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EVALUATING WAP NEWS SITES: THE WEBQUAL/M APPROACH

Stuart J. Barnes, Kenny Liu, Richard T. Vidgen

School of Management, University of Bath, Bath BA2 7AY, United Kingdom
Tel.: +44 (0) 1225 826473, Fax: +44 (0) 1225 826742
mnssjb@bath.ac.uk, mnmlll@bath.ac.uk, mnsrtv@bath.ac.uk

ABSTRACT

This paper reports on the evaluation of wireless Internet news sites using the WebQual/m instrument. From initial application in the domain of traditional Internet Web sites, the instrument has been adapted for sites delivered using the wireless application protocol (WAP). The WebQual approach is to assess the Web-site quality from the perspective of the 'voice of the customer', an approach adopted in quality function deployment. The WebQual/m instrument is used to assess customer perceptions of information, site and user-oriented qualities. In particular, the qualities of three UK-based WAP news sites are assessed via an online questionnaire. The results are reported and analysed and demonstrate considerable variations in the offerings of the news sites. The findings and their implications for mobile commerce are discussed and some conclusions and directions for further research are provided.

1. INTRODUCTION

The rapid expansion of the Internet and related technologies are changing the ways we live. Indeed, if the Internet pundits are correct, few areas of our lives will remain untouched (Tapscott, 1997). Similarly, the increasing diffusion of wireless telephony has had an important impact on human activity. For example, in the US in mid-2000, the number of wireless phone subscribers is approaching 100 million (CTIA, 2000) – around one third of the population. In the UK, over half the population owned one of these devices (Reuters, 2000). Once separate, evidence is now suggesting that these technologies are entering an era of partnership. The convergence of the Internet and wireless technologies is fuelling expectations of growth in wireless data services.

One wireless data service platform for mobile computing is the wireless application protocol (WAP) - offering distinctive, small-screen Web offerings for handheld devices. Although developed specifically for the current technological environment, WAP is designed to be extensible enough to grow with the evolution of infrastructure. In the UK, WAP services have been widely available since autumn 1999 and the number of Web sites has grown considerably. However, as yet, there is little research into the qualities of a good WAP site, which we expect to be very different from that of traditional Web sites. With these issues in mind, we set about a programme of research aimed at assessing the general perception regarding current WAP offerings and developing an instrument capable of evaluating WAP sites. In earlier papers, we reported the development of the WebQual instrument in the domain of traditional Internet Web sites (Anonymous for

reviewing purposes, 2000a; 2000b; 2001). In this paper, such prior research was used as the basis for an instrument adapted to take into account the WAP environment and mobile user context.

The implementation of WAP has provided both problems and opportunities (Barnett et al., 2000; Logica, 2000). Nevertheless, it indicates an important starting point for the growth of the wireless Internet and is presently the de facto standard for wireless information and telephony services on digital mobile phones and other wireless terminals. With the provision of standards such as WAP, mobile telephony offers a potential platform for the penetration of a raft of services, including news, banking, gaming, shopping and e-mail (Durlacher, 1999).

In this paper we report how the WebQual instrument has been adapted for WAP and subsequently tested in the domain of WAP news sites. In the next section, the development of WebQual/mobile (WebQual/m) is described. The third section reports on the collection of data for WAP news sites and in the fourth section the results of the data analysis are reported, including an examination of validity and reliability. Finally, a summary and some conclusions are provided along with an indication of the future development of WebQual/m.

2. THE DEVELOPMENT OF WEBQUAL/M

2.1. Background to WebQual

WebQual (www.webqual.co.uk) is based on quality function deployment (QFD) - a "structured and disciplined process that provides a means to identify and carry the voice of the customer through each stage of product and or service development and implementation" (Slabey, 1990). Applications of QFD start with capturing the 'voice of the customer' - the articulation of quality requirements using words that are meaningful to the customer. These qualities are then fed back to customers and form the basis of an evaluation of the quality of a product or service.

In the context of WebQual for traditional Web sites, users are asked to rate target sites against each of a range of qualities using a 5-point scale. The users are also asked to rate each of the qualities for importance (again, using a 5-point scale), which helps gain understanding about which qualities are considered by the user to be most important in any given situation. Although the qualities in WebQual are subjective (and quite rightly so), there is a significant amount of data analysis using quantitative techniques, for example, to conduct tests of the reliability of the WebQual instrument. In this sense, the approach bears some similarity to SERVQUAL (Parasuraman et al., 1988). WebQual also integrates some of the qualities of SERVQUAL (Barnes and Vidgen, 2001b), as well as those from the information quality and usability literature (Barnes and Vidgen, 2001a).

