The Webquality Analyser: Benchmarking Industry Websites

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The Webquality Analyser: Benchmarking Industry Websites

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Abstract: The structure and layout of various websites across a wide spectrum of service industries was analysed using the WebQuality Analyser (WQA). The WQA incorporated forty five critical success elements delivered by quality on-line websites. These success elements covered information technology (IT) and marketing-services related sectors, and were further divided into five key drivers encapsulating each sector. Each sector driver was then divided into four or five customer-enabler features (covering structure and function), each with several feature components. A present / absent approach determined each component. A seven-point, Likert scale encapsulated the relative presence of the features of each driver.

Although it houses both measurable and subjective components, the WQA offers a useful means to compare relevant websites, and to understand the differences with respect to one’s competitors.

Further investigation of the specific on-line driver ratings demonstrated where key competitive advantage may reside. This benchmarking tool defined website strengths and weaknesses thereby allowing for corrections to the website structure of the specific business. This paper introduces the WQA, and reports on the marketing-services sector of this new benchmarking tool.

Keywords: Service Operations on the Web; benchmarking; website; analysis; service value networks; analysis; compare.

I. Introduction

Benchmarking delivers a “comparison of a company’s performance in certain areas with that of other firms in its industry and / or with those firms that are identified as world class competition in specific functions and operations” [1]. It can also cut across traditional lines, providing opportunities for new and innovative ways to increase performance, and be a “search for industry best practices that lead to superior performance” [2][3]. Modern benchmarking was initiated by Xerox. They modelled their spare parts distribution on the warehousing and distribution practices of L.L. Bean. Since then Xerox has continued to promote best practices. In 2000 the American Productivity & Quality Center recognised Xerox’s development of ‘proactive strategies to identify, retain, and re-use knowledge so that individual expertise is transformed into real working knowledge.’

Benchmarking, best practice, and reengineering are key pathways to achieving dramatic improvement in critical contemporary areas such as cost, quality, service and speed [4]. Reengineering often involves the disruptive [5] reinventing of processes and / or the substantial redesign of existing procedures, and is not merely the delivery of continuous incremental changes. Reengineering without benchmarking will generally deliver smaller improvements than reengineering with benchmarking [6]. By studying other best practice operations, companies may identify, and import new technologies, skills, structures, training and capabilities [7]. Hence, including these identified best practices may then deliver new competitive advantages [8][9].

Today firms routinely share best practice and benchmarking information, and often seek help from one another to achieve higher quality and better performance. At times they may even jointly market their services to customers or even work closely with their competitors. The Cairns Super-Yacht Cluster [10] now houses over forty local businesses who previously competed with each in the fishing, large marine taxi, and tourist related marine activity sectors. These former competitors collaboratively use their world-class facilities, competitive technologies, and specialist best practice skills to repair, maintain and refit foreign registered super-yachts. They have created a world-class, dynamically benchmarked, business block that in 2004 generated an economic impact of over $40M. This industry has technologically reengineered into a best-in-world super-yacht re-builder.

II. Benchmarking and the Web

Benchmarking, best practice and reengineering also apply to virtual businesses or Internet-based website businesses, and also to those physical businesses incorporating internet-based websites into their business models. Evans [5] suggests that if the entire value chain (including devices, networks, standards, and applications) is handled correctly on the supply side and combined as an e-business, new opportunities for both business agility and competitive value may be extracted. In addition, Evans [5] considers the business’s customer-driven demand side with its cost reductions, revenue generation, customer satisfaction, increased productivity, reduced cycle times, speed and flexibility and suggests these functions may be reconfigured to drive innovative use of technologies. He suggests these
attributes, once benchmarked, and assessed, may allow mechanisms that allow the business to differentiate itself from its competitors.

 Benchmarking and competitive intelligence gathering activities are necessary website marketing activities. [11] Competitive intelligence delivers a collage of information about selected competitors. This gathered information is then applied to short and long term strategic planning to facilitate better and smarter business decisions [12]. Competitive intelligence involves data collection and storage, data analysis and interpretation, and the dissemination of intelligence. The process is information-based, systematic, and delivers ‘actionable information’ [13]. Thus a tool to analyse relative website competitiveness will likely be an important aspect of a business’s competitive intelligence.

