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WEB-SERVQUAL: a measure of information systems service quality for the web environment

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Abstract

The research investigated the suitability of the SERVQUAL instrument, extensively used in marketing and selectively used to measure service quality of traditional Information Systems (IS) function, to measure IS service quality in the web environment. The website of a university's library provided the context in which SERVQUAL was applied. From a focus group meeting of study participants, conducted subsequent to the survey, emerged additions and changes required in designing a web-oriented SERVQUAL (WEB-SERVQUAL) questionnaire. These included the addition of two key dimensions in the form of web strategy and managing customer expectations. Other SERVQUAL dimensions, such as IS reliability and IS responsiveness, had to be modified since the Webmaster, and not just the IS function, plays a significant role in providing service to a website. The study produced a high level WEB-SERVQUAL questionnaire that provides the basis for empirical testing and refinement in subsequent research.

Keywords

SERVQUAL, IS service quality, Web-oriented service quality, Management of expectations

INTRODUCTION

Information Systems (IS) is relatively young compared to other disciplines. It is therefore not surprising that it has had to adopt much of its underlying theory and approaches from other, more well established ones in its short history. Obvious sources are science and technology in developing Information Technology (IT), the operating platform and infrastructure for IS, and accounting, management and marketing for developing and managing IS applications. For the latter, a wide variety of approaches have been adopted by IS, including those on how to manage and measure the effectiveness of IS. A well-known example has been the use of the SERVQUAL instrument, developed by marketing professionals (Parasuraman *et al.*, 1988), to determine the service quality delivered by the IS function.

A review of the literature (see following section) indicated that various attempts have been made to adopt and adapt SERVQUAL to IS activities but this has been done for the pre-Internet era. With the emergence of the World Wide Web (web) on the Internet, service is gaining even greater attention. In the new environment of e-Commerce, the market place has become the 'market space' where speed of delivery through digitisation, the ability to mass customise product and services and reaching customers around the globe have become key characteristics. These services are available 24 hours a day, 7 days a week, unrestricted by physical constraints such as 8 to 5 office hours.

The objective of this paper was to establish to what extent the SERVQUAL instrument, as it had been applied to measure traditional IS service quality, was suitable for the web environment and, if necessary, identify modifications to the instrument. The significance of the research was to lay the foundations for a web-based SERVQUAL to ameliorate the absence of research of IS service quality effectiveness in the web environment and to lay the foundation for the new approach to be tested and refined through subsequent research.

INFORMATION SYSTEMS AND SERVQUAL

Kettinger and Lee (1997) provided a good overview of the history of the SERVQUAL questionnaire. It was developed by Parasuraman *et al.* (1988) with 22 items over 5 dimensions. They asserted that these provided core evaluation criteria underlying service

quality that can undergo minor wording modifications and be supplemented with context-specific items. It was therefore regarded as a suitable instrument to measure IS quality, especially as IS had no tested alternative.

The SERVQUAL instrument measures quality by a difference score between perceptions and expectations. This difference is referred to as the gap. As IS researchers began to adopt SERVQUAL so commenced an active debate, mostly published in MIS Quarterly, on the suitability of the service quality dimensions for IS and the nature of gap scoring. First, there was uncertainty on the relevance of the SERVQUAL dimensions for IS. Kettinger and Lee (1997), in agreement with Van Dyke *et al*. (1997), wanted better definitions of the dimensions of IS service quality. "We agree that the dimensionality of the original 22-item SERVQUAL, when adapted to IS, has been problematic" (1997:225). This could only be achieved through a careful re-examination of content validity such as underlying theory and operationalisation of items. They suggested that other dimensions of IS service quality may need to be included to accommodate different industries, cultures and service contexts.

Second, research showed the delineation of service dimensions to be difficult. Kettinger and Lee (1997), again agreeing with Van Dyke *et al*. (1997), stated, "SERVQUAL does not clearly delineate among the dimensions of service quality" (1997:181). Further research was required to achieve a parsimonious refinement of the dimensions using the specification techniques of confirmatory factor analysis. Pitt *et al*. (1995) similarly reported, "SERVQUAL does not clearly delineate among the dimensions of service quality" (1995:181).

