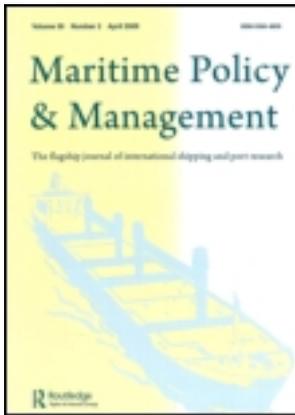


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### Testing the SERVQUAL scale in the passenger port industry: a confirmatory study

Angelos Pantouvakis<sup>a</sup>, Constantinos Chlomoudis<sup>b</sup> & Athanassios Dimas<sup>a</sup>

<sup>a</sup> University of Ioannina, Laboratory of Business Administration, Greece

<sup>b</sup> Department of Maritime Studies, University of Piraeus, Greece

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## Testing the SERVQUAL scale in the passenger port industry: a confirmatory study

ANGELOS PANTOUVAKIS\*†,  
CONSTANTINOS CHLOMOUDIS‡  
and ATHANASSIOS DIMAS†

†University of Ioannina, Laboratory of Business Administration,  
Greece

‡Department of Maritime Studies, University of Piraeus, Greece

A key question is whether the service quality instruments developed for other services' industries may be used to gauge service quality perceptions in shipping. Grounded on similar studies that test the most widely used American service quality instrument, SERVQUAL, in the commercial shipping sector, this study examines its applicability in the passenger shipping realm. Based on a survey of 436 passengers in Piraeus port, SERVQUAL's five main dimensions have been checked regarding their fit with the use of Confirmatory Factor Analysis. Results support that this is a valid instrument for measuring service quality in passenger shipping besides certain considerations regarding its dimensionality. A more parsimonious two-factor model seems more applicable and should therefore be also considered. Finally, it is evident from the study that passengers place more importance to the physical than the interactive elements of service to form their overall satisfaction.

### 1. Introduction

In the last decade the free-market model, which most countries have adopted, increased the global competition among firms. As many countries open up their borders for trading (e.g. [1]) transportation plays an important role in the circulation of goods. Among different modes of transportation, shipping reserves a dominant position. In the European Union (EU), about 90% of the incoming and outgoing goods traffic is transported by the sea (e.g. [2]) thus making the EU a distinctive and decisive player in the world's maritime transportation political agenda.

This emerging role of maritime transportation emphasizes the particular role of ports as traditional transit points (e.g. [3]), should play in this new global era. The globalization of trade and the growth in sea transport have resulted in port traffic increases at an average of about 3% per year (e.g. [4]). Moreover, the technological improvements and rapidly growing Eastern markets have intensified the competition, impacting on port activities. New port infrastructures have been planned, improvements in port services have been designed, new maritime transport technologies have been applied, so that ports improve their efficiency and the quality of their service more than their national and international competitors.

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\*To whom correspondence should be addressed. e-mail: angelos@pantouvakis.gr

The 1997 Green Paper on seaports and maritime infrastructure [5] launched a wide-ranging debate on port issues and possible policies intended to improve efficiency and infrastructure. The European Commission proposed a 'port services' directive [13] that would establish open access on the basis of transparency, non-discrimination, and certain principles for charging, safeguarding public service obligations, and safety. One far-reaching objective was the existence of at least two providers for every port service, which belonged to three categories. The first category consists of technical-navigational services regarding pilotage, towage and mooring. The second category consists of cargo consolidation, cargo-handling services and storage or depot, depending on cargo categories. The last category includes passenger services, including embarkation and disembarkation.

The last category, passenger services, has received scant attention from both marketing or shipping scholars, and a few studies (e.g. [62–64]) have analysed the quality of services in passenger ports. The port industries and their managers, in order to determine the survival and the prosperity of their organizations, must respond to changes in the service economy. Shippers and/or passengers now enjoy a variety of transport alternatives offering different times (route), costs (price), risks and quality; this is leading to the gradual reduction or disappearance of zones of influence or captive markets. The development of an efficient port and an efficient port network is crucial. Relationships between ports and their commercial clients focusing on competition and pricing issues have been examined in the literature in an effort to understand the relative advantage in a highly competitive environment (e.g. [10–20]). However the term 'quality' in the maritime literature is usually associated with the implementation of the engineering ISO series which cannot meet all individual customer's requirements and a more 'marketing oriented or service quality' approach may be required to cover the service quality phenomenon (e.g. [21]).

Service quality has become a pivotal marketing concern in the past two decades (e.g. [22–24]). One of the most widely accepted service quality models is the 5-dimensional SERVQUAL instrument from Parasuraman *et al.* [24], also known as the American Model. SERVQUAL has become popular among researchers who are measuring service quality (e.g. [25–30]) and several attempts to integrate or replicate it to several industries are evident in the literature (e.g. [31–33]) besides its strong criticisms (e.g. [34–36]).

However, despite the global concern about and awareness of service quality, the SERVQUAL scale has been rarely mentioned in the maritime sector and only a few studies examine it in the commercial shipping sector. (e.g. [37–39]). No study has applied this widely used scale to passenger shipping.

The goal of this research is to further the understanding of the applicability and robustness of the SERVQUAL scale in the passenger shipping industry. The paper is organized as follows. It will begin with a presentation of the passenger traffic in certain European ports. A description of service quality, SERVQUAL and port service quality is then presented. The third section of this work introduces the research questions, methodology and sampling terms. The results section reports the findings of this work using Exploratory and Confirmatory Factor Analyses; concluding remarks and managerial implications are included in the last part of this paper.

## 2. Short sea and ferries industry

The liberalization and deregulation undertaken in the European Union in free movement of goods and passengers increased the competition between transport nodes, especially in the coastal shipping industry, due to the very low prices that are offered to customers. Short-sea shipping and ferry operators have been antagonized by low-cost airlines that offer cheap flights throughout Europe. This, compounded with the abolition of duty free sales onboard in 1999, resulted in a substantial loss of income. (A typical income breakdown is 40% passengers, 40% duty free and 20% freight.) It is thus normal for ferry operators to divert their efforts to the development of freight services and the improvement or adaptation of their passenger facilities in an attempt to retain their market share. High-speed modern RoPax vessels (up to 30 knots), flexible employment terms, higher focus on freight capacity and trucks are among many of the things that characterize today's passenger shipping environment. The creation of the four 'sea motorways' (Baltic Sea, western Europe, south-west and south-east Europe) has been recently adopted by the EU in an attempt to concentrate flows of transport and establish regular and frequent maritime links among the member states. Passenger and coastal shipping was subsequently added following lobbying from RoRo owners that wish to also expand into the passenger industry. Important ferry links are Germany/Sweden, Denmark/Sweden, England-Wales/Ireland, England/Scandinavia, Calais/Dover, Valencia/Barcelona to the islands and North Africa, Marseilles/Corsica and North Africa, Sicily/Sardinia, Greece, the Adriatic Sea and Tunisia/Algeria/Morocco; passenger traffic constitutes a very important business for respective operators (ESPO Annual Report, 2006–2007).

