satisfaction from intangible service attributes. This effect is mediated, at least in part, through the servicescape. This finding supports the view that the physical features of service provision influence behaviours before the service episode, and that negative servicescape perceptions require a higher level of interactive service attributes to achieve the same level of customer satisfaction.

In summary, the present study provides empirical evidence that the servicescape is of greater importance in determining customer satisfaction than the literature has suggested; moreover, the study has shown that a recognition of the influence of the servicescape depends on the way in which it is measured.

5.2 Managerial implications

The study has clear implications for service-quality managers who use service-quality tools for choosing strategies, allocating resources, and achieving a competitive advantage.

First, managers who seek to enhance customer satisfaction should pay sufficient attention to both the tangible attributes (physical environment or servicescape) and the intangible attributes (empathy, responsiveness, etc.) of their service offering.

Second, depending on the provider’s service sector, appropriate measurement instruments should be utilised to assess these attributes and their effect on overall satisfaction with the service provided.

Third, rather than attributing undue importance to the interactive elements of service (assurance, empathy, and responsiveness), managers should recognise the benefits of carefully attending to the servicescape within which the service is provided – including signage, customer information systems, and renovated buildings and settings.

Finally, managers should note that a good servicescape environment can facilitate positive interactive experiences for customers. Conversely, an unsatisfactory physical environment demands a higher level of interactive capacity to provide the same level of customer satisfaction.

5.3 Limitations and suggestions for future research

As in any research project, this study has certain acknowledged limitations that should be taken into account when interpreting the results. First, the study utilised data from a single sector; verification of the findings in other industries is clearly desirable. Secondly, the number of items in the servicescape model was deliberately minimised to prevent respondent fatigue; future studies could incorporate additional variables to describe the servicescape in greater detail. Thirdly, other constructs could be added to the new servicescape model; such constructs as loyalty, behavioural intentions, value from the exchange, sacrifice, customer characteristics, and risk behaviour might be included in future research on the model proposed here.

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About the author

Angelos Pantouvakis holds a Master's degree in Engineering from the National Technical University of Athens, an MBA from Nottingham Business School (UK) and a PhD from the Judge Business School (University of Cambridge). He has more than 20 years' professional experience in services management and marketing in top managerial positions with many multinational organizations. He is currently a senior lecturer at the Department of Maritime Studies at the University of Piraeus. His research interests include services marketing, service quality and satisfaction. His work appears in *Managing Service Quality*, *Maritime Policy and Management*, *Maritime Economics and Logistics*, *Journal of Retailing and Consumer Services*, etc. Angelos Pantouvakis can be contacted at: angelos@pantouvakis.eu

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