Website Benchmarking

(A Tropical Tourism Analysis)

PhD Thesis submitted by

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Research associated with this thesis complies with the current laws of Australia and all permits necessary for the project were obtained (JCU Human Ethics H4098).

Abstract

Chapter 1: As more companies move on-line and establish their presence on the World Wide Web demand exists for an efficient benchmarking tool that can suitably assess their measurable on-line features and/or can allow comparison with website competitors. Website benchmarking approaches within organisations vary, and a majority of researchers, in-part capture website aspects using subjective techniques to obtain a result.

This study finds website benchmarking approaches in the literature are generally time-consuming, survey-based, with little agreement on what and how to measure website components. Currently no broad-based, systematic, measurement method or website benchmarking theory exists.

This research aims to rectify the above problem, by developing a theoretical approach to website benchmarking, and by establishing a website analysis method (WAM). This approach is literature supported, hierarchical, objective, and facilitates the evaluation of a website against a universal set of website component measures.

Design Science Research Methodology (DSRM) is employed at the research level. In the development of 10 published (and one submitted) papers, and in the layout and development of this thesis. The DSRM contains 6 activities: problem identification; solution objective; artefact design and development; artefact demonstration; artefact evaluation; and communication.

Chapter 2: This chapter consists of paper one, which identifies the DSRM problem. Current website benchmarking approaches in the literature are sourced, classified by type, and from both a customer perspective and a business perspective are type-collated as a framework. When combined, these approaches deliver a multi-level, website benchmarking approach, offering a broad-scale analysis pathway, capable of delivering at level website benchmarking. However, individually none of these approaches delivers a comprehensive approach to website benchmarking.

Chapter 3: This identifies a solution for the above DSRM problem across papers two, three, and four. In paper two, components identified in the literature are built into a three domain framework to test a Likert survey approach against a dichotomous survey

approach. Although results demonstrate the dichotomous survey is much quicker and delivers more accurate results than the Likert survey, respondents still make errors. Paper three now looks at the theory and mathematics behind website benchmarking.

As no definitive theory of website benchmarking exists, this section of chapter 2 proposes the initial steps towards this theory's development. The mathematics behind website measurement are built, via a proposed three level domain, group and item set-theory approach. This offers a multi-level, interpretable measurement solution to managing websites, while shedding light on developing a website benchmarking theory. Paper four delves deeper into the areas of subjectivity and objectivity in relation to website benchmarking.

Subjective techniques, introduce the vagaries of human opinion, along with a variety of acknowledged limitations, such as survey length restrictions. Hence, participant interpretation of various questions related to a website can create bias. To eliminate this subjectivity I introduce a quantitative website benchmarking approach offering objective website ratings at the website, domain and function levels, and suggest at these website levels comparisons between websites and competitors can be useful.

Therefore the solution to the problem is development, of an objective website benchmarking approach. However before a website benchmarking approach can be fully developed a definitive theory is required. The development of this theory and the design and development of the DSRM artefact follow in chapter 4, in paper 5.

Chapter 4: The artefact design and development stage of the DSRM begins with confirmation that literature-identified website benchmarking approaches have altered little since my first review of the literature. I establish a theoretical approach to website benchmarking and deliver a comprehensive website analysis method (WAM), the DSRM artefact.

This approach employs rough-cut set-theory, and mutual-exclusivity of 230 components allowing causal-summing of typological website components into the objective WAM artefact. These typological website components deliver interpretable website benchmarking scores at website, domain (aesthetic, marketing, and technical), and function levels.

WAM is not static allowing new/emergent components to be included (and redundant components removed) as upgrades to WAM's three domains, and 28 functions. Such modifications help keep the latest benchmarking comparisons (and/or website upgrades) optimised. As this DSRM study employs a dichotomous present/absent component approach, the WAM artefact's components can be software programmed, and merged at three different levels, delivering a useful website benchmarking tool for corporates. Demonstration of the artefact is the next step in the DSRM, this follows in papers six, seven, eight, and nine comprising chapter 5.

Chapter 5: In paper six different website components are tested in a variety of ways to ensure validity. First, I consider how website quality is measured in the literature. I typologically classify 27 empirical studies into 6 functions. This approach captures the broad divisions of website quality as a tabulation from which a comprehensive website model is developed. The results suggest breadth is not adequately captured when considering a business' websites quality. Paper seven goes further, looking at location of components on websites.

Here, the location-specific placement of 22 literature-identified homepage web objects is analysed within 5 services-industries websites, and across 10 countries. This study applies content analysis with a 3D fine-grid approach and considers if web object placement corresponds with consumer mental positioning models. This approach differs from previous studies, where consumers subjectively located various objects on a 2D grid representation of a homepage. Results show regardless of country, several web objects have industry-specific consistency in their actual grid placement and a generic placement of five web objects exists. The placement of some web objects also corresponds with consumer mental models, therefore meeting their expectations.

Paper six has shown website components can be captured and typologically classified, paper seven shows some have specific locations on websites. Now papers eight and nine demonstrate the effects on visitor traffic when new components are added to a website. A tourism informational website is progressively developed, through static, then interactive, and then into dynamic formats.

Here, six stages of increased website richness shows differential offerings can contribute to growth in first-time visiting-consumer website traffic. When sequenced, and released in close succession, Facebook posts boost first-time visiting-consumer website traffic. Return-visitor traffic into a website arises when the consumer is in

pursuit of website offerings that are sufficiently in line with their motivations and/or with their desired outcomes. At each website change, the levels of component presence, interactivity and/or external post are altered to determine their effect on website traffic. By including, and maintaining, currency across all six stages of website development, successful consumer-targeted destination tourism websites can be delivered.

Chapter 5's papers confirm a computer programmable software solution should be considered. Therefore in papers 10 and 11 in chapter 6 the evaluation of the success of WAM is discussed.

Chapter 6: Here, in paper 10 the pilot study employs content analysis and the presence/absence of 47 website quality components on 30 tropical tourism websites. Results demonstrate the majority of websites are lacking in e-service quality and security quality. Several websites do not operate in all versions of internet explorer, while others are not mobile device ready. Hence all tropical tourism websites in this study fail to reach high ratings for website quality. These results provide the impetus to increase the size of the study and to use the hierarchical WAM artefact.

The main study, paper 11, evaluates WAM using content analysis and the presence/absence of components. An abridged WAM with 77 (easily viewable) components from 28 functions, across 3 domains of a website is employed to test 280 tropical tourism websites from 4 tropical continental areas. A focus group then ranks 20 of the websites from best to worst from their perspective. They then try to identify the presence/absence of 12 components on the same websites.

Results demonstrate website scores at level are comparable, and there are significant differences in website scores, domain score, and function scores when related to continental area. Focus group results indicate it is much easier for participants to distinguish between poorly scoring websites than it is to distinguish between higher scoring websites.

Although focus group participants located a limited number of components on a website they did not always locate all components. Therefore for website owners/managers to be able to easily, effectively, accurately, and cost effectively assess their websites at a point-in-time WAM is the logical website benchmarking approach.

This study has identified a problem in the literature and the motivation to solve this problem. The objective for a solution to the problem has been identified, and the artefact to solve the problem has been designed and developed. The artefact has been demonstrated and the results evaluated.

Chapter 7: This chapter communicates the findings of this website benchmarking thesis. It encapsulates thesis outcomes delivered across 10 published papers and 1 submitted paper. It delivers theoretical, empirical, and real world contributions for website benchmarking. It also provides key limitations, recommendations, and future research opportunities.

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Chapter 1

1.0 General Introduction

Thanks to the internet, the world today has a globally connected economy. This has increased competition across many industries, including the tourism industry. The internet provides a connectivity opportunity for members of the tourism industry to compete online through their websites. However, the processes for development and/or analysis of websites are varied and results difficult to generalise. In this introductory chapter, I review the body of literature relating to website benchmarking, outline gaps identified, describe the aims of my thesis, and discuss its structure.

For this research I am employing Design Science Research Methodology (DSRM) adapted from Peffers, Tuunanen, Rothenberger, and Chatterjee 2007 (chapter 4). This approach is common in information systems. I am also utilising DSRM for the design of this thesis, and in each chapter I highlight the relevant DSRM activity (as shown for activity 6, Figure 1.1).

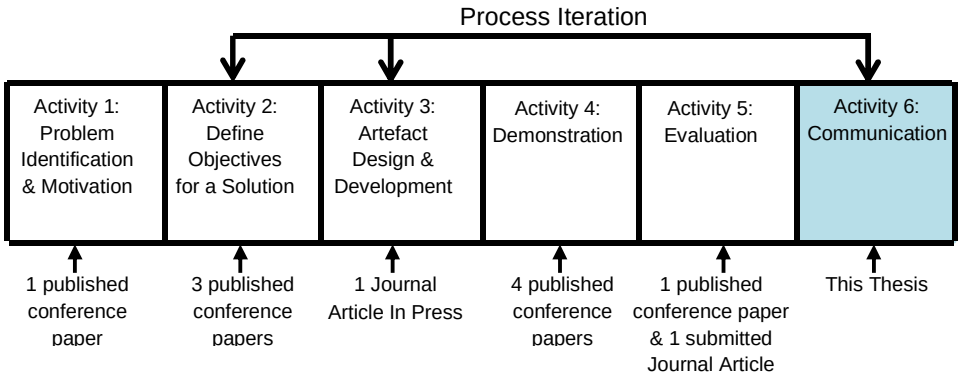


Figure 1.1: Thesis chapter structure **(**based on DSRM adapted from Peffers et al 2007)

This thesis incorporates all DSRM activities, and it communicates (activity 6) new knowledge via the thesis itself. Communication, deliver the thesis and its research to the global audience. Chapter 1, an overall introduction to the research is part of activity 6. Chapter 2 covers the identification of a business problem and the motivation for solving the problem (activity 1). Chapter 3 discusses activity 2, while chapters 4, 5, and 6 cover activities 3, 4, and 5 respectively.

A more detailed discussion of each activity of the DSRM and the related chapter contents are discussed in the thesis outline.

Introduction

To compete in today's global economy, most organisations engage a website that is deemed sufficiently efficient and effective, and capable of attracting customers and encouraging further website visits (Karmokar, Singh, & Tan, 2013). However, not all organisation websites have been successful in the world's online environment. Some have are inadequately developed websites, and other websites are not maintained after the initial implementation (Zahran, Al-Nuaim, Rutter, & Benyon, 2014). A website evaluation (benchmarking) approach is required that can be utilised at any point in the lifecycle (development and maintenance) of the website.

As with previous approaches, discussed in chapter 2, current approaches to website benchmarking are generally survey based, or are a combination of survey and/or experimental design and/or content analysis (Table 1.1). These types of approaches can be time consuming in preparation, delivery, and analysis. They typically emphasise selected and/or specific parts of a website.

Table 1.1: Current website benchmarking approaches

Benchmarking Approach	Researcher(s)
Survey	Chang & Fang, 2013; Cyr, 2013; Cyr & Head, 2013; Lai, Huang, Lu, & Chang, 2013; Wakefield, 2013; Fang, Qureshi, Sun, McCole, Ramsey, & Lim, 2014; Ku, & Chen, 2015; Vatankhah, Wei, & Letchmunan, 2014
WebQual	Bartl, Gouthier, & Lenker, 2013; Al Majali, 2015
Delphi & DEMATEL	Cebi, 2013
IS success model & WebQual 4.0 & E-S-Qual.	Chen, Rungruengsamrit, Rajkumar, & Yen, 2013
eMICA Model	Ting, Wang, Bau, & Chiang, 2013
3Q Model (Service Quality, System Quality, Information Quality)	Xu, Benbasat, & Cenfetelli, 2013
E-SERVQUAL	Ariff, Yun, Zakuan, & Ismail, 2013
DEA (Data Envelopment Analysis)	Io Storto, 2014
AWMM (Attraction Website Maturity Model)	Zhong, Leung, Law, Wu, & Shao, 2014
WebQual & FAHP (Fuzzy Analytic Hierarchy Process)	Shahin, Pool, & Poormostafa, 2014
ELM (Elaboration Likelihood Model) & CST (Consumer Search Theory)	Ho & Bodoff, 2015

Recent literature again shows little agreement, on how to benchmark a website, or even what items to measure on a website. Even when it appears researchers are benchmarking the same area of a website, such as design, or trust, or satisfaction, or loyalty their individual choice of measures appears arbitrary.

One study may select, for example, 12 measures for design whereas the next study may use totally different measures to represent design (Cassidy & Hamilton, 2013).
Further problems with survey approaches to website benchmarking arise with the survey and its scaling selection. Some surveys use 5-point Likert, some 7-point, while others prefer 9, 10 or 11-point scales (Cassidy & Hamilton, 2011a). This can result in further issues when grouping results of a survey.

Another major consideration is participants. Studies have often used undergraduate university students (Fang, Qureshi, Sun, McCole, Ramsey, & Lim, 2014; Ho & Bodoff, 2015; Hong, Hess & Hardin, 2013; Lorenzo-Romero, Constantinides, & Alarcon-Del-Amo, 2013), online questionnaires (Bartl, Gouthier, & Lenker, 2013; Chen, Rungruengsamrit, Rajkumar, & Yen, 2013; Cyr & Head, 2013), and purposive sampling (Zhong, Leung, Law, Wu, & Shao, 2014). This inconsistency makes generalisation of results difficult.

Different theoretical approaches have been applied to website benchmarking, such as, *time perception theories,* to investigate perceptions of waiting in the online environment (Hong et al., 2013), *prospect theory,* to study online trust and distrust (Chang & Fang, 2013), and *fuzzy set-theory,* to determine hotel website functionality (Ip, Law, & Lee, 2012). However no definitive theory of website benchmarking has been successfully proposed.

Initial websites investigated in this research are not all tourism websites nor are they in the tropics. However the major studies involved are of non-commercial tourism websites located in the world's tropical zone (between/on the Tropic of Cancer and the Tropic of Capricorn). This focus is very important to the researcher as I reside in a major tropical tourism city and my university's strategic focus is to "create a brighter future for life in the tropics world-wide through graduates and discoveries that make a difference" (James Cook University, 2015).

The next section discusses the research gaps identified from the literature, the research question, the research aim, and the research objective.

Research Gaps, Question, Aim, and Objective

Across the body of literature on website benchmarking there are numerous measurable website items (herein components). These components have never been brought fully together in one study.

There has been no consistent grouping of identified website components, and there is a wide variety of approaches to website benchmarking. Prior to this study a comprehensive theory of website benchmarking has been lacking. Hence from the areas discussed above, I have identified four gaps in the literature.

1. Components identified across website benchmarking studies have at-best, generally been, partially consolidated.
2. There is no consistent grouping mechanism for website components.
3. There have been many attempts at website benchmarking, but no single approach comprehensively benchmarks a website.
4. There is benchmarking theory, but there remains no consistent and definitive theory of website benchmarking.

From these gaps in the literature I have developed my research question:

> How can a website benchmarking approach be developed that is objective, allows the inclusion of all current literature identified components, and is theoretically supported?

Following on from the identified gaps in the literature and my research question I have developed my research aim:

> To build a theoretically-supported, objective, website benchmarking approach, by consolidating website components into present/absent, thus allowing benchmarking comparisons of websites.

From my research aim there are six research objectives for this study, they are:

1. To collect all current literature-identified website components;
2. To develop a literature supported theory of website benchmarking;
3. To apply DSRM from information systems;
4. To use the Website Analysis Method as the DSRM artefact for website benchmarking;
5. To determine, if adding different components at different stages of a website's development delivers changes in visitor traffic;
6. To test websites with the Website Analysis Method.

Paradigm and Philosophical Assumptions

This study uses a design science paradigm, where a designer answers questions relevant to human problems by creating innovative artefact(s) and thus contributing new knowledge to the field. The artefact(s) must be useful and fundamental in understanding the identified problem (Hevner & Chatterjee, 2010).

Within this Design Science Paradigm of Hevner and Chatterjee (2010), the innovative artefact – WAM is created to answer questions and to contribute new and theoretical knowledge about the build of a theoretically-supported, objective, website benchmarking approach. This WAM approach also builds a website benchmarking theory, consolidates website components, and allows at-level, benchmarking comparisons of websites. It delivers progress, improvement, and understanding to the body of knowledge concerning the theory and application of website benchmarking.

The ontological assumption underpinning this research is that there are multiple, contextually situated alternative world-states which are socio-technologically enabled (Vaishnavi & Kuechler, 2004), an inductive process that becomes deductive as the research develops. In the research area that this thesis addresses the WAM artefact is the best fit for this type of research. From an Epistemological perspective this research explores the nature of knowledge using design science research paradigm enabling the creation, and testing of the WAM artefact, producing factual results. The methodological basis is DSRM using an objectively constrained six activity process of development. Validation is provided via this six activity process that is iterative, where each activity can be revisited. The WAM artefact behaves as predicted, and therefore the information delivered is true. That it is possible to develop a theoretically-supported, objective, website benchmarking approach that consolidates all literature-identified website components (Vaishnavi & Kuechler, 2004) is demonstrated in this thesis.