2.2. Reflection on the Use of SERVQUAL

In the information systems domain, Pitt et al. (1995) argue that SERVQUAL is an appropriate instrument for assessing the service quality of the IS function. The basic SERVQUAL instrument was used with changes to the wording of the questions to make them relevant to the IS domain, where, for example, 'has modern equipment' became 'has up-to-date hardware and software'. Van Dyke et al. (1997) drew on experiences of the use of SERVQUAL in marketing to raise concerns about the application of SERVQUAL by Pitt et al. (1995) to IS service quality. Similar problems are identified in the work of Smith (1995). Chief among the issues raised were: concerns about the use of difference scores to measure the expectation gap; the unstable dimensionality of the SERVQUAL factors - different factors emerge in different applications of the instrument; and the difficulties of using a single instrument across industries. Van Dyke et al. (1997) note that "the perception component of the difference score exhibits better reliability, convergent validity, and predictive validity than the perception-minus-expectation difference score" (p. 205) - taken in conjunction

with concerns about the ambiguity of the perceptions construct they conclude that it is preferable to use a perceptions-only method.

The WebQual instrument uses web site perceptions and importance to customer ratings equivalent to a two-column format, an approach that we believe captures the most important aspects of information and interaction quality whilst keeping the number of assessments that need to be made to a manageable number. Although there is on-going debate about the SERVQUAL instrument, as Pitt et al. (1997) concluded, "No good canvas is completed in a single attempt" and effort and hard work is needed to build a clear picture of IS service quality. The same is true of building a clear picture of web quality, but the tried and tested ideas of service quality and its measurement provide a strong foundation for the development of WebQual.

WebQual/m is based on the WebQual research (Barnes and Vidgen, 2000; 2001a; 2001b). Thus, the same techniques were used for evaluating WAP sites, although of course the focus of the evaluation is quite different. In particular, when creating the WebQual/m instrument, we were careful to provide a measure that is true to the current nature of the WAP service.

2.3. WebQual/m 1.0

As mentioned above, WebQual/m (infosys.bath.ac.uk/webqualm) takes onboard many of the key ideas of earlier research and applies them in the domain of WAP. To do this it is first necessary to understand something of the nature of WAP, before exploring how the WebQual/m instrument was derived.

The Wireless Application Protocol

WAP is a universal standard for bringing Internet-based content and advanced value-added services to wireless devices such as phones and personal digital assistants (PDAs). In its architecture, WAP is optimised for small wireless devices and suited for small displays, the confines of the alphanumeric keypad, and low processing power (Logica, 2000). WAP supports all major network standards like GSM (Global System for Mobile) – the dominant network standard of Europe – as well as GPRS (General Packet Radio Service) and UTMS (Universal Mobile Telephone System). The WAP application environment consists of: (1) the wireless markup language (WML) for programming an application's user interface in a device-independent way; and (2) WMLScript, a programming language that allows executable logic to be embedded in applications. The text and icon WAP interface tends to be intuitive and user-friendly and applications can be dynamically downloaded on demand. WAP also specifies a proxy server that acts as a gateway between the wireless network and wireline Internet, providing protocol translation and optimising data transfer to and from the wireless handset. The application protocol consists of a layered communication stack comprising protocols for session, transaction, security and datagram.

WAP and WebQual/m

Clearly, those that have used WAP will realise that it is a long way from the wireline Internet. Typically, WAP services have been criticised in terms of the restrictions of hardware (phone keypad, small screen, limited processing power), the slow speed (low, 14.4 Kilobits/second speed of GSM) and its relatively high cost (Durlacher, 1999). However, the reality is that WAP provides a workable starting point at the embryonic stage of the mobile Internet (Barnes, 2002). The move to higher bandwidth services and richer technology (such as Java) is an evolutionary one, and WAP is the first in a series of steps that will be taken over the next few years.

With these issues in mind, we were motivated to devise an instrument that reflected a reasonably accurate evaluation of the current nature of WAP services. The embryonic nature of WAP and the low penetration of the mobile Internet in the UK meant that it would not be possible to conduct focus groups in a meaningful way. Therefore, to this end, we re-evaluated the original WebQual instrument in light of the burgeoning professional literature on WAP (e.g. Arthur D. Little, 2000; Barnett et al, 2000; Durlacher, 1999; Logica, 2000), aiming to produce a much-reduced questionnaire for the mobile context.

