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Relative Importance of Web Quality Dimensions

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ABSTRACT

Quality of web sites has major impact on sales and on overall customer satisfaction in business today. Measuring the quality of web site from the users' perspective, will give a fast and early feedback to the firm and will enable it to take corrective action and improve its operations. This paper reports on a study investigating the ranking given by the users to various factors of web site quality and compares it with their perception of the web quality. Extending the work by Aladwani & Palvia, this study validates and revises their model and contributes to better understanding of web quality dimensions. Study concluded that there are significant differences between the perceptions of consumers who buy products and those buying services in terms of their overall perception of web site quality, convenience/availability and specific content of the web site. Study points out the importance of security, access and personalization factors for online consumers irrespective of the products or services purchased online. Low importance attached to appearance and information quality factors of web sites suggests that they are considered as 'qualifiers' by consumers.

Keywords

Web quality, dimensions, relative importance, user perceptions

INTRODUCTION AND BACKGROUND

The Web sites in today's business environment serve as an important point of contact to the stakeholders. An online customer's overall experience comprises of several activities that include information search, navigation, product evaluation, decision making, ordering, making the transaction, delivery, returns and customer service and satisfaction with the products and services (pre-purchase, during the purchase and post-purchase activities). With the rising number of online consumers, and their increasing expectations from the businesses, there is an increasing pressure for the businesses to better understand the issue of web quality (Yoo and Donthu 2001). According to a report, the volume and online sales of products and services will increase significantly in the coming years (NOIE 2003). This underscores the importance of web site quality. Today, web sites play a pivotal role in the dissemination and accumulation of company information, facilitating communications with stake holders, projecting high quality corporate and brand image, selling products and services, providing information related services to customers, and in generating additional business (Subramaniam et al 2000).

Several commercial research firms and trade press have developed scales to rate the web sites. For example, Bizrate.com an online research firm collects information from the online consumers during their buying and after the delivery of the products. Along with an overall score for the retailer, Bizrate collects consumers' perception on attributes such as ease of ordering, product selection, product information, price, on-time delivery, product representation, customer support, privacy policies and shipping and handling. Other online researchers such as Forrester Research, Jupiter Communications, Gartner research etc. regularly publish research on the consumers' ratings of online experiences (Wolfenbarger & Gilly 2003). Though these commercial research firms have created attributes to measure the quality, they do not address the conceptualization and testing of validity and reliability of these measures.

Because of the dual nature of the online consumer as traditional shopper and computer user, appropriate user interface influenced by the technology and information systems are as important as offering the customer with good customer service, transaction efficiencies, lower prices (Koufaris et al 2002) and order fulfillment. Several researchers from a variety of disciplines including information systems, marketing, operations and communications have studied web quality. Depending upon the focus of the individual research study, several authors have developed multi-item scales to measure the web site quality. Among them four instruments can be considered comprehensive in the literature. They are Aladwani & Palvia (2002) model of user perceived web quality, WebQual model by Loiacono et al (2002), eSQ (electronic service quality) scale by Zeithaml et al (2002) and eTailQ (electronic retailer quality) by Wolfenbarger & Gilly (2002). While the instrument designed by Wolfenbarger and Gilly (2002) concentrates on the comprehensive e-tailing experience that includes pre- and post-

purchase factors, Zeithaml et al (2002) focused on the electronic service quality that includes web interface and service quality dimensions such as empathy.

Loiacono et al (2002) developed an instrument called WebQual to measure the dimensions of web quality. They have identified twelve dimensions of web quality and includes factors such as informational fit to task, interactivity, trust, response time, ease of understanding, intuitive operations, visual appeal, innovativeness, flow/emotional appeal, consistent image, online completeness and better than alternative channels. The WebQual instrument designed by Loiacono incorporates factors such as availability of alternative channels of distribution, corporate image of the company and response time, which are outside the web site interface instance and measures to some extent overall quality experience of customers.. Further Loiacono et al (2002) found that the composite WebQual measure significantly correlates with the customers' intention to purchase and revisit the site.