The methodology is developmental where the impacts of the artefact on the combined system are measured, with an axiology that delivers value through control, and the creation of a new artefact(s) (Vaishnavi & Kuechler (2004). This delivers progress, improvement, and understanding to the body of knowledge, through communication of results to the appropriate audience(s) (Kuechler & Vaishnavi, 2011).

Thesis Outline

This thesis consists of nine double-blind peer reviewed published conference papers, one, In Press, double-blind peer reviewed journal paper, and one submitted, double-blind peer reviewed journal paper. These papers have been reformatted and structured into full or partial chapters of this thesis.

The overall structure of this thesis is shown in Figure 1.1. Authorship of published papers is shared with members of my thesis committee, Professor John Hamilton (chapters 2 to 6), and Dr SingWhat Tee (chapter 5). Details of contribution are provided in each chapter outline. Tables and Figures are presented throughout the chapters with duplications removed and supporting information located in the appendices. All figures and tables are created by me unless otherwise stated.

Chapter 1 reviews the latest papers on website benchmarking and identifies gaps in the literature, and the aims and objectives of this research.

Chapter 2 – paper one. This paper relates to activity 1 of the DSRM, identifying the problem and the motivation for the research. I identify different website benchmarking approaches contained in the literature from 2001 to 2012. I demonstrate these approaches can be grouped into studies focusing on business or studies focusing on consumers. These studies can be placed in a common framework for website benchmarking.

The areas of concentration for business focused studies are effectiveness, usability, strategies, and performance components with almost 53% exclusively employ web-analytics. The areas of focus for studies, from the consumer perspective are satisfaction, design, loyalty, and quality. Only 7% of consumer perspective studies use web-analytics, whereas opinion (subjective) based are used in almost 41%.

These approaches do not deliver a truly comprehensive website benchmarking method. Agreement is divided on what components of a website should be measured and how they should be measured. This makes direct comparison between studies difficult. Generalisation of results from these studies is also difficult due to a significant number using university students as respondents.

Generally due to time-delay and costs associated with subjective website benchmarking approaches they are unsuitable for website managers/owners who

require near real-time results. Hence, an online website benchmarking approach would be more practical.

This chapter establishes my research question: How can a website benchmarking approach be developed that is objective, contains all current literature-identified components, and is theoretically-supported?

Publication details:

Cassidy, L., & Hamilton, J. (2012a). Multi-level website benchmarking: typological collation of recent approaches. *In Proceedings of the 26th Annual Australian and New Zealand Academy of Management Conference* (pp. 1-19). Perth: Australia.

Intellectual input of authors:

Cassidy (the candidate), collected the literature, identified the different approaches and created Figure 2.1 and Table 2.1, with input into customer and business perspective groups from Hamilton. Cassidy wrote the first draft of the paper which was revised with editorial input from Hamilton.

Chapter 3 relates to Activity two of the DSRM, to define the objectives for a solution (to the identified problem). It consists of papers two, three, and four.

Herein objectives for a solution to the identified business problem are defined and the model introduced. Differing survey approaches are tested and an exploration of the initial steps for a website benchmarking theory and measurement approach are conducted.

The hierarchical design concept model for website benchmarking is introduced (Fig. 3.1). There are three levels of website benchmarking proposed. Level one delivers a combined score (of the domains) with the individual score for each of the three domains is delivered at level two. Level three provides scores for each function (sub-group) for each domain. Initial groupings of website components are proposed.

I use a dual approach to test survey application and investigate whether a benchmarking approach can suitably assess a website at all three levels. A 7-point (strongly agree to strongly disagree) Likert survey and a 2-point – present/absent dichotomous survey approach are employed. The survey questions are developed

around components from the aesthetic, marketing, and technical domains of a website. To ensure validity several 'dummy' questions are included. Respondents complete one survey at a time with a one week interval between to limit short-term subjective memory influences between the surveys.

Respondents reported, and results, demonstrate that the dichotomous survey was simpler and completed more quickly that the Likert survey. This allows the dichotomous survey results to be quickly and easily interpreted using a sum scored out-of 10 (Table 3.1). A dichotomous survey approach to website benchmarking is rarely used in the literature.

Next I demonstrate literature-identified website benchmarking components can be successfully captured under the aesthetic, marketing and technical domains. I show that although a dichotomous survey delivers more accurate results than a Likert survey when checked against actual features on the website they both fall short, each delivering several incorrect results. Therefore there is justification in developing an online website benchmarking approach encompassing all domains, functions, and components of a website.

A hierarchical approach to website benchmarking has been proposed, this now requires a theory and a measurement approach. The literature provides no definitive theory of website benchmarking, or comprehensive website benchmarking approach.

To develop a theory of website benchmarking I propose using Aristotle's 4-step theory-of-causation in combination with rough-cut set-theory. Here the universal set contains all current literature-identified components, this set is infinite, allowing new components to be added and redundant ones removed as necessary. A simple website benchmark score can be calculated as the number of components present over the number of components possible (those in the universal set). This proposed website benchmarking process is visually theorised at Figure 3.2. Using this typological approach aesthetic, marketing and technical domain components are combined into a present/absent item. When a component is present on a website this causation, rough-cut, set-theory approach numerically collates each component as contributing to website subset domain, and one of the domain's functions. This approach delivers a comprehensive, hierarchical balanced measurement interpretation.

To complete chapter 3, I revisit the literature and confirm website benchmarking is still generally performed using subjective techniques such as Likert style surveys, modified WebQual, and modified balanced scorecard. Several issues may occur with these approaches, such as, sample groups not being representative of the wider community (not generalisable), 'learning effect' occurring when multiple websites are visited, and answer bias where respondents try to please the researcher by providing answers they expect the researcher requires.

On occasion when an objective approach to website benchmarking is used it is reasonably common for a subjective rating to be applied to the results. Using my approach each component is deemed to be as important to a website as the next; hence no weighting is applied to any website components. Instead I use a numerical approach with a score out-of 10 for components present in each function. This means regardless of the number of components housed in each function (whether 4, 5, 9 or even 12) a score out-of 10 can be determined to enable direct comparison. Figure 3.3 demonstrates the refined hierarchical approach to website benchmarking, and how components, functions, and domains contribute to an overall website score. Here I propose a tentative name for this website benchmarking approach as WebMATRs. Figure 3.4 demonstrates how, by adding missing components identified using the objective WebMATRs approach, a website can move closer to the universal set and beyond competitors.

Results from these three papers provide justification for my overall research aim to build a theoretically supported, objective website benchmarking approach by consolidating website components into present/absent, thus allowing benchmarking comparisons of websites.

Publication details:

Cassidy, L., & Hamilton, J. (2011a). Website benchmarking: evaluating scaled and dichotomous approaches. In S. Rotchanakitumnuai & L. Kaewkitipong (Eds.), The*11th International Conference on Electronic Business, Borderless E-Business for the Next Decade (pp. 408-412).* Bangkok, Thailand: Thammasat University.

Intellectual input of authors:

Cassidy investigated the literature, identified and collated website benchmarking measures. Cassidy determined level two and three groupings (Figure 3.1) from the literature and with input from Hamilton. The authors co-designed the sum-

score method used. Cassidy wrote the first draft of the paper which was revised with editorial input from Hamilton.

Publication details:

Cassidy, L., & Hamilton, J. (2011b). Website benchmarking: theoretical and measurement aspects. In S. Rotchanakitumnuai & L. Kaewkitipong (Eds.), The*11th International Conference on Electronic Business, Borderless E-Business for the Next Decade (pp. 413-416).* Bangkok, Thailand: Thammasat University.

Intellectual input of authors:

Cassidy identified the need for research in this area and the approach. Hamilton assisted with input on set-theory, and development of Figure 3.2. Cassidy wrote the first draft of the paper which was revised with editorial input from Hamilton.

Publication details:

Cassidy, L., & Hamilton, J. (2012b). Website benchmarking: a comprehensive approach. *In Proceedings of the 12th Hawaii International Conference on Business* (pp. 543-548). Honolulu: HICOB, Hawaii.

Intellectual input of authors:

Cassidy extended the research from paper one in chapter 3. Further refining and naming the grouping of website component measures. Cassidy developed the hypothesis with assistance from Hamilton. Cassidy wrote the first draft of the paper which was revised with editorial input from Hamilton. Cassidy developed Figures 3.3 and 3.4.

Chapter 4 – paper five. This paper relates to activity 3 in the DSRM, artefact design and development.

As websites increase in value and importance to commercial and non-commercial entities in this global economy the urgency for an objective, easy to implement website benchmarking approach is apparent. However some still rely on subjective survey approaches even though there are several complications associated with this method. For example, a respondent's possible restriction in their level of understanding of a website's aesthetic, marketing, and technical language terminologies; and task-time fatigue when large amounts of data are required. Design and development of the DSRM artefact is now undertaken.

Here the WebMATRs approach from chapter 3 is refined and further developed into a Website Analysis Method (WAM – Figure 4.1). Through the design science paradigm and DSRM rough-cut mutually-exclusive set-theory and Aristotle's four-step theory-of-causation is incorporated with a typological collation of literature-identified components. The WAM artefact can generate component-recognition algorithms, which researchers can then use for internal/external industry specific requirements.

Research objective 2 is met; the WAM artefact has been developed and designed with a solid theoretical base. Research objective 1 is achieved with WAM holding its existing literature-identified components in 28 functions and 3 domains. As each of these components is seen as present/absent, a programmable, updatable, software solution is possible. Next, in chapter 5, I conduct a number of differing tests with the identified website components to ensure their validity.

Publication details:

Cassidy, L. & Hamilton, J. (2016). A design science research approach to website benchmarking. *Benchmarking: An International Journal, 23*(6) (In Press).

Intellectual input of authors:

Cassidy developed the study, and identified the most appropriate methodology. Cassidy extended and refined the theory proposed in chapter 3 with assistance from Hamilton. Cassidy designed the data capture method and worked closely with website builders. Cassidy collected the data and performed the data analysis with assistance from Hamilton. Cassidy wrote the first draft of the paper which was revised with editorial input from Hamilton. Cassidy developed the tables and figures.

Chapter 5 relates to activity 4 in the DSRM, demonstration (of the artefact). This chapter consists of papers six, seven, eight, and nine.

To demonstrate the validity of component collation by likeness I look at 27 empirical studies relating to different qualities of a website and determine individual quality components can be grouped on likeness. These groupings of e-service, content, design, information, security, and technical can then provide an overall quality score for a website. This quality model can be assessed against satisfaction, trust and loyalty providing a means to engage the consumer more closely with the organisation's

website. This paper (paper six) demonstrates the effectiveness of typological collation of components. Next, in paper seven, I look at web object positioning.

Web objects are components that have a specific place on a website. Methods employed in prior research of web object placement are subjective with the results being mapped onto a 2D grid representation of a website homepage. Here, I investigate the 'actual' placement of web objects on websites from 5 industries and across 10 countries plotting the results on my software programmed 3D Web Objects Visualiser. I then compare the actual placement of web objects with consumer mental positioning models reported in earlier studies.

Employing Nielsen's (1999) rule, if more than 80% of websites place a web object in one position this becomes the defacto standard the following is determined. The defacto standard for web objects logo, search box, navigation, header, and footer align with consumer mental models. These results enable specific website components to be refined to placement queries. Papers eight, and nine address research objective four – to determine if adding different components at different stages of a website's development delivers changes in website traffic.

A publically-accessible niche tourism information website was constructed in six stages, and monitored over 100 weeks to test consumer traffic. Data was collected from Google analytics. The data was 'cleaned' to remove any non-human visitor hits, such as website crawlers and bots that regularly inflate normally reported visitor numbers.

Paper eight concentrates on actual first-time visiting consumers and how changes to the website affect visitor numbers. Results demonstrate an increase in any of the three independent variables, website richness; website post (from Facebook/forums) frequency; and website interactivity contribute towards growth in first time visiting consumer numbers to this niche tourism website. Further, external posts co-vary with website richness and interactivity. These results confirm all four hypotheses.

Overtime website first time visiting consumer traffic can grow, but relatively slowly. This growth can be accelerated by increasing website richness, by expanding interactivity at the personal level, and/or by dynamically supporting and maintaining each set of offerings, enabling specific targeting of first time visiting consumers. This now leads us into the paper nine in this study relating to return visitor traffic to the website.

Website traffic originates when first-time visiting consumers locate a website and explore its functionality. The first-time visitor can be directed to the website or find it by chance. These first-time visitors become multi-time visiting consumers when they recognise the website offers consumptive deliverables that may meet their specific requirements. Consumers may also be influenced by posts on social media networks.

All five hypotheses are confirmed in this paper. Website interactivity does influence website traffic; website component levels do influence website traffic; external posts from social and informative connections do influence website traffic and co-vary with website component levels and interactivity; and websites providing consumptive deliverables to first-time visiting consumers positively influence multi-time visiting consumer website traffic. Hence, to successfully target first time visiting consumers and multi-time visiting consumers, development of a website should be one comprehensive, dynamic, and interactive solution, with currency maintained.

This chapter confirms typological collation of website components is a valid approach. It shows certain components have specific positions on a webpage, and hence they are web objects. Further, the addition of components to a website does influence first-time and multi-time visiting consumer traffic to a website. I have validated the use of components and now in chapter 6 I evaluate the DSRM artefact WAM.

Publication details:

Cassidy, L.J., & Hamilton, J.R. (2013). A comprehensive approach to capturing website quality measures. *In Proceedings of the 12th International Decision Sciences Institute and 6th Asia-Pacific Decision Sciences Institute Conference* (pp. 280-289). Nusa Dua, Bali: Indonesia.

Intellectual input of authors:

Cassidy developed and conducted the research. Cassidy wrote the first draft of the paper which was revised with editorial input from Hamilton. Cassidy developed the tables and Figure 5.1.

Publication details:

Cassidy, L. & Hamilton, J. (2014b). Location of service industry web objects: developing a standard. *In Proceedings of the 25th Australasian Conference on Information Systems* (pp. 1-10). Auckland: New Zealand.

Intellectual input of authors:

Cassidy developed the research question, collected the data, and performed the data analysis. Hamilton assisted with hypotheses refinement. Cassidy wrote the first draft of the paper which was revised with editorial input from Hamilton.

Publication details:

Cassidy, L., Hamilton, J., & Tee, S. (2015). Generating first time visiting consumer traffic: a live case study. *In Proceedings of the 25th Annual CAUTHE Conference* (pp. 88-100). Gold Coast: Australia.

Intellectual input of authors:

Cassidy developed the research question, collected the data, and performed the data analysis. Hamilton and Tee assisted with hypotheses refinement. Cassidy wrote the first draft of the paper which was revised with editorial input from Hamilton and Tee. Cassidy developed the figures.

Publication details:

Cassidy, L., Hamilton, J., & Tee, S. (2014). Generating return visitor website traffic. In E.Y. Li (Ed.). *The 14th International Conference on Electronic Business & The 1st Global Conference on Internet and Information Systems: Creating Business Values through Innovations in Clouds Services* (pp. 126-133). Taiwan: National Chengchi University.

Intellectual input of authors:

Cassidy developed the research question, collected the data, and performed the data analysis. Hamilton and Tee assisted with hypotheses refinement. Cassidy wrote the first draft of the paper which was revised with editorial input from Hamilton and Tee. Hamilton and Tee assisted with refinement of figures.

Chapter 6 relates to activity 5 of the DSRM, evaluation of the artefact that is the solution to the identified business problem. There are two studies and papers 10 and 11 relate to this chapter.

In this chapter research objective three, to apply DSRM from information systems with WAM to website benchmarking; and research objective five to test websites with WAM are undertaken.

Paper 10 is a pilot study of the presence/absence of 47 website quality components across 30 tropical tourism websites. The majority of websites in this study scored poorly for e-service quality and security quality. The highest score overall for the websites tested is 43.3 out-of 60. The score for 56.7% of websites lies between 30 and 40, with only 20% scoring 40 and above. Here I analyse websites using the presence/absence of specific components. However website quality is only one consideration for customers visiting a website. This pilot study was successful therefore the next stage in this research is to conduct a larger study across more websites with components from each function, and functions from each domain contained within WAM.

In paper 11 the results of a study of 280 non-commercial tropical tourism websites from within the world's tropical zone (between/on the Tropic of Cancer and the Tropic of Capricorn) (Figure 1.2) are reported. The tropical Zone is divided into three continental areas; these are the Africa continental area (Figure 1.3); the Asia continental area (Figure 1.4); the Oceania continental area (Figure 1.5); and The Americas continental area (Figure 1.6).

As not all components of a website are readily visible an abridged WAM is employed in this analysis. This abridged WAM contains all 3 domains, and all 28 functions, however the component number is limited to 77.

Here, five research questions are answered. First, that website scores are discernably different at the website, domain, function, and component level. To answer the second research question I group websites by continental area, Africa (Figure 1.3), Asia (Figure 1.4), Oceania (Figure 1.5), and The Americas (Figure 1.6). Results reveal continental area website location does influence a website score. Those located in The Americas have an overall significant difference to those located in Africa, Asia, and Oceania continental areas. The abridged WAM shows where differences lie at the domain, and function level, and which components occur more on websites from which continental area. However it is not determinable if there are any underlying causes or influences and this remains an area for future research.