As a big market, the Mediterranean ports witnessed an increased north–south traffic (e.g. Italy–Greece, Corsica–France) and present the potential to develop the southern peripheral EU coastal areas and islands (e.g. tables 1,2,3). They also offer access to the EU, including connecting the EU with many non-European countries and contributing to sustainable mobility by linking the most environmental friendly parts of the network in a multimodal perspective. The development of European short-sea shipping that limits the congestion of inland traffic and significantly decreases the private, social and environmental costs of road transport (estimated at 1% of EU GDP or some 80 billion €), has become a major transport policy at the European level. In the European Commission's White Paper 'European Transport Policy for 2010: Time to Decide,' [40] ports are critical for the implementation of the EU's transport policy that shifts traffic from road to sea, although disagreements

**Table 1. World ferry traffic in 2005.**

Area	Passengers	Cars	Buses	Trailers	Trips
Baltic	187.182.008	67.816.381	305.106	6.926.465	3.569.383
Mediterranean	192.195.725	26.551.362	85.131	6.578.501	351.432
North Sea	131.772.903	18.786.155	275.265	10.100.708	315.830
Subtotal Europe	511.150.636	113.153.898	665.502	23.605.674	4.236.645
Rest of world	883.964.931	43.295.710	86.015	4.878.016	1.404.400
World Total	1.395.115.567	156.449.608	715.517	28.483.690	5.641.045
Share of Europe	36.6%	72.3%	88.6%	82.9%	75.1%

Source: ShipPax Statistics and Outlook 2006.

**Table 2. Top 15 European ferry operators at 2006.**

Company	Total GT	Company	Total GT
DFDS Group	925.167	Scandlines	349.274
Stena	834.359	Tallink	347.914
P&O	572.082	ANEK Lines	328.243
Tirrenia di Navigazione	549.565	Silja Line	317.313
Grandi Navi Veloci	443.181	SNCM Ferryterrancee	264.645
Color Line	424.613	Viking Line	246.032
Superfast Ferries	388.184	<b>Total top-15</b>	<b>6.740.270</b>
Trasmediterranea	381.405	<b>Total ferry fleet</b>	<b>12.816.377</b>
Minoan Lines	368.293	<b>Share of top-15</b>	<b>52.6%</b>

Source: ShipPax Statistics and Outlook 2006.

**Table 3. The total passengers embarkation and disembarkation from 1997 to 2007 in 11 European ports.**

Ports	1997	1998	1999	2000	2001	2002	2003	2004	2005	Average annual
										growth rate
										1997–2005 (%)
Dover	21.236	19.330	18.462	16.197	15.957	16.449	14.770	14.429	13.501	–5.5%
Calais	20.060	18.117	17.100	15.066	14.370	14.991	13.729	13.259	11.695	–6.5%
Piraeus	13.397	9.131	9.590	7.289	8.237	8.639	9.315	10.713	11.076	+3.1%
Helsinki	8.146	8.616	9.073	9.251	9.010	8.871	8.549	8.747	8.854	+1%
Stockholm	7.499	7.780	7.977	7.746	7.001	6.826	7.294	7.823	8.211	+1.1%
Tallinn	–	–	–	–	5.740	5.136	5.172	6.452	6.701	–
Napoli	7.277	6.168	6.960	6.748	7.056	6.708	6.811	6.801	6.084	–2.2%
Palma	907	1.115	1.300	1.864	1.873	2.286	2.537	3.773	4.611	+22.5%
Mallorca										
Santa Cruz de Tenerife	3.980	4.357	4.553	4.927	4.910	4.861	5.011	5.164	4.564	+1.7%
Capri	4.995	4.650	5.555	5.404	5.546	5.028	4.749	4.771	3.860	–3.2%
Turku	3.601	3.656	3.678	3.514	4.074	4.026	4.039	3.828	3.697	+0.3%

Source: Eurostat 2007.

and differences persist over certain policy issues (e.g. the European Parliament's 2006 rejection of the so-called 'port-package' that attempted to regulate market access to port services).

### 3. Literature review

#### 3.1. The quality of port services

The definition of quality, according to the International Standards (ISO series) is the complex of properties and characteristics of a good or service that satisfy the client's implicit and explicit needs. In accordance with this definition, port quality may be defined as the provision of services that meets the expectations of corporate or individual clients, whether or not these are specified in advance. The quality of provided services was usually underestimated by the port industry as 'location' and/or 'cost considerations' were usually conceived as the main criteria for port excellence. However, the recent political and economic developments, globally and in the EU, in addition to the integration of land, sea and air transport networks,

have led to increased competition among ports vying for the same hinterland (e.g. [41–42]). The ‘location’ advantage seems to fade for the benefit of other criteria such as the ‘connection to hinterland’, ‘complementary logistic services’ and finally ‘port services’ as the main preference factors for port choice from customers and significant conditions for port competition and excellence (e.g. [43]). The quality of port services (in terms of speed and reliability) has been identified as a strong determinant of port competitiveness, directly affecting the end users’ choice of terminals and ports (e.g. [44–46]). Port services are ‘experience goods’ [47] as they can only be judged after their delivery to the client and they suffer from variability in the quality of provision. This is the reasoning behind the need for the provider to send ‘quality signals’ to the client regarding the characteristics of the service or the expected performance (e.g. [48]). Price, reputation, guarantees and maybe certification by a third body (e.g. [49, 50]) are among possible but not mutually exclusive choices for service providers. The nature of the maritime industry considers certification (ISO series) as the preferred signalling mechanism between providers and their clients. This certification conveys to the prospective or existing clients the level of ability, excellence and good organization possessed by the port so to reduce uncertainty and increase confidence to undertake transactions (e.g. [16]). Indicators such as the number of sailings, available equipment and support services, level of congestion, quality of customs handling and amount of free time allowed for cargo and security or safety of ports, are some of the elements that world ports promote in order to compete in a global environment.

However, criticism includes the inability of clients to observe and evaluate the performance of the port provider due to their weak bargaining position and that the ISO system is firmly linked to the whole supply chain of the service provision. In other words, a failure on one level immediately affects the stability of the entire system. The complex internal port organization and the large number of port supply chain provision members, all operating in a heavily regulated environment, limits the anticipated benefits from the implementation of ISO series and allows for the introduction and adoption of the Malcolm Baldrige National Quality Award (MBNQA) and/or the European Quality Award (EQA) standards (e.g. [51]) or other even more sophisticated service quality approaches (e.g. [52]). Quality management approaches, however, must overcome the fragmented nature of port services which interfere with the implementation of quality management within ports and perceive them on a unified basis (e.g. [52]).

### 3.2. *The service quality of ports*

Service quality has been an important issue in marketing literature and in service firms. The need for a valid measure of perceived service quality has become crucial. Academics and practitioners have shown that the customer’s evaluation of service quality and the resulting satisfaction is connected to loyalty and to the willingness to maintain a long-term relationship with the company (e.g. [53]). Service quality is defined as a consumer’s judgement about an entity’s excellence (e.g. [54]), and comprises two main dimensions: the core aspects of the service and the peripheral elements (e.g. [24, 55]). It is a key differentiator for service industries by to increasing the reliability of the offering and improving performance (e.g. [23]). It is distinct from the quality as determined by the ISO series in that it concerns the overall entity’s excellence and not only the satisfaction of any specific party’s needs. Following this reasoning, ports, although fragmented and complex in operations, are conceived

by their customers as unique entities and are valued on the basis of their global performance (e.g. [52]). This approach is close to the typical services marketing notion where employees and customers belong to the same provision chain such that the employee is an internal customer and the customer a part-time employee. This enables the development of a clear services marketing and quality of services approach as a prerequisite for a distinct competitive advantage for the transportation industry in general and for ports in particular.