There are several other studies in the area, with some focusing on the usability issue and satisfaction (Agarwal & Venkatesh 2002, Cox and Dale 2002), while others on the factors contributing to the web site success (Palmer 2002, Liu & Arnett 2000). Certain other authors focused on the entire online experience (Srinivasan et al 2002) and the consumers' intention to return (Koufaris et al 2002, Novak et al 2002). Similarly, Zanda et al (2002) developed five dimensions of web sites, Ranganathan & Ganapathy (2002) identified four key dimensions of web sites, Cox and Dale (2002) developed four key quality factors, and McKinney et al (2002) proposed nine key constructs to measure web-customer satisfaction.

While some of these studies have used real online customers, others have used surrogate customers who have not made a purchase at the site they have evaluated. Most of these studies were conducted in the USA and have different objectives and focus. With theoretical models emerging from technology acceptance model, innovation diffusion theory, and human-computer interaction theories, these researchers have developed conceptual models and proposed constructs for measuring the dependent variables such as web quality, usability, customer satisfaction, web site success, intention to return and customer loyalty. It is, however, not clear from the previous studies, whether the relative importance attached by the consumers to various dimensions of web site quality is influenced by the nature of products they buy online or not. What is the influence of their own online buying experience in rating the relative importance of various factors? Is it different to their assessment of overall web quality? Since the determinants of web quality desired by the consumers and their relative importance in predicting overall web quality may be influenced by the nature of product or service, this study analyzed the differences between two broad groups – physical products and information-based services.

Since this study is primarily focusing on the web interface that deals with an instance related to the actual buying experience and not pre- and post-purchase issues, Aladwani and Palvia (2002) instrument is employed as the basis for data collection. Focusing on the quality of web interface, Aladwani & Palvia have identified four underlying dimensions of web site quality - technical adequacy, specific content, content quality and appearance and developed a 25 item instrument to measure the user perceptions of web quality. Culture may influence user expectations regarding web quality and therefore it is difficult to generalize them across the different cultural and national contexts (Tsikriktsis 2002). By extending Aladwani & Palvia's work on web quality, and further confirming and revising their model, this study contributes to the knowledge and facilitates better understanding and explanation of the relative importance of underlying factors in a different national and cultural context.

METHODOLOGY

The objectives of this research study are to determine the relative importance attached by the users to various web quality dimensions and analyze the differences between the customers who purchase physical products and information-based services. This study has asked the respondents to evaluate the site from which they have actually purchased earlier. By doing so, it is possible to collect information from the actual online shoppers rather than from potential shoppers who might never have visited them or just visited them for the sake of study. This approach ensures that the respondents have both the knowledge and experience of the web site they are evaluating. It is difficult to get permission from the companies to survey their real customers because of its effect on their internal operations and buyers' shopping experience. Therefore, students and practicing managers who attend the university on part-time basis and above the age of 21 years were used as the subjects in this research.

The instrument designed by Aladwani and Palvia (2002) has 25 items that measure various aspects of web site quality including variables such as ease of navigation, security, search facilities, ease of access, availability, speed of page loading, quality of the content in terms of completeness, currency, conciseness and accuracy; information about the company, products/services, customer service and privacy; and appearance of the web site. The respondents were asked to rate the importance of each item in a scale of 1 (not important) to 7 (highly important) based on the previous online buying experience. In order to improve the reliability, the participants were also asked to give reasons for the rating given for each

item. It is expected that the reliability of the responses will increase significantly when the respondents are asked to give reasons for the rating given to a particular variable (Koriat et al (1980). In addition, respondents were asked to list the top six items they think are generally important for web site quality and give reasons. The intention is to compare the relative importance rating given by the respondents for each item with the ranks they have assigned to individual items. In the study, from the 229 responses received, 218 were found to be valid after deleting the responses with incomplete data.

Firstly validation of the instrument was carried out in this study by asking respondents to visit the Amazon web site and rate their online interface using the instrument. After the completion of the survey on Amazon site, respondents were asked whether they have purchased any products or services online earlier in the past three months or not. Basing on their personal online buying experience, respondents then were asked to rate the importance of these items listed in the instrument. In addition they were also asked to indicate the web site and/or online company details. Respondents who did not buy any product or service in the past three months were removed for further analysis. Based on the information received from the individual respondents they are categorized into two groups for further analysis - i) consumers that purchased physical products, and ii) consumers that bought information based service products such as travel and accommodation.