Research questions three, four, and five relate to website evaluation by experts. Here limited consistency between individual experts when ranking 20 websites from the 280 studied is demonstrated. When the experts are placed in groups of two the consistency

between groups is more consistent than between individuals, however experts are still less accurate than the objective, abridged WAM.

Ranking of websites even by experts may be influenced by subjective variables that are difficult to quantify, such as personality, or motivation. Experts do concede it is easier to distinguish between lower scoring websites (those with fewer components) than higher scoring websites (more components present).

These experts had one more task, to consider the presence/absence of 12 specific components across the 20 websites. Here inconsistency with agreement still occurs, this may hold implications for survey-based studies seeking consumer opinions.

Here results demonstrate that it is possible to use an abridged WAM to benchmark tropical tourism websites successfully. This abridged WAM is objective, it provides results at-level, these results are easy to interpret; the approach is quick and easy to use and suitable for non-commercial website application.

This achieves my research aim to build a theoretically-based, objective website benchmarking approach by consolidating website components into present/absent, allowing benchmarking comparisons of websites. Hence, the abridged WAM is successfully demonstrated.

Publication details:

Cassidy, L.J., & Hamilton, J.R. (2014a). Tropical tourism website qualities. *In Proceedings of the 24th CAUTHE Conference* (pp. 232-245). Brisbane: Australia.

Intellectual input of authors:

Cassidy developed the research question, collected the data, and performed the data analysis. Cassidy wrote the first draft of the paper which was revised with editorial input from Hamilton. Cassidy developed the tables and figures

Publication details:

Cassidy, L. & Hamilton, J. (2015) Website Benchmarking: an abridged WAM study. *Submitted to: Benchmarking: An International Journal*

Intellectual input by authors:

Cassidy developed the research question, collected the data, and performed the data analysis. Hamilton provided assistance with data analysis. Cassidy wrote the first draft of the paper which was revised with editorial input from Hamilton. Cassidy developed the tables and figures.

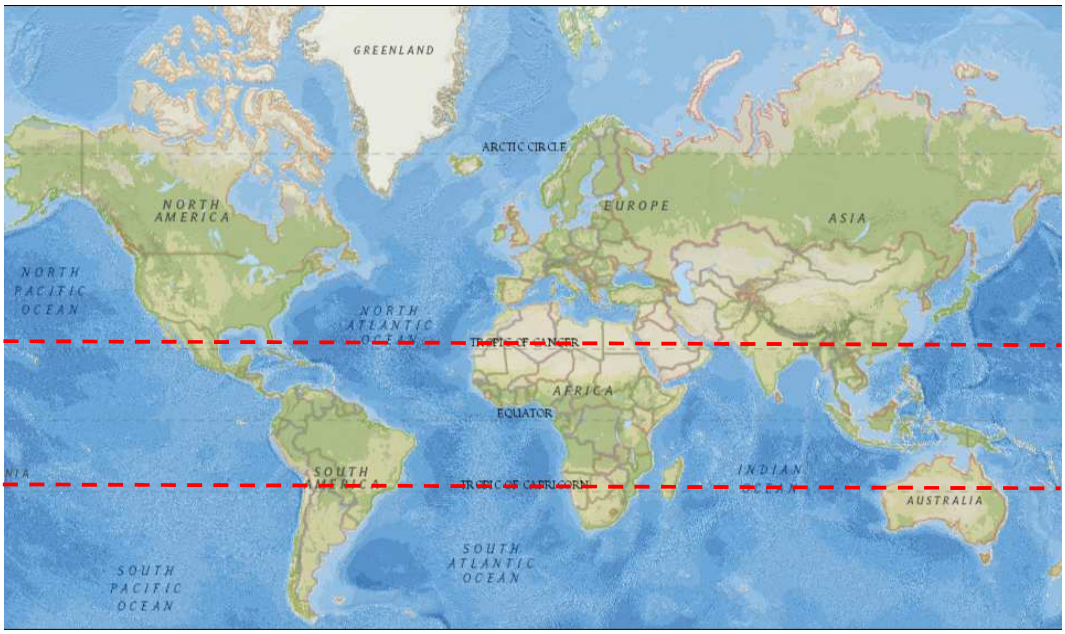


Figure 1.2: World Tropical Zone

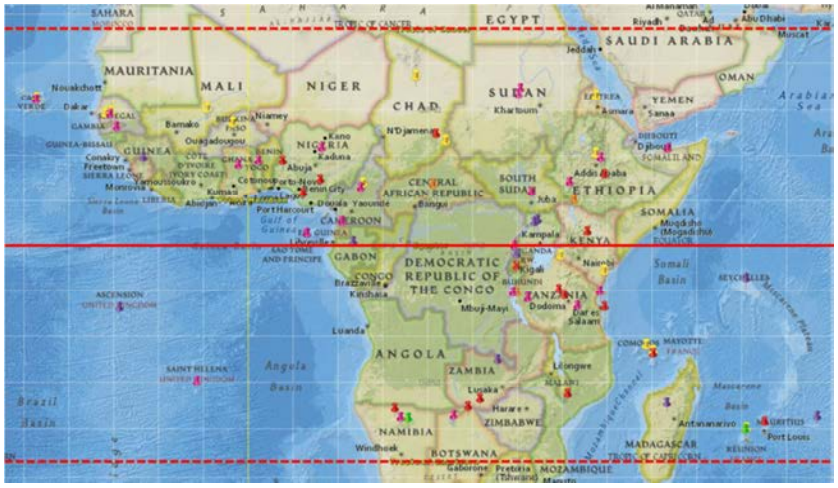


Figure 1.3: Tropical Zone of the Africa Continental Area

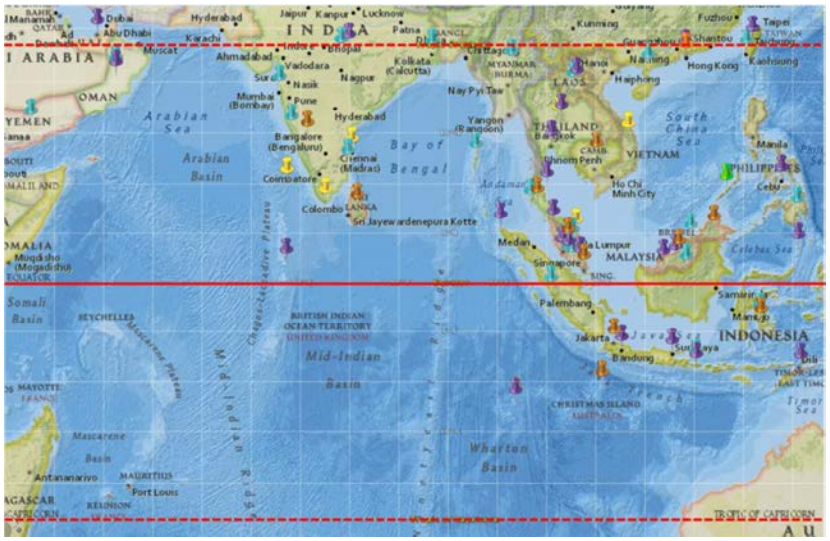


Figure 1.4: Tropical Zone of the Asia Continental Area

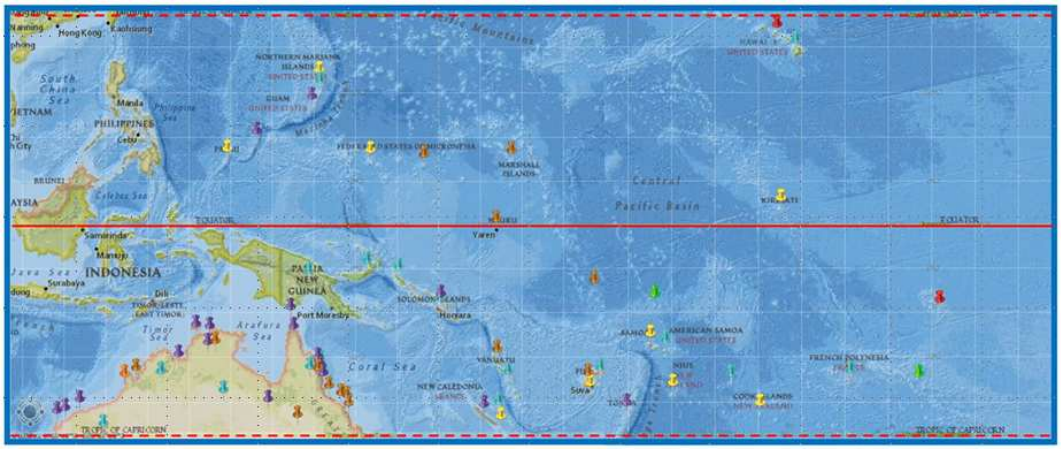


Figure 1.5: Tropical Zone of the Oceania Continental Area

Figure 1.6: Tropical Zone of The Americas Continental Area

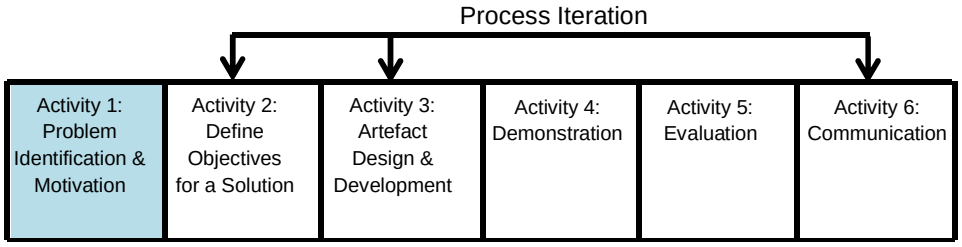
Chapter 7 is part of activity 6 in the DSRM, here I communicate my theoretical contribution, my empirical contribution, my real world contribution, and deliver recommendations and discuss areas for future research.

I now move into the DSRM phase of my thesis, commencing with chapter 2 covering activity 1.

Chapter 2

2.0 Problem Identification & Motivation

This chapter addresses activity 1 (below), and looks at recent approaches to website benchmarking, identifying areas for further research. A version of this chapter has been published in the proceedings of the ANZAM conference in 2012[1].



[1] Cassidy, L., & Hamilton, J. (2012). Multi-level website benchmarking: typological collation of recent approaches*. In Proceedings of the 26th Annual Australian and New Zealand Academy of Management Conference: Managing for Volatility and Instability, Perth, WA, Australia.*

2.1 MULTI-LEVEL WEBSITE BENCHMARKING: TYPOLOGICAL COLLATION OF RECENT APPROACHES

Published: *26th Annual Australian and New Zealand Academy of Management Conference*

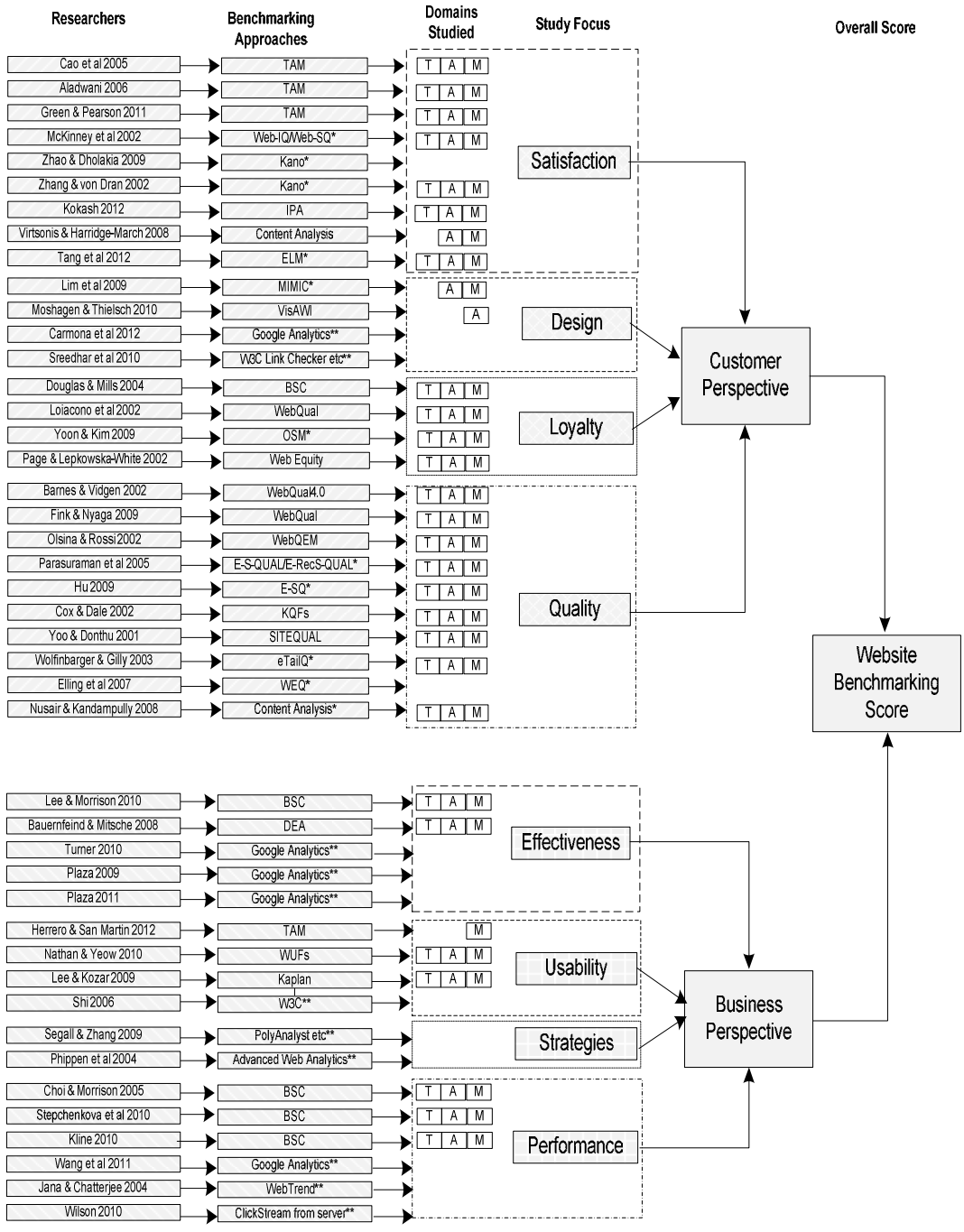
Introduction

Website Benchmarking

Website benchmark evaluation studies are approached from many angles. Some deploy a narrow approach considering limited features of the website (Cassidy & Hamilton, 2011b), whilst others adopt a broader approach (Kim, Kim, & Kandampully, 2009). However, depth of evaluation is seldom a prime consideration from either perspective. Studies are typically survey-based (or mathematically reasoned) geared to establishing a particular method or a particular website analytics approach. Survey-based studies involve website user opinion conducted as point-in-time-and-place collections, with degrees of restrictive coverage (Novak, Hoffman, & Yung, 2000). Hence, managers mapping pathways to improve and/or refocus websites (Cassidy & Hamilton, 2012b) should astutely interpret their benchmarking findings. To build understanding concerning website benchmarking, I now collate (and type) recent benchmarking approaches.

Website Benchmarking Approaches

To benchmark websites several researchers have adapted existing business benchmarking approaches, such as the Technology Acceptance Model (TAM), and the Balanced Scorecard (BSC). Others have developed their own website benchmarking approaches, such as etail quality (eTailQ) (Wolfinbarger & Gilly, 2003), and Web Usability Factors (WUFs) (Nathan & Yeow, 2011). Recent website benchmarking approaches may be collated in several ways, such as type of approach, and method of research. In this instance, and shown in Figure 2.1, past research approaches are collated by their functional/dependent construct and capture the functional groups within customer or business domains. Hence I close the gaps within past literary approaches.



T = Technical; A = Aesthetic; M = Marketing; * = Opinion-based; ** = Web-analytics

Figure 2.1: Collation Framework for Website Benchmarking

The components of each approach are collated into five mutually-exclusive blocks (technical (T), aesthetic (A), marketing (M), web-analytics (W), and opinion-based (O)). Technical components are associated with the information technology or 'back-end' of a website. Aesthetic components are visual or 'front-end' aspects of a website.

Marketing components encompass two-way communication with users as well as marketing. Web-analytics components include visitors, returning visitors, length of visit, and pathway to site, obtained with software such as Google analytics and WebTrends. Opinion-based components are from surveys which include questions such as: 'is this site fun?' An example relating to T, A, and M from the modified BSC studies is shown at Table 2.1.

Table 2.1: Modified balanced scorecard approaches

Researcher(s)	Industry	Perspective	Function	Component Measures (CM)	No. of CM
Douglas & Mills, 2004	Tourism	Customer Perspective	Loyalty	Technical	19
				Aesthetic	5
				Marketing	24
Lee & Morrison, 2010	Upscale hotels	Business Perspective	Effectiveness	Technical	5
				Aesthetic	6
				Marketing	59
Kline, Morrison & St John, 2004	Bed & breakfast	Business Perspective	Performance	Technical	7
				Aesthetic	9
				Marketing	25
Choi & Morrison, 2005	Travel agent	Business Perspective	Performance	Technical	16
				Aesthetic	33
				Marketing	9
Stepchenkova, Tang, Jang, Kirilenko & Morrison, 2010	Convention & visitor bureaus	Business Perspective	Performance	Technical	5
				Aesthetic	13
				Marketing	16

These website benchmarking approaches may be collated into eight (mutually-exclusive) functions of a website (satisfaction, design, loyalty, quality, effectiveness, usability, strategies, and performance). Satisfaction may be determined by repeat visits to a website and/or length of visit (Zhang & von Dran, 2002). With several differing components contributing to website satisfaction, these may alter over time with user experience (Zhao & Dholakia, 2009).

