EXPLORING SERVICE QUALITY DIMENSIONS IN B2B e-MARKETPLACES

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ABSTRACT

The purpose of this study is to explore quality dimensions in the service that B2B e-marketplaces provide to their users in the construction sector. The study identified four key B2B service quality dimension as perceived by online selling side users of e-marketplace: reliability and privacy, utility of the information, value-added services, and efficiency. The basis of the study is an analysis of empirical data provided by 197 Spanish e-marketplace users. All the variables extracted had a significant positive impact on the outcome variable –client loyalty– with reliability and privacy being those of the greatest influence. To improve the services provided to users and ensure their future loyalty, it would be interesting for managers to be aware of these dimensions and to invest in improving these aspects for the future.

Keywords: Electronic service quality; e-Marketplaces; B2B e-Commerce; Quality dimensions; Construction sector

1. Introduction

In recent years there has been a dramatic growth in firms' use of the Internet for their business transactions, with the emergence of what has come to be known as electronic commerce or e-commerce. Although it was initially thought that Web presence and low prices would ensure success, issues related to the quality of service quickly came to be recognized as the key element. For these new channels to be viable, clients have to perceive them as effective and efficient [Parasuraman et al., 2005].

Many academic studies have highlighted the poor quality of service deliveries that have frequently been made over the Internet [Ahmad, 2002; Barnes and Vidgen, 2003b; Cox and Dale, 2002; Dobie et al., 2001; Lenon and Harris, 2002]. Hence, the focus in the literature soon switched from considering website design as the key factor in the services provided to users via the Internet [Kim and Eom, 2002] to the realization that electronic service quality needs to be concerned with all the aspects issues that arise before, during, and after the delivery of the service [Bauer et al., 2006; Ladhari, 2010; Li and Suomi, 2007; Parasuraman et al., 2005; Rust, 2001; Selz and Schubert, 1998, Zeithaml et al., 2002].

Firms with an online presence should therefore re-orient their e-business practice from a transaction-based focus on e-commerce to one on e-services. To this end, their managers need to understand how consumers perceive and evaluate the online services the firm offers its client [Zeithaml, 2002].

There has now been steady progress in research on service quality for over two decades, but only recently[1] have these studies begun to consider the e-commerce environment. We concur with Akinci et al. [2010] and Ding et al. [2011] that research on the quality of e-services is still in its infancy, both theoretically and empirically. Those authors note that, while work in the business-to-consumer (B2C) field is still very limited, studies in the field of e-commerce between firms, business-to-business (B2B), have been even fewer and farther between. It is precisely this area which is the focus of the present work – in particular, a business model known as the B2B e-marketplace or e-

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[1] The first study on service quality and the Internet was published by Caruana and Pitt in 1997 with the title: "*Right first time in service: A checklist of best-practice and the link to performance*".

marketplaces.

When e-marketplaces first emerged, it was expected that they would improve the effectiveness and efficiency of inter-firm business, radically changing traditional procurement strategies, and restructuring the firms themselves, their supply chains, and the industries they belong to. After this phase of euphoria, however, which lasted into the second half of the year 2000, many international e-marketplaces have failed, and their effectiveness in general has been called into question [Balocco et al., 2010]. After this period of relative disappointment, Standing, et al. [2010], reviewed the literature on e-marketplaces, and found that there was an absence of research on aspects related to their efficiency. It is this context, therefore, which formed the framework for the present study aimed at contributing to filling this gap in research.

In the context of B2C e-commerce, there has been extensive development of multi-item scales to measure the quality of e-services (see appendix A), but there is evidence that different priorities and experiences of corporate buyer (B2B) and individual buyers (B2C) could lead service providers to perceive e-service quality differently in the two context [Turban et at., 2008]. However, in the B2B context, of the relatively far fewer studies on the topic, we would highlight some original proposals to measure the quality of e-services [Chakraborty et al., 2005; Evans and King, 1999; Vaidyanathan and Deveraj, 2008] and some adaptations of the traditional SERVQUAL scale, implementing slight modifications to fit it to the new context [Lai, 2006; Stiakakis and Georgiadis, 2009]

A review of the literature on quality management in B2B e-commerce found no study addressing the context of e-marketplaces, so that our principal objective in the present study was to explore and identify key underlying dimensions of service quality provided by an e-marketplace to its users, and discover if there are differs significantly between to B2B y B2C context.

We believe that any proposal of such a measuring instrument should add value to both researchers and e-marketplace managers in the sense of allowing them to know which dimensions the users consider important in their perception of the quality of the service offered.

Following the structure proposed by Churchill [1979], the rest of this paper is organized as follows. In Sec. 2, we review the literature and conceptual definitions, we will specify the domain of the construct and we will generate the sample of items, stopping to analyze what e-marketplaces are and how they work, and then examining quality management in e-services and putting forward our proposal of the main dimensions of perceived quality. In Sec. 3, we describe the methodology, we study the context and the sample selection, the Sec. 4, is dedicated to the data analysis, to assess the reliability and to validate the construct. Sec. 5 gives the conclusions drawn from those findings, finally, the Sec. 6 gives the limitations of the study and some lines for future research.

2. Literature review and conceptual definitions

2.1. B2B e-marketplaces

There is no clear consensus among authors on the definition of the e-marketplace [Grieger, 2003]. Some refer to a place, a meeting point, or a location at which the transaction takes place [Ariba, 2000; Gulledge, 2002; Jensen and Skovgaard, 2001; Kaplan and Sawhney, 2000; Petersen et al., 2007; Segev et al. 1999; Stockdale and Standing, 2002], others view it as a system of information about products or services [Bakos, 1991; Choudhury et al., 1998; Mueller, 2000], as an intermediary or business community [Bakos, 1998; Dai and Kauffman, 2002; Guo et al, 2012; Hoque, 2000; Jensen and Skovgaard, 2001; Lee et al, 2013; Yu et al. 2002], or as a medium that assigns different roles to the members of the community and establishes conditions for participation [Grieger, 2003].

We define the e-marketplace as a way of doing business that uses Internet technology to bring together multiple buying and selling firms around a website or platform, enabling them to transact business through various mechanisms, and directed either by a neutral third party outside the exchanges that take place, or by one or more of the parties involved [buyers or sellers]. It also offers various value-added services that improve relationships between buyers and sellers [Janita and Miranda, 2013].

Research on e-marketplaces has shown that, in their early years, one of the principal motivations for participation was that they generated significant procurement cost savings. This naturally led to an increase in the return on investment (ROI) as a result of reducing paper transactions, allowing buyers to aggregate their demand and achieve significant economies of scale [Bakos, 1998; Barrat and Rosdahl, 2002; Christiaanse, 2005; Eng, 2004; Favier et al., 2000; Granot and Sosic, 2005; Kaplan and Sawhney, 2000; Min and Galle, 2003]. More recently, over the last decade participants have shifted from short-term, price-based contracts towards achieving long-term transactions, establishing collaborative relationships between buyers and sellers [Le, 2005]. The aim is now not only cost savings, but also to improve the quality and integration of the various processes involved so as to achieve efficiencies in the supply chain [White et al. 2007].

The various e-marketplaces can be classified according to their transactional content as vertical or horizontal [Balocco et al., 2010; Barrat and Rosdahl, 2002; Chien et al., 2012; Howard et al., 2006; Le, 2005; McIvor and

Humphreys, 2004; Ratnasingam et al., 2005; Tapia, 2001]. Vertical e-marketplaces offer goods and services directly related to the production process of a specific industrial sector, for example *Agroterra* (for the agriculture industry) or *Plazasalud24* (for the healthcare and pharmaceutical industry). Horizontal e-marketplaces offer indirect goods and services common to all industrial sectors, and necessary although not strategic to firms' activities in different sectors of industrial activity [Lee, 2005; Popovic, 2002; Wang et al., 2012], for example *Eventoplus.com* (it offers services and products related to events) or *Adquira* (it offers indirect goods and services such as: office supplies, cleaning and safety services, etc.).