The consensus in the literature is that WAP is currently constrained to largely informational use, and that in this situation quick and easy access to 'good' information for the user's mobile context are key. Thus, in devising WebQual/m, this meant that questions on the quality of information and navigation were most relevant – questions which have been a key part of WebQual since version 1.0. Table 1 presents the final WebQual/m instrument, indicating the relationship of the instrument with the last version of WebQual – version 3.0 (Barnes and Vidgen, 2001a). Notice that nine of the questions are clearly linked to the last version of WebQual. Of the remaining three, one is drawn from WebQual 1.0 and the others are new additions.

No.	Description	WebQual 3.0
1	Has an appropriate appearance	Q3, Q4
2	Provides accurate information	Q7
3	Provides up-to-date information	Q9
4	Provides relevant information	Q10
5	Provides information which is easy to understand	Q11
6	Provides information at the right level of detail	Q12
7	Provides fast navigation to what I intend to find	*
8	Provides navigation which is free from errors	**
9	Is easy to find my way around and return to	Q1, Q2
10	Has content designed and selected for the mobility context	***
11	Has content which creates a sense of user community	Q17, Q18
12	Has interesting content	Q6

Table 1: *WebQual/m questions and WebQual 3.0*

Notes: (*) This question did not appear in WebQual 3.0, but a similar version is found in WebQual 1.0.
(**) This is a new question that combines some of the elements from question 7 of WebQual 3.0 with the key problem of navigational errors found in the professional literature (Durlacher, 1999).
(***) This is a new question aimed at assessing the suitability of content for the individual user's mobile context.

3. WEBQUAL 2.0 RESEARCH DESIGN

In applying WebQual/m 1.0 we were keen to find a domain that would reflect the current capabilities of the WAP service. The rationale for choosing WAP news sites was clear: the provision of news is largely text-based or information intensive, and thereby provides a much higher suitability to task for the current technological infrastructure. In support of this, indicative research on usability found that news provision is one of the best-developed WAP services; the suitability to task of news (61.54%) and booking a flight (42.14%) are rated far in excess of shares prices (26.88%) and e-mail (23.13%) (PC Magazine, 2000).

The WAP news sites chosen were the BBC, The Guardian, and Excite (Reuters). These represent three of the first movers into WAP news services, all of which are large and well established in their traditional domains:

- *The British Broadcasting Corporation (BBC).* The BBC has 2000 journalists in 55 bureaus throughout the world. BBC News reaches 70 per cent of the UK population (BBC News, 1999). BBC World Service radio broadcasts in 43 languages to every country in the world reaching 143 million listeners, whilst BBC World television broadcasts to 170 million households globally in 200 countries and territories. The BBC announced its WAP portal in December 1999, in partnership with Vodaphone Airtouch, and it went live in January 2000. This provides an extension of its successful and award winning BBC News Online service on the Internet – launched in November 1997 and now the most popular news service outside the US. Using the BBC's significant resources BBC News Online provides around 300 news stories per day, and an archive of nearly half a million stories (BBC News, 1999). The WAP service provides a diverse range of news and information direct from BBC News to the WAP phone, including the top six general news stories as well as similar volumes of information on the City, sport, travel, TV, and science/technology. When fully rolled-out the service will allow personalised news for the user, dependent on interests.

- *Excite Mobile*. Excite was a first mover to the portal market. The Excite Mobile Portal is a free, fully featured WAP version of Excite's popular Web portal, which has around 1.2 million subscribers worldwide (Oreskovic, 2000). The WAP site, announced in January, was launched in February 2000 (Anderson, 2000). A broad range of optimised content is offered that utilises Excite's personalisation features - letting users pre-set category selections for, e.g. news, TV listings, sport and stock prices. A total of 11 news categories are provided with content fed directly from Reuters.
- *The Guardian*. The Guardian is one of the UK's major broadsheet newspapers, with a market share of 16.65 per cent (as of July 2000). The Guardian Media Group also publishes The Observer – a Sunday newspaper - which enjoys a 15.47 per cent market share. The Guardian announced its WAP news service in January 2000, and it debuted shortly afterwards (Gapper, 2000). The WAP site is an extension of its award-winning network of Web sites – Guardian Unlimited. The News Unlimited WAP site includes the daily editorial content of the Guardian and Observer, updated 24 hours a day. Other parts of the WAP site include Football, Cricket, Film, Books, Jobs, Education and Work. All of these include breaking news, special reports, interactive features and bulletin boards.

One key problem that we were aware of in designing the questionnaire was the small percentage of WAP phone ownership. Even though this is likely to be higher among the sample population (students) than elsewhere, it would still be very low. As of July 2000, sales of WAP phones have been disappointingly low in the UK (Reuters, 2000), although the predictions are much better for other European countries such as Finland, France and Germany (Financial Times, 2000; NOP Research Group, 2000). The solution was to make use of a WAP emulator, several of which are available for the Web. The WAP emulator chosen was acquired from www.gelon.net. In testing, this provided a quick, reliable and relatively true-to-life imitation of a WAP phone. It also allowed for a variety of phone types, although the survey standardised on the Nokia 7110.