Third, the gap scoring process was criticised on a number of grounds (Kettinger and Lee, 1997; Van Dyke *et al*., 1997). Essentially the criticism was that SERVQUAL is too simplistic to measure complex cognitive evaluation approaches when separately measuring expected and perceived service quality. Furthermore, the perception of service quality already entails an expected service (e.g. Brown *et al*., 1993; Cronin and Taylor, 1992; 1994). In addition, expectation measures suffer from multiple interpretations such as the prediction that service will occur or should occur.

Despite the criticisms that could be identified, the SERVQUAL approach was applied for a range of purposes in the IS discipline. It was used to establish user information satisfaction (Kettinger and Lee, 1994), to place IS service quality into Delone and McLean's (1992) IS Success Model (Pitt *et al*., 1995), to observe cross cultural influences across 4 different countries (Kettinger *et al*., 1995) and the delivery of IS service quality over time (Watson *et al*., 1998).

STUDY DESIGN AND CONDUCT

In order to evaluate the suitability of SERVQUAL in the web environment, we applied it in the context of our university's library website. The site's home page consisted of three sections – general services, academic staff and library staff. The general services section outlines the use of the site by students and includes items such as borrowing, library locations and regulations. For academic staff, the site provides advice on how to add to library collection while for library staff they are given access to information that assists in servicing student inquiries, tracking orders for new books and journals, and checking overdue loans.

To provide overall control and guidance for our study we adopted the framework developed by Cameron and Whetten (1983) and applied by Seddon *et al*. (1999) to measure IS success. The key research components were identified as follows:

- The perspective of the stakeholder: the usefulness of the website to the university's library staff.
- The domain of the activity: to access information (e.g. to respond to an enquiry) and to place and track orders for books, journals, etc.
- Purpose of the evaluation: to establish the difference between what was expected from the website and was provided.
- Time frame: the current effectiveness of the website.
- Type of data used: effectiveness was captured by perceptual data provided by library staff when answering a questionnaire.

- Referent against which effectiveness is judged: there was no referent available because of the newness of the research domain.

In an attempt to measure the service effectiveness of the university's website, the SERVQUAL instrument was applied. It had the same format as that used by Pitt *et al*. (1995). The research dimensions and variables are reflected in Table 1.

SERVQUAL
Tangibles
Up-to-date hardware and software
Physical facilities are visually appealing
Reliability
IT support is dependable
IT support provide their services at the times they promise to do so
Responsiveness
IT support give prompt service to users
IT support have operating hours convenient to all their users
Assurance
The behaviour of IT support instils confidence in users
IT support have the knowledge to do their job well
Empathy
When users have a problem, IT support shows a sincere interest in solving it.
IT support always are willing to help users

Table 1: SERVQUAL Dimensions and Operators

The study was conducted with staff of the university' library. A pilot test by 3 members resulted in minor changes to the questionnaire and improvement in the instructions to completing the questionnaire. For example the instruction page made it clear that the study was for the library website whose homepage could be found at a particular URL and web pages with library related information that could be accessed from the home page.

Each of the 80 library staff was given the questionnaire. Of those, 47 completed it giving a response rate of 59 percent. Most of the respondents had worked in the library for more than 6 years (68%) and rated the frequency of using the library website and the necessity to use it to carry out their duties as high (mean of 5.3 and 5.4 on a 7-point scale). The overall experience with using web resources was rated towards the middle of the scale (mean of 4.96). Tables 2 and 3 below summarise the backgrounds of study participants.

	Frequency	**Percentage**
Less than 1 year	3	6.4
1-3 years	4	8.5
4-6 years	8	17.0
Over 6 years	32	68.1
Total	47	100.0

Table 2: Years worked in the University's Library

	Mean	**Median**	**St. Dev.**	**Range**
Frequency of using Library website	5.38	6.00	1.81	1 - 7
Necessity of Library website to carry out duties	5.47	6.00	1.87	1 - 7
Overall experience with using web resources	4.96	5.00	1.33	2 - 7

Table 3: Frequency and Necessity of Website Use and Overall Experience

The mean ratings of the responses for expectations and perceptions were computed so that the gap could be determined. According to t-tests, all differences in the means for expectations and perceptions were statistically significant with 95% confidence. A ranking of the mean differences (i.e. the gap) is provided in Table 4. An indication is also provided of the dimensions that the items represented.