 In addition to marketing considerations, latest advances in website-related technologies such as Microsoft Research’s 3D TaskGalley [14] offer new ways to present information, and to maximise the quality of information conveyed whilst minimizing the effort applied by the end user. This technology enhancement also impacts on website marketing functions [16]. Microsoft’s 3D smart visual website interfaces present more information. This 3D space or room, with information objects arranged on the floor, ceiling and walls, moves the most important information to the front, and the least important information to the back. Hence, the productivity of the website may be enhanced.

 Considering web-based business–customer encounters, the bundling of products and services has become another important trend to add value and drive sales. These drivers for the website marketing-services sector are: functionality, design, content, originality and effectiveness. The drivers for the website marketing-services sector are: functionality, design, content, originality and effectiveness.

 III. Website Marketing Drivers and Component Features

 The key structure and function feature components used in assessing the weighting of the five features for each driver within the website information technology sector of services industry are presented under the driver blocks of: functionality, design, content, originality and effectiveness. The drivers for the website marketing-services sector are: functionality, design, content, originality and effectiveness. The drivers for the website marketing-services sector are: functionality, design, content, originality and effectiveness. The drivers for the website marketing-services sector are: functionality, design, content, originality and effectiveness.

 III. 1 Company – Product Presence

 Product Representation: here products / services are faithfully described; ‘sold’ to the user as quality items; quality-badged; accurately costed [18] [35][78][79][80].

 Product Information: is accurate and concise; linked to databases; linked to additional user information; capable of showing alternative products / services [25][63].

 Company Representation: shows the company as modern and professional business [18][80][81].

 Company Information: presents relevant company information; accreditations; contacts; ‘About Us’ [40][80][81].

 III. 2 Value Adding Services

 Value Added Links: cover links to internal or external added-value sites e.g. lending facilities, financial institutions, removalists, etc; are responsive to user demands; cover internal SC members and external peripheral partners)
III. 3 Target Market

**Portrayal:** here properties, are portrayed, accurately targeted to assumed market, markets accurately defined; details offered; product / service accurately & succinctly portrayed [35][83].

**Price Range:** include accurate segmentation of prices; prices reflect the targeted market, price ranges realistically reflect the demographic of the target market; value for money is apparent [40][41][42][43] [84].

**Promotion:** shows the site offers promotions relating to target markets; promotions effectively positioned to-website or product / service or demographic of targeted market; promotions well-timed during year [39][82][85].

**Segmentation:** here target markets are clearly defined; products / services fit the defined segments; users are targeted; personalised service offered [25].

III. 4 Searchability

**Price:** here a price search is offered; prices are searchable by range, price discounts are explained; competitor prices are compared [18][86].

**Locality:** asks does name search by locality work; is fuzzy logic or postcode or map or other criteria; used business address is displayed [36][67].

**Accuracy:** delivers consistency across site; search methods; search accuracy; correct information delivered [18].

**Number of Clicks to Content:** here time on site, min number of mouse clicks to make a sale; Min number of clicks to create a user desired transaction [18][87].

III. 5 Creative Expressions

**Video:** covers compressed virtual tours; video clips; audio visuals; download quality and time on standard 56kbs modem [18][36][39][88].

**Photo:** image size and quality professionally presented; photographic tours download promptly; expandable thumbnail photos offered [18][36][37].

**Text:** text typeface readability; text colour; typeface consistent; overabundance and relevance of text; easily understood text & followed [18][36].

**Theme:** consistent across site; appropriate; synergy; adds creative content [18][36].

The above twenty key website features (representing the five marketing-services drivers) and their components were systematically investigated across 130 service industry businesses, each operating a strong on-line website presence in their respective marketspace. Websites delivering the highest combined scores possessed more substantial levels of user focussed presence compared to other websites analysed. Researchers suggest sites delivering high user orientated (targeted) presence, will likely hold users’ attention for longer periods [18][34][36][38] [63][64][68], provided the website ‘flow’ is of high quality [40][41][42][43] enticing them to access a more of information, and, where appropriate, to lead more users to the purchase point. A summary page of the WQA instrument is presented in Table 1.

| Table 1: WQA Sample Summary Page |

IV. Analysis

The WQA assesses websites using five information technology design drivers – functionality, design, content, originality, and professionalism / effectiveness. These structures offer a position-promotion vehicle for the website. The WQA also incorporates five marketing-services related drivers – company product presence, additional services, target market, searchability, and creative expression. These
relate to the product and / or service, and how the website should be moulded. This paper assesses the marketing-services related drivers of the WQA.