A second classification of e-marketplaces is in terms of ownership [Le, 2005; Kaplan and Sawhney, 2000; Ordanini and Pol, 2001;]. Partial or consortia e-marketplaces are those created and run by one of the participants (buyer or seller), for example *Obralia* (building and construction industry, created by buyers). Impartial e-markets are those created and run by a neutral third party uninvolved in the exchanges that take place, for example *Mundoacero* (steel industry).

One can distinguish two types of market mechanism – static or systematic, and dynamic or unsystematic [Kaplan and Sawhney, 2000]. Static mechanisms are characterized by prices having been negotiated prior to the exchange and dynamic by prices being negotiated at the time of the exchange. The main static mechanisms are the catalogue aggregation model and the buyer aggregation model. Examples of catalogue aggregation model include *PlasticNet.com* (plastic industry) and *EcoSpainB2B* (food and beverage industry). The main dynamic mechanisms are the call for quotations model, the auction model, and real-time exchanges. An example of marketplaces than use the call for quotations is *Mercatrans* (for the transportation industry), the auction model is used by *Aquanima* (for the multiples sectors] and real-time exchanges are used by *Agromaquinaria* (for the agriculture sector).

2.2. E-services Quality

There is still no unanimous agreement in the literature on the concept of e-service, and in particular there is no *definition of the term that is generally accepted by researchers.*

Some researchers stress what differentiates electronic from traditional services – above all, the lack of human interaction [Cox and Dale, 2001; Fassnacht and Koese, 2006]. For others, a definition of e-service should take into account both its functional dimension –what is actually delivered as a result of the service– and its technical dimension – how the service is delivered [Grönroos et al., 2000]. A complete definition of e-service should go beyond mere commercial transactions (e-commerce) to take into account all the key processes and interactions that are involved before, during, and after delivery of the services [Bauer et al., 2006; Parasuraman et al., 2005; Rust, 2001; Rust and Lemon, 2001].

One finds the first definition of e-service quality in Zeithaml et al. [2000, p.11]: "*e-SQ can be defined as the extent to which a website facilitates efficient and effective shopping, purchasing, and delivery of products and services.*" As one observes in recent research in the B2C context, academic interest has been directed to measuring the quality of e-services [see Appendix A]. Indeed, the quality of e-services has become a key factor in differentiating the services offered and in building a competitive advantage [Santos, 2003].

From a review of the literature on e-service quality, we can say that at least there is unanimity among researchers about its multidimensionality [Kim and Stoel, 2004a; 2004b; Fassnacht and Koese, 2006]. The lack of consensus concerning the nature of e-service quality dimensions results in different approaches and outcomes as well as the existence of research gaps [Fassnacht and Koese, 2006]. Therefore, the literature on e-service quality calls for its more complete and comprehensive understanding and conceptualization.

We believe that the conceptualization of e-service quality should be based on the way customers judge it, considering the process (web site design, functionality and ease of use) and the service outcome. The process quality positively affects their perceptions of the outcome quality of the transaction and the quality of the transaction's outcome subsequently affects satisfaction evaluations.

The critical question that arises, therefore, is which dimensions are the most important for the evaluation of service quality in e-commerce. To clarify this issue, we retrieved and consulted from the major existing databases (EBSCOhost, Emerald, ProQuest, and ScienceDirect) 104 articles published since 1997, the year in which the first articles appeared, corresponding to the principal researchers in this area. Most (89%) of these articles had been published in the last nine years, most (85%) dealt with the B2C context, and just a few (8%) dealt with the area (B2B) that we are concerned with in the present study. The remainder dealt with the field of the connection between government agencies and consumers. Regarding the sectors addressed by the empirical works, most (59%) were applied to the online retail sector, mainly to the sale of discs, books, music, etc.

Of the articles reviewed, 90 included scales to measure the quality of e-services (see Appendix A). Despite the lack of unanimity in the presentation of the different models, we found many similarities between the elements they considered relevant for these measurements. Thus, Zeithaml et al. [2000, p.15] state: "*Consumers use basically similar dimensions in evaluating e-SQ (e-service quality) regardless of the type of product or service being*

evaluated on the Internet." Most (70%) of the studies present original models: e-Selfqual proposed by Ding et al. [2011]; Netqual by Bressolles and Nantel [2008]; PesQ by Cristóbal et al. [2007]; WebQual or eQual by Barnes and Vidgen [2001, 2006]; eTransqual by Bauer et al. [2006]; WebQual by Loiacono et al. [2002], etc. In 20% of the reviewed articles, the scales are based on the traditional American school –SERVQUAL, e-SERVQUAL, and E-S-Qual– in several cases with certain modifications. The remaining 10% use scales based on the work of other researchers.

One area that is relatively under-researched in the service quality literature is B2B service quality and its relationships to perceived value and loyalty intentions. In the field of e-commerce, Anderson and Srinivasan [2003, p.125] define e-loyalty in a form similar to the definitions corresponding to the non-electronic environment as: "a favorable attitude of the customer towards the e-business resulting from repeated purchasing behavior." A range of studies have shown a positive direct or indirect association through satisfaction or trust between service quality dimensions and customer loyalty, with website design and associated usability factors being the most frequent features reported (see [Valvi and West, 2013]). In the B2B context, a recent paper [Chen et al. 2013] posits that process quality will significantly influence perceptions on satisfaction and customer loyalty. However there is a need to identify what attributes B2B users consider when judging the quality of service. Our research is positioned to cover this gap in research.

It was clear from our literature review that most researchers consider the dimensions of efficiency, security and privacy, communication, reliability, and information as components of e-service quality (see Figure 1). To these dimensions, we shall add a new dimension which we term value-added services, considered in e-marketplace research as being differentiating elements that help the firm achieve a competitive advantage [Ordanini and Pol, 2001]. Mainly, they are services that complement the usual transactions of e-marketplaces. Among them, we would highlight financial, logistics, and integrative services.

In the following, we shall review the proposed principal dimensions of quality.

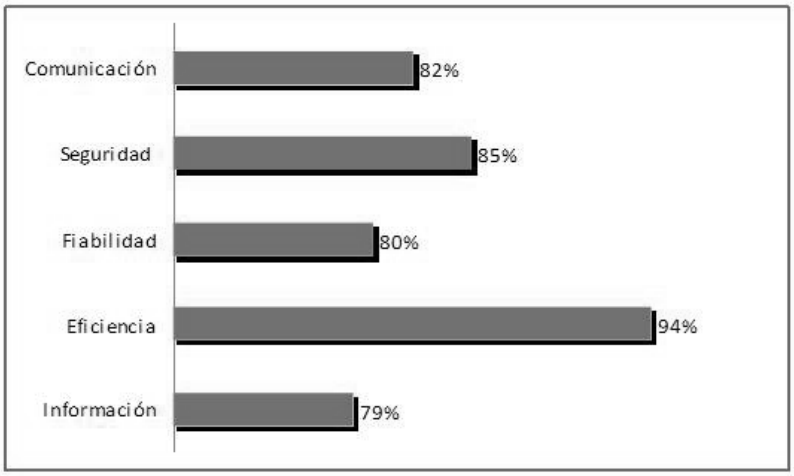

Figure 1: Proposals of dimensions of quality.

2.2.1. Information dimension

Although the classic IS success model [DeLone and Mc Lean, 2003] suggests that the information quality is a dimension independent of the service quality, almost a 79% of the revised researches in e-commerce include the information inside the service quality.