Design encompasses components that limit user dissatisfaction and increase user satisfaction (Zhang & von Dran, 2002). Loyalty may occur when components engendering trust are present in a website (Yoon & Kim, 2009). With website quality gauging when a website possesses components that meet both user and website owner expectations (Cox & Dale, 2002).

Website effectiveness is assisted by components that may contribute to the user achieving specified goals with accuracy and completeness (De Marsico & Levialdi, 2004). Usability is defined by Nielsen and Loranger (2006) as 'how quickly people can

learn to use something, how efficient they are while using it, how memorable it is, how error-prone it is, and how much users like using it'. However a more concise definition is: usability occurs when the correct set of components are present (Nathan & Yeow, 2011). Website strategies, are website improvement components that may be measurable with advanced analytics (Phippen, Sheppard, & Furnell, 2004; Segall & Zhang, 2009). While performance may be maximised when all necessary components are present in a website and user expectations are met (Phippen et al., 2004).

As shown in Figure 2.1 these website functions are grouped into higher level domains of customer-perspective (satisfaction, design, loyalty and quality), and business-perspective (effectiveness, usability, strategy and performance). When combined these domains then offer an overall website benchmark score. I now discuss the approaches within each function of the customer perspective domain.

Customer Perspective Approaches

Satisfaction

Although some of the following studies do not specifically say 'satisfaction' the measures used may be collated as satisfaction components. To determine satisfaction with tourism websites, marketers use Importance-performance Analysis (IPA) (combined Likert 5-point importance and performance scales). From here strengths and weaknesses may be identified (Kokash, 2012).

The Elaboration Likelihood Method (ELM) employed by Tang, Jang, and Morrison (2012) uses a Likert communication questionnaire to rate user interest and involvement in a specific destination. Respondents then rate information quality/design, thought responses, attitude to website (and destination), and future intentions towards the website (or destination).

A content analysis approach identifies 14 website communication constructs (structural elements; corporate themes; atmospheric, aesthetic, graphic imagery and multimedia; ergonomics, navigation and usability; contact, access and interaction; customisable events; links; community; marketing communications integration; online demonstration; online price quoting; online service delivery/integration platforms; value adding elements; online data collection) of United Kingdom print suppliers (Virtsonis & Harridge-March, 2008). These communication constructs are developed into brand positioning components and mutually-exclusively coded into present/absent measures

(Virtsonis & Harridge-March, 2008). Such an approach can assist management, but with limited breadth website analysis is restrictive (Virtsonis & Harridge-March, 2008).

McKinney, Yoon, and Zahedi, (2002) combine nine literature-identified constructs with expectation-disconfirmation effects, Web Information Quality (Web-IQ) and Web System Quality (Web-SQ), to investigate user satisfaction of service industry websites (McKinney et al., 2002). From their university-student questionnaire McKinney et al (2002) show Web-IQ and Web-SQ both influence user satisfaction.

The Kano model is adapted to website design by Zhang and von Dran (2002), categorising website components as basic, performance, and exciting constructs. Basics are those taken-for-granted; performers contribute to performance quality, and exciters are those outside the user's normal expectations. Student respondents to questionnaires are required to judge, and recall from experience when using websites of service industries whether (over time) the quality of basic components moves into performance or exciting component measures.

A modified Kano model is also used by Zhao and Dholakia (2009) to identify how five student-weighted constructs of website components affect user satisfaction. They find user experience influences results, therefore changes in interactivity against satisfaction should be considered when website managers seek to optimise their websites.

The following three studies employ TAM to evaluate different forms of website satisfaction. User intention-to-revisit and user opinion of e-business/commerce website quality is evaluated by Cao, Zhang, and Seydel (2005). While Aladwani (2006) assesses technical, general content, specific content, and appearance qualities effects on user-attitude towards a website and intent-to-purchase. Perceived-ease-of-use (navigability; responsiveness; download delay) as influencers of perceived-usefulness (content; interactivity), are targeted by Green and Pearson (2011).

Design

Although important to a website, design has not been studied to the same extent as website satisfaction. To test website design quality for errors, Sreedhar, Chari, and Ramana (2010) use W3C Link Checker, W3C Markup Validation Service, Webpage analyser, and Website Extractor. Clustering analysis and data mining algorithms are

employed by Carmona, Ramirez-Gallego, Torres, Bernal, del Jesus, and Garcia (2012) to extract useful knowledge on website design from one year of Google analytic data.

Not all approaches to design are objective. The Multiple-Indicator-Multiple-Cause (MIMIC) approach subjectively measures content and transaction quality; playfulness; and security against user intention to use an e-shopping site (Lim, Heinrichs & Lim, 2009). Survey respondents are university students, and hence MIMIC may not be a practical approach. Other studies concentrate on one area of website design, Moshagen and Thielsch (2010) utilise Visual Aesthetics of Website Inventory (VisAWI) that is 4 constructs of 18 perceived website visual aesthetics (simplicity, diversity, colourfulness, and craftsmanship).

Loyalty

To investigate how constructs influence user revisit-intention/loyalty, Loiacono, Chen and Goodhue's (2002) Website Quality (WebQual) employs ease-of-use, usefulness, entertainment, and complementary relationship. By 2007 Loiacono, Watson, and Goodhue (2007) combine the theory of reasoned-action and TAM, using focus-groups/telephone-interviews, and student beta testing, creating a refined WebQual suitable for evaluating e-business/commerce website loyalty.

Yoon and Kim's (2009) Online Store Success Model (OSM) uses five online questionnaire constructs (system, information, service qualities, trust, and customer loyalty) to test relationships/influences between constructs, and loyalty to a website.

Focusing on visitor retention/loyalty a modified BSC approach is used by Douglas and Mills (2004). As with other modified BSC studies Douglas and Mills (2004) assess the technical aspect with a commercial tool. User friendliness, site attractiveness, and marketing effectiveness are rated and scored by a panel of evaluators.

Quality

The four main functions of Key Quality Factors (KQFs) help describe a website that meets the expectations of: ease-of-use, customer confidence, online resources, and relationship services. Each contains several sub-functions with embedded components (Cox & Dale, 2002). Some KQFs score Yes (1) or No (0), whilst site map scores rate as: easily accessible on every page (2), must search (1), and none (0). Thus, a net website KQF score is generated to assess the quality of websites.

Focus groups plus an online panel are utilised by Wolfinbarger and Gilly (2003) to establish (and scale) the eTailQ of websites. They consider fulfilment/reliability, website design, privacy/security, and customer service; to test for relationships between quality, satisfaction, loyalty, and user-attitude towards a website. Developed by Elling, Lentz and de Jong (2007) - the Website Evaluation Questionnaire (WEQ) measures the quality dimensions of informational websites. WEQ contains opinion-based questions such as 'I think this website is fast'.

Another Website Quality (WebQual) approach is WebQual4.0 (Barnes & Vidgen, 2002). This updates and differs from Loiacono et al's 2002 WebQual approach. WebQual4.0 uses an on-line survey of usability, information quality, and service interaction quality to measure (and possibly redesign) and refocus a website.

To benchmark website quality between public accounting firms Fink and Nyaga (2009) add riskiness to WebQual. The study is in a controlled laboratory setting using post graduate university students. Follow-up studies should be conducted to confirm results (Fink & Nyaga, 2009). The Web Quality Evaluation Method (WebQEM) is a 4-step process with particular use in early stages of website development (Olsina & Rossi, 2002). Once the website is operating, it is generally directed towards the website's products.

When investigating the electronic service quality of e-business/commerce websites Parasuraman, Zeithaml, and Malhotra (2005) use a 22 measure E-core Service Quality Scale (E-S-QUAL). They combine 11 measures into 3 functions (responsiveness, compensation, and contact) and use an on-line survey to investigate how websites address customer problems/issues creating an E-Recovery Service Quality Scale (E-RecS-QUAL). To improve the Electronic Service Quality (e-SQ) approach, Hu (2009) uses an online survey. Then generates a fuzzy numbers algorithm of 45 component measures (grouped into 12 categories) determining user subjective preferences under an automated degrees-of-importance-of-criteria.

The quality of e-business/commerce sites continues to grow in importance as users digress from traditional shopping methods (Yoo & Donthu, 2001). Students assist Yoo and Donthu (2001) in developing SITEQUAL, evaluating user quality perceptions in internet shopping with ease-of-use, aesthetic design, processing speed, and security. To assess quality functions (navigability, playfulness, information quality, trust, personalisation, responsiveness) of six travel websites Nusair and Kandampully (2008)

use content analysis. Here 53 components assess user e-satisfaction to indicate where website improvements are suitable. However, not all components within the six quality functions are deployed in this study (Nusair & Kandampully, 2008).

In the following section I discuss approaches within each function of the business perspective domain.

Business Perspective Approaches

Effectiveness

Website effectiveness can be evaluated using a number of different benchmarking approaches. A modified BSC is used by Lee and Morrison (2010) to develop a set of website critical success factors. The technical quadrant is assessed with a commercial tool as with previous BSC studies, with remaining quadrants evaluated by a group of university students.

Data Envelopment Analysis (DEA), a linear programming model is preferred by Bauernfeind and Mitsche (2008) focusing on tourism organisations. DEA has five input (searchability, linguistic offer, number of forms, travel preparation criteria, updating) and two output measures (visits and email inquiries), delivering a mathematical result for website efficiency which can be utilised by managers/designers of websites within tourism organisations (Bauernfeind & Mitsche, (2008).

To assess the effectiveness of websites delivering information (such as libraries) Turner (2010) employs Key Performance Indicators (KPIs). Here, a university library may monetise each journal's value, then track the number of accessions to the journal using Google analytics. Another use for Google analytics is evaluating how effective a tourism website is at attracting users, and directing them to their goals (Plaza, 2009; 2011).

Usability

Measuring website usability across industries Nathan and Yeow (2011) identify seven WUFs, use of colour and fonts; graphics and multimedia; clarity of goals; trust; interactivity; ease of navigation; and download speed. An online survey of students determines the critical set of WUFs differs from industry to industry, hence this approach may aid in industry specific website design (Nathan & Yeow, 2011).

Kaplan's landscape preference model is modified to assess a website's usability, employing legibility, coherence, variety, and mystery (Lee & Kozar, 2009). Here, travel sites and electronics sites are scenario and questionnaire assessed by university students to explain differences in attitudes and purchase intentions of website users.

A commercial approach, Bobby Online Free Portal, that checks website coding according to the World Wide Web Consortium's (W3C) accessibility (usability) guidelines for websites, is employed in Shi's (2006) study of visitor information centre homepage content. However this approach focuses on accessibility/usability measures, neglecting other areas of a website.

TAM based user and manager focus groups are chosen by Herrero and San Martin (2012) to evaluate user intentions concerning rural tourism accommodation websites. They determine interactivity and navigability influence perceived ease of use (usability) of a website.

Strategy

Web analytics can over-time check success/failure of website strategies (Phippen, Sheppard & Furnell, 2004). Here, mixes of analytics (report summaries, page views, clickstreams, referrals, searches) are deployed. Commercial software packages (PolyAnalyst, SPSS Clementine, and ClickTracks) are used by Segall and Zhang (2009) for tracking and web mining analysis of customer surveys, marketing campaigns, and website use, enabling managers to select website improvements.

However, website analytics requires careful interpretation of the information before it can be applied (Phippen et al., 2004; Weischedel, Matear & Deans, 2005).

Performance

Website performance can be measured in a number of ways, such as web analytics and BSC. Advanced Google analytics is employed by Wang, Shen, Chen, and Wedman (2011) to track search traffic, direct traffic, and referral traffic to a website. WebTrends (server-generated statistics) is used over 13 months by Jana and Chatterjee (2004) to determine hits, page views, visits, and visitors and to gauge users directed to a site by a search engine. To assess the ability of new marketing strategies to increase website sales Wilson (2010) uses clickstream data and web analytic software. In combination these track movement of users through the website and assess which new marketing strategies work best.

A modified BSC is preferred to assess website performance of travel retailers (Choi & Morrison, 2005), convention and visitor bureaus (Stepchenkova, Tang, Jang, Kirilenko, & Morrison, 2010), and bed and breakfast accommodation (Kline, Morrison, & St. John, 2004). Each study assesses the technical area with a commercially available tool, and uses similar techniques across the remaining quadrants. The customer, marketing, and travel agency perspectives of Choi and Morrison's (2005) study are assessed by a group of students completing a dichotomous yes/no questionnaire. A present/absent questionnaire is used by Stepchenkova et al (2010) for customer friendliness and usability; effectiveness of marketing destination; and information and content. While Kline et al (2004) use a combination of dichotomous yes/no and 4-point Likert scale questionnaire for user friendliness, site attractiveness, and marketing effectiveness.

Implications of Research

Theoretical Implications

From an overall perspective, of the many approaches used to develop and evaluate websites, none truly yields comprehensive benchmarking of a website. There remains no consensus as to what components must be utilised, or as to how to measure the specifics of each function within the website.

Some chose to benchmark only one set of components, such as, Moshagen and Thielsch (2010) who concentrate on the visual (aesthetic) components of a website. Other studies selectively choose benchmarking measures to capture specific components of specific functions - but each time they only apply limited components. Still other studies collect data under subjective opinion methods, often coupled with students as the respondents. Hence, combinations of past research can engage larger numbers of components across more functions and domains thereby offering more detailed benchmarking analysis.

Practical Implications

Comparisons between studies remain difficult, even when the same approach is used as the components deployed may differ and/or the data collection methods may differ.

Further, many studies use student respondents/assessors to obtain data. Such studies should not be generalised and applied to the wider population of website users/customers. In addition, as time progresses both the web-business and its end-users' capabilities advance. Hence, it is wise to redo such theoretical work – applying

latest technologies to the website, and also seeking current responses from its general users/customers.

Many recent website evaluation (benchmarking) approaches employ time-consuming data collection and analysis methods more suitable for research than practical use. These methods are no longer suitable for business managers, web designers and web analytics interpreters who require such information as near real-time findings. This area remains poorly researched.

Future Research Implications

Measurement Aspects

Recent approaches to measuring and benchmarking websites lack consideration and explanation as to what to measure, and how to categorise the defined components. An approach that considers basic and key components of a website across multiple domains is likely to offer a smart way to produce enhanced and more comparable benchmarking applications. Here, targeting quick and easy computer software generated groupings recorded in an understandable and comparative format offers considerable interpretative value to business managers, web designers and web analytics assessors.

Theoretical Aspects

The pace of website innovation development, information technology capabilities and socially engaging software necessitates the development of an on-line benchmarking/collations approach that quickly, fully and accurately evaluates (and compares) websites. The existing website evaluation approaches lack the capabilities to capture the benchmarking components sourced in this study. Figure 2.1 demonstrates how these data collection approaches can be typologically grouped into a universal collation framework for website benchmarking.

Management Aspects

Business managers, website designers and web analytics assessors seek approaches that deliver website information in a timely manner. To remain competitive or move ahead of the competition they interpret this information and improve their organisation's website via website updates, and/or re-designs/refocusing. This helps keep their website information current, and may capture new website interactive elements along with social media changes.

To achieve maximum value from website benchmarking, scores obtained should be comparable at each level of a website (function, domain, overall). The components present on a website set the basis for its benchmarking score. To obtain the benchmarking score we treat each component as having equal importance to a website. We note the website literature does not consistently identify any difference in the relative importance of any of the components.

I acknowledge there may not be an even distribution of components within each website function. Hence I suggest a sum-scoring method be applied to facilitate comparisons between websites. I apply a score (out-of 10) to each function. For example,

$$\frac{7}{11} \times 10 = 6.36$$

As each domain may not have the same amount of functions, the same method is applied to achieve comparable scoring across domains.

I acknowledge this assumption has limitations; however it allows comparison at each level, to sum across the different levels, and to develop an overall website benchmark score with measurable comparison capabilities against competitor websites. This sum-scoring approach highlights the website's weaknesses and strengths. It remains a useful change management guide to business managers, web designers and web analytics interpreters.

Conclusion

This paper considers recent website benchmarking approaches and typologically builds them into a new collation framework for website benchmarking. I elucidate a different approach to website benchmarking where four customer web perspectives (satisfaction, loyalty design, quality), and/or four business web perspectives (usability, effectiveness, strategy and performance) combine to offer a different, yet comprehensive benchmarking approach.

My combined, multi-level website benchmarking approach offers a broad-scale analysis pathway - capable of delivering universal, detailed and at-level benchmarking. My sum-scoring approach builds at-level scores into an overall website benchmarking

score. This approach offers comparisons between different levels of measurement, and between items within the same level (or at-level) of benchmarking.