A standard data-collection criterion was used [89]. A multidimensional scaling technique drawing on the combination of subjective (or perception), objective (or measurable), and respondent feature preference (idea patterns) rating scales allowed the comparison of individual business websites [90]. A present (‘1’) or absent (‘0’) rating scale similar to those used by Whiteley and Everett [21][23] was used at the feature component level, and was then converted to a feature Likert measure. The traditional seven point ‘more’ or ‘less’ Likert scale was adopted as the prime scaling measure for each feature. This summated rating scale actually measured multiple questions in one, with the numeric score reflecting the degree of attitudinal or measurable ‘favourableness’.

The ten website drivers – five IT, and five marketing-services related drivers (or factors), presented forty five Likert scale features (indicator variables). Each four or five features influence each driver.

The forty five dataset features (indicator variables representing their respective components) measured, easily met all reliability criteria. These features were then used to compile comparison datasets. The business’s ability to deliver desired effects (when compared to its competitors) was thus measurable. Feature presence (or absence) was either measured, or estimated. Individual differences were controlled using a sufficiently large dataset, and a relative effectiveness scale could be produced from the dataset.

Trials with tertiary student groups (across first, third and MBA levels) were conducted over 2003 and 2004. Typically, final year undergraduate student groups, averaged 30 persons per class per location, Students from Sydney, Melbourne, Townsville and Cairns, Singapore and Malaysia participated. These trials delivered a successful website ratings model called the Web Quality Analyser (WQA). This paper reports on the 2005 study, and only considers the marketing-services components of the WQA.

In 2005 the WQA was tested in the business community across Australia. Twenty eight, IT-skilled, data-collectors each rated websites similarly. In addition sixty five marketing persons across Australia tested the marketability drivers. Again feature classifications were rated similarly.

IV. 1 Sample

The sample size consisted of 126 service industry websites. In order to avoid possible bias firms selected were drawn from across the services industry. These included: financial services (3%), hospitality (14%), logistical transportation - including airlines (30%), Real Estate (24%), recruitment and careers (10%), legal services (10%), and tourism (10%). Within these sectors a spectrum of large, medium and small firms were selected. In addition multiple testing of certain areas was conducted to ensure consistency of results.

Predominant businesses were of micro and small to medium size, with approximately 18% fitting the major or global corporation’s category. This approximates with the Australian Bureau of Statistics 2004 data where 79% of businesses are small to medium sized industries, and is in accordance with the Australian services industry mix, and implies that the sampling error is low at around +/- 5% for the overall sample.

IV. 2 Dimensionality

Here a large range of components, features and drivers have been identified. Figure 1 summarises the factorial models for each of the five marketing-service sector drivers. As can be seen from this diagram all features (competencies) are considered first order factors.

Considering this model and the uniqueness of each service sector driver, a confirmatory factor analysis (CFA) was conducted and an estimation of the model was theoretically deduced from each scale.

Dimensionality of the tool was tested utilising factor analysis using Varimax rotation across all twenty indicators (termed features, and listed in section 3.6. to 3.10 above) to reduce these indicator variables into the predicted model five factor areas. Factor analysis tested appropriateness of the indicators divisions into the selected driver groups as used in the WQA. The Kaiser-Meyer-Olkin measure of sampling adequacy yielded a value of greater than 0.6, being 0.894,
with Bartlet’s tests for sphericity at 0.000, being highly significant, (with 190 degrees of freedom). Thus indicating factor analysis was deemed appropriate. Using the Varimax rotation method with Kaiser normalisation factors a convergence to the five marketing-services sector driver factors of the WQA were reached after only six iterations of rotation.