The WebQual/m questionnaire and associated survey was made available on the Internet and, as with WebQual, consisted of an opening instruction page that would then open a separate browser window containing the qualities to be assessed (Figure 1). In this case, the browser window used the Wapalizer from www.gelon.net and could be substituted by the user's own phone. The control panel allowed the user to switch the contents of the target window between the instruction page and the target WAP site to be evaluated. This design allows the user to decide on the sequence of site evaluation and the order in which the questions are to be answered. For example, the user could decide to answer all questions for one site and then move on to the next site, or answer the same question for all three sites, or adopt a mixture of the two approaches.

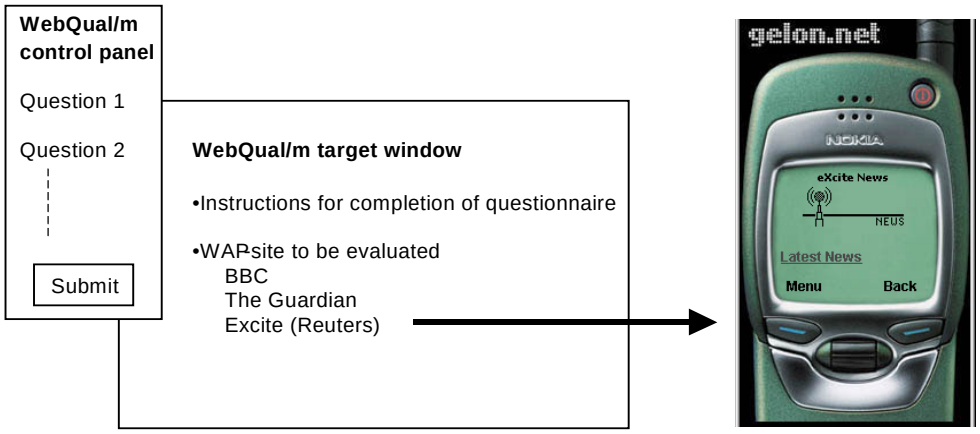

Figure 1: *Internet-based WebQual/m questionnaire with emulated WAP site*

In addition to the assessment of the sites using WebQual/m, we were also interested in gauging some general perceptions of WAP services. This would help to put WAP services in context and reinforce some of the ideas from the WAP literature. In particular, respondents were asked to select WAP services that appealed to

them in the mobile context (binary answer from a list), and about perceptions of aspects of security, transactions, cost and information access. These are discussed more fully in the next section as part of data analysis.

4. DATA ANALYSIS

The data collected are summarised in Tables 2 and 3. Note that at this stage we have not presented any groupings of the questions to provide pertinent categories (this is discussed below). In all, we received 32 completed questionnaires from students and these formed the basis of the analysis discussed here. The body of responses came largely from students studying the MSc in Management (and variants) at the University of Bath. The questionnaire responses were received via e-mail, filtered to check for duplicates, and converted into a form usable in SPSS (a statistical software package) and Excel.