This typology-developed, broad-scale, sum-scoring approach also highlights website weaknesses and strengths. Thus, a more universal and detailed benchmarking approach is available for business managers, web designers and web analytics interpreters as they seek to implement competitive website changes.

With chapter 2 capturing activity one of the DSRM, identifying the problem and motivation for website benchmarking chapter 3 follows covering activity 2.

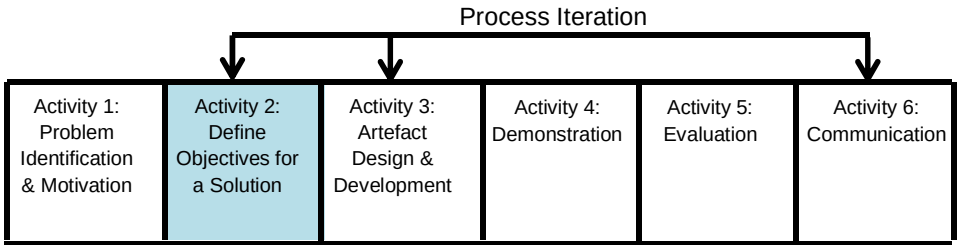
Chapter 3

3.0 Define Objectives for a Solution

This chapter consists of published papers two, three, and four. Papers two, and three in the proceedings of the 2011 International Conference on Electronic Business,[2,3] and paper four in the proceedings of the 2012 Hawaiian International Conference on Business[4].

Here I seek to define the objectives for a solution to the problem identified at activity 1. Hence I investigate the literature for current approaches to the problem and determine they generally involve survey based methods to some degree. Hence I conduct a study testing a 7-point Likert survey and a 2-point dichotomous survey for accuracy and timeliness in solving the identified problem. I propose an alternative.

Next I undertake initial investigations into the theory of website benchmarking and its measurement aspects (domains, functions and components). I conclude this chapter by revisiting subjective approaches to website benchmarking and propose an initial model for website benchmarking. These papers constitute activity two of the DSRM.



[2] Cassidy, L., & Hamilton, J. (2011). Website benchmarking: evaluating scaled and dichotomous approaches. *In Proceedings of the 11th International Conference on Electronic Business: Borderless E-Business for the Next Decade, Bangkok, Thailand*, *11*(1), 408-412.

[3] Cassidy, L., & Hamilton, J. (2011). Website benchmarking: theoretical and measurement aspects. *In Proceedings of the 11th International Conference on Electronic Business: Borderless E-Business for the Next Decade, Bangkok, Thailand*, *11*(1), 413-416.

[4] Cassidy, L., & Hamilton, J. (2012). *Website benchmarking: a comprehensive approach. In Proceedings of the 12th Hawaii International Conference on Business, Honolulu, Hawaii.*

3.1 WEBSITE BENCHMARKING: EVALUATING SCALED AND DICHOTOMOUS APPROACHES

Published: *11th International Conference on Electronic Business*

Introduction

Since 1993 website benchmarking has concentrated on combining various aspects of technical design and marketing (Francis, 2009). However, more recently website benchmarking has expanded to include areas of aesthetic (visual) design (Kim, Kim, & Kandampully, 2009).

These three domains are often measured using subjective Likert style techniques or by verbal questioning techniques (Pearson, Pearson, & Green, 2007). These approaches regularly present business-directed and marketing focused measures (Venkatesh, & Agarwal, 2006), and may capture varying degrees of technical design (Tamimi, Rajan, & Sebastianelli, 2000). Such subjective approaches generally portray the perspectives of the benchmarking designer or of the business analyst (Sharma, Gupta, & Wickramasinghe, 2006).

Benchmarking research has also involved computer software and on-line analysis techniques; these typically compare and rate websites against other websites in their database (Jenamani, Mohapatra, & Ghose, 2006). Other computer programs measure the inter-arrival rate of incoming website traffic, the number of objects contained in a web page, and the size of the web page objects (Gilly, Quesada-Granja, Alcaraz, Juiz, & Puigjaner, 2009). Website statistics obtained through website tracking programs have assessed degrees of usability of a website (Jana, & Chatterjee, 2004). Here, technical domain aspects and/or the basic design components of the website are measured.

Some businesses deploy aspects of customer relationship marketing approaches to further capture their customer's behavioural dimensions (Wang, Head, & Archer, 2000). Information technology and information systems benchmarking investigations continue to shift with human-computer interface (HCI) researchers delivering new computer screen and interface design understanding (Zuehlke, & Thiels, 2008). Such ongoing developments add aesthetic, emotive and design knowledge concerning websites and so constitute an emerging area of interest to website benchmarkers, website managers and business decision makers.

Literature Review

Website benchmarking literature consistently shows researchers only measure different aspects of a website's technical design and/or marketing and/or aesthetic (visual) design (Kim et al., 2009). There is little evidence of website researchers investigating in-depth, and in one study, aspects across all three of the benchmarking domains now discussed.

Although researchers use differing website benchmark data collection methods the majority of approaches involve subjective measures such as: Likert scale, telephone interview, and focus group data capture. Occasionally, website benchmarking researchers have used a dichotomous data capture method (Brown, Rahman, & Hacker, 2006). This small study benchmarked website technical design, marketing and aesthetic (visual) design (Brown et al., 2006), but was limited to just two measurements in each of these three domains.

Other researchers acknowledge problems and limitations in using such subjective data collection methods (Sharma, et al 2006) and suggest alternate methods should be considered (Sharma, et al 2006). Today, software business intelligence systems can be developed, and designed, to trawl a website, compile present/absent features and then develop weighted results which may be built into a concise benchmarking tool.

Figure 3.1 presents my proposed concept model for website benchmarking. It groups the measurement contributors under three domains, technical design, marketing and aesthetic (visual) design. Each domain is split into constituent functions of like components and collectively represents the measures related to each domain.

Three potential levels of website benchmarking are offered in Figure 3.1. Level one constitutes the combined website benchmarking score. Level two benchmarks at the three domains, and provides added detail. Level three benchmarks as nine sub-group measurements per domain. These 27 Level three functions are next discussed under each of the three domains - T1 to T9 for technical design; M1 to M9 for marketing, and A1 to A9 for aesthetic (visual) design.

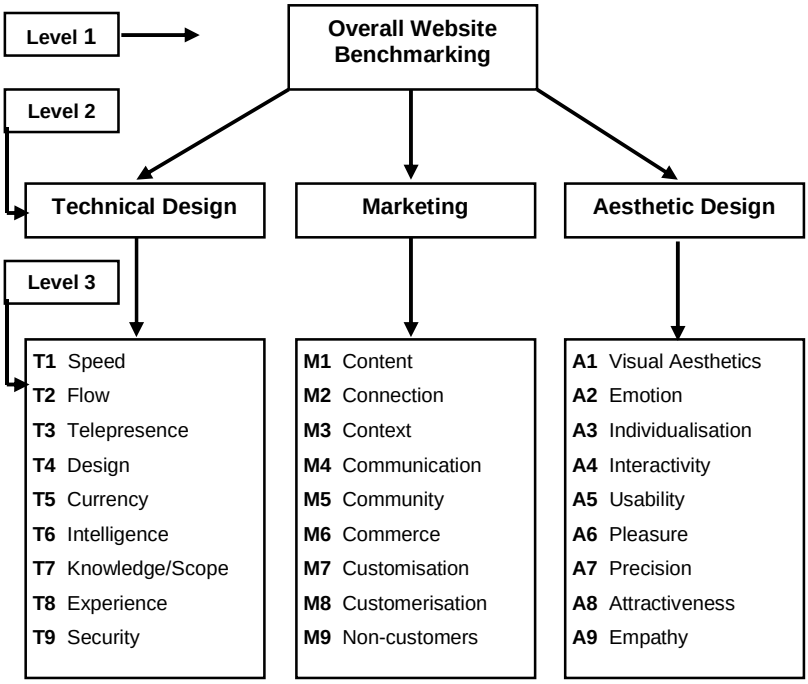


Figure 3.1: Benchmarking of websites

Technical design domain components

Technical design papers show a business may measure ways to efficiently generate customer loyalty (Kim et al., 2009), to increase customer trust (Francis, 2009), or to enhance speed and/or capabilities of websites (Pearson et al., 2007). Such research components apply to specific functions of the technical design domain.

Researchers working within the technical design domain and its functions have investigated speed (T1) of website (Francis, 2009) including home page loads and/or subsequent page loads each in under 7 seconds (Francis, 2009). Technical flow (T2), components include ease of site location (Kim et al., 2009), and search engine presence (Kim et al., 2009). Telepresence (T3) maps a seamless navigation (Taylor, & England, 2004) and whether 3D activities are present (Zhu, Basil, & Hunter, 2009).

Design (T4) components include the presence of background music (Zhu et al., 2009), and the presence of cookies (Huang, Le, Li, & Ghanda, 2006). The website currency (T5) sub-group is built to include website availability 24/7 (Pearson et al., 2007) along with the regularity of updates (Cao et al., 2005). Intelligence (T6) captures ability to load in any browser (Kim et al., 2009), and automatic page resizing (Brown et al., 2006). Knowledge (scope) (T7) checks the presence of a content management system (Costa, Silva, & Rogerson, 2008), and of digital assets management (Costa et al.,

2008). Experience (T8) is considered via operating chat rooms (Kim et al., 2009), and/or bulletin boards (Kim et al., 2009). Security (T9) is gauged by legal notices (Zhu et al., 2009), and secure monetary transaction facilities (Francis, 2009).

Marketing domain components

Journal papers measuring website marketing may determine advertising effects on customers (Patsioura, Vlachopoulou, & Manthou, 2009) and how repeat business is generated from customers (Taylor, & England, 2004). It captures how sales are improved (Fink, & Nyaga, 2009) with better online shopping experiences (Page, & Lepkowska-White, 2009) or better quality practices (Fink, & Nyaga, 2009) that may build long-term customer relationships (Geissler, 2001).

Functions of the marketing domain measure content (M1) using items including products arranged in categories (Francis, 2009) and product site searches (Kim et al., 2009). Connection (M2) components include information sourced within 5 clicks (Francis, 2009), page hyperlinks to the home page (Taylor, & England, 2004), and the absence of broken hyperlinks (Taylor & England, 2004). Context (M3) includes regular information updates (Cao et al., 2005) and the presence of ads (Kim et al., 2009). Customisation (M4) considers such areas as dynamic navigation bars (Francis, 2009) and, log-in facilities (Pearson et al., 2007). A new marketing domain sub-group is customerisation (M5) measuring fully personalised page availability (Kim et al., 2009) and personal blogs (Pearson et al., 2007). Communication (M6) components include email contacts (Kim et al., 2009), and feedback forms (Francis, 2009). Areas of community (M7) captured under the marketing domain evaluate customer discussion forums (Kim et al., 2009) and website social network presence (Huang et al., 2006). Commerce (M8) includes online booking and/or ordering availability (Kim et al., 2009) and product pages (Francis, 2009). Another marketing sub-group now considered is non-customers (M9) which may include reciprocal ads on external websites (Geissler, 2001), and customer - business gaming (Cao et al., 2005).

Aesthetics (visual) design domain components

Aesthetics (visual) design is a recent addition to website benchmarking. Recent moves towards enhancing websites have seen companies adding aesthetic design features to their technical design and marketing benchmark domains. This aesthetic (visual) design domain is often driven by HCI researchers.

The visual aesthetics (A1) sub-group captures layout and crowding (Brown et al., 2006), and the use of animation and/or flash (Brown et al., 2006). The motion (A2), sub-group components colours, contrasts and luminosity (Kim et al., 2009), along with webpage printing (Kim et al., 2009). Individualisation (A3) covers user selection of website appearance when accessed (Chaffey, Ellis-Chadwick, Mayer, & Johnston, 2009), along with selected font size (Chaffey et al., 2009). Website interactivity (A4) gauges customers placement of comments (Kim et al., 2009) and 24/7 on-line live help (Kim et al., 2009). Usability (A5) shows navigation consistency (Taylor & England, 2004), and consistent page search capabilities (Brown et al., 2006). The sub-group pleasure (A6) covers both virtual 3D activities (Kim et al., 2009), and zoom-in/out functions (Kim et al., 2009).

Precision (A7) assesses consistency of position for page features and links (Kim et al., 2009), and hyperlinks between pages (Taylor & England, 2004). Attractiveness (A8) houses audio adjustability (Kim et al., 2009) and operating videos (Cao et al., 2005). The empathy (A9) website sub-group offers individualised customer-business contact (Francis, 2009) along with discussion expert forums (Francis, 2009), and online chats with company representatives (Francis, 2009).

To date 230 present or absent literature tested website components are incorporated as the Level three sub-group benchmark components of Figure 3.1. To determine if benchmarking by survey suitably assesses websites the three website domains and their functions are investigated as outlined below.

Methodology

The website benchmarking framework (Figure 3.1) is investigated via a dual (7-point strongly agree to strongly disagree Likert and a 2-point present or absent dichotomous) survey approach across the three domains of technical design, marketing and aesthetics (visual) design.

These survey questions are all built on components tested in past website studies, and encompass features present across the website under test. Several dummy questions are included as response validity checks. Survey respondents first complete either the Likert survey or the dichotomous survey. They then complete the alternate survey one week later. This time delay between surveys limits short-term subjective memory influences between the two surveys (Pearson et al., 2007).

Opinion based Likert scale ratings (Sharma, et al., 2006), combined with point-in-time data capture relevance (Novak et al., 2000) suggests such questionnaires require careful interpretation (Sekaran, 2000), as respondents have been found to present more positive scores than expected when considering their website visit experiences (Elling et al., 2007). This positive tendency may arise when respondents blame themselves for benchmarking one website too strongly against another (Sekaran, 2000), and it is most prevalent in attitudinal scores concerning navigation (Elling et al., 2007).

The Likert scale data collected for the sub-group items in the survey is Level three sub-group weighted, summed, and weighted-scored out-of 10 so each sub-group equally contributes to the Level two domain, and to the Level one overall ranking score. Thus website benchmarking is achievable at all three Levels.

The dichotomous, present or absent, survey is again subjective, but it is simpler and somewhat faster to complete. Here, respondent dichotomous data for each Level three sub-group is summed and weighted out-of 10 as shown in Table 3.1. Again each sub-group equally contributes to the Level two domain and to the Level one overall ranking score, with website benchmarking achievable at all three Levels.

Table 3.1: Technical design – speed components

Measurement	**Score**	
	Yes	**No**
Home page loads in <5 seconds	1	
Subsequent page loads in <2 seconds	1	
CSS used		0
HTML is used	1	
CSS rollovers used		0
Java script and CSS files merged at the server		0
Database loads in <10 seconds	1	
Information in <6 seconds	1	

Table 3.1 presents the technical design domain sub-group ‘measurement’. Here, this Level three sub-group is sum scored out-of 10 for ‘measurement’ as shown:

$$\frac{5}{8} \text{ x } \frac{10}{1} = 6.25$$

This score may be interpreted by management as mid-range or slightly above average, but with three non-compliant areas that could be improved. With 27 Level three functions housed in Figure 3.1, a score of 270 would equate to 100% of features being present.

If the net Level two technical design domain score was 75, then the Level three measurement sub-group (scored in equation one) may be considered for improvement. Further, if the website's three Level two domains scored as technical design 75, marketing 30, and aesthetics (visual) design 75, then the marketing domain being the weak contributor may be targeted for improvement, especially if all competitor websites rated well above 200.

Discussion

Website benchmarking has traditionally been approached through surveys, and sometimes has led to the establishment of on-line assessment tools. Rarely have dichotomous website benchmarking studies been attempted by researchers. This study successfully builds the available research into the three benchmarkable domains of Figure 3.1. It also offers a procedure to investigate and to compare the various approaches to website benchmarking.

This research shows the technical design domain, the marketing domain, and aesthetic (visual) design domain successfully capture the available benchmarking research components, and so may be considered representative of measurable and benchmarkable features of the website. My initial research shows an on-line approach delivers precise results, but questionnaire based studies deliver lower levels of precision.

Conclusion

This paper combines technical design, marketing, and aesthetic (visual) design into one benchmarking tool. A two part questionnaire (Likert and dichotomous) is used to assess whether either approach better gauges website benchmarking, and where improvements to current systems may be generated. My research shows this broad approach (Figure 3.1) delivers a more detailed and balanced measure of benchmarking. Initial research based on the two questionnaires show the quicker response dichotomous surveys when checked against actual measurement features captures more accurate survey results.

The dichotomous surveys still falls short of delivering all correct respondent survey answers. Hence, a computer software programme offering precise and efficient benchmarking components across all area discussed herein is a better benchmarking solution.

Therefore, I suggest only on-line benchmarking tools capturing the features outlined above and including any other relevant available data (such as ISP clickstream data) should be deployed as website benchmarkers. I am now constructing an on-line measurement capture system capable of benchmarking across Level one and/or Level two and/ or Level three (as shown in Figure 3.1).

In paper two I identify issues with subjective measurement techniques when applied to website benchmarking. The following section (paper three) looks to the initial theoretical and mathematical process for website benchmarking.