Table 1: Varimax Factor Loadings: WQA Marketing-Services Sector

<table>
<thead>
<tr>
<th>Driver (Factor)</th>
<th>Initial Eigen-values</th>
<th>Extraction Sums of Squared Values</th>
<th>Rotation Sums of Squared Values</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>% of Var.</td>
<td>Cum.%</td>
</tr>
<tr>
<td>Presence</td>
<td>10.413</td>
<td>41.683</td>
<td>41.683</td>
</tr>
<tr>
<td>Val</td>
<td>2.980</td>
<td>10.722</td>
<td>52.374</td>
</tr>
<tr>
<td>Searchability</td>
<td>2.110</td>
<td>8.840</td>
<td>60.015</td>
</tr>
<tr>
<td>Market</td>
<td>1.743</td>
<td>6.870</td>
<td>67.785</td>
</tr>
<tr>
<td>Creativity</td>
<td>1.408</td>
<td>5.603</td>
<td>73.386</td>
</tr>
</tbody>
</table>

Principal factor analysis conducted on the five drivers, yielded all drivers with eigenvalues above 1.0. After Varimax rotation, the first driver (factor) - ‘Product Company Presence’, reflected that all four features (indicator variables) loaded highly. Similar trends applied to the other marketing-services drivers, albeit at slightly lower levels. The five Varimax drivers (factors) ranged from 24.9% to 8.7% of total variance, and accounted for 73.4% of the total variance. The five factors were subjected to a comparison analysis with eigenvalues calculated using the Montocarlo PCA – Parallel Analysis. All five drivers (factors) chosen had eigenvalues greater than their comparable Montocarlo compatriates, and were therefore retained.

Table 2: Montocarlo PCA Parallel Analysis: WQA Marketing-Services Sector

<table>
<thead>
<tr>
<th>Number of variables</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of subjects</td>
<td>200</td>
</tr>
<tr>
<td>Number of replications</td>
<td>50</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Eigenvalue</th>
<th>Random Eigenvalue</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.6046</td>
<td>0.0744</td>
</tr>
<tr>
<td>2</td>
<td>1.4861</td>
<td>0.0432</td>
</tr>
<tr>
<td>3</td>
<td>1.3997</td>
<td>0.0407</td>
</tr>
<tr>
<td>4</td>
<td>1.3241</td>
<td>0.0258</td>
</tr>
<tr>
<td>5</td>
<td>1.2659</td>
<td>0.0278</td>
</tr>
<tr>
<td>6</td>
<td>1.2035</td>
<td>0.0286</td>
</tr>
<tr>
<td>7</td>
<td>1.1532</td>
<td>0.0256</td>
</tr>
</tbody>
</table>

Montocarlo PCA – Parallel Analysis

Table 3: Varimax Factor Loadings: WQA Marketing-Services Sector

<table>
<thead>
<tr>
<th>Driver (Factor)</th>
<th>Initial Eigen-values</th>
<th>Extraction Sums of Squared Values</th>
<th>Rotation Sums of Squared Values</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
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<td>6.870</td>
<td>67.785</td>
</tr>
<tr>
<td>Creativity</td>
<td>1.408</td>
<td>5.603</td>
<td>73.386</td>
</tr>
</tbody>
</table>

Figure 2: Factor Analysis Varimax Rotation: WQA Marketing-Services Sector

Table 3 and Figure 2 summarise the Rotated Component (Factor) Matrix five driver (factor) outcomes which map the WebQuality Analyser tool.

Table 4 and Figure 3 display a further factor analysis to ensure a more concrete factored model. This Oblique rotation, accounts for any non-orthogonal mapping of factors. Again a high degree of variance is explained by the first five factor components eigenvalues, which explain 68.1% of the total variance.

Table 4: Oblique Factor Loadings: WQA Marketing-Services Sector

<table>
<thead>
<tr>
<th>Component</th>
<th>Initial Eigen-values</th>
<th>Extraction Sums of Squared Values</th>
<th>Rotation Sums of Squared Values</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>% of Var.</td>
<td>Cum.%</td>
</tr>
<tr>
<td>Presence</td>
<td>7.421</td>
<td>37.107</td>
<td>37.107</td>
</tr>
<tr>
<td>Searchability</td>
<td>2.190</td>
<td>10.928</td>
<td>47.056</td>
</tr>
<tr>
<td>Value Adding</td>
<td>1.674</td>
<td>8.369</td>
<td>55.678</td>
</tr>
<tr>
<td>Market</td>
<td>1.304</td>
<td>6.519</td>
<td>62.468</td>
</tr>
<tr>
<td>Creativity</td>
<td>1.121</td>
<td>5.603</td>
<td>68.100</td>
</tr>
</tbody>
</table>
IV.3 WQA Marketing-Services Sector

The resulting Pattern and Structure matrices, are displayed in Tables 5 and 6. These matrices were constructed after rotational convergence of nine iterations which strengthened the factors originally computed via the Varimax rotations, the Oblique methods thereby displaying a strong inter-correlation between the factors.