In order to test the dimensionality of the instrument and inter-dependency of the second order latent variables, structural equation modeling (SEM) technique was employed (Gefen et al 2000). A confirmatory factor analysis using Structural Equation Modeling was carried out to test the goodness of fit of the data set. It is then used to analyze the relative importance attached by the customers to various latent variables such as security, ease of use, personalization, content quality, specific content and appearance. Two-tailed t-tests were conducted to test the significance of differences between various independent variables in their perception of the web quality dimensions and their importance.

ANALYSIS AND DISCUSSION OF FINDINGS

Demographics:

The demographic characteristics of the respondents are as follows. About 70% of the respondents are below 30 years and above 12% of the respondents are more than 40 years age, with the remaining 18% between the age of 30 and 40 years. About 56% are male and 44% are female. Almost 75% of the respondents indicated that they have purchased some products or services online in the past 3 months. Out of the 218 respondents, all of them have purchased some products/services online earlier, with about 75% of them purchasing more than thrice in the past one year. Analysis of the data about the web sites reveals that about 25% of the respondents have purchased the products from eBay, 16% have purchased from Amazon, and another 15% purchased event tickets from a popular local event management company, reflecting the popularity of these web sites in Australia. A total of 12 different web sites were named as those where the respondents had shopped most often in the past one year. While about 76% of the respondents have purchased a product from the retail online stores such as Amazon and Dell, about 24% have purchased online service that include tickets to events, air tickets and accommodation. Even though the nature and type of product purchased is different, every interaction with the web site involved financial transaction through credit card. The respondents have paid monies ranging from \$15 to \$1400 for purchasing their products and services.

Importance ranking:

When asked to rank top six items that are relatively important in determining the web quality, almost all the respondents have considered security as important, whether they are buying physical products or information-based service products. About 80% of the respondents have ranked it as number one, with almost all the respondents naming it as one of the top six important factors. While the variable 'ease of navigation' is ranked second, details of products/services, availability of the web site, speed of page loading, and customer service information are the items ranked important in that order. Items that generally deal with the appearance factor (such as proper use of color, fonts and multimedia), conciseness and completeness of the content and ease of access are considered least important by the respondents.

Frequencies of rating items:

While respondents are asked to give a rating in a scale of 1 to 7 for each of those items, the item security is rated the most important with a mean rating of 6.7, while the item 'use of multimedia' was rated least important with a mean rating of 3.6. Majority of the items such as ease of navigation, search facilities, valid links, speed of page loading and ease of access under the factor 'technical adequacy' are rated between 5 and 6, while the items customization and interactivity are rated around 4.4 in a scale of 1 to 7. All the six items about the usefulness, completeness, clarity, currency, conciseness and accuracy of the content under the dimension 'content quality' have a mean rating of around 5.7 with the item accuracy rated 6.2 and conciseness rated 5.3 by the respondents. The factor 'specific content' deals with the different types of information that

include contact details, company details, product details, privacy and customer service information, with the product details rated most important with a mean rating of 6.10 and company information rated lowest with 4.8 mean rating. Under the heading 'appearance' factor there are five items – attractive web site, organized web site, proper use of fonts, proper use of color and proper use of multi-media. The item 'proper use of multi-media has scored lowest mean rating of 3.85 and organized web site scoring 5.7. It is interesting to note that the respondents have rated security (6.7), accuracy of the content (6.2), product details (6.1), currency of the content (5.9) and content usefulness (5.9) as the top five ranking items of web quality.

Comparison of general ranking and relative importance:

Comparison of the frequencies of item rating with the general ranking of the items by the respondents reveals that security and product details are rated as the top two items by the respondents. The remaining four items are also similar. In general, items in the 'appearance' factor generally scored least rating in both types of rating. This result suggests that the appearance of the web site is considered a qualifier these days by the consumers and it is expected that the minimum level of quality would have to be ensured in terms of the web site appearance if the company wants to do online business. In addition to these two, items such as accuracy of the content, currency and usefulness of the content, speed of page loading, customer service information, availability and customer service information are also rated important by the respondents.