3.2. WEBSITE BENCHMARKING: THEORETICAL AND MEASUREMENT ASPECTS

Published: *11th International Conference on Electronic Business*

Introduction

Website components (each representing a measurable feature) can be collated based on similarities or concepts into technology, aesthetics and/or marketing domains. These domain components can be further sub-grouped, and used to offer wider understanding of websites offerings (Hamilton, 2010).

Website components are measures built from empirical literature and typologically-collated into subsets of similar likenesses termed ‘domains’. Here, each component in a domain captures a different measurement perspective of this domain of the website, and so measures a unique website aspect. Thus each domain component operates as a mutually-exclusive element – different to all the other components within the domain, and within the website itself.

The typologically defined domains can be further refined by a skilled website focus group (with strong understanding of the relevant literature) into smaller subset sections of close likeness termed ‘functions’. Again each component of the function remains mutually-exclusive within its focus group allocated subset.

However, this alone does not constitute a website benchmarking theory. Website benchmarking may be partly understood from an Aristotle perspective. Aristotle (Barnes, 1984) believed in cause-and-effect. He defined ‘cause’ as a 4-step process.

First the universal set (that captures all possible items of measurement potentially present on the website) is defined. Here, the components, constituents and properties are presented.

Second the components present within the website are defined. Here, the governing principles, patterns, laws, and nomenclature are introduced.

Third the website component set is compared to the universal set. Here, comparison or efficiency against primary causal source of measures, components and properties arises.

Fourth, the website components present are expanded to include new items from the universal set and so move the relative positioning of the website to a new position. Here, the 'end' of this causal knowledge development concerning this benchmark may arise. Hence this is a cause-and-effect theory.

Similar causal approaches are employed in continuous improvement processes (Shewhart, 1980), total quality management (Deming, 1982), and many other management measurement systems, including in strategic planning and management 'balanced scorecards' (Kaplan, & Norton, 1992). These approaches rely on modified cause-and-effect benchmark processes, and are set in specifically controlled areas.

Benchmarking

Today benchmarking sets a standard against which something can be judged. It typically allows measurement, comparison, assessment, and repositioning into a new final state. Yet, this cause-and-effect benchmarking approach built on Aristotle's views is not a sufficient theory from which to benchmark, and then enhance, rebuild or reposition, a website.

Website benchmarking theory is advanced mathematically when Aristotle's theory is combined with mutually-exclusive set-theory (built from literature-based, typologically-collated groupings of components). This allows stage one to stage three of Aristotle's theory to be delivered.

However, new components may arise when new technologies emerge within the universal set of components (and possibly also within the website set of components). As time progresses, other website components within the universal set may become irrelevant, and so may require deletion from the set of website components. Thus, a rough-cut approach to set-theory may be engaged to better capture such ongoing changes to the components involved in website benchmarking. This rough-cut approach delivers a close approximation to the website's benchmark features.

Again, cause-and-effect, rough-cut set-theory does not adequately capture website benchmarking theory because it fails to capture the business and/or customer interface motivations that underlie necessity. Here, deliverable website improvement outcomes may be motivated by a business desire to: improve website competitiveness, or include new website innovations; or grow website economic rewards; or to strategically position the website or to implement website change (Page, & Lepkowska-White, 2009; Zhu et

al., 2009). In addition the customer, through the website, exerts expectations on the business which must provide for such intensions (purposes) and extensions (elevated value provisions) (Hamilton & Tee, 2011).

Hence, website benchmarking theory is built around the website interface, and contains an outcomes-motivated, cause-and-effect, rough-cut set-theory. Finally website benchmarking theory requires the addition of astute market-placement timing – specifically designed to maximise customer engagement, interaction and exchange.

Therefore, website theory remains a complex mix of theoretical targeting and measurement component combinations. To complete the benchmarking process the website may be appropriately altered after astute management decision making considerations.

This paper adopts a rough-cut mutually-exclusive set-theory to build a website measurement approach, and then discusses the basis of the above theoretical considerations using a visual representation of how website benchmarking theory can be operationalised (Figure 3.2).

Website Benchmarking Measurement: Set-theory

Website components can be grouped based on similarities with a concept, but from different perspectives. Hence, with each component built from past empirical studies, it is likely each retains discriminant validity, and so is considered mutually-exclusive. Where a component is present, or absent within a website, each binary component is still an element of the set of website measures (M). Within the set of website measures, subsets of present measurement components (m_p) are collated into subsets – termed domains (D) and functions (F).

To form a website benchmarking subset function, six or more logically grouped components are combined to deliver a statistically interpretable component average. Where these function components exceed 12 consideration is given to split the subset function into two subset functions. This approach is adopted to ensure a benchmark component is not masked by the remainder of the subset function. Hence, function analysis of websites offers a fine focus for website analysis. Thus, a simple benchmark score, (Boisvert & Caron, 2006) may be developed as follows:

$$Benchmarking = \frac{\sum(measures\ present)}{\sum(measures\ possible)}$$

$$= \frac{\sum(m_p)}{\sum(M)}$$

$$where:\ m_p\ \in M$$

Considering the website items of measurement (M) as a function of a universal set of website items (U):

$$where: m_p\ \in F\ \in D\ \in M\ \in U$$

The universal set of benchmark components may contain an infinite number of embedded mutually-exclusive components (Vilenkin, 1986). Each literature-developed (and tested) website component gauges a different measurement perspective, and each is assumed mutually-exclusive of all other components. Hence, I apply set-theory, and the inclusion-exclusion principal, and sum these components to achieve a benchmarking score as per:

$$|A \cup B| = |A| + |B| - |A \cap B|$$

and where 'A' and 'B' are combined as shown. As this is mutually-exclusive note:

$$|A \cap B| = 0$$

and the simplified set-theory collation emerges:

$$|A \cup B| = |A| + |B|$$

To statistically compare the universal set of benchmark components against the set of components present on the website, each component is recorded as '1' if present, and '0' if not-present on the website. Further each set of components is assigned a positive numerical value that is less than M.

Similarly, functions of individual measurement components can be collated into their larger website-subset – termed a 'domain'. Here each function forms a recognisable aspect of its domain, and each website domain resides within the overall website components set.

Hence, a function (F_{ij}) is a summation of its constituent mutually-exclusive components and behaves as a small recognisable subset of the website's set of components:

$$F_{ij} = \sum_{i=1}^{i} m_{ij}$$

As functions are subsets of a domain (D_{ijk}):

$$D_{ijk} = \sum_{j=1}^{j} F_{ijk}$$

The domains are collated into a benchmark score for the website (B):

$$B = \sum_{k=1}^{k} D_{ijk}$$

The benchmark score is compared to the universal set (U) as a ratio score (T):

$$T = \frac{B}{U}$$

This approach allows websites to be compared. Larger 'T' scores capture more extensive components, but this alone often masks problems where two strong domains may mask a problem within a weaker domain.

Hence, means are also determined at group and domain levels. Ho, and Wu, (2006) use this approach to assess the 'greyness' of incomplete information as this allows finer comparisons (Deng, 1989).

At the individual group level the number of components per function may vary, and this may be exacerbated when new marketing, technology, aesthetic or social domain

components are added to the website, or when components are deleted due to web-related technical changes. Hence, $F_{ij(\ av)}$ is computed by averaging the components present (m_{ij}) against this function's total components (i).

$$F_{ij(av)} = \frac{1}{i}\left[\sum_{i=1}^{i} m_{ij}\right]$$

With some functions scoring poorly, and others exhibiting high scores, very low scoring functions suggest areas for website improvement. Other higher scoring areas may also need improvement, but whichever is the case, missing items within the universal set of website components are highlighted for attention.

The same logic applies at the domain level, and weakest domains can be targeted for improvement, or for competitive re-positioning

Thus a 'rough-sets' approach (Zhu, 2007) captures the greyness of information (Deng, 1989) from a typological perspective, and presents conditions under which lower and upper approximations operate.

Benchmarking Set-Theory

Benchmarking improvements, by missing component inclusions, can be identified with rough-cut set-theory. To build a theoretical basis for benchmarking further considerations are required.

Benchmarking should contribute towards a superior state of affairs – one consistent with the business' purpose to exist, survive and hopefully grow. It can be considered as a cause-and-effect process. The cause being to satisfy the knowledge about something such as material components, formal principals, efficient actions, or a reason to apply something and change a state of affairs (Moriarty, 2011). The effect is built on antecedents, which in themselves cause change or chance alterations, or generate efficiencies. Hence benchmarking may enable management to post-event, change a process, and so attempt to deliver a perceived effect (which may or may not occur over time).

This website benchmarking process is visually theorised as Figure 3.2. Here the literature typology collation of existing website components currently falls into the

domains of Technology, Aesthetics and Marketing (Cassidy & Hamilton, 2011a; Hamilton, 2010). When mapped in three-dimensional-space with each domain operating independently (at right angles) to each other, an optimal universal set position may be determined. This position represents Aristotle's first causal step.

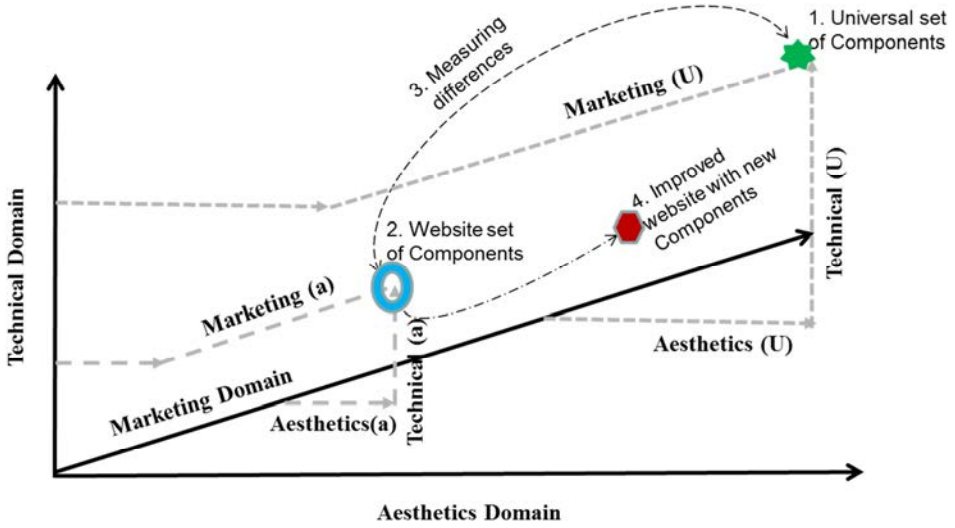


Figure 3.2: Visually theorised website benchmarking

Next, following Aristotle's second causal premise, the components of the website being benchmarked are position-defined by the above rough-cut set-theory approaches.

Third using rough-cut set-theory the website measurement subsets (domains, functions, and components) are compared to those of the website universal set. Here missing components and weak areas are exposed for possible management consideration (or actioning).

To this point Aristotle's cause-and-effect theory is followed, but step four of website benchmarking moves beyond the simple Aristotle cause-and-effect and rough-cut set-theory approaches. Here, modern day competing agendas influence the effect of the responsive decision making processes. Hence, in response to the benchmarking, management may choose to act and improve and/or re-position the website, or choose not to act leaving the website unchanged. Thus website benchmarking theory involves a 4-stage process – three measurement based and one management intelligence based

Discussion

Thus, the global set of existing website components, typologically collated, may be used causally under rough-cut set-theory to logically determine, and relate, the missing components on a website – potentially offering these as areas in which to effect improvements or re-positioning within the existing website.

To complete the website theory each instantaneous business-customer interface engagement that arises must also be intelligently captured, assessed and deployed as required by the business. These instantaneous additions to the business intelligence suite contribute to the stage four benchmarking application suite. Here, expectations and experiential engagement (by the customer) adds perceived customer value concerning the website (Flavian, Guinaliu, & Gurrea, 2006; Hamilton, & Tee, 2011; Novak et al., 2000; Zuehlke, & Thiels, 2008) and remains a pre-cursor to elevated website satisfaction, loyalty and trust (Flavian et al., 2006).

Conclusion

Through a typology approach this study combines technical design, marketing and aesthetic (visual) design components available to websites into binary (present/absent) components that contribute to the benchmarking process (Cassidy, & Hamilton, 2011a; Pearson et al., 2007). Each present component within the website under causal, rough-cut set-theory is numerically collated as contributing to a website subset domain and into one of this domain's functions. Thus a multi-level benchmarking interpretation is deliverable. The theoretical approach developed herein establishes a four stage theoretical benchmarking approach (visualised as Figure 3.2) capable of delivering these detailed, multi-level, balanced measurement interpretations.

Here the feasibility of developing a website benchmarking theory and measurement approach has been proposed. In the next section (paper four) issues with subjective techniques from the literature are identified and discussed. Then the first objective, hierarchical approach to website benchmarking is introduced.

3.3 Website benchmarking: A comprehensive approach

Published: *12th Hawaii International Conference on Business*

Introduction

Organisations are part of an ever increasing competitive global economy, continually employing new innovative techniques to remain at the forefront of their industry (Yasin, 2002). Benchmarking is used by many organisations to identify areas or methods that may need improvement and better manage resources (Adebanjo, Abbas & Mann, 2010; Yasin, 2002). One such important resource is the organisation's website.

Website benchmarking is generally accomplished with a subjective technique such as, a Likert style survey (Carlson & O'Cass, 2010; Zhao & Dholakia, 2009), a modified WebQual (Fink & Nyaga, 2009), modified balanced scorecard (Lee & Morrison, 2010), or content analysis (Zhu et al., 2009). These subjective techniques can have a variety of issues, the sample groups used may not be representative of all consumers and therefore not generalisable (Featherman & Wells, 2010; Kim et al., 2009), 'learning effect' may occur when subjects visit more than 1 website for the survey (Green & Pearson, 2011), and answers may be biased when the survey participants answer what they think the researcher expects (Cao et al., 2005).

Occasionally researchers use objective techniques, such as presence/absence of components, but include a subjective rating for each component (Boisvert & Caron, 2006; Brown et al., 2006). Gonzalez and Palacios (2004) use a qualitative evaluation of websites with factor weightings. These researchers acknowledge this technique introduces subjectivity into the results due to the 'human factor' in deciding the weightings. I demonstrate that it is possible to obtain meaningful results without introducing subjectivity into benchmarking of a website by using an objective technique.

Consistency in Subjective Website Benchmarking Measures

Benchmarking criteria differ greatly between researchers, even when it appears they are benchmarking the same thing, such as the quality of a website.

Quality Measured Subjectively

Quality is a prominent topic in website research (Yoon & Kim, 2009) although measures are grouped differently. System quality, information quality, and service quality are used by several researchers. Yoon and Kim (2009) combine them with trust and loyalty to develop an 'online store success model'; Tsai, Chou & Leu (2011) group

under e-quality with a combination of e-marketing (price, place, promotion, and product) for an evaluation model. System quality, information quality, and service quality are grouped by Cao et al., (2005) under e-commerce website quality to determine the effect on customers' perceptions, preferences and intentions towards a website. Aladwani (2006) uses differing quality groupings (technical quality, general content quality, specific content quality, and appearance quality) to determine attitudes to a website.

Interactivity Measured Subjectively

Dholakia and Zhao (2009) investigate the influence of interactivity on customer attitudes. Teo, Oh, Liu, and Wei (2003) use interactivity and monitor these effects on satisfaction, effectiveness and efficiency, and in turn, monitor their influence on value, and attitude towards a website.

Usability/Ease of Use Measured Subjectively

Usability/ease-of-use of a website appears a simple criterion. However, researchers incorporate differing measures as 'usability' (ease-of-use). Lee and Kozar (2012) focus on how usability influences customer behaviour. While Green and Pearson (2011) focus on usability's influence on customer acceptance of a website, Cox and Dale (2002) consider it to be the ease-of-use of a website.

Categories for a Website Benchmarking Approach

The above approaches offer subjective evaluation of websites. Several researchers include subjectivity by adopting Evans and King's 1999 approaches on 'what constitutes a website assessment approach' (Chiou, Lin & Perng, 2010; Gonzalez & Palacios, 2004). Evans and King (1999) specify 'any assessment approach has five components: categories, factors, weights, ratings, and total score.'

I do not give weights to my website categories (functions) or my factors (components) and I propose all have value, and without ratings I consider all to be of equal importance. I therefore use a numerical approach and build a total website score - and thus deem this my 'website rating'. Hence, my website benchmark approach is, by default, objective, and not influenced by subjective limitations as identified in the literature.

In constructing this approach I have identified 230 empirically developed components in the literature (Cassidy & Hamilton, 2011a; Cassidy & Hamilton, 2011b). These

components are grouped into three domains (marketing, aesthetic, and technical). Within each domain are mutually-exclusive sets of website functions (Figure 3.3), and within each of these functions are its constituent and mutually-exclusive components (Figure 3.3).