The ‘goodness-of-fit’ over each of the twenty features (indicator variables), as well as across each indicator variable comprising the five factors. Goodness-of-fit was calculated using Pearson’s and Deviance Chi-Square under multi-regression analysis. This resulted in a solid significance of 1.000 for each driver (factor) model. Thus, each marketing-services driver was deemed unidimensional, and driver measurement supports its distinctiveness against the other marketing-services drivers.

Principal Component Analysis; Oblique Rotation with Kaiser Normalisation; Rotation Convergence: 9 iterations.

IV.4 Reliability Analysis

Individual reliability testing using Chronbach’s alpha indicated equal to or greater than 0.5, while composite testing indicated equal to or greater than 0.7. Further testing was achieved utilising Friedman’s ANOVA Test (between groups). Here, a large significance of greater than 0.2 showed no difference between the indicators of the services sector driver group. In addition a significance of equal to or greater than 0.05 signified a difference between the indicators of differing services sector driver groups. The entire twenty indicator set provided a composite Chronbach’s Alpha of 0.905, and a Friedman’s In-Between ANOVA of 0.000, thus indicating significant differences between all groups.

IV.5 Content Validity & Convergent Validity

Content validity was grounded in the literature, with all indicators (features) of the measurement considered covered across all important aspects of the latent variable (driver) to be measured. In addition extensive pre-testing enabled scales suitable for this research.

Convergent validity correlated the various indicator measurements (features) required to evaluate the latent variables (driver) to each other. Each indicator variable was tested for convergence using a variety of tools. Considering appropriate chi squared values, and the statistical significance of factorial loadings, a high level of convergent validity was shown – with all Bentler-Bonnett coefficient values close to one (0.975Æ1.0), and the individual factorial loadings of each driver having t values above 1.96.

Principal Component Analysis; Oblique Rotation with Kaiser Normalisation. (All estimated parameters are statistically significant at 95% (t>1.96))

IV.6 Discriminant Validity

Discriminate Validity was tested using Baggozi & Phillips ‘pairwise test’ to determine whether paired factors fitted the data better than a single factor. A series of chi squared difference tests were conducted. Here, at p values of 0.000, each showed statistically significant differences. Thus from their correlation values, the drivers were interrelated, and each concept differed from the other. Hence, the existence of discriminant validity was affirmed.

V. Discussion

The analysis of marketing-services aspect of this tool has been discussed above. It is a reliable, viable, useful tool.

The WQA offers a simple, yet highly useful, means to compare relevant competitive (or benchmarked) websites. It
offers a mechanism to better understand differences between competitors. A comparative benchmarking standard may be established, allowing a business like an on-line real estate firm to enhance its relative competitive position using value-added features such as - distance to local schools, average time to drive to city, local council contacts, help services, and the like. It may then develop a more ‘customised’ [24][25] services-product suite – offering increased ‘one-on-one’ customer satisfaction [26], and possibly, increased return on investment (and profit) [16].

Table 6: Oblique Pattern Matrix Factor Loadings: WQA Marketing-Services Sector

<table>
<thead>
<tr>
<th>Component</th>
<th>Presence</th>
<th>Searchability</th>
<th>Value Adding</th>
<th>Marketing</th>
<th>Creativity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co. Representation</td>
<td>0.843</td>
<td>0.834</td>
<td>0.723</td>
<td>0.523</td>
<td>0.779</td>
</tr>
<tr>
<td>Prod. Representation</td>
<td>0.917</td>
<td>0.862</td>
<td>0.617</td>
<td>0.604</td>
<td>0.717</td>
</tr>
<tr>
<td>Product Info.</td>
<td>0.523</td>
<td>0.730</td>
<td>0.611</td>
<td>0.531</td>
<td>0.514</td>
</tr>
<tr>
<td>Company Info.</td>
<td>0.523</td>
<td>0.730</td>
<td>0.611</td>
<td>0.531</td>
<td>0.514</td>
</tr>
<tr>
<td>Location</td>
<td></td>
<td>0.800</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accuracy</td>
<td></td>
<td>0.730</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Clicks</td>
<td></td>
<td>0.611</td>
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<td></td>
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<tr>
<td>Price</td>
<td></td>
<td>0.531</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Links</td>
<td></td>
<td>0.827</td>
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<tr>
<td>Relevance</td>
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<td>0.757</td>
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<td>Tools</td>
<td></td>
<td>0.695</td>
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<tr>
<td>FAQ</td>
<td></td>
<td>0.597</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