Rk	Item description	E	P	G	SD	Dimension
1	IT support give prompt service to users	6.64	3.32	3.32	1.96	Responsive
2	IT support provide their services at the times they promise to do so	6.76	3.69	3.07	1.86	Reliability
3	IT support is dependable	6.64	3.69	2.96	2.10	Reliability
4	The behaviour of IT support instils confidence in users	6.60	3.79	2.81	1.97	Assurance
5	IT support have operating hours convenient to all their users	6.44	3.87	2.58	2.06	Responsive
6	When users have a problem, IT support shows a sincere interest in solving it.	6.52	4.02	2.50	2.01	Empathy
7	IT support always are willing to help users	6.53	4.09	2.44	1.96	Empathy
8	IT support have the knowledge to do their job well	6.73	4.40	2.33	1.91	Assurance
9	Up-to-date hardware and software	6.55	4.80	1.75	1.78	Tangibles
10	Physical facilities are visually appealing	5.74	4.74	1.00	1.79	Tangibles

Table 4: Ranking of Gap data

DISCUSSION OF FINDINGS

The senior librarian who had administered the survey assembled a group of library staff. The group of seven persons included the library's webmaster. They were assembled as a focus group and given a presentation by the researcher in which the quantitative findings of the survey were presented and comments were invited from group members.

The first comment made by the group related to the relative large gap size that existed particularly for items ranked highest in Table 4. In order to provide insight into the gap size, the group felt that gap size could have been caused by expectations being too high relative to perceptions. This brought about an initial discussion on 'management of expectations' and led to a review of underlying theory and research as presented in the following sections.

Peters (1988) advocated that expectations management should 'under-promise and over-deliver'. However, as Pitt and Jeantrout (1994) point out, this will increase the expectations for the next encounter. The latter hold the view that it is best to 'deliver exactly what is promised, every time'. Promises however need to reflect reality (Berry and Parasuraman, 1991); this can be achieved by regular communication between those who serve customers (e.g. service and maintenance personnel) and those who make promises to customers (e.g. salespeople) according to Pitt and Jeantrout (1994).

Expectations management also requires effective communications with customers (Berry and Parasuraman, 1991); for example the organisation contacts customers regularly to determine their needs and to better understand their business (Pitt and Jeantrout, 1994). Another approach is to exceed in service delivery and service recovery (Hart *et al*., 1990); for example the organisation constantly searches for ways to delight customers by delivering a little more than what they would expect (Pitt and Jeantrout, 1994).

Despite the richness in approaches to managing expectations, a number of authors that have criticised the conceptual validity of the expectations construct. Van Dyke *et al*. (1997) pointed out the ambiguity of the term by drawing attention to its loose definition and subjectivity to multiple interpretations in the literature such as desire, wants, ideal. This has led to measurement errors that may have different impacts on perceptions of service quality problems.

The focus group was interested in learning how management could possibly use the gap data. For example, should management be concerned about items with the greatest gap

differences or with reducing the gap over time whatever the size. For the former, the group pointed out that in the web environment, service quality differs from that of the traditional IS environment. Library staff attributed service quality to the development of web pages that was done by library staff themselves (through their webmaster) and that they felt was not being evaluated by the SERVQUAL instrument. Instead SERVQUAL appeared to measure IS service aspects not under their control that were related to IT infrastructure (e.g. server reliability, access via a modem pool, access to an ORACLE database).

To manage the gap size over time requires careful consideration of what constitutes the gap. Under SERVQUAL it is merely an arithmetical derivation and has no intrinsic meaning. For this reason, Kettinger and Lee (1997) advocated the use of 'zone of tolerance' that represents the gap between desired service (what the customer believes 'can be' and 'should be' provided) and adequate service (the minimum level of service performance a customer would be willing to accept). This has appeal since multiple departments and customers can have different levels of tolerance. The zone can be managed effectively, for example by clearly communicating that hours of operation are between 8 and 8 and not 7/24, expectations can be lowered. Furthermore, varying levels of expectations are traditionally canvassed when determining and agreeing on system requirements.