Many researchers recognize the importance of the characteristics that the information provided has to have for the perception of service quality. In particular, the information needs to be trustworthy, in the sense how much can one trust in the information provided by the site, timely, relevant, easy to understand, with a high level of detail and depth, sufficient, and presented in a suitable format [e.g., Barnes and Vidgen, 2002; Bressoles and Nantel 2008; Chakraborty et al., 2005; Fassnacht and Koese, 2006;]. For the client, it is important to be able to get adequate information about the product or service. The website should therefore provide the details that the client needs [Ranganathan and Ganapathy, 2002], including technical information in the B2B field [Chakraborty et al., 2005]. Research has also shown the need to make information available about the firm, its history, its mission, its financial statements, etc. [Kim et al., 2006], as well as about the industrial sector it belongs to [Chakraborty et al., 2005].

Based on the work of Aladwani and Palvia [2002], Barnes and Vidgen [2002], Cox and Dale [2002], Janda et al.

[2002], Loiacono et al. [2002], Yu et al. [2002], Kim and Stoel [2004a], Barrutia et al. [2006], Fassnacht and Koese [2006], and Boshoff [2007], we here propose the following seven-item scale:

Q1: The e-marketplace's website provides information that is relevant and with a high level of detail and depth.

Q2: The website's content is clear, concise, easy to understand, well organized, and includes tutorials for its use.

Q3: The website's content is up-to-date.

Q4: The website's content is trustworthy.

Q5: The website provides extensive information about my products and services, allowing them to be viewed and how to obtain more details about them.

Q6: The website provides information about the e-marketplace, its activities, and the participating firms, both buyers and sellers.

Q7: The website provides general information about my activity sector: legal regulations, a magazine, forums, newsletters or messages, links to pages of interest, etc.

2.2.2. Efficiency dimension

The efficiency dimension was explicitly included by 94% of the studies reviewed (see Figure 1). It refers to three important aspects corresponding to accessibility and system availability, usability and design.

The first aspect is indicative of how straightforward it is for the user to access the resources the website offers and concerning the availability of the system, refers to the proper technical operation of the website. Firms may not have total control of this dimension since the client's own computer system or connection to Internet may well affect this dimension [Parasuraman et al., 2005].

The second refers to usability, defined by Collier and Bienstock [2006, p. 264] as "*the ability of a customer to find information or enact a transaction with the least amount of effort.*" This aspect is an essential element of online business, since many clients may find the online environment intimidating and complex [Parasuraman et al., 2005; Santouridis et al., 2012]. The third aspect is related to the website's design, i.e., it should be structured and well organized, offering sufficient information for the client to be able to compare products and make a good choice [Cristobal et al., 2007].

In what follows, we shall present the items we propose in this study to measure the efficiency dimension[2]:

Q8: The site loads quickly, and is always available and ready to perform a transaction.

Q9: I find it easy to learn to navigate around the site and find what I need or am looking for.

Q10: The website design looks attractive, the diagrams, images, use of colour, and fonts are suitable, and symbols or icons are readily identified.

Q11: The layout of the site is well organized, and has a clear structure which allows you to find the right things at first sight.

These four items were adapted from the work of Zeithaml [2000], Aladwani and Palvia [2002], Barnes and Vidgen [2002, 2004a], Cai and Jun [2003], Kim and Stoel [2004a], Ribbink et al. [2004], Parasuraman et al. [2005], Barrutia et al. [2006], Fassnacht and Koese [2006], and Boshoff [2007].

2.2.3. Reliability dimension

As in the other dimensions, different researchers use different terms, but what here we shall call the reliability dimension refers to the successful delivery of products and services when the website is used [Ho and Lee, 2007], i.e., that the promised service is dependable. This means having items in stock, and delivering them in the promised time [Parasuman et al., 2005; Zeithalm, 2002]. The orders must be processed to the specifications of the customers and should be free from defects or damage [Collier and Bienstock, 2006]. In addition, the product the client receives must match the description on the website [Wolfinbarger and Gilly, 2003]. It is important to tell the truth in what is offered, and only to make promises that can be kept [Parasuraman et al., 2005].

We have found in general that, in recent research on quality management in e-commerce, clients consider reliability to be one of the most critical dimensions determining their perception of the quality of a website's services [Barnes and Vidgen, 2002; Santos, 2003; Wolfinbarger and Gilly, 2003].

Based on the work of Zeithaml [2000], Barnes and Vidgen [2002], Janda et al. [2002], Cai and Jun [2003],

[2] Our "efficiency" dimension only deals with the efficiency in the website, not the efficiency of the e-marketplace operation, as recommended in previous studies [see Parasuraman et al., 2005; Collier and Bienstock, 2006; Cristobal et al., 2007; Santouridis et al., 2012]. It refers to three important aspects corresponding to accessibility and system availability, usability and design. The efficiency of the e-marketplace operations is measured in the last 3 dimensions: reliability, communication and privacy and security.

Ribbink et al. [2004], Lee and Lin [2005], Parasuraman et al. [2005]; Barrutia et al. [2006], and Boshoff [2007], our proposed scale to measure the reliability dimension consists of four items:

Q12: The products and services are delivered within the time promised.

Q13: The quality and quantity of the products I receive match the description that was made on the website.

Q14: In general, the e-marketplace inspires confidence.

Q15: The products are delivered in good condition, free of defects.

2.2.4. Privacy and security dimension

Numerous researchers (85% of the papers reviewed; see Figure 1) include the privacy dimension. This aspect is considered of particular importance due to the absence of physical contact between the firm and its clients in the purchasing process.

In our literature review, we found that this dimension was referred to using the terms confidence, privacy, and/or security. Some authors use the terms security and privacy as synonyms [Collier and Bienstock, 2006; Iwardeen et al., 2003, 2004; Kim e al., 2006; Wolfinbarger and Gilly, 2003; Zeithalm et al., 2000], others exclusively use the term privacy [Parasuman et al., 2005] or security [Gounaris and Dimitriadis, 2003; Melián, 2005; Santos, 2003], and others add confidence as a third measure of a website's security [Barnes and Vidgen, 2006; Cao et al., 2005; Ho and Lee, 2007; Kim and Stoel, 2004a; Loiacono et al., 2000].

Parasuraman et al. [2005, p. 220] define the dimensions of E-S-QUAL privacy as: "*The degree to which the site is safe and protects customer information.*" This dimension therefore refers to the protection of personal information associated with the risk perceived when making a purchase online [Kim et al., 2006]. Researchers such as Janda et al. [2002], Ranganathan and Ganapathy [2002], Jun et al. [2004], and Parasuraman et al. [2005] distinguish between two types of security in online sales: financial and non-financial. While financial security is related to the communication of information online (i.e., number of a bank credit card), non-financial security refers to the non-disclosure of personal information (e.g., telephone number).

There is no unanimous agreement among researchers about the role played by privacy in the evaluation of a website. Some studies have found that privacy and security have no significant influence on users' perceptions of the quality of a website [Fassnacht and Koese, 2006; Wolfinbarger and Gilly, 2003], or on their satisfaction with the website [Kim and Stoel, 2004a]. Others find that these aspects constitute a necessary but not sufficient condition for the success of a site [Liu and Arnett, 2000]. Many researchers, however, find that security and privacy have indeed been important for online sales in recent years [Akinci et al., 2010; Barnes and Vidgen, 2002; Bauer, 2005; Cho and Menor, 2010; Collier and Bienstock, 2006; Ho and Lee, 2007; Hsu et al., 2012; Iwardeen, 2003; Janda et al., 2002; Ladhari, 2010; ; Melián, 2005; Ranganathan and Ganapathy, 2002; Santos, 2003].