VI. On-Going Research

A valid tool for comparing and benchmarking websites is now under development, with a computerised version of the WQA currently being prepared for commercial release.

One limitation within the marketing-services sector of the WQA remains to be solved. Within a couple of features inside the total IT marketing-services sector, occasional difficulties were encountered by users when rating certain complex feature components. This technical weakness in measurement capture is currently under investigation for both the marketing services, and the IT sectors of the WQA. New additional measurable component datasets are under test, and are likely to be incorporated into the final computerised WQA model.

Another area possibly warranting additional investigation is the issue of ‘search’, or ‘trawling the web to locate a website’. The ability to find a website is vital for both the user and the vendor. Other ‘search for airline’ studies [20][21], further highlight such problems. Research into ‘search’ requires additional structured experimentation, and was considered beyond the initial scope of this research.

VII. Conclusions

The marketing-services sector of the WebQuality Analyster (WQA) is an empirically validated, useful tool for the analysis of e-business enabled web sites. When married with its IT sector, two previously disparate approaches to benchmarking websites deliver a new, empirically developed benchmarking and comparison tool. The WQA is more accurate than existing alternatives. It unites: (1) a process oriented analysis involving the stages within the trade cycle, with (2) a HCI approach (focusing on technology, R&D outsourcing, application development, client focus, and core business delivery) treating user or client visits as personalised website e-business–client encounters. Overall, the WQA contains the key elements necessary for valid, detailed, assessment of websites.

The use of the WQA as a benchmarking and comparison tool, also contrasts with the website ‘gut reaction’ often provided by web users. Schaffer and Sorflatten [91], report that many web users assess a web site as: too slow; disorganised or confusing; or not offering the required service; and then move-on - to other websites! The ‘gut reaction’ does not deliver an objective basis for benchmarking or comparing websites (other than on a two point scale), nor for planning website improvements. In comparison, the WQA delivers a thorough, empirically supported and well tested benchmarking tool. In addition the WQA delivers an instrument that may be used as a strategic management tool.

Thus, this research supports the use of the WebQuality Analyster’s the five marketing–services sector drivers and their inherent features as indicators of marketing-services website quality.

References

Author Profiles:

John Hamilton is the Director of E-Business at James Cook University. His extensive domestic business ownership and management experience includes: importing, exporting, mining, rural, wholesale, manufacturing, and several small-medium businesses (supermarket, video wholesale, fashion stores, florist/gifts, restaurants,) His international business experience includes: Sapphire mining, processing and gemstone sales; plastics manufacturing; importing/exporting; and international finance.


John Hamilton has extensive business, management, consulting and research experience. He is an active researcher. His current specialisations include: development of strategic web-based instruments; QFD; strategic positioning; strategic e-marketing; logistics, killer strategies for business; service value networks, industry-wide future technologies and solutions; and the performance, value and alignment of customer-business interfaces.

Roy Wybrow has worked in IT/IS business related fields including aircraft R&D, engineering, e-commerce and ERP for various MNE’s in Vietnam, China, Malaysia, Fiji, Papua New Guinea, and Australia.

He lectures in statistics, e-business, communications technologies and venture management at James Cook University.

He is a skilled researcher, especially in the statistics and information technologies arena. He is currently researching across a wide range of industrial sectors to determine the factors driving successful industrial clusters.

His consulting firm has identified, developed, and commercialised, many unique business solutions including: computerised fruit picking, energy efficient housing, sophisticated IT/IS solutions for business, and value adding, peripheral, sugar-based industries and associated industrial clusters. He has also consulted, developed and implemented Balance Scorecards for SME’s.