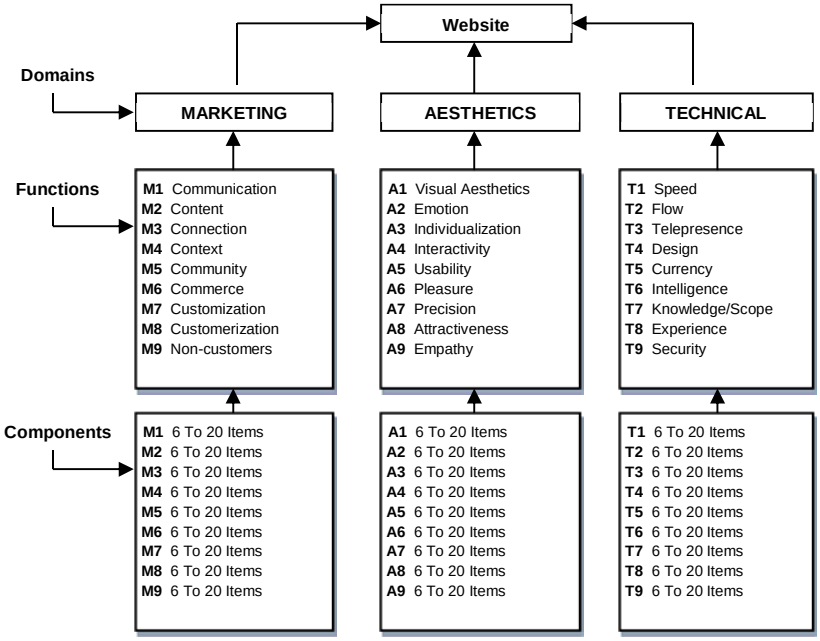


Figure 3.3: Website Marketing, Aesthetics, Technical Ratings (WebMATRs) approach

Boisvert and Caron (2006) specify 'a component is related to a function if it contributes to that function' (therefore, a company phone number contributes to communication). The components making up each function, give each function a degree of solidity. For example, the components of a communication function could be: the phone number, the company name, company email contacts, a company physical address, feedback forms etc (Boisvert & Caron, 2006).

My objective website benchmarking approach - termed 'WebMATRs' checks a website to verify if components are present or absent (1 or 0). This method gives a score of 'present components' for each function, which in turn gives a rating for the relevant domain, and then the scores for each domain are totalled – delivering a rating for each website.

Hypothesis

Each domain's rating is calculated independently of any other domain. The functions and the components reside in only 1 domain, for example, if in marketing, they do not

appear in technical or aesthetic domains. Similar components fit logically into only one function, and similar functions fit logically into only one domain. As can be seen in Figure 3.3 each domain has a set of functions that are unique to that domain, and so represents a mutually-exclusive section (similar to a factor in statistics). Here, each domain rates a different area of a website, and each domain may not necessarily yield the same rating.

Retail/sales websites, such as 'Harvey Norman,' 'Amazon,' and 'Ebay' each want a high marketing domain rating. 'Android market' and 'iTunes' offer technical assistance applications, and so require high technical domain ratings. An information site such as 'Emergency Management Queensland' or the 'Australian Government' website has lower marketing domain rating expectations compared to retail/sales sites. Gaming websites - such as 'World of Warcraft' and dating websites like 'eHarmony,' target high ratings in aesthetics, technology and marketing. I therefore use 'rating' as my dependant variable for website benchmarking, and suggest this dependant variable is altered by combinations of aesthetics, technology and marketing sum-scores for the website(s) being considered.

I now present my first two hypotheses:

- H_1 Each of the 3 domains (marketing, aesthetics, and technical) contributes towards the website's rating.
- H_2 An organisation's service-type influences a domain's rating.

The components within each function are also mutually-exclusive to each other. However not all functions have the same number of components. For this reason, and to equilibrate comparisons between functions, a score out-of 10 is calculated for each function. If the technical function, speed, scored '5 present components' out-of a possible '8 components,' the score calculates as 6.25 out-of 10 (equation 1). If a function has more than 10 components a score out-of 10 is still calculated – as shown in equation two.

$$\frac{5}{8} \text{ x } \frac{10}{1} = 6.25 \quad (1)$$

$$\frac{12}{15} \text{ x } \frac{10}{1} = 8 \quad (2)$$

I now present my third and fourth hypotheses:

H_3 Each function of a domain within a website is of equal importance to its domain.

H_4 Each function of a domain within a website contributes to its domain.

Methodology

This research is designed to find a method of benchmarking websites that is not subjective. The first step, reviewing the literature, identifies 230 empirically developed components. After studying the literature three domains emerge for classification of the components; Marketing, Aesthetics, and Technical. Each domain is then divided into nine functions, and within each function, between 6 and 20 components exist. I consider four to be the lowest number of components acceptable – in a similar vein to that of solid factor analysis.

Data collection emanates from 10 different service industry websites. From my literature determined domain functions I deploy an 'expert' website analysis team – each with a specific area of expertise relating to websites. Experts included are from: information systems, information technology, design, business management, marketing and information management (CIO) in this website' analysis team. The analysis by each expert of the set of 10 websites provides a domain level rating, and an overall rating for each website. These ratings enable the 10 websites to be compared against each other. Each website can also be rated against a fully featured website to see what is lacking, and then investigated by adding selected components, again checking the new benchmark score against perceived changes.

Consider two marketing websites X and Y with strong component contributions to marketing domain and weaker component contributions the other two domains. The organisation owning website X wants to rate their website against website Y - as website Y appears to be more popular. Figure 3.4 demonstrates that although website X is not a poor website, and rates well in its marketing domain, website Y still shows a higher rating for its marketing domain. Website X's owners now recognise they have a competitive target (website Y), and may now choose to change/improve their website by adding missing marketing components in-line with those of website Y, or they may choose to differentiate adding alternative marketing functions to those of website Y. Hence website X is repositioned into a different competitive marketspace.

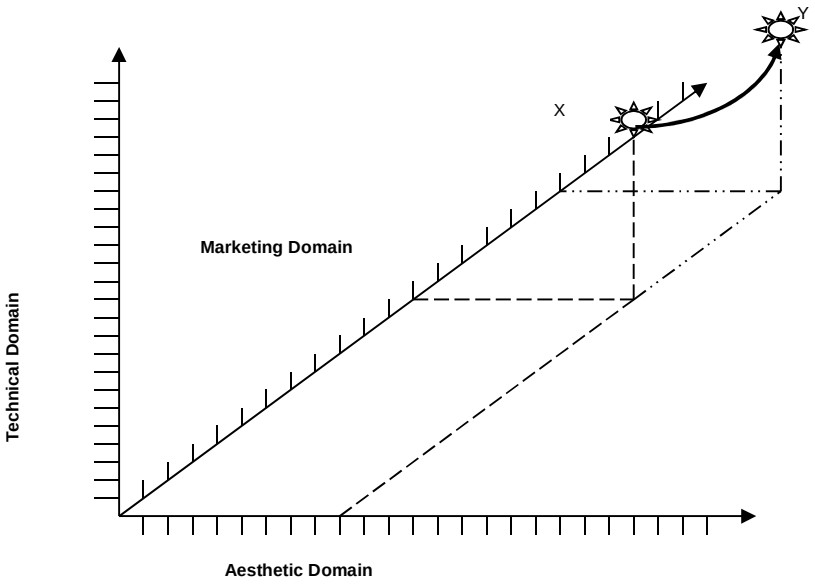


Figure 3.4: Website ratings graphed

Conclusion

I have demonstrated that it is possible to develop a website benchmarking approach that is objective. This removes human subjectivity and human bias when assessing websites. I show that components identified in the literature can be collated into three separate domains (marketing, aesthetics, technical), and that each domain may contribute differently to the website's rating. I explain how the focus of different organisations can influence the rating of each domain, and I show in Figure 3.3 how each function contributes to its domain. I also demonstrate, and discuss, the mutual-exclusivity of each domain's components and functions. WebMATRs offers a website benchmarking approach that allows organisations to, extensively, and objectively, rate their website across all 3 website domains. This approach also allows comparisons to be made at the website, domain and function levels within service industries (Figure 3.4), and possibly between different service industries.

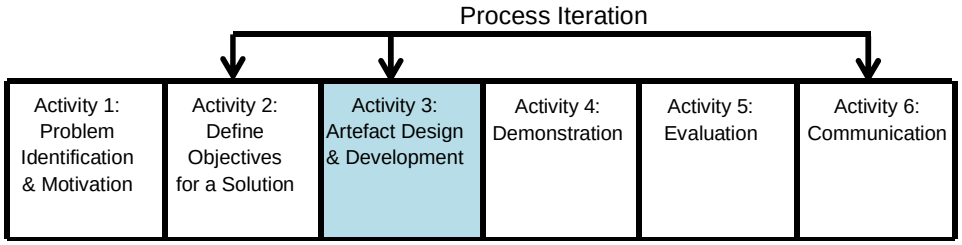
Chapter 3 has defined the objectives for the solution (activity 2) to the problem identified (activity 1) in chapter 2. Chapter 4 follows with artefact design and development (activity 3), and a detailed explanation of the theory outlined in this paper.

Chapter 4

4.0 Artefact Design and Development

In this chapter (paper five), I revisit the literature and consider issues associated with current approaches to website benchmarking. I further develop my theory of website benchmarking, and my new mathematical approach, updating my previous approach WebMATRs (chapter 3). This delivers my website analysis method (WAM). WAM contains 3 domains, 28 functions, and 230 literature-identified components.

A version of this paper has been accepted for publication in Benchmarking: An International Journal[5]. Chapter 4 addresses activity 3 in the DSRM.



[5] Cassidy, L., & Hamilton, J. (2016). A design science research approach to website benchmarking. *Benchmarking: An International Journal, 23*(6) (In Press).

4.1 A Design Science Research Approach to Website Benchmarking

In Press: *Benchmarking: An International Journal*

Introduction

Websites are assets that can deliver high dollar return-on-investment – especially when fully incorporated into a corporate's business model (Simmons, Armstrong, & Durkin, 2008). Although the global e-commerce sales through websites are to exceed $1.5 trillion in 2014 (eMarketer, 2014), at the national and corporate level, business websites generally do not capture the quality, the innovation and the competitive positioning benchmarks (O'Cass & Ngo, 2012) expected when the corporate is in pursuit of high financial returns. Yet these websites provide a key 24/7/365 connecting environment to online consumers, and visitors, and inquirers.

Approaches to website benchmarking

Currently well over 150 website components have been identified (Cassidy & Hamilton, 2011b; Olsina & Rossi, 2002; Stepchenkova et al., 2010), but few studies have attempted to use these large numbers of measures when comparing or benchmarking websites. In addition there is little consistency or consensus on what and how to benchmark. However, some recognise website benchmarking should deliver a process that is both easy-to-implement and one that deliverers timely, cost-effective, and interpretable (internal and external) results (Boisvert & Caron, 2006).

From a corporate perspective, although websites do change, website benchmarking is often assessed irregularly, and inconsistently. This assessment has involved specific scoping (Lee & Kozar, 2009), and subjective comparisons of convenient components at a selected point-in-time, or the occasional comparison against a selection of competitor websites.

Website benchmarking employing surveys is complicated, because respondents are often restricted by their level of understanding regarding the website's marketing, aesthetics and design technical parameters; language terminologies; or its social and interactive components. Also when large amounts of benchmarkable data is to be collected (Krosnick et al., 2002) the respondent often suffers from task-time fatigue (Lee, Ungson, & Russo, 2011) and their benchmarking decisions show cognitive inconsistencies (Krosnick et al., 2002)

Other corporates choose to derive their website benchmarking metrics through computer scanning approaches (Calero, Ruiz, & Piattini, 2005; Olsina & Rossi, 2002) and accept comparative ratings where the website is deemed more innovative, or economic, or strategic (Page & Lepkowska-White, 2009; Zhu et al., 2009). As most computer scanning, website benchmarking approaches incorporate degrees of human subjectivity in their design or interpretation ratings, these approaches are limited. For example, most are point-in-time developed and scoped by the programming team who set which website components are to be evaluated and interpreted, and then decide on the intelligence of the software, its comparative mechanisms and its associated metrics.

Although a raft of website benchmarking survey software and scanning approaches has emerged each displays limitations in scope, or in the capture of new technologies or features, or in inherent program and reporting subjectivities.

Study motivation

This study is motivated by an interest in e-business, and information systems research, along with concerns for corporates and their websites when competing globally. Further motivation emanates from the relatively slow and often small advances, deployed in business website comparison approaches, and that to-date website benchmarking has lacked both a theoretical approach and an approach to capture relevant analytics. Another motivation is to offer corporates' a simple, comprehensive, and time-efficient way to interpret their website components and so overcome managerial reluctance to instigate website change(s).

A final motivation emanates from the knowledge that when a corporate, through its website, instigates such experimentation, exploration, and exploitation approaches, it can release new competitive and positioning opportunities (Adler et al., 2009). An extensive literature study also identifies (and supports) a need for a different and non-subjective universal approach to business website benchmarking.

Hence I draw from information systems and look to the design science paradigm as the philosophical basis (Fink & Nyaga, 2009) to my non-subjective website benchmarking approach.

Design science research

This study adopts a design science research (DSR) approach to design and develop a new website benchmarking approach for business.

> *Design science research is a research paradigm in which a designer answers questions relevant to human problems via the creation of innovative artefacts - thereby contributing new knowledge to the body of scientific evidence. The designed artefacts are both useful and fundamental in understanding that problem. (Hevner & Chatterjee, 2010).*

Under DSR I apply its seven guidelines to develop my technology-based solution (artefact) to solve this website benchmarking issue (Hevner, March, Park, & Ram, 2004). From the literature, I first explain the gaps that exist, and that no theory shows overall relevance to this website benchmarking problem. The artefact can be a construct, or a model, or a method, or an instantiation. In this study I engage the artefact as a website analysis model (termed WAM). The WAM artefact is supported by clear, verifiable, and rigorous method, and is applied at the construction and evaluation stages of the artefact. The WAM artefact also offers an effective and understandable approach for its relevant audiences (Hevner et al., 2004).

The following sections discuss existing literature approaches to website benchmarking and the design science research methodology (DSRM) employed within this study. The application of set-theory; Aristotle's theory-of-causation; planned behaviour, motivation, consumption, and gratification theories are further considered for applicability to website benchmarking. The study then describes the deployment and evaluation of the WAM artefact, and concludes with an assessment of implications and other areas befitting future research.

Background

Current literary approaches to business website benchmarking include theoretical approaches such as subjective impressions of website consumers (Barnes & Vidgen, 2002; Io Storto, 2014), perceived-qualities (Grigoroudis et al., 2008; Yoo & Donthu, 2001), theory-of-organisational-trust (Fang, Qureshi, Sun, McCole, Ramsey, & Lim, 2014), and usability. Other website benchmarking studies adopt consumer satisfaction and literary assessments (Elling et al., 2007), or prior research across information and service qualities (Webb & Webb, 2004). Loiacono et al (2007) engage the theory-of-reasoned-action and technology acceptance models for marketing. Whilst other

website benchmarking approaches, synthesise the expectation-disconfirmation paradigm and create theories around consumer-satisfaction (Ghasemaghaei & Hassanein, 2013; McKinney et al., 2002). Several studies show how the visual complexity and ordering of components within a website affect the consumer (Deng & Poole, 2010). The above approaches to website benchmarking are based around consumer opinion; hence they remain open to subjectivity constraints.

Some website benchmarking researchers adopt narrowly-focused, survey-based approaches, and for a specific purpose, generally employ selected survey components (rather than considering a broad-ranging assessment of the website). These study-specific website aspects include: effects of privacy and perceived security on user trust levels (Chang & Fang, 2013; Flavian et al., 2006), influences of online trust (Chen & Barnes, 2007), e-service quality (Udo, Bagchi, & Kirs, 2010), information flows between websites (Nel, Niekerk, Berthon, & Davies, 1999), and consumer website satisfaction (Luo, Chea, & Chen 2011). Such website benchmarking studies are restrictive and are designed to assess specific components, and so cannot provide comprehensive solutions.

Survey-based Website Benchmarking Tools

Several website benchmarking tools are actually survey-based methods. These studies typically target specifically-chosen website components. Such approaches include WebQUAL 4.0 (Barnes & Vidgen, 2002), WEQ (Elling et al., 2007), SITEQUAL (Yoo & Donthu, 2001), eTailQ (Wolfinbarger & Gilly, 2003), SiteQual (Webb & Webb, 2004), MUSA+ (Grigoroudis et al., 2008), e-SQ (Hu, 2009), and PEEIM (Fang et al., 2014). These approaches employ questionnaires and each measure less than 58 website components on a 5-point or 7-point Likert type scale.

Although questionnaires remain popular for data capture, several psychological and human respondent issues warrant consideration prior to survey implementation. First, when website benchmarking researchers use exchange-theory to improve motivation for survey completion, they must account for respondents who weigh-up the reward/benefit they receive when completing a survey against their cognitive-cost (or effort-required) (Albaum, Evangelista, & Medina, 1998; Evangelista, Poon, & Albaum, 2012). Here, and in self-reported questionnaires, respondents weigh a question's focus and then attempt to anticipate the answer being sought (Cao et al., 2005). Thus, bias can emerge in exchange style approaches.