This last perception is shared by Parasuraman et al. [2005] whose regression analysis showed that, although privacy is the least critical of the four dimensions, its influence on the overall evaluation of the website is still significant. A perception of privacy influences perceived quality and value, and purchase loyalty, and thus encourages firms to continue to emphasize in their communications the security and privacy of their websites.

We propose the following items to measure the privacy dimension:

Q16: The e-marketplace protects my financial information when payments are made to me.

Q17: My personal information is not shared with other websites.

The sources on which we based this proposed scale were the works of Janda et al. [2002], Cai and Jun [2003], Kim and Stoel [2004a] and Parasuraman et al. [2005].

2.2.5. Communication dimension

Communication is defined as keeping clients properly informed, and communicating with them in a language they can understand. Communication in e-services consists of both online communications (e-mail or chat) and traditional communications (telephone, fax, and conventional mail). A quality website should offer many forms of contact [Santos, 2003].

There is no unanimity in the terms different authors use to refer to this dimension. Some authors use the term empathy to refer to the means by which the website provides the customer with care, individualized information, and attention [Cao et al., 2005]. Others, emphasize the need to provide quick responses to customer requests [Gounaris and Dimitriadis, 2003; Wolfinbarger and Gilly, 2003]. Some studies note the importance of providing personalized service in order to achieve a closer relationship with the customer [Bauer et al. 2005; Cox and Dale, 2002; Jun et al., 2004]. The traditional American school [Parasuraman et al., 2005; Zeithaml et al., 2002] defines a scale which measures the responsiveness, compensation, and contact focused on resolving problems and customer complaints.

Although the communication dimension was explicitly included by 82% of the studies reviewed (see Figure 1), there is no general agreement among them about the importance of this dimension in delivering services to the customer through the website. Some researchers in the B2C field state that a rapid response to user questions and interactive communication are critical for the client to consider the convenience of online shopping [Yang et al.,

2003]. In the B2G [Business to Government] field, however, the study of Barnes and Vidgen [2006] showed empathy to be one of the least important dimensions of service quality, although in their conclusions those authors maintained that there was a need for empathy (in communication above all) in delivering services to clients.

Our proposal for a measure of the communication dimension consists of the following seven items:

Q18: I can interact with the website to obtain personalized information based on my specific needs.

Q19: The e-marketplace provides me with confirmation by e-mail or other means of my orders or of the services performed.

Q20: The e-marketplace has a client support area to attend to any questions or comments that I might have.

Q21: The e-marketplace responds quickly to my requests.

Q22: The e-marketplace resolves problems quickly.

Q23: The e-marketplace deals with product returns properly.

Q24: The e-marketplace provides me with contact information for my clients, facilitating my communication with them.

These items are based on the works of Zeithaml [2000], Janda et al. [2002], Cai and June [2003], Jun et al. [2004], Kim and Stoel [2004a], Ribbink et al. [2004], Lee and Lin [2005], Barrutia et al. [2006], and Parasuraman et al. [2005].

2.2.6. Value-added services dimension

Value-added services complement the e-marketplace's usual transactions, and facilitate the completion of those transactions by delivering the product to the buyer and providing the corresponding cash flows to the seller. The literature review showed that various studies have considered the value-added services offered by e-marketplaces [Barrat and Rosdahl, 2002; Engstrand and Haraldsson, 2001; Ganesh et al., 2004; Turban et al., 2002]. There particularly stand out the financial services, including payment services such as electronic cards or credit cards [Turban et al., 2002]. Logistics services can also be included in this dimension. As indicated by Ordanini and Pol [2001], these can include such complementary transaction processes as transport, storage, insurance, etc., resources which positively affect the cost process, and facilitate quality, speed, and proper delivery. Other possibilities offered by some e-marketplaces are integrative or collaborative services. These make it possible to design new products in collaboration, to forecast demand, or to integrate information from the e-marketplace into the user firm's internal management systems. With these collaborative or integrative services, e-marketplaces are thus changing the structure of the value chain, and are starting to build networks forming complete value chains [Popovic, 2002].

To measure the value-added service dimension, we used three items based on the work of Woods [2000], Keenan [2000], Ordanini and Pol [2001], Barrat and Rosdahl [2002], Popovic [2002], and Turban et al. [2002].

Q25: The e-marketplace has negotiated with financial institutions to obtain favourable terms for my business.

Q26: The e-marketplace offers me the opportunity to use their logistics services.

Q27: The e-marketplace provides me with tools to share information with other participants or collaborators.

3. Methodology

In order to achieve the objective of the study and to determine the dimensions that affect the quality of the service provided by an e-marketplace, we conducted an empirical study of e-marketplaces located in Spain. To determine the study population, we used the census provided by Spain's Foreign Trade Institute (Instituto de Comercio Exterior, ICEX) for eMarketServices. We chose the construction sector (see Table 1) as being one of the areas in which most e-marketplaces are operating, and with the greatest number of registered users. We constructed a list of 1000 firms from the information obtained from their websites and with the aid of the SABI database.[3]

An initial design of the questionnaire was subjected to a pre-test. This consisted of in-depth interviews with 10 experts selected from both the academic world and the B2B professional field (e-marketplace managers, user firm management, construction procurement managers). The result was the introduction of some changes to give the final definitive questionnaire. The research was conducted by means of this questionnaire being sent directly to vendor users on paper and by e-mail, with the opportunity also being provided for them to respond through a Web page.

[3] The "*Sistema de Análisis de Balances Ibéricas (SABI)*" is a database of Spanish and Portuguese companies. It provides access to general information about more than 550 000 Spanish and 320 000 Portuguese firms.

Table 1: The study's technical data sheet.

Methodological procedure	Direct questionnaire with Likert scale (1 to 7)
Geographical area	Spanish construction sector firms operating in some Spanish e-marketplace
Sample size	197 firms
Sample error	7.12%
Confidence level	95.5%; Z=1.96; p=q=0.5
Date of fieldwork	September 2009 to July 2010
Data processing	Computerized, using the SPSS and SmartPLS software package

The reason for choosing vendor users was that research has shown that the management of relationships in e-marketplaces is unbalanced at the expense of suppliers. In particular, some e-marketplaces are moving their reduction of costs to their suppliers, who are not finding this to be offset by any increase in sales. This is causing a sense of discouragement among suppliers [Gulledge, 2002]. In the present research, we therefore wanted to address this limitation in the relative lack of attention that e-marketplaces have been paying to their supplier users in recent years.

At the completion of the field work, we had a total of 197 valid questionnaires from vendor firms. This sample size exceeds the conventional requirements of 5 observations per variable needed to perform a factor analysis [Hill, 2000].

Most respondents (96%) belonged to the Obralia, Spanish e-marketplace founded in 2002, with about 50.000 registered firms and where are involved most of the main construction Spanish companies[4] . As for the distribution of the sample by size, 92% were small- and medium-sized businesses,[5] and the remaining 8% were large firms. Most belonged to the purchasing (22.8%), sales (28.9%), or general management (17.8%) departments of their firm. Many of the respondents had clear experience in the use of e-marketplaces – 62.5% had used it for over five years, and 45.6% for over ten. Of the firms surveyed, 66.5% had a turnover of less than €10 million. Most of the transactions involved are national (48.2%). Only 16.2% of the firms have transactions in the international context, and the use they make of e-marketplaces is low – 84.8% of the respondents make less than 10% of their market sales through the e-marketplace.