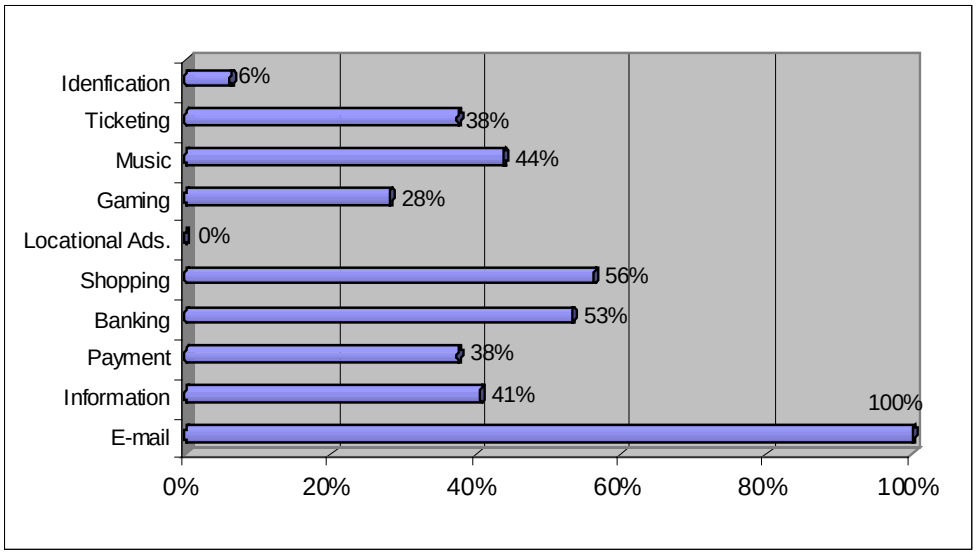

Figure 2: *Preferred WAP services*

4.1. General Perceptions of WAP Services

To put the assessment of WAP in context, we were interested in examining students' general perceptions of these services. Figures 2 and 3 summarise this data. Older students, such as postgraduates, many of which can expect a good job on graduation, are a large part of the target market for WAP data services (Peter D. Hart Research Associates, 2000). Although the sample is not large, it provides some indicative data in an area where research is scarce.

WAP can be used for many areas of service provision. Respondents were asked which areas they would be interested in using on a WAP phone – as drawn from the literature (e.g. Arthur D. Little, 2000; Durlacher, 1999; Logica, 2000). A list of ten services was created for the questionnaire, along with a short description of each; respondents were then asked to select services they preferred in a binary fashion. Figure 2 shows the result. Responses ranged from 100% for e-mail down to 0% for location-based advertising. Using the phone as a means of identification and authentication also rated very low at 6%. Of the remaining services, more than half would use banking or purchase online from mobile retailers. Music and information provision – the latter of which would include the news services which are the focus of this study – also rated quite well at more than 40%, with mobile e-cash and ticketing not far behind.

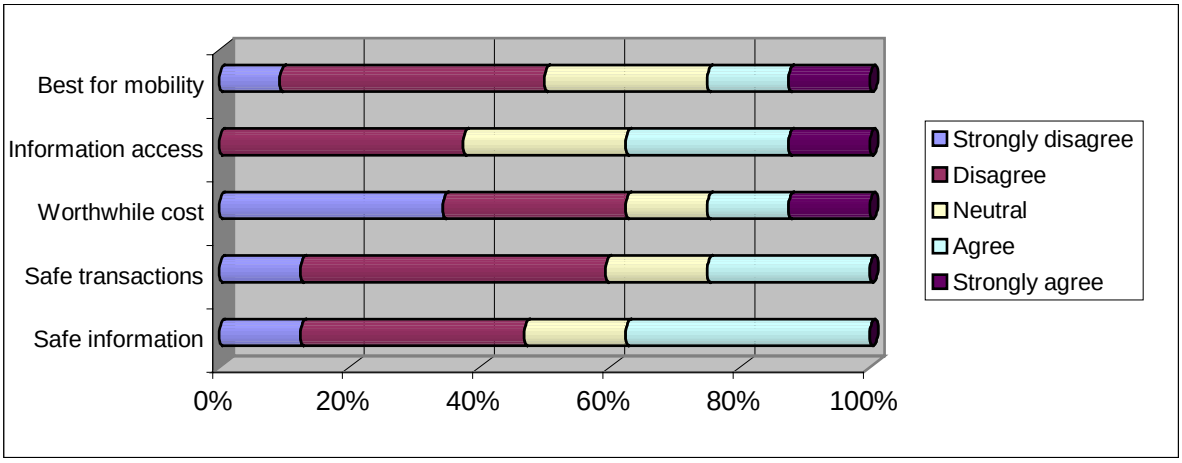

Figure 3: Perceptions of WAP services in general

In addition to areas of service, the survey also contained several questions relating to general perceptions of WAP. A sample of these questions is discussed here (others are not included in this paper due to space restrictions). Specifically, respondents were asked about whether they thought that: WAP was superior to paper (e.g. newspapers or books) in the mobility context, access to information was satisfactory, the cost (currently £0.10 per minute) would be worthwhile, transactions would be safe, and personal information would be secure. Figure 3 shows the set of responses. As we can see, the views are somewhat mixed. There is quite strong feeling that the cost of WAP services is prohibitive and that safety of transactions is a problem. Both findings support issues discussed in the literature (Korpela, 2000; Logica, 2000; Manchester, 2000). There is similar feeling that paper-based information content is still enduring in the mobility context (`Best for mobility` in Figure 3), and quite mixed feelings about the safety of personal information. The most positive perceptions were about access to information – only 38% of respondents felt that this was unsatisfactory, with no strong disagreement.

4.2. Discussion of the Summary Data

The data summary provided in Table 2 shows a number of items for discussion. The columns represent four data subsets based on the 32 responses: the importance rating for each question and the per question ratings for each of the three WAP news services (each of which was based on a scale of 1 to 5). Two summary items are shown in the table for each question and subset: the arithmetic mean and standard deviation.