Focusing on customers' satisfaction and performance is a major policy switch for transportation organizations (e.g. [56]) and almost every transport mode has shifted its interest towards satisfying customer needs and providing better service. Examples include air transport (e.g. [57–60]) rail (e.g. [61, 62]) and urgent services. Like other industries, ports have reallocated their resources to satisfying their internal and external customers by providing better service (e.g. [63]) and acquiring more power in the global logistic chain (e.g. [52]).

The literature has identified several dimensions of service quality of commercial ports: efficiency, security and punctuality (e.g. [16]), need for frequency, speed, reliability and safety (e.g. [41]), relationships with suppliers (e.g. [20]) and SERVQUAL dimensions (e.g. [39]) they will be examined later in this work. Six factors that describe the multi-dimensional construct of passenger port service quality perceptions and expectations are 'cleanliness', 'safety and security', 'parking facilities', 'guidance and communication' and finally the 'information from sights or tables in the port area' (e.g. [7]).

Further understanding of port users' expectations and perceptions of service quality has become crucial in light of the importance of ports to national development. The knowledge of customer expectations and requirements is essential for two reasons: first, it provides an understanding of how the customers define quality of service and products; and second, it facilitates the development of customer satisfaction questionnaires (e.g. [64]).

#### **4. The dimensions of the SERVQUAL Model**

Within this context, evaluating service quality offered to customers is essential. One of the most widely accepted models for measuring service quality is SERVQUAL. SERVQUAL is derived from the GAP-model of Parasuraman *et al.* [23] in which the authors defined service quality as the gap between customers' expectations and their perceptions of the service experience. In this model Parasuraman *et al.* [23] proposed ten dimensions of service quality: reliability, responsiveness, competence, access, courtesy, communication, credibility, security, understanding/knowing the customers, and tangibles. Parasuraman *et al.* [23] developed SERVQUAL, reducing the ten dimensions to five: tangibles, reliability, responsiveness, assurance and empathy. They proposed by a 22-item scale (e.g. [23, 24, 27, 55, 65–67]). Tangibles are the physical evidence of the service (physical facilities, appearance of personnel, tools or equipment used to provide the service), reliability is consistency of performance and dependability (a firm performs the service right the first time and honours its promises), responsiveness is the willingness or readiness of employees to provide service (timeliness of service), assurance corresponds to the knowledge and courtesy of employees and their ability to inspire trust and confidence and, finally, empathy is the caring and individualized attention that a firm extends to its customers.

Parasuraman *et al.*'s [24] five dimensions of service quality and the SERVQUAL model have been applied in many sectors (e.g. [25–30]) and several attempts to integrate or replicate it are described in the literature (e.g. [31, 32, 37, 68]). It has also been the subject of criticism (e.g. [35–37]). Applications include the health industry (e.g. [69–71]), banking (e.g. [24, 28]), leisure (e.g. [28]), public sector transport (e.g. [72]), public sector services (e.g. [73]), and information technology (e.g. [74]). Other settings have included a dental clinic, a business school placement centre, a tire store, an acute care hospital (e.g. [27]); independent dental offices (e.g. [71]); AIDS service agencies (e.g. [75]); physicians (e.g. [26, 76]); large retail chains (e.g. [45]); pest control companies, dry cleaning services and fast-food restaurants (e.g. [28]).

#### 4.1. *SERVQUAL and shipping*

In the shipping industry, SERVQUAL has been tested in ocean freight operations by Durvasula *et al.* [37, 77] and in commercial ports by Unboma and Ugboma [38, 39]. Both studies identified the good fit of the SERVQUAL instrument while noting the problems associated with its dimensionality. They both recommend SERVQUAL as a good 'starting point' for shipping service quality but special attention should be given to its adaptation for the specific industry under consideration. Apart from these two studies there seem to be no others on the application of SERVQUAL either in the maritime industry or in the passenger port industry.

In an attempt to identify and adjust the five dimensions of the SERVQUAL in ports, and especially passenger ports, one could note that:

1. Tangibles as described by the SERVQUAL model may well be reflected in the port industry's infrastructure, which, according to Tongzon and Ganesalingam [78] refers not only to the number of berths, the size of the terminal area, or the number of tugs or cranes but also in the quality and effectiveness of cranes, the availability of inter-modal transport, the quality of information systems and the preparedness of the port management. For passenger ports, tangibles may include the length of quays, the parking lots, the passenger terminals or waiting facilities, the guidance and information inside the port area, the connection to other transport modes and to the port management systems. Without all these characteristics, congestion, delays and higher costs are unavoidable.
2. Reliability, the second dimension of SERVQUAL, affects the port's efficiency and the speed of port services. 'On time' delivery of products is a major concern of most shippers (e.g. [79]) and terminal operators must guarantee reliable and quick service. Efficiency of port services is usually directly linked to speed of delivery and reliability.
3. Responsiveness is the port's ability to meet the port users' needs quickly. According to Unboma and Ugboma [39], ports should understand the needs of their customers and respond to them as quickly as possible.
4. Assurance is the port's reputation for preventing cargo damage. Lack of port safety affects the existing customers and can drive away potential ones. According to Unboma and Ugboma [39], a record of accomplishment and achievements reassures ports' customers of quality. A port's reputation for safety and security issues can be a powerful and significant competitive tool for foreign passengers when they have the ability to choose an embarkation port; it is also imperative for cruise shipping passengers.

5. Empathy is the ability of the port to inform its clients promptly of any problems with their transportation.

## 5. Hypotheses formation

The first application of SERVQUAL in shipping was conducted by Unboma and Ugboma [38, 39] who applied the SERVQUAL model to 40 registered licensed clearing agents who use the port services of Nigerian ports of Lagos and Harcourt Nigeria. They found that the SERVQUAL model could be applied in ports and greatly assisted them in their marketing strategies. They have found that ‘responsiveness’ and ‘tangibles’ (modern cargo handling equipment) received high ratings and the lower ratings were received by the last dimension of SERVQUAL (‘empathy’). The findings suggest that service per se should be improved and that staff should show a greater willingness to help. They recommend SERVQUAL scales as a good starting point for assessing service quality in ports and for continuing to measure service quality in ports.

Durvasula *et al.* [37, 77] applied the SERVQUAL model to 114 shipping managers of ocean freight shipping companies in Singapore who regularly use the service for exporting. They found that the SERVQUAL model fits the data reasonably well but the measures may be better represented by a more parsimonious three- or two-dimensional structure instead of the original five-dimensional one. The suggested two dimensions of service quality, according to Durvasula *et al.* [37], are the tangibles and a combination of the other four dimensions to one. This was supported by the tests that the authors conducted on their data, indicating that none of the five dimensions presented discriminate validity. They have also argued for the need for further studies to determine whether the dimensionality of SERVQUAL scale may be reduced to fewer dimensions. After comparing perceptions and expectation scores, they provided evidence that perceptions-only questions provide a better measure of service quality; these will therefore be used throughout this work. They also tested the association of SERVQUAL scale on overall satisfaction from the service offering (by the most preferred shipping line). They found that the ‘tangibles’ dimension had a lower correlation with overall satisfaction, implying a less significant importance than that accorded to the other four dimensions.