4. Data Analysis and Results

In so far as possible, the measurement instrument was adapted to the context of the research. In this regard, as noted above, we conducted a pre-test in which the different scales were adapted to the specific B2B e-marketplace context. Each of the items in these scales was scored on a 7-point Likert scale (1 = strongly disagree; 7 = strongly agree).

The perceived quality variable was measured through the 27 items of the scale we have denominated "e-merQual", detailed in the previous sections. The scale was developed specifically to measure the perception of quality by vendor users of Spanish e-marketplaces.

Coefficient Alpha

The recommended measure of the internal consistency of a set of items is provided by coefficient Alpha by which should be the first measure one calculates to assess the quality of the instrument [Churchill, 1979]. In Table 2, one sees that Cronbach's alpha for each of the four e-merQual factors exceeded the standard minimum of 0.7 [Nunnally and Bernstein, 1994], suggesting that the measure is reliable. The value of Cronbach's alpha did not increase with the removal of any of the factors. The overall reliability of the scale was 0.949, i.e.,

Factor Analysis

A factor analysis (see Table 2), consisting of a principal components analysis with varimax rotation, was used to

[4] Data corresponding to15/4/2009 and obtained from e-Market Services of the Instituto Español de Comercio Exterior.

[5] According to Recommendation 2003/361/European Commission (EC), small and medium-sized firms are enterprises which employ fewer than 250 persons.

identify homogeneous groups of variables or factors, and to establish the dimensions of the perceived quality construct. An eigenvalue of unity was taken as the threshold criterion for extraction.

Prior to the factor analysis, the Kaiser, Meyer, and Okin (KMO) statistic was calculated. The value obtained was 0.931, indicative of good correlation between the variables [Reis, 2001], and showing the data to be appropriate for a factor analysis. The perceived quality variable generated four factors accounting for 63.99% of the total variance. Table 2 displays that, for a sample size about 200, the factor loadings are larger than 0.40. This is the minimum value proposed by Hair et al. [1999] to be considered as significant, consequently, no item was erased.

We denominated these factors as follows: F1 **reliability and privacy**, F2 **efficiency**, F3 **value-added services**, and F4 **information usefulness**.

Table 2: Results of the Exploratory Factor Analysis (EFA).

Factors/Definitions and items **Items**		**Factor loading**	**Variance explained**	**Cronbach's alpha**
F1	***Reliability and privacy*: The client's confidence in the service being provided by the e-marketplace**		**44.228%**	**0.899**
Q15	The products are delivered in good condition, free of defects	0.744		
Q21	The e-marketplace responds to my requests quickly	0.674		
Q18	I can interact with the website to obtain personalized information based on my specific needs	0.660		
Q12	Products and services are delivered to the client within the promised time	0.649		
Q13	The quality and quantity of the products I deliver matches the description on the website	0.633		
Q20	The e-marketplace has a client support area in order to address any questions and comments that I might have	0.626		
Q22	The e-marketplace resolves problems quickly	0.624		
Q17	My personal information is not shared with other websites	0.592		
Q14	In general, for me the e-marketplace inspires confidence	0.579		
Q19	The e-marketplace gives me by e-mail or other means confirmation of orders or services performed	0.469		
F2	***Efficiency*: Issues related to the website's usability, design, access, and comprehensive information**		**9.757%**	**0.918**
Q 9	I find it easy to learn to navigate around the site and find what I need or am looking for	0.813		
Q10	The website design is attractive, the drawings, images, use of colour, and fonts are suitable, and symbols or icons are readily identified	0.800		
Q11	The layout of the site is well organized, has a clear structure which allows you to find the right things at first sight	0.790		
Q2	The website content is clear, concise, easy to understand, well organized, includes tutorials for its use	0.775		
Q6	The website provides information about the e-marketplace, its activities, and the participating firms, both buyers and sellers	0.632		
Q7	The website provides general information about my activity sector: legal regulations, a magazine, forums, newsletters or messages, links to pages of interest, etc.	0.609		

Factors/Definitions and items Items		Factor loading	Variance explained	Cronbach's alpha
Q5	The website provides extensive information about my products and services, allow them to be viewed and how to obtain details about them	0.543		
Q8	The website loads quickly, and is always ready and available to perform a transaction	0.517		
Q1	The website provides relevant and in-depth information, with a high level of detail	0.512		
F3	***Value-added services*: Services that complement transactional activities**		**5.726%**	**0.861**
Q26	The e-marketplace offers me the opportunity to use their logistics services	0.836		
Q25	The e-marketplace has negotiated with financial institutions to obtain favourable terms for my business	0.785		
Q16	The e-marketplace protects my financial information when payments are made to me	0.669		
Q23	The e-marketplace deals with product returns correctly	0.633		
Q27	The e-marketplace provides me with tools to share my information with other participants or collaborators	0.573		
F4	***Usefulness of information*: Information that is useful as having up-to-date content, and being credible and trustworthy**		**4.287%**	**0.778**
Q4	The content of the website is reliable, credible, trustworthy	0.687		
Q3	The website content is up-to-date	0.686		
Q24	The e-marketplace provides me with client contact information facilitating my communication with them	0.560		

The resulting scale, e-merQual, consists therefore of 27 items covering the following four dimensions:
1. **Reliability and privacy**: The client's confidence in the service being provided by the e-marketplace.
2. **Efficiency**: Issues related to the website's usability, design, access, and comprehensive information.
3. **Value-added services**: Services that complement transactional activities.
4. **Information usefulness**: Information that is useful as having up-to-date content, and being credible and trustworthy.

Assessing the reliability and validity of the construct: correlations with other measures

Each time more researchers note that service quality might be better represented by formative instead reflective indicators. Consequently, PLS might be more appropriate in the analysis of those measurement models that contain formative indicators [Collier and Bienstock, 2009]. In the validation of formative constructs the concept of construct validity is not meaningful when employing such models [Bollen 1984; 1989]. However, Diamanpotopoulos [2006] indicates that the examinations of validity become crucial. For assessing the validity of formative constructs one must check that the relationship between the formative construct and other model´s constructs are strong and significant, which have been sufficiently referred to in prior literature [Henseler et al., 2009; Peter, 1981; Straub et al., 2004].

To test the validity of the scale, we performed a SEM using the program SmartPLS, taking client loyalty as the dependent variable. We measured client loyalty using the following items:

LOY1: The information I transmit to others about the e-marketplace is always positive
LOY2: I have no intention of changing e-marketplace
LOY3: I prefer this e-marketplace to others

LOY4: The e-marketplace is my first choice as distribution channel for my products and/or services
LOY5: I would continue to use the e-marketplace even if there were an increase in the fee I pay
LOY6: I would rather pay a higher fee than move to other e-marketplaces due to the benefits I receive

These items are based on the work of Gremler [1995], Zeithaml et al. [1996], Zeithaml [2000], Anderson and Srinivasan [2003], Ribbink et al. [2004], Parasuraman et al. [2005], Boshoff [2007], Casaló et al. [2008], and Huang [2011]. The quality scale we shall present subsequently was reduced by applying an exploratory factor analysis. The reliability of the set of indicators related with the loyalty construct can be verified examining the loading. According to Carmines and Zeller [1979] all the indicators have loading above 0.707 except LE4 (Table 3), which has a value of 0.63. However one can accept loading with values greater than just 0.6 when the scales it is used for causal modelling applied to different contexts [Baggozi and Yi, 1988, Barclay et al., 1995].

We used two indicators to check the reliability of a loyalty construct, Cronbach´s alpha than gives a satisfactory value of 0.867 and the composite reliability that takes an appropriate value of 0.901 [Nunnally and Bernstein, 1994]. Convergent validity was assessed thought the AVE. The construct loyalty has a value of 0.6, greater than the recommended value of 0.5 [Fornell and Lacker, 1981]. As can be seen in Table 3, all four perceived quality factors considered had high values of the standardized coefficient in the regression analysis. Reliability and privacy, and information usefulness had the strongest effects on client loyalty, followed by value-added services, and finally efficiency.