No.	Description	Importance		BBC		The Guardian		Excite (Reuters)	
		Avg.	*St. Dev.*	*Avg.*	*St. Dev.*	*Avg.*	*St. Dev.*	*Avg.*	*St. Dev.*
1	Has an appropriate appearance	3.34	1.21	3.03	0.90	3.47	0.72	3.38	1.07
2	Provides accurate information	3.75	0.98	3.34	1.00	3.41	0.87	3.72	0.68
3	Provides up-to-date information	4.13	1.39	3.47	1.24	3.38	1.24	3.88	1.07
4	Provides relevant information	3.59	0.84	3.13	0.94	3.38	0.71	3.63	0.71
5	Provides information which is easy to understand	3.53	1.11	3.38	1.24	3.47	0.72	3.97	0.90
6	Provides information at the right level of detail	3.53	0.72	3.38	0.98	3.41	0.84	3.78	0.83
7	Provides fast navigation to what I intend to find	3.91	1.53	2.78	1.10	3.03	1.03	3.28	0.96
8	Provides navigation which is free from errors	3.47	0.98	3.47	0.88	3.22	0.66	3.22	0.66
9	Is easy to find my way around and return to	3.53	1.16	3.28	1.57	3.41	0.84	3.91	1.15
10	Has content designed and selected for the mobility context	3.41	1.07	2.91	1.15	3.28	0.81	3.53	0.88
11	Has content which creates a sense of user community	3.72	0.85	3.59	0.87	3.59	0.76	4.22	0.91
12	Has interesting content	3.66	1.23	3.16	1.37	3.28	0.63	3.53	1.32

Table 2: *Average and standard deviation information for the questionnaire*

Referring to Table 2, there are notable patterns in the data. In terms of the importance ratings for the individual questions, these are quite high (with means of 3.34 and above), indicating some face validity to the components of the instrument. There are also some useful groupings to note. Those questions considered most important by the respondents - as indicated by means above the upper quartile of 3.73 - are associated with quick access to 'hard' information quality. Here we find, in descending order of importance, questions

3, 7 and 2. Such questions concern the accuracy and timeliness of information, as well as how quickly it can be found. Conversely, when examining those items considered least important - below the lower quartile of 3.52 - we find a quite different variety of questions. Specifically, questions 1, 10 and 8 are in ascending order of importance. This group revolves around softer issues such as aesthetics, the mobility context and navigation errors. The remaining questions fall somewhere in between these two groupings and the median is 3.56.

The results suggest that there are a number of priorities demanded from WAP news service users. The results are rather pragmatic and underline quite strongly what we might expect from the current technology offerings; users are not so concerned with the look and feel of WAP sites, which is an obvious limitation, and have a pragmatic attitude towards the unreliability of navigation (as emphasised in the computer press: PC Magazine, 2000). Users appear to want immediate access to 'hard' information quality.

Turning to the results for the ratings of individual sites, we find some very stark contrasts. The unweighted averages in Table 2 show very clearly that the Excite UK (Reuters) WAP site ranks well above its two contemporaries. The site scored consistently higher than the other two sites for all but two items - questions 1 and 8 – where The Guardian and the BBC respectively each ranked top. The BBC and Guardian and much closer in their scores, although the BBC ranks lower on all but three qualities.

4.3 WebQual Indices

The weighted results shown in Table 3 serve to accentuate the differences indicated above in the direction of user priorities. Again, Excite (Reuters) appears to rank highest, although there is more competition in the rankings between the BBC and The Guardian. The total weighted scores give some indication of this.

No.	Description	Max. Score	BBC		The Guardian		Excite (Reuters)	
			Wgt. Score	*WQI*	*Wgt. Score*	*WQI*	*Wgt. Score*	*WQI*
1	Has an appropriate appearance	16.72	10.25	0.61	11.47	0.69	11.22	0.67
2	Provides accurate information	18.75	13.25	0.71	13.50	0.72	14.25	0.76
3	Provides up-to-date information	20.63	15.72	0.76	15.00	0.73	17.00	0.82
4	Provides relevant information	17.97	11.50	0.64	12.00	0.67	13.00	0.72
5	Provides information which is easy to understand	17.66	11.91	0.67	12.66	0.72	14.19	0.80
6	Provides information at the right level of detail	17.66	12.44	0.70	12.19	0.69	13.72	0.78
7	Provides fast navigation to what I intend to find	19.53	11.16	0.57	12.88	0.66	13.91	0.71
8	Provides navigation which is free from errors	17.34	12.50	0.72	11.25	0.65	11.25	0.65
9	Is easy to find my way around and return to	17.66	11.22	0.64	12.34	0.70	13.97	0.79
10	Has content designed and selected for the mobility context	17.03	10.84	0.64	11.75	0.69	12.41	0.73
11	Has content which creates a sense of user community	18.59	13.91	0.75	13.81	0.74	16.06	0.86
12	Has interesting content	18.28	11.31	0.62	12.06	0.66	13.06	0.71
	TOTALS	***217.81***	146.00	***0.67***	150.91	***0.69***	164.03	***0.75***