Taking this into account, the hypothesis could be formulated as follows:

- H1. Does the SERVQUAL model, as applied to the port passengers’ data, fit and explains them well?
- H2. Does the SERVQUAL scale exhibit the five-dimensional structure (tangibles, reliability, responsiveness, assurance, empathy) in a port passengers’ environment?
- H3. Is Infrastructure (reliability and tangibles) more important than ‘soft’ or peripheral elements of service in predicting customers’ satisfaction with the passengers’ port industry?

## 6. Methodology

### 6.1. The sample

Data for the quantitative survey were collected from 500 passengers (port-facility users) of Piraeus Passenger Port in Greece. The sampling frame was random selection inside the port’s area and was performed by trained interviewers. Interviews

were conducted on five days, with different densities of traffic flows. Due to the sensitivity of the used analytic techniques for the handling of missing data, special attention was paid to the accurate completion of the questionnaires. Sixty-six questionnaires were excluded from analysis to avoid non-response or skewed answers and a final sample of 434 questionnaires was finally drawn. The responses contained an almost equal number of males and females. The age of the respondents ranged from 15 to over 65 years, with an average age of 34 years.

### 6.2. *The questionnaire*

We used the 22-item battery of the SERVQUAL scale to represent the five SERVQUAL dimensions (tangibles, reliability, responsiveness, empathy and assurance). Only perceptions from the port services were asked, following similar suggestions in the literature (e.g. [28]) and in practice (e.g. [37]). The questions were translated and adapted to the shipping environment and to the features which are specific to the port service industry after a short initial qualitative phase.

Having validated the measuring instrument and its scales, passengers and port facilities users were asked to indicate the level of their agreement with regard to the service he/she perceived from the port (Piraeus). All items were measured using a 7-point scale of agreement anchored 1 = 'Strongly disagree' to 7 = 'Strongly agree'. Reliability checks when applied to all 22 items provide excellent overall Cronbach's alpha coefficient (0.970) which indicates the very good scaling of the instrument. Alpha coefficients and item-to-total correlations were calculated for every one of the original five quality dimensions and final results support that all 22 items present a robust structure with no evident need for deletions or modifications.

The mean responses to the 22 SERVQUAL items are presented in table 4.

### 6.3. *Analysis*

To test the hypotheses, means, standard deviations, kurtosis and skewedness were first reviewed; no normal distribution violations were present. Then data were analysed, first using exploratory and then confirmatory factor analyses (EFA and CFA). EFA was used to explain the pattern of relationships within the data set and to compare them against the hypothesised SERVQUAL dimensions. CFA was then used to test the dimensionality of the hypothesised structure of the instrument as suggested by the literature review. Finally, the predictive ability of the instrument was tested with the use of multinomial regression.

### 6.4. *The data and the dimensionality*

The dimensionality of the instrument was assessed by comparing the fit of the hypothesized five-dimensional SERVQUAL model for that scale with a number of other competing models. Given the expectation that the five dimensions might be correlated, an iterated EFA was performed on all data sets using principal components analysis (PCA) rotated by a Promax algorithm was used. Table 5 presents the factor loadings as extracted. Loadings lower than 0.40 in absolute value were suppressed to sharpen the clarity of the relationships. The Kaiser—Meyer—Olkin statistic was an excellent 0.970 (e.g. [80]), indicating strong relationships among items. Therefore patterns of correlations are relatively compact and so factor analysis should yield distinct and reliable factors (e.g. [81]). Finally, two factors, explaining the 69.5% of the total variance were identified where the 'tangibles' and 'reliability' elements (dimensions) were collapsed to one factor

**Table 4. Mean and std deviation of the 22-Servqual items.**

		Mean	St.Deviation
<b>TANGIBLES</b>			
Port has modern looking equipment	1	3.33	1.348
Materials associated with the service (pamphlets or statements) are visually appealing	2	3.17	1.487
Port facilities are up to date	3	3.27	1.539
Port's terminal, embarkation/disembarkation and hygiene areas are adequate and sufficient	4	3.23	1.461
Connection to other transportation means and parking spaces are adequate	5	3.86	1.490
<b>RELIABILITY</b>			
All functions are performed according to specifications	6	3.12	1.595
When a passenger or port user has a problem Port procedures are able in solving it	7	3.45	1.531
Port provides high quality services to the customers	8	3.75	1.386
Port provides reliable services	9	3.77	1.388
Port insist on error-free records	10	3.40	1.402
<b>RESPONSIVENESS</b>			
Personnel in the port tell you exactly when services are to be performed	11	3.69	1.585
Personnel in the port give you prompt service and solves any problem	12	3.59	1.426
Personnel in the port always be willing to help me	13	3.90	1.525
Personnel in the port never be too busy to respond to my requests	14	3.86	1.655
<b>ASSURANCE</b>			
Personnel in the port is consistently courteous to you	15	4.14	1.504
You feel secure inside port's area	16	3.96	1.581
The behaviour of personnel in the port will instil confidence to you	17	3.74	1.587
Personnel in the port have the knowledge to answer your questions	18	3.90	1.531
<b>EMPATHY</b>			
Personnel in the port give passengers individual attention	19	3.44	1.567
The port facilities operating hours are convenient to passengers	20	3.92	1.557
The port understands passengers specific needs and personal requirements	21	3.29	1.454
Personnel in the port understand every passenger's individuality	22	2.96	1.581

while the other three elements form another. These findings contradict the 'classical' five-dimensional structure of SERVQUAL but are consistent with other empirical works. For example, Babakus and Boler [82] identified two dimensions in SERVQUAL scale, as many as Durvasula *et al.* [37] found in their exploratory factor analysis of the shipping data.

Table 5 presents the EFA's findings on port passengers' data.

### 6.5. CFA methodology

In order to test and confirm the dimensionality of the model, a confirmatory factor analysis (CFA) is performed using AMOS 5. The software was used to measure the model. Confirmatory factor analysis measures the relationship between the latent and observable variables. In this study, the latent variables were the five dimensions of SERVQUAL and the observed variables are the 22 items comprising these dimensions. In a refined version, three items (4, 10 and 15) had low standardized

Table 5. Results from the factor analysis.

	Components	
	Factor 1	Factor 2
Personnel in the port is consistently courteous to you	0.989	
Personnel in the port never be too busy to respond to my requests	0.982	
The behaviour of personnel in the port will instil confidence to you	0.947	
Personnel in the port always be willing to help me	0.869	
Personnel in the port have the knowledge to answer your questions	0.824	
Personnel in the port give me individual attention	0.744	
Personnel in the port give you prompt service and solves any problem	0.701	
You feel secure inside port's area	0.649	
Personnel in the port understand every passenger's individuality	0.626	
When a passenger or port user has a problem Port procedures are able in solving it	0.552	
Port provides high quality services to the customers	0.501	
Port provides reliable services	0.481	
Port insist on error-free records	0.479	
Port has modern looking equipment		0.966
Port facilities are up to date		0.909
Materials associated with the service (pamphlets or statements) are visually appealing		0.869
Connection to other transportation means and parking spaces are adequate		0.756
All functions are performed according to specifications		0.726
Port's terminal, embarkation/disembarkation and hygiene areas are adequate and sufficient		0.686
Personnel in the port tell you exactly when services are to be performed		0.555
The port understands your specific needs and personal requirements		0.470
The port facilities operating hours are convenient to you		–

loadings and thus explain a small portion of the total variance; as they also presented multi-factor loadings from EFA they were excluded from subsequent analysis. A model of 19 items out of the original 22 of SERVQUAL model was therefore used.