Table 3: Measurement results.

Constructor	**Indicator**	**Item Loadings**	**Weights**	***t*-value**	**Standard Error**
Loyalty (1)	LE1	0,784***		15,678	0.050
	LE2	0,861***		38,523	0.022
	LE3	0,846***		33,226	0.025
	LE4	0,630***		10,161	0.057
	LE5	0,738***		15,728	0.046
	LE6	0,783***		20,763	0.037
Quality	F1: Reliability and privacy		0.638***	6.499	0.098
	F2: Efficiency		0.333***	4.376	0.076
	F3: Value-added serv.		0.455***	8.300	0.054
	F4: Information usefulness		0.524***	7.817	0.067

(1) Cronbach´s alpha =0.867 Composite Reliability=0.901 AVE=0.605 R^2=0.584

To evaluate the discriminant validity, the indicators should not be more strongly correlated with any other construct than that which we want to use for the measurement [Barclay et al., 1995]. An examination of Table 4 shows that the discriminant validity was satisfactory for all the constructs.

5. Discussion

The principal aim of this work is to explore service quality dimensions in the context of e-marketplace. The factorial analysis for e-merQual scale generated four key service quality dimensions: reliability and privacy, usefulness of the information, value-added services and efficiency. These factors confirmed that the quality, in the B2B context, is a multidimensional construct and are not far away from the results found by others researchers (see appendix A). On the other hand, all four dimensions also have their own unique service quality characteristics inherent in online B2B environment.

First, the dimension reliability and privacy, the most important from the standpoint of an e-marketplace's users is reliability and privacy, since this dimension has the strongest influence on client loyalty, with a significant weight of 0.638. This dimension refers to correct and timely delivery to the client, confidence in the e-marketplace, protection of the client's personal information, and personalization and communication with the client. In particular, the client has particular interest in the fulfilment of the conditions governing the transaction, in receiving personal attention, and in being able to rely on communicating easily with the e-marketplace in the case of problems arising.

Table 4: Correlation factor matrix.

Factor	Items	*Reliability and privacy*	*Efficiency*	*Value-added services*	*Information usefulness*
Factor 1: ***Reliability and privacy***	Q15	**0.744**	0.193	0.019	0.240
	Q21	**0.674**	0.167	0.245	0.323
	Q18	**0.660**	0.126	0.103	0.156
	Q12	**0.649**	0.289	0.096	0.058
	Q13	**0.633**	0.202	0.207	0.128
	Q20	**0.626**	0.121	0.229	0.489
	Q22	**0.624**	0.228	0.330	0.372
	Q17	**0.592**	0.337	0.361	-0.077
	Q14	**0.579**	0.299	0.186	0.343
	Q19	**0.469**	0.122	0.420	0.452
Factor 2: ***Efficiency***	Q9	0.169	**0.813**	0.107	0.082
	Q10	0.200	**0.800**	0.136	0.129
	Q11	0.226	**0.790**	0.167	0.206
	Q2	0.268	**0.775**	0.028	0.206
	Q6	0.236	**0.632**	0.123	0.438
	Q7	0.181	**0.609**	0.321	0.280
	Q5	0.211	**0.543**	0.360	0.322
	Q8	0.108	**0.517**	0.054	0.512
	Q1	0.324	**0.512**	0.066	0.498
Factor 3: ***Value-added services***	Q26	0.157	0.107	**0.836**	0.219
	Q25	0.035	0.187	**0.785**	0.076
	Q16	0.518	0.126	**0.669**	-0.065
	Q23	0.495	0.143	**0.633**	-0.041
	Q27	0.388	0.112	**0.573**	0.428
Factor 4: ***Information usefulness***	Q4	0.194	0.430	0.033	**0.687**
	Q3	0.143	0.420	0.068	**0.686**
	Q24	0.410	0.164	0.193	**0.560**

The following dimension in order of importance to ensuring loyalty, with a significant weight of 0.524, is the usefulness of the information, i.e., that the client finds the information provided by the website to include content that is kept up-to-date, and is reliable, credible, and trustworthy.

The third dimension in order of importance in gaining and maintaining client loyalty, with a significant weight of 0.455, is that of value-added services. These are services that complement the e-marketplace's transactional activities – financial, logistics (both for the delivery of products and/or services and for dealing properly with product returns), and integrative services that enable information to be shared with other of the e-marketplace's users or collaborators.

The least valued of the four dimensions in terms of gaining client loyalty, with a significant weight of 0.333, is efficiency. This dimension includes the website's usability, the attractiveness of its design that it is well organized and structured, that it is always accessible in the sense that the site is always available, and that it provides extensive information about the products offered, about the e-marketplace's activities, and about the sector of economic activity in general.

Thus, the vendor users of e-marketplaces consider that the market's offer of high service quality in order to ensure their loyalty has to go beyond questions related to the design and usability of the website. Instead, they place great importance on issues related to compliance with the conditions agreed on and accepted by the e-marketplace (resulting in the delivery of products within the agreed time-frame and with the specified characteristics), to providing personalized services, to the protection of personal information, to the availability of appropriate communication channels, and to providing useful information about the goods and services offered. These key issues can all be complemented by providing suitable financial, logistics, and integrative services.

The present results on the dimensions of B2B e-commerce quality do not differ significantly from those reported in the B2C context. For instance, Parasuraman et al. [2005] state that the most critical factors in that field are efficiency and fulfilment (the latter coinciding with our concept of reliability), and are equally important in the customer's perception of the website's quality (that work did not consider information as a possible dimension of quality).

6. Conclusions and managerial implications

We have here first presented a review of the literature on quality management in e-services, and then explored service quality dimensions to measure the quality of the services provided by e-marketplaces. To the best of our knowledge, this is a pioneering study in the e-marketplace context, since we could find no previous research addressing this issue. The 4 factors dimensions confirming that quality in this context is a multidimensional construct.

We recognize that it is no easy task for managers of e-marketplaces to attain a competitive advantage that will endure over time. The sector that we have examined –construction– has several active e-marketplaces. Gaining customer loyalty is therefore a very important aspect for the future success of any one of them. To this end, it is necessary to understand which are the guidelines or key factors that can lead to such loyalty.

We think that one way for a B2B e-marketplace to achieve differentiation from the competition is to offer superior levels of quality, and that this strategy may become a motor to drive the firm to gaining and improving customer loyalty.

If e-marketplace managers understand what are the needs and preferences of their customer, and that these are related to the dimensions of quality, they will be able to act and direct their strategies to developing those aspects that are most relevant to their customers. In this way, they will be contributing to their firm's future survival. In sum, therefore, e-marketplace managers should make a particular effort to improve service quality. In particular, the present study has identified four key factors in maintaining a high quality level, to which we believe managers of B2B e-marketplaces should pay special attention: reliability and security, usefulness of the information provided, value-added services, and efficiency.

As we are aware that e-marketplaces have limited resources, and they are operating in a particularly competitive sector, managers should pay special attention to those dimensions more important to users. In this sense, the study has shown that a crucial element for any improvement of the quality perceived is the "reliability and privacy" of the services provided by the e-marketplace.

More specifically, our recommendation would be for e-marketplace managers to focus their effort on improving their users' confidence. This is achieved by taking the appropriate steps to ensure that products are delivered on time, that they coincide with the description given on the website, and that they are in good condition. Also, users value that the market confirms the successful closure of transactions that have been undertaken via the market's platform. In addition, the manager should create channels that allow each user to provide and receive personalized information based on their specific needs, and should set up a client support area on the website through which any questions or problems that may arise for the user can be responded rapidly, while at the same time guaranteeing the privacy of the users' personal information.