When it comes to monitoring gaps over time, the findings of Watson *et al*. (1998) are relevant. They conducted a longitudinal study in which they measured IS service quality three times in two different service firms (information management consulting firm, information service business). They found that after the first measurement, IS management initiated actions to improve quality which was reflected in the improvement observed in the second measurement. However, the third measurement indicated that it had returned to the levels of the first measurement suggesting that management attention waned after about a year. It was recommended that management regard IS quality as on ongoing commitment rather than as a fad.

To deliver consistent service quality Watson *et al*. (1998) suggest that the CIO links IT strategy to the business strategy. This would demonstrate collective responsiveness of the IS department to ensuring high levels of service quality within the organisation. Furthermore, they advocated having a framework for empathising with clients in which communications with clients are particularly important in that accurate information and realistic expectations of the IS unit are produced. They went as far as suggesting that organisations introduce a reward system, i.e. incentives to motivate IS personnel to improve service quality, e.g. 25% of bonus based on service.

SUGGESTIONS FOR WEB-ORIENTED SERVQUAL

To develop a measure of service quality for the web environment requires that key actions that have the greatest impact on IS service quality be identified. As an outcome of the discussion with study participants and our review of relevant literature we obtained an initial insight into additions and changes that need to be made to the SERVQUAL instrument. As will be seen in the following discussions, new dimensions can be identified and operationalised in diverse ways depending on the context in which IS service quality is measured.

The first dimension should recognise the need to integrate web and business strategy in the same way as Watson *et al*. (1998) suggested that IS strategy be linked to business strategy. This would support the notion that the quality of the web is determined to a large extent by the ability of the organisation to strategically exploit the advantages of this environment. As reasoned at the start of the paper, the web has significantly increased the ability to make services enduring by providing features such as 7/24 availability and global reach. Furthermore, through the use of multi media technology, customer's experiences are enhanced creating a sense of fun, excitement and belonging. This leads to the creation of a digital brand (Dayal *et al*., 2000) that contributes to enhancing customer loyalty.

Next, customers' expectations need to be managed effectively. Pitt and Jeantrout (1994) found a significant relationship between their three dimensions of expectations management (keeping promises, marketing orientation, employee skills) and overall perceptions of customer satisfaction. These dimensions can be decomposed further and adapted for the

web environment. Pitt and Jeantrout (1994) perceived 'keeping promises' as the organisation always attempting to provide a realistic picture of what customers can expect in the service, performing the service right the first time, and evaluating services provided regularly in order to identify areas where mistakes could occur.

According to Pitt and Jeantrout (1994), marketing orientation is reflected in regular attempts to assess the impact of prices of services on what customers expect of services, contacting customers regularly to determine their needs and to better understand their business. Employee skills include training programmes in which employees are taught how to deliver service that is free of errors and to show customers how much the organisation cares for and values its customers. Berry and Parasuraman (1991) suggested that particular attention be given to recovery situations since this turns angry customers into loyal ones.

The importance of providing feedback to customers and attending to their needs promptly is also recognised in studies on trust building strategies for e-Commerce. According to the findings of Cheskin Research and Studio Archetype/ Sapient (1999), the fundamental forms that were found to communicate trustworthiness on the Internet are brand, navigation and fulfilment. The most trusted Internet brands are those that are well known and the least trusted aren't well known. Consumers rely on the quality of navigation to tell them if the site is likely to meet their needs. Furthermore, the site should clearly indicate how an order will be processed and provide information on how to obtain information should problems occur.

Our study revealed that support for websites originates from two sources, namely central IT (the traditional IS group) and the webmaster. When study participants completed the questionnaire, they attributed the dimensions of IS reliability, responsiveness, assurance and empathy to central IT. However, this group only provide some of the support in a web environment, in the case of the library the IT infrastructure (e.g. server reliability, access via a modem pool, access to an ORACLE database). Other support was provided by the webmaster who was responsible for designing and developing the web pages for the library. Based on these findings, SERVQUAL needs to be modified to include the quality of services provided by both IS and the Webmaster. Figure 1 outlines the two sources of IS quality impacting on a website.