Confirmatory factor analysis using SEM

A confirmatory factor analysis is carried out using Structural Equation Modeling (SEM) technique to validate the underlying latent variable structure in the data collection instrument. Using maximum-likelihood method, parameter estimates were computed using AMOS software and the model was evaluated to determine the adequacy of the fit with the data. When the four-factor model as suggested by Aladwani & Palvia (2002) did not fit the data well, other comparable models were developed based on substantive criteria and other statistical indices (modification indices and squared multiple correlations). Since there is no consensus on a single or a set of measures to assess the fit of the composite variables, several measures are normally reported while reporting on the structural equation models (Gefen et al 2000). Comparison of three models is presented below.

	Indices in SEM analysis / Models	4 factor model (A)	6 factor model (B)	Model (relative importance) (C)
	Data set used in the analysis	Amazon evaluation	Amazon evaluation	Actual buying experience data
1	Number of items in instrument	25 items	20 items	20 items
2	Chi-square/degrees of freedom ratio (CMIN/DF)	1.871	1.90	1.30
3	GFI (Goodness of Fit Index)	0.836	0.910	0.913
4	AGFI (Adjusted Goodness of Fit Index)	0.803	0.848	0.853
5	CFI (Comparative Fit Index)	0.888	0.936	0.963
6	Standardized Root Mean square Residual (SRMR)	0.064	0.049	0.048
7	RMSEA (Root mean Square Error Approximation)	0.062	0.049	0.036

Table 1: Goodness of fit statistics for three models

In general, values higher than 0.90 for GFI (Goodness of Fit Index) and CFI (Comparative Fit Index), 0.80 for AGFI (Adjusted Goodness of Fit Index) suggest a good fit of the hypothesized model. For RMSEA (Root Mean Square Error Approximation) and SRMR (Standardized Root Mean square Residual), a value less than 0.1 is considered a good fit and a value less than 0.05 is considered very good fit of the data to the research model (Gefen et al 2000, Hair et al 1998, McKnight et al 2002).

Analysis revealed that the items 'attractive web site', 'use of multimedia', 'company information', 'content accuracy' and 'content usefulness', were accounting for the substantial misspecification of the model (with larger error covariances with other items and cross loadings on other factors). Based on further substantial justification, these five items that appear to be redundant and accounting for substantial misspecification are removed (Byrne 2001, Hair et al 1998). This has resulted in the improvement of this model as shown in the goodness of fit statistics (model B). The final model has 20 items. This final six

factor model with 20 items as derived from several iterations, termed as model B, was used as the basis for validating the relative importance data collected from the actual online consumers.

The third model C uses sample data set collected based on the actual online buying experience of respondents in the study. While the first data set on Amazon provided a basis for model estimation and modification, the second data set is used for the validation of the model in the individual web experience context and to delineate the relative importance attributed to various factors by the respondents. To this final model, data collected from respondents based on their actual online experience is applied and tested for the goodness of fit. Results presented in the table 1 (final column) indicate that the data fits well.

Comparison between different groups:

It is expected that the web quality perceptions are influenced by the nature of products and/or services purchased online. Hence, two tailed t-tests for two independent samples were employed to analyze the differences. The null hypothesis in these tests was that there is no difference between these two subgroups' scores. This hypothesis is tested using independent samples t-test at 95% significance level. Details of the t-test results between the consumers buying products and those purchasing services are presented below. For the sake of analysis, the cumulative score of each of the factor is taken into consideration while comparing the mean differences.

Description Dimensions	Consumers buying products	Consumers buying Services	Signifi- cance	Significant difference
Secure access (4 variable)	23.45	23.5	0.923	No
Convenience/availability (3 variables)	8.96	8.30	0.008	Yes
Personalization (2 variables)	8.96	8.18	0.465	No
Content quality (4 variables)	23.11	22.79	0.495	No
Specific content (4 variables)	22.39	24.24	0.005	Yes
Appearance (3 variables)	15.12	15.16	0.919	No
Total score (20 variables)	126.54	117.78	0.014	YES

Table 2: Differences between consumers buying products and those buying services online

The above analysis suggests that there are some significant differences between the consumers who purchased products and those that purchased information based services, especially on the aspects that deal with convenience/availability and specific content constructs and the overall web quality score. In terms of issues such as availability of the web site, speed of page loading, and the site having valid links, consumers who buy services apparently attach less importance than the consumers who buy products online. Similarly, consumers buying service products consider the information about customer services, privacy and products more important than those buying physical products. Consumers generally perceive information about privacy and customer service as an indicator of trustworthiness of the web site. Apart from the technical factors, qualitative aspects such as company's privacy policies and customer service influence the confidence and trust on the web site and therefore may have an impact on their purchasing behavior.