In order to identify the best model, several alternatives have been evaluated. Each alternative approaches the dimensionality problem in a different way, ranging from one to five dimensions. CFA was used in every case to assess the fit of each model to the data and several indices were used. In the first model the initial five dimensions of SERVQUAL were tested (e.g. figure 1); in the second model the dimensions of 'responsiveness' and 'assurance' were collapsed to a single dimension (in line with Parasuraman's findings) forming a four-dimensional construct. Continuing the analysis, a three-factor model is tested with 'responsiveness', 'assurance' and 'empathy' combined into one factor. Moreover, a two-dimensional model was examined, with 'tangibles' and 'reliability' combined in one factor, while 'responsiveness', 'assurance' and 'empathy' were combined into another. Finally, in the last model we use only one dimension. The models' fit for each CFA was evaluated comparing the Tucker–Lewis's goodness-of-fit index (TLI), Bentler's comparative fit index (CFI), and the goodness-of-fit index (GFI). The chi-square value was also reported as reference for model fit. Construct reliability was evaluated by examining the parameter estimates and their associated *t* values and assessing the average variance extracted for each construct.

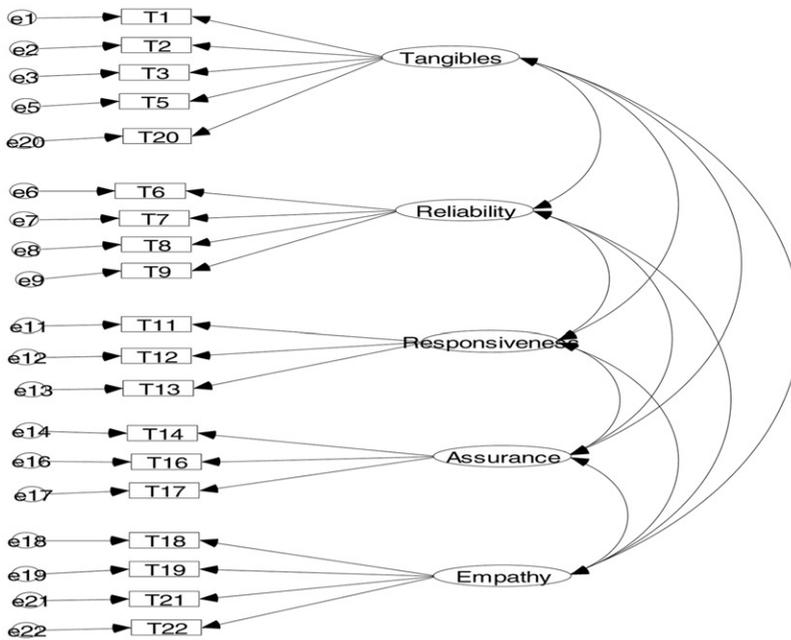


Figure 1. Examined model.

Table 6. Confirmatory Factor Analysis Results for tested models.

	5 factors solution	4 factors solution	3 factors solution	2 factors solution	1 factor solution
Chi-square	402.505	416.019	511.594	611.157	797.752
Df	136	140	143	145	147
CMIN/DF	2.960	2.972	3.578	4.215	5.427
GFI	0.914	0.911	0.888	0.861	0.821
AGFI	0.880	0.880	0.851	0.818	0.768
NFI	0.949	0.944	0.931	0.918	0.893
RFI	0.932	0.932	0.918	0.903	0.876
IFI – Delta 2	0.964	0.962	0.950	0.936	0.911
TLI	0.954	0.954	0.940	0.925	0.896
CFI	0.963	0.962	0.949	0.936	0.911
RMSEA	0.067	0.067	0.077	0.086	0.101
AIC	510.505	516.019	605.594	701.157	883.752
ECVI	1.179	1.192	1.399	1.619	2.041

#### 6.6. Assessing the fit between proposed models

Table 6 and the included indices show that all goodness-of-fit (chi-square, DF, GFI and RMSEA), incremental (CFI, NFI, TLI) and parsimonious (AGFI) measures present acceptable levels both within and between constructs. Almost all exceed the magic 0.9 with RMSEA below 0.8 which is accepted as good for this sample size and the number of variables (Hair *et al.*, 2005). The five-factors solution, however presents the best fit among all alternatives and shows a clear improvement. Hence this model should be accepted for the port passengers' data,

**Table 7. Tests for convergent and discriminant validity for the SERVQUAL model.**

	Tangibles		Reliability		Responsiveness		Assurance		Empathy	
	AVE	(Corr) <sup>2</sup>	AVE	(Corr) <sup>2</sup>	AVE	(Corr) <sup>2</sup>	AVE	(Corr) <sup>2</sup>	AVE	(Corr) <sup>2</sup>
Reliability	0,596	0,7691	0,735	0,784	0,713	0,931	0,77	0,931	0,677	0,85
		0,88		0,917		0,88		0,9		0,892

**Table 8. Reliability and variance extracted equations.**

$$\text{Variance extracted} = \frac{(\sum \text{standardized loading})^2}{(\sum \text{standardized loading})^2 + \sum \varepsilon_j}$$

$$\text{Construct reliability} = \frac{\sum (\text{standardized loading})^2}{\sum (\text{standardized loading})^2 + \sum \varepsilon_j}$$

in contrast to Durvasula *et al.* who argue for a more parsimonious unidimensional SERVQUAL measure.

#### 6.7. Assessing the reliability and validity of the models

The reliability for each factor of the model was assessed by evaluating the Cronbach's alpha coefficient as the most general form of reliability estimation (e.g. [83]). Values exceeding 0.7 were considered adequate for a scale to present internal consistency. From table 7 it is obvious that the factors of SERVQUAL scale are internally consistent.

Construct validity was assured due to the literature survey and the high reliability scores. Convergent validity was examined following Fornell and Larcker's [84] suggestions by calculating the average variance (AVE) extracted by each factor. Table 7 summarizes the results, indicating that every factor's variance exceeds the cut-off point of 0.5 presenting convergent validity.

Finally, discriminant validity is assessed by comparing the AVE to the highest squared correlation between factors of interest and remaining factors. Results show that SERVQUAL measures do not present discriminate validity, meaning that factors are indistinct to each other with the exception perhaps of the 'reliability' dimension. This result is in line with Gounaris' [85] findings regarding the discriminant validity of SERVQUAL and Durvasula *et al.* [37] who argue for a more parsimonious two-factor model.