Table 3: *Weighted scores and the WebQual Index (WQI)*

Unfortunately, the weighted scores make it difficult to give a benchmark for the sites. One way to achieve this is to index the total weighted score for sites against the total possible score (i.e. the total importance multiplied by 5, the maximum rating for a site). To this end, Table 3 shows the maximum scores for each question and site. It also shows the WebQual Index (WQI) for each question and an overall WQI for each site (indicated in bold italics). Overall, Excite is benchmarked well above the other two WAP news services, with an overall WQI of 0.75. The Guardian follows with a WQI of 0.69, whilst the BBC is close behind at 0.67.

Perhaps more interesting is some conceptual assessment of how the WAP sites differ in quality. For this, we need to move beyond the scores and indices of individual questions towards a set of meaningful, reliable sub-groupings. To this end, the next section derives a set of subcategories and applies them to the analysis.

4.4 Scale Reliability and Question Subcategories

To verify the scale reliability of WebQual/m, a statistical reliability analysis was conducted using Cronbach's α. The test was conducted on the empirical data from each of the online news services. The resultant values of α averaged at 0.90, suggesting that the scale is quite reliable.

Furthermore, to better facilitate comparison between the WAP sites, reliability analysis was extended to a number of question sub-groupings. Three categories were chosen, each with a further two subcategories. These can be explained as follows:

- *Information quality*. This includes hard aspects of quality such as accuracy and currency, as well as softer, more interpretive aspects such as relevancy, ease of understanding and level of detail.
- *Site quality*. This includes aspects of the design of the site. WAP sites are not known for their aesthetic appeal, so the focus here is particularly geared around the appropriateness of appearance (format and style) and quality of navigation. Where sites are largely information-based, finding the right information quickly, easily and without errors is of paramount importance.
- *User quality*. This refers to the WAP site's ability to meet the user's needs. These are the softest aspects of quality. Important questions include the suitability of content for the user's mobility context, whether such content is engaging for the recipient, and whether it is targeted at a suitable user community group in an appropriate way.

The average values of Cronbach's α are quite high for the categories, and two of them exceed 0.8. The user category has the smallest value of α at 0.71, although this also has the smallest number of items – just three. Thus, it appears that we have a quite reliable set of question groupings. This provides a more solid foundation for assessment, based on a stronger recognition of the association between certain questions.

Sub-categories	Questions	Average Alpha
Information	*Q2 - Q6*	*0.86*
- hard quality	Q2, Q3	
- soft quality	Q4, Q5, Q6	
Site	*Q1, Q7 - Q9*	*0.83*
- navigation	Q7 - Q9	
- appearance	Q1	
User	*Q10 - Q12*	*0.71*
- empathy	Q11 - Q12	
- mobility	Q10	

Table 4: *Summary of reliability analysis for questionnaire categories*

4.5. Site Analysis Using Question Subcategories

By utilising the framework of categories examined in the last section, we are able to build a profile of the qualities of an individual WAP site that is easily compared to its rivals. Thus, we are in a better position to examine why some sites fared better than others on the WebQual index. Figure 4 gives an example of how this can be achieved.