Importantly, there are no significant differences with regard to the importance attached to the factors such as security, personalization, content quality and appearance. Since credit cards are used for carrying out financial transaction, security appears to be equally important for both types of respondents. Similarly, as mentioned earlier, appearance and content quality also are expected to be equally good for attracting the customers to the web site, and are 'taken for granted' by the respondents.

The instrument employed in this study measured the perceptions of web quality and is typically confined to the measurement of web interface. Therefore, it may have no bearing on the pre-purchase and post-purchase experience of consumers. However, the experience is not complete until the physical product ordered is received exactly to the specifications and requirements of the customer. This is critical, and may influence the overall perception of web quality. Though, this factor is not studied in this study, the significant differences identified above may be attributed to the fact that the buying experience is complete when information based products are received instantaneously, while for physical products it is still incomplete.

Examination of the standardized regression weights in the model (as shown in figure 1) reveals that the six underlying factors – security/access, convenience/availability, personalization, content quality, specific content and appearance are loading very strongly on the ‘perceived quality’ (0.90, 0.96, 0.62, 0.83, 0.69 and 0.61 respectively). The fact, that the correlations between the factors ‘appearance’ and ‘content quality’ (correlation = 0.367), and between ‘appearance’ and ‘specific content’ (correlation = 0.344) are not very strong suggests that the appearance of the web site is not a strong factor. As discussed earlier, respondents did not list any of the items under the factor ‘appearance’ and ‘content quality’ in the top five items and conveyed the low importance relatively attached to the general appearance and content quality of the web sites. It, however, does not mean that the customers do not want the site to have good quality content and good appearance. This confirms the argument that the factor ‘appearance’ and ‘content quality’ are considered qualifying factors these days for conducting online business, especially for the standard products and services such as books, computers, travel, event tickets etc. Though they may not contribute any additional value to the overall perception of web quality, lack of it may actually refrain the customer from visiting the site and buying the products/services. Therefore, managers must treat appearance and content quality as qualifiers and concentrate on security, convenience/availability and specific content that will have potential impact on the online consumer behavior and their intentions to return to the web site. Usage of multi-media and other appearance aspects, however, may be important in certain industries such as fashion and conclusions from this study are not generalisable across all industries and product/services.

CONCLUSIONS AND LIMITATIONS

While this study focuses on users’ perception of web site based on one online experience, the quality of web site may also depend on other factors such as the distinctive nature of products/services offered online on that web site (McKinney et al 2002), the past on-line experience of customers (Zaithmal et al 2002), pricing efficiencies (Koufaris 2002), technology readiness of the customers (Zaithmal al 2002) and temporal effect on the customers’ perceptions. Analyzing these issues is beyond the scope of this study. Further studies are necessary to explore the impact of these factors on the importance attached to various quality dimensions by the consumers and in different cultural contexts. The fact that the respondents visited the web site on their own volition and purchased the product or service online is a major strength of this study. Even though, this has enabled us to collect information from the actual shoppers of the web sites rather than potential consumers who had never visited the site, it still does not allow us to study the actual online buying while the transaction is taking place and therefore has limited generalisability. Moreover, user perceptions are collected well after their individual experience (up to 3 months) and it is possible that the customers’ importance ranking and their perceptions might have changed over time since that purchase. This is another limitation of this study.

Sampling of the respondents is also a major limitation of this study. Even though the respondents are actual online shoppers (based on their self-classification), all of them have some association with a university. Therefore, the sample may not be representative of the general online population. It is, however, logical to consider the respondents as genuine web users, as they have purchased products online in the past six months. The ultimate success of e-commerce depends on how customers perceive its value that is predominantly derived from their interaction with the company’s web site. This study based on empirical research on online consumers points out the importance of security, access, personalization and convenience factors in determining the overall web quality. In spite of significant improvements in online security of transactions with modern technologies, security is still considered the most important factor influencing the online consumer behavior. If the consumers do not feel secure to deal with the online company, factors such as competitive pricing, variety of products and services, ease of access, information quality, and appearance of the web site, do not have any impact on the consumer buying behavior, the study points out. When compared with the consumers that buy physical products with those purchasing services, the study clearly concludes that there are significant differences in terms of their overall perception of web quality, convenience/availability and specific content factors.