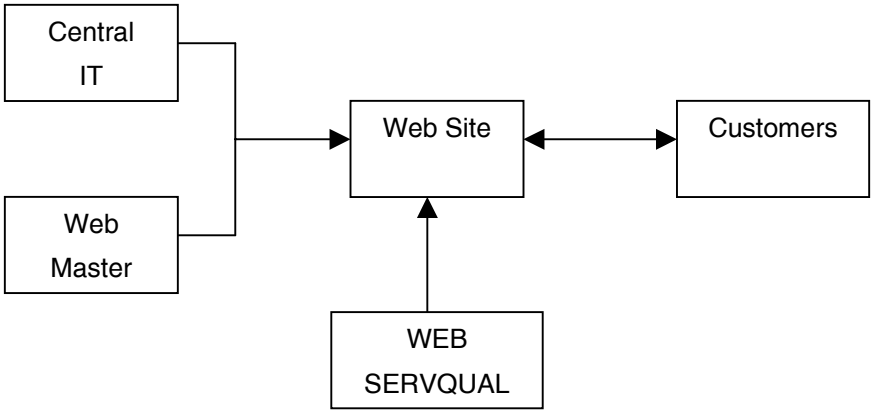

Figure 1: Sources of IS Quality for the Web Environment

The above findings and discussion enabled us to develop a high level WEB-SERVQUAL instrument that is shown in Table 5 below.

WEB-SERVQUAL
Web strategy • Web strategy is integrated with business strategy • The potential of web to maximise customer service is exploited • Enjoyable customer experiences and thereby a digital brand are created **Keeping promise** • A realistic picture of what customers can expect in the service is provided • Service is performed right the first time

• Services provided are evaluated regularly in order to identify areas where mistakes could occur
Market orientation
• The market is surveyed to establish customer needs
• Satisfactory feedback on order fulfilment is provided
• Prompt responses to enquiries (e.g. suggestions, criticism) are provided
Employee skills
• Employees are trained to provide customer service free of errors
• Employee show customers how much the organisation cares for and values its customers
• Particular attention is given to recovery situations since this turns angry customers into loyal ones
Responsiveness
• Central IT/ Webmaster give prompt service to users
• Central IT/ Webmaster have operating hours convenient to all their users
• Webmaster maintains currency of information on web pages
Reliability
• Central IT/ webmaster are dependable
• Central IT/ webmaster provide their services at the times they promise to do so
• Central IT provides 7/24 web access and a reliable infrastructure
Assurance
• The behaviour of Central IT/ webmaster instils confidence in users
• Central IT/ webmaster have the knowledge to do their job well
• Webmaster adopt appropriate web design strategies
Empathy
• When users have a problem, Central IT/ Webmaster whow a sincere interest in solving it
• Central IT/ webmaster always are willing to help users
Tangibles
• Up-to-date hardware and software are used
• Physical facilities are visually appealing

Table 5: A High Level WEB-SERVQUAL Dimensions and Operators

CONCLUSIONS AND FUTURE RESEARCH

This study has provided strong initial indications that the usefulness of SERVQUAL can be prolonged by modifying the instrument for the web environment. Additions and changes that were incorporated in the proposed WEB-SERVQUAL could readily be identified in the context of a university's library website. However, as is the case with all new research, further work needs to be carried out. The suggestions that have been made to establish reliability and validity of SERVQUAL in the past are also valid for WEB-SERVQUAL.

Kettinger and Lee (1997) together with Van Dyke *et al*. (1997) proposed that the instrument's dimensionality be cross-validated by comparing factor structures against factor structures in multiple samples. Multiple groups could be analysed using LISREL (Chin and Todd, 1995). Kettinger and Lee (1997) recommended that research identify the determinants of IS expectation levels and how specific tactics of expectation management affect users' expectation levels. Van Dyke *et al*. (1997) raised criticisms when SERVQUAL produced a single measure of service quality across different industries. Considerable customisation was required to accommodate differences in service settings; "It takes more than simple adaptation of the SERVQUAL items to effectively address service quality across diverse settings" (1997:199).

The significance of research related to web service quality is high since it should be every organisation's objective to have the concept of service quality institutionalised so that service quality becomes an enduring aspect of IS. Watson *et al*. (1998) provided valuable lessons

from their longitudinal research into quality practices of organisations. They concluded that deliberate attempts should be made to design service quality processes since services are inherently process oriented. “Standardized processes ensure reliable performance” (1998:73). Furthermore, under the approach of total quality management quality is built into the process, not something added by inspection (Deming, 1981), “This is particularly true in a service business, where shoddy quality cannot be ‘inspected out’, as in manufacturing” (1981:74).

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