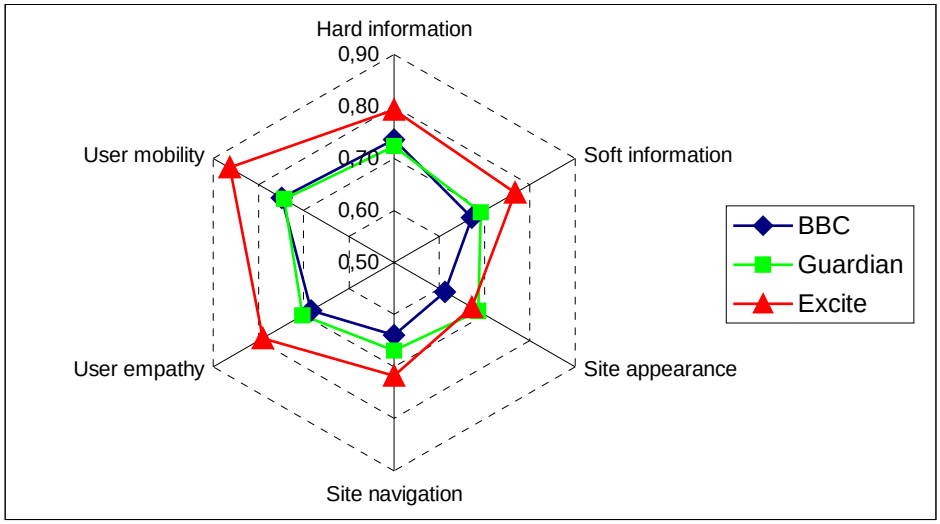

Figure 4: *Radar chart of WebQual/m 1.0 subcategories for the three WAP sites*

As a starting point, the data was summarised around the six questionnaire subcategories. Then, and similarly to the WebQual Index in Table 3, the total score for each category was indexed against the maximum score (based on the importance ratings for questions multiplied by 5). Figure 4 is the result, which rates the three Web sites using these criteria. Note that the scale has been restricted to values between 0.5 and 0.9 to allow for clearer comparison.

Figure 4 demonstrates very clearly that the Excite UK site stands head and shoulders above the two rivals. With the exception of site appearance, the indices for the subcategories for Excite make a clear circle around the other two sites, with mobility, user empathy and information quality rating particularly well. Other areas are less strong, in relative terms, although still ahead of other sites. In particular, site appearance ranked lowest for Excite, with other categories somewhere in between. Of the two other sites, The Guardian appears to be the stronger, although the scores are very close. The Guardian scores particularly well for site appearance, where it rates 8 points above the BBC and 2 points above Excite. However, the BBC edges slightly ahead of The Guardian for hard information quality and user mobility.

Overall, it is interesting to see that Excite is a clear leader in WAP news services. Excite is by far the most experienced player in providing electronic portal services, and this filters through strongly into its WAP offerings. The reliance on news feeds from Reuters, itself a key player in the electronic provision of news content, consolidates its position in the area of news services. The other players, both much less experienced in Web offerings, are some way behind. Of these two other players, The Guardian, whose competencies have traditionally relied on the written word, is slightly ahead of the BBC, which has traditionally focused on the spoken word (TV and radio). Notwithstanding, as the technological infrastructure of the mobile Internet improves – particularly via faster, third generation network transmission – players such as the BBC are likely to prosper due their multimedia experience.

4.6. The Validity of WebQual/m

It is worth mentioning some points regarding the validity of the Webqual/m instrument. In developing the tool, we have paid attention to creating a scale that has some validity in measuring perceived WAP quality, drawing on an analysis and integration of the literature (for a full discussion see: Anonymous for reviewing purposes, 2000a; 2000b; 2001). Thus, in terms of the dependency on theoretical considerations, this adds a certain degree of validity. In addition, from the results of the research, the instrument does appear to have some usefulness in analysing the chosen Web sites; insofar as some aspects of Web site and service quality are observable, it appears to provide a reasonably valid indicator of criteria (IT Reference, 2000).

The questionnaire has purposefully been kept to a manageable size for data collection, and this is in line with similar work on service quality (Zeithaml et al., 1993). However, whilst we believe that it captures many of the important items for WAP quality for news services, of course it does not cover all possible items. Further relevant items may emerge as we further refine and test the instrument in different domains, and as the mobile technology infrastructure improves.

5. SUMMARY AND CONCLUSIONS

WebQual/m is designed to give insight into customer perceptions of WAP site quality. The application of WebQual/m to news services shows that Excite is considerably ahead of its UK competitors, The Guardian and the BBC. Although analysis of the data suggests that the WebQual/m instrument has some reliability, further work is needed to refine and develop the instrument and to adapt it for different domains. Currently, information intensive applications are dominant on the mobile Internet: there is not enough bandwidth for multimedia-intensive applications and there are very few services aimed at commercial activities such as product purchase. However, with improvements in transmission technology such as GPRS and later UMTS - bringing speeds up to 115 Kilobits/second and 2 Megabits/second respectively - this is likely to change. Along with enhancements to service technologies like WAP (and implementation of those based on Java, for example), such advances will allow interactive and multimedia-rich applications for the mobile phone, resembling those of the Web today. Future revisions of WebQual/m will take more consideration of interactivity – based on an analysis of other important domains such as mobile commerce and mobile banking.

Furthermore, whilst WebQual/m has proved useful in giving a benchmark for WAP sites in terms of user perceptions, it says very little about how such issues translate into supply-side development. Based on QFD, future work will attempt to examine how the developer and organization can go about enhancing the perceptions of users, thereby increasing the value of the WebQual Index. Such issues will require attention both to site and organisational aspects, the latter becoming particularly important as WAP sites become more interactive and commercial.

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