It is therefore important that the manager create channels of communication with users to ensure that these aspects are being successfully dealt with, because they directly impact the e-marketplace's perceived quality level. We firmly believe that it is essential for the owners of B2B e-marketplaces to establish a strategy for managing client relationships with both buyers and sellers. The aim will be to work towards establishing open communication links and mutual understanding between all the parties involved, so as to be able to guarantee reliability and privacy in the services provided.

Another important aspect that the manager must pay especial attention to is to provide information that is genuinely useful for the users. The information provided on the website must be kept up-to-date, and has to be credible, timely, and trustworthy. Also, buyers and sellers should be offered the possibility of contacting each other straightforwardly through the online platform. In addition, the e-marketplace manager needs to bear in mind that for the customer it is very important to obtain comprehensive information not only on the products and services offered, but also on the sector as a whole and the activities taking place in the e-marketplace. An appropriate tool to facilitate this transfer of information (and one which is currently used by various e-marketplaces) is a newsletter sent to customers periodically. It will report on current and future activities, on which products are being traded most, new regulations, industry news, etc.

Users also value aspects related to financial, logistics, and integrative services. The e-marketplace could make contacts with financial institutions that would allow its users to benefit from special treatment. Similarly, arrangements may be made with some of the logistics platforms that exist in our country to ensure that the products and services are delivered appropriately and in good condition.

Finally, if vendors can integrate the platform into their management systems, this would avoid the duplication in the delivery of information when transactions are made which is often a cause for complaint by e-marketplace users. We believe that managers will have to take the initiative in this task of integration. The buyers and sellers in the e-marketplace will need to be convinced to use the platform to its full potential, and avoid unnecessary requests for documents and closing off transactions outside the e-marketplace's platform.

7. Limitation and future research

The first limitation of this study is that its results are based in a national context, i.e., the sample we used corresponds to e-marketplaces created in Spain, so that the results could vary from one country to another. We propose for future work, therefore, to extend the model to an international context, taking samples from different countries, to examine whether the results differ significantly due to cultural factors.

A second limitation is that the study was based on the perception of users of e-marketplaces in the construction sector. We therefore believe that the present results should be interpreted with caution, because they may not be extrapolated to other industrial sectors. Extending the present methodological approach to other sectors would increase the generalizability of the results. A third limitation is that the sample consisted only of vendors in the e-marketplaces. We believe that if the study had been directed towards buyers, the results might have been different. A fourth limitation is that the e-marketplace that contributed by far the greater part of the sample was not impartial. The results could well be different if the sample were taken from impartial e-marketplaces.

These limitations clearly suggest many possibilities for future directions of research.

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Appendix A - The scales and dimensions proposed for the measurement of e-service quality

Authors	*Dimensions (number of items)*	*Context*
Liu and Arnett [2000]	Information and service quality, system use, system design quality, enjoyable [4]	Several sectors
Loiacono, Watson, and Goodhue [2000, 2002, 2007]	WebQual [1]: Task-setting information, intuitive operations, easy to understand, intuitive appearance, capacity for innovation, personalized communication, trust, relative advantage, response time, emotional appeal, consistent image, full online service [12]	Online retailers
Zeithaml et al. [2000]	e-SQ [e-SERVQUAL]: Efficiency, reliability, fulfilment, privacy, responsiveness, compensation and contact [7]	Online retailers
Cox and Dale [2001, 2002]	Appearance of the website, communication, accessibility, credibility, understanding, availability [6]	Online retailers
O'Neill et al. [2001]	Contact, responsiveness, reliability, tangibles [4]	e-Services
Yoo and Donthu [2001]	SITEQUAL: Usability, æsthetic design, process speed, security [4]	Online retailers
Aladwani and Palvia [2002]	Technical adequacy, specific content, content quality, and appearance of the website [4]	Several sectors
Barnes and Vidgen [2002, 2003a, 2003b]	Usability, design, information, trust, and empathy [5]	Online retailers (bookshop)
Cox and Dale [2002]	KQFs: Online resources, usability, design, communication, client confidentiality, service relationships, security [7]	Several sectors
Francis and White [2002]	PIRQUAL: Functionality of the Web shop, description of product attributes, conditions of ownership, delivery, client support, and security [6]	Online retailers
Janda et al. [2002]	IRSQ: Performance, access, security, sensation, and information [5]	Online retailers
Madu and Madu [2002]	Efficiency, characteristics, structure, æsthetics, reliability, storage capacity, service availability, security and integrated systems, trust, responsiveness, service differentiation and personalization, web shop policy, reputation, assurance, empathy [15]	e-Quality
Palmer [2002]	Delay in downloads, navigation around the site, interactivity, responsiveness, content/information, [5] [success of the website]	Several sectors
Ranganathan and Ganapathy [2002]	Content information, design, security and privacy [4]	Online retailers
Zeithaml [2002]	Heart e-SQ: Efficiency, fulfilment, reliability, privacy [4]; Dealing with problems: responsiveness, compensation, and contact [3]	e-Services
Zeithaml, Parasuraman, and Malhotra [2002]	e-SQ: Usability, privacy, confidentiality, reliability, and site design [5]; Recovery of service: contact and compensation [2]	e-Services
Cai and Jun [2003]	Website design/content, reliability, service availability [readiness], and communication [4]	Online retailers
Gounaris and Dimitriadis [2003]	Client care and reduction of perceived risk, beneficial information, technological benefits [3]	Portal users
Madu and Madu [2003]	Performance, features [privacy], structure, æsthetics, storage capacity, willingness to enhance services, reliability, responsiveness, differentiation and personalization of products and services, web shop policy, trustworthy reputation, assurance, empathy [15]	Literature review
Santos [2003]	Usability, appearance, links, structure, content, efficiency, reliability, communication, security, incentives, and client support [11]	Web experiences and online shopping
Wolfinbarger and Gilly [2003]	eTailQ: Website design, reliability, security, and client support [4]	Online shop site