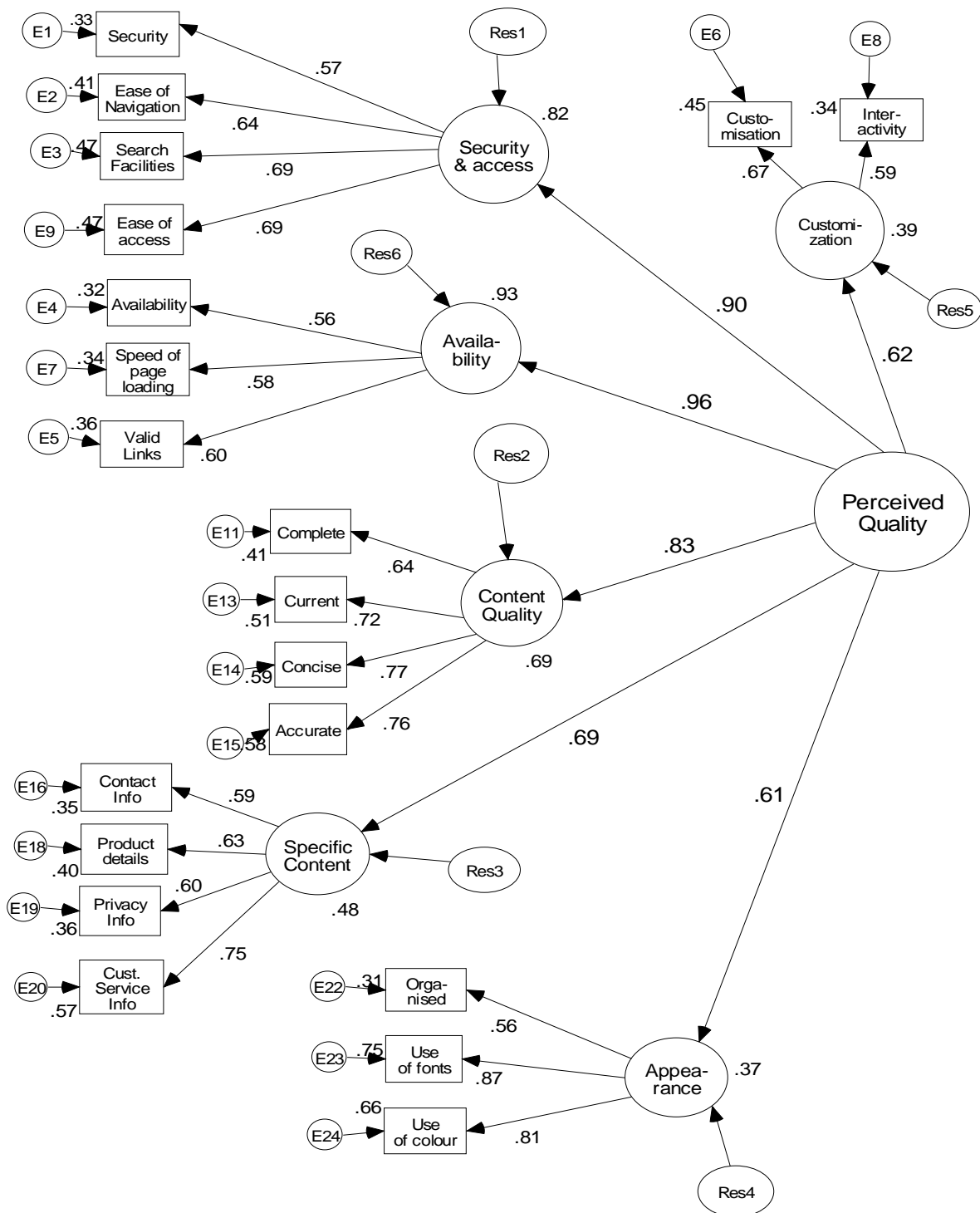


Figure 1. Path diagram for the six factor second order structure with respondents own online experience data (standardized regression weights and squared multiple correlations)

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