#### 6.8. Predictive ability of the models

The ability of the SERVQUAL model to assess the overall satisfaction perceived by the passengers was next assessed. Two models were tested. The first consisted of the five dimensions identified from the CFA confirming SERVQUAL dimensionality. The other incorporated the discriminant validity considerations where two distinct factors were assumed. These two factors were hypothesized that sum up 'tangible' and 'reliability' factors to one and the rest three to another in line with our hypothesis 3 provisions. The question emerged from the analysis, is which of the two

**Table 9. Results from the multinomial logistic regression.**

	Cox and Snell	R <sup>2</sup> Nagelkerke	Change in 2LL	Sig.	Overall prediction
2 factors	0.407	0.543	374.674250	0.000	80.9%
5 factors	0.393	0.525	332.099	0.000	80.4%

**Table 10. Results from the multinomial logistic regression.**

How satisfied are you from the port area in general?	B	Wald	Sig.	Exp(B)
1st model: 2 factors				
Absolutely Intercept	-6.643	100.797	0.000	
Tangibles + reliability	0.164	39.098	0.000	1.179
Assurance + responsiveness + empathy	0.046	5.807	0.006	1.047
2nd model: 5 factors				
Absolutely Intercept	-6.828	100.468	0.000	
Tangibles	0.256	37.202	0.000	1.292
Reliability	0.23	0.178	0.647	1.023
Responsiveness	0.154	4.822	0.028	1.166
Assurance	0.035	0.237	0.626	1.035
Empathy	0.015	0.080	0.777	1.015

\*Reference category = Not at all.

models (with either two or five dimensions) better predicts travellers' satisfaction; this is the importance of every dimension to the predictive ability of its model.

Taking into account the categorical nature of the responses, a multinomial logistic regression method was selected instead of the correlation analysis followed in Durvasula's work. This way not only prediction but also the importance of every dimension could be assessed. In arithmetic terms, the relationship between traveller satisfaction and the two or the five factor model of S. Q. takes the form of:

$$Y = a + b_1X_1 + b_2X_2 \text{ - for the first model}$$

or

$$Y = a + b_1X_1 + b_2X_2 \dots + b_nX_n \dots \text{ in}$$

$$Y = a + b_1X_2 + b_2X_2 + \dots + b_5X_5 \text{ - for the second model}$$

where Y = traveller satisfaction, (dependent variable), a = exposure variable or constant, b<sub>1</sub>, b<sub>2</sub>, b<sub>n</sub> = coefficients, and X<sub>1</sub>, X<sub>2</sub>, X<sub>n</sub> represent the two factorial construct or the five factorial construct (independent variables).

The significance of the two models was assessed by using the chi-square test for the change in the -2LL value from the base model, which is comparable to the F test in multiple regression. In assessing model fit (goodness of fit), two of the available tests were used: Cox and Snell's and Nagelkerke's pseudo R<sup>2</sup>, which compare predicted to observed probabilities, with higher values indicating better fit. Models fitting information results are presented in tables 9 and 10.

Table 9 shows that both models seem to have the same predictive validity on overall satisfaction. However, taking into account the results from table 10, three

factors (reliability, assurance and empathy) of the SERVQUAL model do not seem to be statistically significant. Results indicate that the two factors of the aggregated SERVQUAL model of service quality not only present a slightly better ability to explain customer satisfaction from the port area but it is also statistically significant. However, the five-dimensional structural model did not support its superiority against a more parsimonious two-factor model, as three of its five dimensions were identified as not significant.

## 7. Conclusions

The phrase 'quality of service' has recently been added to the port industry lexicon. The EU highly values the need for increased competitiveness and better services among European ports. In addition to general policy initiatives regarding privatization and liberalization of the sector, it urges ports (e.g. Directive 2001/96) to adopt and apply service quality standards as ISO 9000; 9001. Service quality indicators are suggested and introduced to port industry to ensure better operation and to communicate the relevant cues to clients. A port's prosperity depends on the efficient flow of ships and goods and passengers through its docks and, obviously, the quality-of-service issue is closely associated with efficiency of operation.

A central premise of this study is that successful relationship marketing and quality of service facilitate competition among ports. Through service quality measures, certain discrepancies of the fragmented nature of the port industry are removed and customer perspectives for measuring service quality are introduced. One of the best-known and used service quality models, the SERVQUAL model, had been tested in many service industries and results support its universal applicability despite some criticisms. SERVQUAL has also been tested in the commercial shipping environment by Durvasula *et al.* [37] and Unboma and Ugboma [38, 39], although there are concerns about its ready extension to the sector. However, both studies support SERVQUAL's contribution to a clear identification of service quality attributes. No other study seems to have tested this instrument in the passenger port arena. Our study therefore tests the applicability and the robustness of the five-dimensional SERVQUAL model in the passenger port industry as a measure of service quality.

A sample of 434 passengers travelling from Piraeus evaluated the service by rating it on the 22-items SERVQUAL instrument. The SERVQUAL scale was hypothesized as a five-dimensional model representing tangibles, reliability, responsiveness, assurance and empathy, according to our first two hypotheses.

Results of the confirmatory factor analysis indicate that the fit of the five-dimensional model to data is better than with the other more parsimonious 1-, 2-, 3- or 4-dimensional alternatives. The finding thus supports our first hypothesis regarding the proper fit of SERVQUAL to data. However, when performing discriminant validity tests to the dimensions extracted no support has been found for the five-dimensional structure. One dimension—reliability—has been identified while the others seems to be confusing or overlapping in and thus our second hypothesis considering the number of factors did not find support. Finally, the predictive ability of the SERVQUAL instrument on passenger satisfaction was tested. Two- and five-factor alternatives were assessed following concerns with discriminant validity. For each of the two models, the  $R^2$  have been calculated as was their predictive abilities. The more parsimonious two-dimensional structure presents both better

explanatory capacity (0, 543) and better predictive ability (80.9%) than the original five-dimensional model. Further testing identified that three out of the five dimensions—reliability, assurance and empathy—are statistically insignificant when entered as variables to a multinomial logistic regression against satisfaction. Both models, though, support that tangibles have a higher importance than non-tangibles in terms of overall satisfaction. These findings contradict Durvasula *et al.*'s and Unboma and Ugboma's studies that identified the non-tangible elements of SERVQUAL (empathy, responsiveness and assurance) as of major importance. These findings may be justified in a service factory (such as airlines, hotels and coastal shipping), where the customer is more likely to be interested in the physical environment than to be involved with the personnel.

The results of this study have several managerial implications. Evidence indicates that in passenger industries, including the shipping passenger sector, managers should pay more attention to technological advances, and capital investments and facilities, and not look solely at contact customer employees. The findings support that physical surroundings are more important than interactive elements of service in enhancing customer satisfaction. Effort and resources should be allocated to improve connections to other transportation means, more spacious facilities, parking lots and guidance and information within the port area. The analogy to airport terminals may be of great assistance to all port managers, especially for those serving passengers or coastal shipping sectors.

The findings of this study elevate the considerations regarding the unquestionable application of SERVQUAL in passenger shipping. Because of its discriminant validity problems it seems more appropriate for a two-factor model like the Nordic quality model to be tested. In addition, it may provide the opportunity for the development of a condensed and valid instrument of overall satisfaction that includes only a 'physical' and an 'interactive' component.