Authors	***Dimensions (number of items)***	***Context***
Tan et al. [2003]	e-SERVQUAL modified: Reliability, responsiveness, access, flexibility, navigability, efficiency, guarantees/trust, security, site æsthetics, personalization, quality of information [11]	Web information systems (WIS)
Trocchia and Janda [2003]	Performance, access, security, sensation, information [5]	Online retailers
Yang et al. [2003]	Responsiveness, credibility, usability, reliability, convenience in communication, access, competence, courtesy, personalization, continuous improvement, collaboration, security, and æsthetics [14]	Online retailers
Iwardeen et al. [2003, 2004]	SERVQUAL by Zeithaml and co-workers [1990]: Tangibles, reliability, empathy, security, responsiveness [5]	Online retailers
Jun et al. [2004]	SERVQUAL by Zeithaml and co-workers [1990] modified: Reliability/speed of response, attention, usability, access, security, and credibility [6]	Online retailers
Kim and Stoel [2004a 2004b]	WebQual of Loiacono [2000]: Web appearance, enjoyable, task-setting information, transaction capability, responsiveness, and trust [6]	Online retailers
Sánchez and Villarejo [2004]	SERVQUAL by Zeithaml and co-workers [1990] modified: Usability, tangibles, reliability, empathy, security, responsiveness, enjoyable [7]	Websites
Webb and Webb [2004]	SERVQUAL of Parasuraman and co-workers [1994a], SiteQual, Quality of services: Reliability, responsiveness, security, empathy, tangibility, information quality, access, contextual quality, representational quality, intrinsic quality [7]	Online retailers
Yang and Fang [2004]	Responsiveness, reliability, credibility, competence, access, courtesy, continuous improvement, communication, service portfolio, content, data updating, security, æsthetics, usability, reliable and flexible system [16]	e-Services
Yang et al. [2004]	Reliability, responsiveness, competence, usability, product portfolio, security [6]	Online retailers
Bauer et al. [2005]	TAM [Davis, 1989] SERVQUAL: Design/functionality, enjoyment, processes, reliability, responsiveness [5]	Online retailers
Cao et al. [2005]	Quality systems, information quality, quality services, and attractive [4]	
Chakraborty et al. [2005]	Information, information quality, use [3]	B2B construction
Lee and Lin [2005]	Web site design, reliability, responsiveness, trust, and personalization	Online retailers
Melián [2005]	Design, guarantee, value, and security [4]	Online retailers
Parasuraman, Zeithaml, and Malhotra [2005]	E-S-QUAL: Efficiency, system availability, fulfilment, privacy [4]; e-RecS-Qual: Responsiveness, compensation, and contact [3]	Online retailers
Semeijn et al. [2005]	Guarantee, navigation, e-range, security, responsiveness, personalization [6]	Online retailers (various sectors)
Weber et al. [2005]	KQFs adapted from Cox and Dale [2002]: User interface, online resources, client confidentiality, service relationships [4]	Luxury hotel clients
Yang et al. [2005]	Overall quality -- Quality of information: content utility; Quality systems: Adequate information, usability, access, interaction [5]	Informational Web portals
Zhang and Prybutok [2005]	Information on products and services, navigability, access, site æsthetics, responsiveness, guarantees, and updating of information [7]	e-Services, Web use
Aladwani [2006]	Technical quality, general content quality, specific content quality, appearance of quality [4]	Online retailers
Barnes and Vidgen [2006]	Usability, information quality, interaction in services, overview [4]	e-Services government
Barrutia et al. [2006]	Information on the website, terms of delivery, reliability, money back guarantees, contact, response to complaints [6]	e-Services banking
Bauer et al. [2006]	Design/functionality, enjoyment, processes, reliability, responsiveness [5]	Online retailers

Authors	***Dimensions (number of items)***	***Context***
Caruana and Ewing [2006]	Etail Q of Wolfinbarger and Gilly: Fulfilment/reliability, client support, web site design, security/privacy [4]	Online retailers
Collier and Bienstock [2006, 2009]	Process dimension: Functionality, secure information, design, privacy, usability [5]. Results dimension: Secure orders, conditional orders, on-time delivery [3]. Recovery dimension: Interactive fairness, procedural fairness, results fairness	Online retailers
Fassnacht and Koese [2006]	Graphics quality, distribution, attractive selection, information, usability, technical quality, reliability, functional benefits, and emotional benefits [9]	e-Services
Kim et al. [2006]	Efficiency, fulfilment, system availability, privacy, and responsiveness [5]	Online retailers
Rowley [2006]	Site features, security, communication, reliability, client support, responsiveness, information, access, delivery, and personalization [10]	Literature review
Yang et al. [2006]	BSQ: Marketing services, logistics services, operational services, and collaborative services [4]	Theoretical B2B
Boshoff [2007]	Efficiency, delivery, privacy, speed, system availability, reliability [6]	Online retailers
Cristobal et al. [2007]	client support, web design, guarantees, order management [4]	e-Services
Heim and Field [2007]	Web site design [payment process], fulfilment/fidelity [on time delivery], facility to recover funds, security/privacy [experience with privacy], client support [support services] [5]	Online retailers
Ho and Lee [2007]	information quality, security, website functionality, client relations, responsiveness [5]	Online retailers tourism
Li and Suomi [2007]	Before the transaction: Efficiency, information; During the transaction: system availability, fulfilment, privacy; After the transaction: Responsiveness, compensation, and contact [8]	Literature review
Park and Gretzel [2007]	Information quality, usability, responsiveness, security/privacy, visual appearance, trust, interactivity, personalization, fulfilment [9]	Literature review
Bai et al. [2008]	Functionality, usability [2]	e-Services travel agencies
Bressolles and Nantel [2008]	NetQual: Information, usability, reliability/fulfilment, site design, security/privacy [5]	e-Services travel and insurance
Vaidyanathan and Deveraj [2008]	Quality in the flows of information processes: Online information, order processing; Quality processes in logistics fulfilment: Secure orders, orders on time [4]	B2B procurement agents
Ha and Stoel [2009]	Web site design, client support, privacy/security, experience/atmosphere [4]	Online retailers
Herington and Weven [2009]	e-SERVQUAL: Personal needs, site organization, user friendly, website efficiency [4]	e-Services banking
Hu [2009]	e-SQ: Efficiency, fulfilment, system availability, security/privacy, responsiveness, compensation, contact, benefits, customization/personalization, tangibility, guarantee/trust, continuous improvement [12]	e-Services travel agencies
Kim et al. [2009]	Based on eTailQ of Wolfinbarger and Gilly [2003]: Fulfilment/loyalty, responsiveness, web design, security/privacy [4]	Online retailers
Stiakakis and Georgiadis [2009]	e-SQ: Security, rapid response, access, secure information, personalization, client support, proper operation of the website, web site design, client confidence in the firm, use of the website's technology and tools [10]	e-Services B2B/B2C
Akinci et al. [2010]	Based on E-S-QUAL and e-RecS-Qual [Parasuraman, Zeithaml, and Malhotra, 2005]: Efficiency, system availability, fulfilment, privacy [4]; responsiveness, compensation, and contact [3]	e-Services banking Turkey

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Caruana and Ewing [2010]	Based on eTailQ of Wolfinbarger and Gilly [2003]: Fulfilment/loyalty, client support, web design, privacy, and security [4]	Online retailers
Cho and Menor [2010]	Handling, maintenance, security, range, flexibility, reliability, availability, usability, access [9]	Theoretical
Finn [2010]	Enjoyment, æsthetics, personalization, security, guarantees, access, reliability, information, responsiveness, site characteristics, delivery [11]	Online retailers
Kim and Damhorst [2010]	Material dimension, style/design, durability/fulfilment [3]	Online retailers
Ladhari [2010]	Fulfilment/reliability, responsiveness, privacy/security, web design, quality/beneficial information [5]	Literature review
Udo et al. [2010]	Perceived risk, website content and service, convenience [3]	Online retailers
Ding et al. [2011]	eSELFQUAL: Perceived control, service convenience, client support, service fulfilment [4]	Online retailers
Finn [2011]	Functionality, compliance, professionalism, speed [4]	Online retailers
Wu et al. [2011]	Based on E-S-QUAL and e-RecS-Qual [Parasuraman Zeithaml, and Malhotra, 2005]: Efficiency, fulfilment, compensation, system availability, privacy, responsiveness, and contact [7]	Online game
Lee et al. [2011]	Based on SERVQUAL: Timeliness, responsiveness, assurance, empathy, tangible; Overall satisfaction: promptness	e-Government
Lin [2011]	Tangibility, responsiveness, empathy [3]	Multi-channel retailing (mobile service)
Venkatesh [2011]	Technical quality, communication, interpersonal interactions, and time spent [4]	Electronic healthcare systems
Kaisara and Pather [2011]	e-GovSqual: Information quality, security, communication, website æsthetics, website design, access [6]	e-Government
Hasan and Abuelrub [2011]	Content, design, organization, user-friendly	Theoretical review, websites
Hsu et al. [2012]	Website design, security, customer relationship, enjoyment	Travel websites
Santouridis et al. [2012]	Efficiency, privacy, fulfilment, service availability	e-Commerce in Greece