## References

1. LEE, B. H., 2002, *FDI from development countries: A vector for trade and development* (Paris: Organisation for Economic Co-operation and Development).
2. MARITIME TRANSPORT POLICY, 2007, European Commission, [http://ec.europa.eu/transport/maritime/index\\_en.htm](http://ec.europa.eu/transport/maritime/index_en.htm)
3. LARROQUE, A., 1995, Los puertos: de puntos de paso a nudos logísticos. *Boletín económico de ICE*, **2460**, 35–41.
4. EUROSTAT, 2007, Statistics in focus. *Transport*, 94/2007, <http://www.eurostat.eu>
5. CEU, (1997), *Green Paper on Seaports and Maritime Infrastructure*, Com(97)678 final (Brussels: Commission of the EU).
6. CEU, 2001, *Reinforcing Quality Services in Sea Ports: A Key for European Transport*, Com(2001) 35.final 13.2.2001 (Brussels: Commission of the EU).
7. PANTOUVAKIS, A. M., 2006, Port's service quality dimensions and passenger profiles: an exploratory examination and analysis. *Maritime Economics and Logistics*, **18**, 402–418.
8. PANTOUVAKIS, A. M., PANYGIRAKIS, G. and THALLASINOS, EL., 2007, An examination of 'SERVQUAL' and 'Nordic' service quality models. Evidence from the coastal shipping sector, IAME Conference, Challenges and Trends in Shipping, 4–6 July, Athens.
9. PANTOUVAKIS, A. M., 2007, Who pays the ferryman? An analysis of the ferry passenger's selection dilemma. *Maritime Policy & Management*, **34**, 591–612.
10. BENNETT, R. and GABRIEL, H., 2001, Reputation, trust and supplier commitment: the case of the shipping company/seaport relations. *Journal of Business and Industrial Marketing*, **16**, 424–438.

11. KENT, J. L. and PARKER, S. R., 1999, International containership carrier selection criteria. Shippers/carriers differences. *International Journal of Physical Distribution and Logistics Management*, **29**, 398–408.
12. ABSHIRE, R. D. and PREMEAUX, S. R., 1991, Motor carrier selection criteria: Perceptual differences between shippers and carriers. *Transportation Journal*, **31**, 31–35.
13. EVERS, P. T., HARPER, D. V. and NEEDHAM, P. M., 1996, The determinants of shipper perceptions of modes. *Transportation Research Forum*, **31**, 13–25.
14. KENT, P. E. and ASHAR, A., 2001, Port competition regulation: a tool for monitoring for anti-competitive behaviour. *International Journal of Maritime Economics*, **3**, 27–51.
15. FARRELL, S., 2001, If it ain't bust don't fix it: the proposed EU directive on market access to seaport services. *Maritime Policy & Management*, **28**, 307–313.
16. LOPEZ, R. C. and POOLE, N., 1998, Quality assurance in the maritime port logistic chain. *Supply Chain Management*, **3**, 33–44.
17. HARALAMBIDES, H. E., VERBEKE, A., MUSSO, E. and BENACCHIO, M., 2001, Seaport financing and pricing in the European Union. Theory, politics and reality. *International Journal of Maritime Economics*, **3**, 368–386.
18. MURPHY, P. R., DALEY, J. M. and HALL, P. K., 1997, Carrier selection: do shippers and carriers agree, or not? *Transportation Research Part E: Logistics and Transportation Review*, **33**, 67–72.
19. HARALAMBIDES, H. and VEENSTRA, A. W., 2002, Port pricing. In: *The Handbook of Maritime Economics and Business*, edited by C. Grammenos (London: Lloyds of London Press).
20. PANAYIDES, M. P. and SO, M., 2005, The impact of intergrated logistics relationships on third-party logistics Service Quality and Performance. *Maritime Economics and Logistics*, **7**, 36–55.
21. VINH, T. and GREWAL, D., 2006, The Maritime Safety Management System (MSMS): a survey of the international shipping community. *Maritime Economics and Logistics*, **8**, 287–310.
22. FRANKEL, E. G., 1993, Total quality management in liner shipping. *Marine Policy*, 41–50.
23. PARASURAMAN, A., ZEITHAML, V. A. and BERRY, L. L., 1985, A conceptual model of service quality and its implications for future research. *Journal of Marketing*, **49**, 41–50.
24. PARASURAMAN, A., ZEITHAML, V. A. and BERRY, L. L., 1988, SERVQUAL: a multiple item scale for measuring customer perceptions of service quality. *Journal of Retailing*, **64**, 12–40.
25. BOLTON, R. N. and DREW, J. K., 1991, A multistage model of customer's assessments of service quality and value. *Journal of Consumer Research*, **17**, 875–884.
26. BROWN, S. W. and SWARTZ, T. A., 1989, A gap analysis of professional service quality. *Journal of Marketing*, **53**, 127–147.
27. CARMAN, J. M., 1990, Consumer perceptions of service quality: an assessment of the SERVQUAL dimensions. *Journal of Retailing*, **66**, 33–55.
28. CRONIN, J. J. Jr and TAYLOR, S. A., 1992, Measuring service quality: a re-examination and extension. *Journal of Marketing*, **56**, 55–68.
29. CRONIN, J. J. and TAYLOR, S. A., 1994, SERVPERF versus SERVQUAL: reconciling performance-based and perceptions-minus-expectations measurements of service quality. *Journal of Marketing*, **58**, 125–131.
30. PARASURAMAN, A., ZEITHAML, V. A. and BERRY, L. L., 1996, The behavioural consequences of service quality. *Journal of Marketing*, **60**, 31–46.
31. DEAN, A. and WHITE, C., 1999, Analyzing service quality in the hospitality industry. *Managing Service Quality*, **9**, 136–143.
32. KANG, Gi. and JAMES, J., 2004, Service quality dimensions: an examination of Gronroos's service quality model. *Managing Service Quality*, **14**, 266–277.
33. OLORUNNIWO, F., HSU, M. K. and UDO, G. J., 2006, Service quality, customer satisfaction, and behavioural intentions in the service factory. *Journal of Services Marketing*, **20**, 59–72.
34. GRONROOS, C., 1990, *Service Management and Marketing* (Lexington, MA: Lexington Books).
35. MANGOLD, G. W. and BABAKUS, E., 1991, Service quality: the front-stage perspective vs the back-stage perspective. *Journal of Services Marketing*, **5**, 59–70.

36. RICHARD, M. D. and ALLAWAY, A. W., 1993, Service quality attributes and choice behaviour. *Journal of Services Marketing*, **7**, 59–68.
37. DURVASULA, S., LYSONSKI, S. and MEHTA, S., 1999, Testing the SERVQUAL scale in the business-to-business sector: the case of ocean freight shipping service. *Journal of Services Marketing*, **13**, 132–150.
38. UNBOMA, C. C. and UGBOMA, O., 2004, Port users' perception and expectation of service quality attributes and dimensions in ports of a developing economy—a case study. *Journal of Research in National Development*, **2**, 23–34.
39. UNBOMA, C. C. and UGBOMA, O., 2007, Service quality and satisfaction measurements in Nigerian ports: an exploration. *Maritime Policy & Management*, **34**, 331–346.
40. EUROPEAN UNION, 2001, White Paper: European Transport Policy for 2010—Time to Decide (Luxembourg: Eur-OP).
41. COMPES LOPEZ, R., 1996, La Marca de Garantia de la Comunidad Portuaria de Valencia: un instrumento de calidad para los servicios portuarios, *Generalitat Valenciana*, Valencia.
42. CHOMOUDIS, C. and PALLIS, A., 2002, *European Port Policy: Towards a Long Term Strategy Cheltenham* (Cambridge, Northampton, MA: Edwards Elgar).
43. CUADRADO, M., FRASQUET, M. and CERVERA, A., 2004, Benchmarking the port services: a customer oriented proposal. *Benchmarking: An International Journal*, **11**, 320–330.
44. SONG, D. W. and YEO, K. T., 2004, A competitive analysis of Chinese container ports using the analytic hierarchy process. *Maritime Economics and Logistics*, **6**, 34–52.
45. TEAS, R. K., 1993, Expectations, performance evaluation and consumers perception of quality. *Journal of Marketing*, **57**, 18–34.
46. TIMARI, P., ITOH, H. and MASAYUKI, D., 2003, Shipper's port and carrier selection behavior in China: a discrete choice analysis. *Maritime Economics and Logistics*, **5**, 23–39.
47. NELSON, P., 1974, Advertising as information. *Journal of Political Economy*, **82**(4), 21–35.
48. SPENCER, 1974.
49. SHAPIRO, C., 1983, Premiums for high quality products as returns to reputations. *The Quarterly Journal of Economics*, **98**, 659–680.
50. VISCUSI, W. K., 1978, Labor market valuations of life limb: empirical evidence and policy implications. *Public Policy 1978*, **26**, 359–386.
51. CHLOMOUDIS, C. I., KOSTAGIOLAS, P. A. and LAMPRIDIS, C. D., 2005, Prospective employment of quality awards in the seaport industry: old solution to contemporary questions [CD-ROM]. *Proceedings of the International Association of Maritime Economists (IAME) Conference*, 23–25 June, Limassol, Cyprus.
52. PANDO, J., ARAUJO, A. and MAQUEDA, F. A., 2005, Marketing Management at the world's major ports. *Maritime Policy & Management*, **32**, 67–87.
53. IACOBUCCI, D., GRAYSON, K. A. and OSTROM, A.L., 1994, The calculus of service quality and customer satisfaction: theoretical and empirical differentiation and integration. In: *Advances in Services and Marketing and Management*, Vol. 3, edited by T. A. Swartz, D. A. Bowen, S. W. Brown (Greenwich, CT and New York: JAI Press).
54. ZEITHAML, V. A., 1988, Consumer perceptions of price, quality, and value: a means-end model and synthesis of evidence. *Journal of Marketing*, **53**, 2–22.
55. PARASURAMAN, A., ZEITHAML, V. and BERRY, L., 1991, Refinement and reassessment of the SERVQUAL scale. *Journal of Retailing*, **67**, 420–450.
56. GIFFORD, J. L. and STALEBRINK, O. J., 2002, Remaking transportation organizations for the 21st century: consortia and the value of organizational learning. *Transportation Research: Policy and Practice*, **36**, 645–657.
57. ZINS, A. H., 2001, Relative attitudes and commitment in customer loyalty models: some experiences in the commercial airline industry. *International Journal of Services Industry Management*, **12**, 269–294.
58. DRIVER, J. C., 2001, Airline marketing in regulatory context. *Marketing Intelligence and Planning*, **19**, 125–135.
59. FROST, F. A. and KUMAR, M., 2000, INTSERVQUAL—an internal adaptation of the GAP model in a large service organization. *Journal of Services Marketing*, **14**, 358–377.
60. RHOADES, D. L., BLAISE, P. and WAGUESPARK, B. P. Jr, 2004, Service and safety quality in US airlines: pre- and post-September 11th. *Managing Service Quality*, **14**, 307–316.

61. MILLER, M., 1995, Improving customer service and satisfaction at London Underground. *Managing Service Quality*, **5**, 26–29.
62. TRIPP, C. and DREA, J. T., 2002, Selecting and promoting services encounter elements in passenger rail transportation. *Journal of Services Marketing*, **16**, 432–442.
63. LOBO, A. and JAIN, V., 2002, Port user's perspective of the container transshipment business-hierarchy of service quality attributes and dimensions. *Singapore Maritime and Port Journal*, **5**, 154–161.
64. HAYES, B. E., 1997, *Measuring Customer Satisfaction: Survey Design, Use and Statistical Analysis Methods*, 2nd edn (Milwaukee, WI: ASQ Quality Press).
65. BRENSINGER, R. and LAMBERT, D., 1990, Can the SERVQUAL scale be generalized to business to business? *Knowledge Development in Marketing*, 1990 AMA's Summer Educators' Conference Proceedings.
66. CROMPTON, J. L. and MACKAY, K. J., 1989, Users' perceptions of the relative importance of service quality dimensions in selected public recreation programs. *Leisure Sciences*, **11**, 367–375.
67. WOODSIDE, A. G., FREY, L. L. and DALY, R. T., 1989, Linking service quality, customer satisfaction and Behavioural intention. *Journal of Health Care Marketing*, **9**, 5–17.
68. OLORUNNIWO, F. and HSU, M. K., 2006, A typology analysis of service quality, customer satisfaction and behavioural intentions in mass services. *Managing Service Quality*, **16**, 106–123.
69. BOWERS, M.R., SWAN, J.E. and KOEHLER, W.F., 1994, 'What Attributes Determine Quality and Satisfaction with Health Care Delivery?,' *Health Care Management Review*, **19**(4), 49–55.
70. LYTLE, R. S. and MOWKA, M. P., 1992, Evaluating health care quality: the moderating role of outcomes. *Journal of Health Care Marketing*, **12**, 4–16.
71. MCALEXANDER, J. H., KALDENBERG, D. O. and KOENIG, H. F., 1994, Service quality measurement. *Journal of health Care Marketing*, **3**, 34–40.
72. PEREZ, M. S., ABAD, J. C. G., CARILLO, G. M. M. and FERNANDEZ, R. S., 2007, 'Effects of service quality dimensions on behavioural purchase intentions. A study in public sector transport', *Managing Service Quality*, **17**(2), 134–151.
73. BRYSLAND, A. and CURRY, A., 2001, 'Service improvements in public services using SERVQUAL', *Managing Service Quality*, **11**(6), 389–401.
74. BARDI, M. A., Abdulla, M. and Al-Madami, A., 2005, Information technology center service quality assessment and application of SERVQUAL. *International Journal of Quality and Reliability Management*, **22**(8), 819–849.
75. FUSILIER, M. R. and SIMSON, P. M., 1995, AIDS patients' perceptions of nursing care quality. *Journal of Health Care Marketing*, **15**, 49–53.
76. WALBRIDGE, S. W. and DELENE, L. M., 1993, Measuring physician attitudes of service quality. *Journal of Health Care Marketing*, **13**, 7–15.
77. DURVASULA, S. LYSONSKI, S. and MEHTA, S. C., 2000, Service recovery and customer satisfaction issues with ocean shipping lines. *European Journal of Marketing*, **34**(3–4), 433–452.
78. TONGZON and GANESALINGA, M., 1994, 'An evaluation of ASEAN port performance and efficiency. *Asian Economic Journal*, **8**(3), 317–330.
79. UNCTAD, 1992, Port marketing the third generation port. TD/B/AC7/14 (Geneva: UNCTAD).
80. HUTCHESON, G. and SOFRONIOU, N., 1999, *The Multivariate Social Scientist* (London: Sage).
81. FIELDS, A., 2005, *Discovering Statistics Using SPSS*, 2nd edn (London: Sage Publications).
82. BABAKUS, E. and BOLLER, G. W., 1992, An empirical assessment of the SERVQUAL scale. *Journal of Business Research*, **24**, 253–268.
83. NUNNAULLY, J. C., 1978, *Psychometric Theory* (New York: McGraw-Hill).
84. FORNEL, C. and LARCKER, D., 1981, Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, **18**, 39–50.
85. GOUNARIS, S., 2005, Measuring service quality in b2b services: an evaluation of the SERVQUAL scale vis-à-vis the INDSERV scale. *Journal of Services Marketing*, **19**, 421–435.