Second, as survey-length increases, response-time increases. Here, some respondents answer each survey question to the best of their ability, and some may experience survey fatigue (Nathan and Yeow, 2011) when weighing their personal cognitive cost against time to select from near-identical questions (Krosnick, 1991). In contrast, less rigorous respondents may just select 'don't know/neutral', or select randomly across the scale (Krosnick et al., 2002), whilst others, may select an answer that appears acceptable, but not necessarily optimal in their view (Krosnick & Alwin, 1987; Klayman & Ha, 1987). Hence, carefully prepared and balanced surveys are imperative, but the number of questions asked of respondents remains numerically-restrictive when compared to the full range of components available for website benchmarking.

Third, 'response-order-effects' such as question wording, complexity of rating scale, or order of answers (Krosnick, 1991; Krosnick & Alwin, 1987; Weijters et al., 2010) can directionally lead responses (Schwarz, 2007; Weijters et al., 2010).

Fourth, many past studies utilise student respondents (Loiacono et al., 2007), but such convenience sampling approaches lack validity (Wells *et al.,* 2011) and transferability when applied to consumer diversity within global web communities (Lee et al., 2012; Xu et al., 2013; Yang et al., 2012). These studies may also introduce unexpected (or unexplained) biases (Steelman et al., 2014).

Hence, although well-executed, surveys generally account for the majority of psychological and respondent issues (Krosnick et al., 2002); they remain constrained by the above. In addition, most website benchmarking studies are lacking in a strong theoretical base (Io Storto, 2013; Lee & Kozar, 2009; Yoon & Kim, 2009), with some applying various theories to benchmarking tools - which they then adapt, and apply to websites.

Website benchmarking using modified business tools

Some website benchmarking approaches have modified existing business application tools. Kaplan and Norton's (1992) balanced scorecard (BSC) approach has been modified in several tourism and travel website benchmarking studies. These studies typically use commercially-available software to measure technical performance of the website (Choi & Morrison, 2005; Lee & Morrison, 2010). However, they show considerable variation in their use of the remaining three BSC dimensions - with Choi and Morrison (2005) using consumer, marketing-effectiveness, and/or business

perspectives; Lee and Morrison, (2010) adopting marketing, consumer, and internal-critical-success-factors; and Kline et al., (2004) adding consumer-friendliness, site-attractiveness, and marketing-effectiveness.

Dichotomous (present/absent) website benchmarking studies (Choi & Morrison, 2005; Kline et al., 2004; Lee & Morrison, 2010) provide yet another modified BSC approach, however these again show inconsistencies and differing degrees of detail, but they do extend website benchmarking studies into classifications that engage between 40 and 150 components.

Technology acceptance model (TAM) variants applied to website benchmarking have added online shopping perceptions across 45 Likert scale web components of e-service quality and perceived measures of service value, trust, and usefulness (Lee & Wu, 2011), others used 50 Likert scale web components to consider trust and intention to purchase (Gefen, Karahanna, & Straub, 2003). Whilst in tourism accommodation, TAM is modified using semi-structured interviews across 36 website components (Herrero & San Martin, 2012). Again website benchmarking variants are purpose specific and inconsistent in approach.

Component-based website benchmarking tools

From a website benchmarking tools perspective, the KQFs approach rates 28 components as present, or absent, or not assessed and graphs comparisons (Cox & Dale, 2002). In pursuit of potential website performance improvement areas, function-benchmarking captures 91 present or absent business components under 18 separate groups, and rates a level-of-presence for each group (Boisvert & Caron, 2006). Again website benchmarking tool approaches lack consistency.

Content-analysis website benchmarking approaches also vary with 53 components across 6 service quality domains (each containing closely-related components) (Nusair & Kandampully, 2008), or with website-usability-factors tracked using 38 Likert scale consumer-needs components (Nathan & Yeow, 2011).

Expert reviewers of websites often display differing views of website component groupings (Cassidy, 2010). To improve consistency Stepchenkova et al., (2010) use two experts over 11 weeks to build their 99 component and 4 domain WebEVAL tool.

The above website benchmarking approaches are inconsistent, lack precise point-in-time comparison capabilities; are respondent completion-time restricted, are survey scope-and-size restricted, and at some point each website benchmarking approach relies on human involvement and subjective judgment. Hence, automated website benchmarking tools are developed.

Automated Website Benchmarking Tools

Automated website benchmarking tools such as WebTango, crawl a website, and compute metrics on 157 components (Ivory & Hearst, 2001), but this tool is limited to website design (Ivory & Megraw, 2005). WebQEM is a hyper-document website benchmarking tool tracing 150 direct (or indirect) quality aspects (Olsina & Rossi, 2002) but overlap between the website benchmarking components arises, and its restrictive scoping leaves out other website benchmarking components.

Hypertext markup language (HTML) validation programs such as Weblint, are best used in combination with other HTML checking tools (Bowers, 1996). EvalIris evaluates the markup of webpages, identifying accessibility failures through HTML components (Abascal, Arrue, Fajardo, Garay, & Tomas, 2004); however some accessibility issues still require manual checking. HTML tools focus on the technical domain, and so offer narrow website benchmarking solutions.

KWARESMI extracts, structures, and organises web usability guidelines towards an automated evaluation (Beirekdar, Vanderdonckt, & Noirhomme-Fraiture, 2002), but only does so 1 page at a time. GIST collects information on users; then infers website behaviour and attitudes; then identifies and tests new nano-segments; and tracks the gaps across chosen website benchmarking segments (Albert, Goes, & Gupta, 2004). As per previous approaches, these automated website benchmarking tools also lack completeness, requiring degrees of human consideration (developer or respondent), and are often costly to implement.

Thus, a significant website benchmarking gap remains in the literature, and I now present my proposal for an artefact to solve this business problem. This artefact - termed WAM (my website analysis model) draws together existing web components under three domains (marketing, aesthetics, and technical) that are associated with a website.

Methodology

Design Science Research

This study follows a *Design Science Research Methodology* (DSRM) (Peffers et al., 2007), and applies DSR guidelines (Hevner et al., 2004) to the practical study of website benchmarking. Table 4.1 summarises the 6 DSRM activity stages. The above introduction and literature review completes DSRM activity stages 1 and 2, identifies website benchmarking approaches, identifies the limitations in the literature, identifies and discusses problems for organisations, and then defines objectives for the solution to the identified website benchmarking business problem.

This study now discusses activities 3, 4, and 5 of the DSRM process. It then considers the implications of this research, suggests what path future research may take, and lastly provides conclusions to the research community at this point-in-time.

Table 4.1: Design Science Research Methodology – adapted from Peffers et al., 2007

Process Iteration	**Activity 1.** ***Problem identification & motivation***	• Approaches in literature: time-consuming, generally survey-based, lack of agreement on components (and how measure), limited components and/ or area measured • Organisations need: easy-to-implement, all-encompassing tool that benchmarks internally (and externally) and offers multi-level comparisons and easy-to-interpret, efficient and cost-effective, and capable of delivering interpretable solutions for website improvement.
	Activity 2. ***Define objectives for a solution***	• Extensive literature review and investigation of research developed tools. • Develop comprehensive and integrated framework to evaluate websites. One allowing managers to strategise and possibly reposition their website (possibly to better fit user expectations).
	Activity 3. ***Artefact Design & Development***	• DSRM, set-theory, causation theory, planned behaviour, motivation theory, gratification theory, consumption theory • WAM artefact = multi-level, hierarchical, 230 literature-identified, mutually-exclusive components into 28 mutually-exclusive functions into 3 mutually-exclusive domains. Measure components present=1 or absent=0 = software programmable easy-to-interpret scores at level, cost-effective
	Activity 4. ***Demonstration***	• Implement WAM during the design stages of www.therideguide.com.au • A purposed-built publicly-accessible tourism website built in 5 monitored stages - each with more components added to gauge if component additions influence traffic on an active website and if these additions can be deemed website improvements
	Activity 5. ***Evaluation***	• Google advanced analytics and server statistics track consumers. Data analysed and results compared with objectives (est. June 2013) • Statistical analysis and interpretation
	Activity 6. ***Communication***	• Journal articles and conferences • DSR and IS journals, and Benchmarking, an International Journal, and ACIS conferences

Design and Development

Mutually-exclusive set-theory and causation-theory

The measureable components sourced across the literature each represent a different, and mutually-exclusive, part of the website. Hence, using mutually-exclusive set-theory I can sum the components present on a website. I can then compare this internal

website benchmarking score, to the website benchmarking scores obtained from other (external) websites.

As set-theory houses mutual-exclusivity, each website component present is collated into just one mutually-exclusive subset of similar components - termed a *function*. Each function, and its small cluster of similar website components, is grouped with other like functions (each made up of their own mutually-exclusive set of similar components). These mutually-exclusive functions are then grouped into 1 of 3 mutually-exclusive *domains*. The sum of all the components present across the three domains of a website constitutes the total score of all the components present on the website.

When measured against the sum of all the components possible for any website, a benchmark score for this website can be generated, and website comparisons at component, function, and domain level are achievable. Thus, a benchmarking process is theoretically available for websites. The difficulty is - how can this be done, and can the existing website components be meaningfully interpreted?

To understanding the possible website components through mutually-exclusive set-theory approach the WAM artefact is defined as the universal set of all possible website components. It is noted that within a domain, the full subset of literature-established possible website components making up a function can be different in number when directly compared to another function's full subset of components. Hence, to mathematically compare function contributions to a website - a function scaling process is also required.

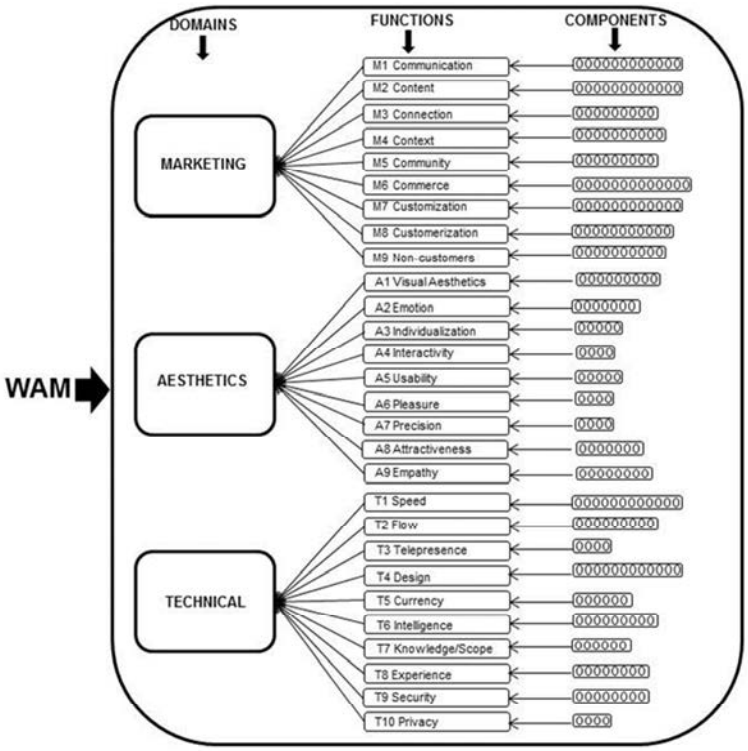


Figure 4.1: WAM (developed from Cassidy and Hamilton, 2011a)

Next mutually-exclusive set-theory is combined with Aristotle's 4-step *theory-of-causation* (material-cause, formal-cause, efficient-cause, and final-cause) (Falcon, 2011), and build the following linkages:

1. *Material-cause*: The WAM artefact universal set is defined. The WAM artefact captures all possible literature-supported website components.
2. *Formal-cause*: All components are linked and compared through typologically-collated subsets and sets. The presence (or absence) of components within a subset or website set is determinable.
3. *Efficient-cause*: The existing components of a website are collected and compared to the WAM artefact universal set of all possible website components. This allows internal benchmarking at the component, the function, the domain, and at the overall-website level. It also allows external benchmarking against other chosen (or competitive) websites.
4. *Final-cause*: the universal set components not accounted for in a website are presented as both improvement considerations and as possible future inclusion components. This can be useful when strengthening weaker functions or poorly covered domains within a website.

Rough-cut mutually-exclusive set-theory and causation-theory

The WAM artefact is dynamic and can grow. For example - as the literature advances, and technology advances, new website components continually emerge, and each of these new components potentially adds to a function, then to a domain, and then to the website's subset score of the WAM artefact universal set. Alternatively, if the new component represents a breakthrough technology (Cassidy & Hamilton, 2011b) another new function (or even a new domain) may start to emerge for inclusion in the WAM artefact universal set. Likewise, obsolete components (such as obsolete website software-related technical components) are considered for deletion.

Thus, the WAM artefact universal set typifies an infinite number of mutually-exclusive website components (Vilenkin, 1986), and at any point-in-time, function and domain subset changes may arise. Hence, the currency of the WAM artefact universal set engaged is normally a very close approximation to the actual scope of universal set components available for websites.

Over time, component, function, and/or domain changes are possible, and these changes affect the WAM artefact universal set. Hence, this study engages a *rough-cut* (Zhu, 2007), *inclusion-exclusion principal of set-theory*, and the *causal-summing of components* into a *rough-cut, mutually-exclusive, causal-summing, set-theory-* approach when benchmarking websites via their components.

The WAM artefact universal set (U) contains all available website components at the point-in-time. C_p is components present on the website. The website's benchmark score (W) compares the existing components against the possible components of the universal set as follows:

$$W = \frac{\sum(components\ present)}{\sum(components\ possible)} = \frac{\sum(Cp)}{\sum(U)}$$

where: $Cp \in U$

This study's multi-level benchmarking of websites offers further finely-focused assessments, and more detailed internal or external comparison, and also delivers an interpretable benchmark score (Boisvert & Caron, 2006).

To statistically compare components present on the website against the WAM artefact universal set each component present is recorded as '1', and each component missing is scored as '0'. Components in a function are summed into a function score. Similar function scores are then summed into a domain score. The function and the domain scores allow finer internal (or external) website comparisons. A function or a domain score below its maximum exhibits a degree of 'greyness' (or the extent of missing components) (Deng, 1989; Ho & Wu, 2006) in the score, and these missing components can then be scheduled for inclusion at a chosen point-in-time.

Each function captures a different aspect of the website, and the number of its literature-established components can vary. Such variations may be exacerbated when new components are added to the website. Hence, to reduce component-masking, currently only 13 components are allowed per function, and to ensure sufficient triangulation, the function must possess at least four components.

Hence, the theoretical approach of *rough-cut, mutually-exclusive, set-theory* plus the *causal-summing* of the website components, enables current benchmarking scores and comparisons to be established.

The relative contribution of a function (F_j), from all its components (C_{ij}), is described as the maximum number of components (x_j), present in a given function, with '10' norming the components (i), into a comparable subset solution. Thus, a function (F_j) is benchmarked as follows:

$$F_j = \frac{10}{x_j} \sum_{i=1}^{x_j} C_{ij}$$

A comparable domain level (D_{jk}), benchmark score is derived with (x_{jk}) as the maximum number of components present in each function (j), of the domain (k), and y_k is the maximum number of functions in this domain.

$$D_{jk} = \sum_{j=1}^{y_k} \frac{10}{x_{jk}} \sum_{i=1}^{x_{jk}} C_{ijk}$$

A low scoring function contains less than its possible number of components, and where some missing components are deemed important by management, these can be scheduled for point-in-time addition. High scoring functions may be checked by management against industry (or competitor) norms, thus ensuring each existing component remains appropriate. Whichever decision management may make, missing website components within the WAM artefact universal set are highlighted for point-in-time attention. This logic again applies at the domain level, highlighting weaker domains for potential internal website benchmarking improvement by management.

To enable external website benchmarking, domain scores are collated into an overall website score (W) using the following formula (adding *k* domains, and *z* as the maximum number of domains).

$$W = \sum_{k=1}^{z} \sum_{j=1}^{y_k} \frac{10}{x_{jk}} \sum_{i=1}^{x_{jk}} C_{ijk}$$

Thus, from a typological perspective, rough-cut set-theory (Zhu, 2007) identifies missing website components, and so highlights grey (or missing component) areas (Deng, 1989) within the function. But although the *rough-cut, mutually-exclusive, set-theory* approach deploying *causal-summing* of website benchmarking components delivers the benchmarks required, it also needs to give effective solutions.

Cause-and-effect considerations

Benchmarking should contribute towards a superior state of affairs - one consistent with the corporate's purpose to exist, to survive and hopefully to grow (Moriarty, 2011). This is a *cause-and-effect* process. The *cause* satisfies knowledge about something as related to material components, to formal principles, to efficient actions, or to a reason to apply something (and so change a state-of-affairs). The *effect* builds on the antecedents (which themselves cause change), or the opportune/chance alterations, or the efficiencies that are generated (Hamilton, 2010). Therefore, website benchmarking also permits management to reflect, and to then change a process, or to then choose to build a different future perception.

This effect recognition process visualised as Figure 4.2. In three-dimensional-space, the front pale green domain score of all its components within a website can be visually benchmarked for major weaknesses against the back, blue, WAM artefact universal set

for each websites domain. The same process applies to the overall website versus the WAM artefact universal benchmark set. Such visual benchmarking comparisons (Boisvert & Caron, 2006) also align with the above theory. However, Aristotle's 'final' cause also includes consideration around responsive decision making. Hence, I introduce *cognitive-theory* to understand consumer decisions for visiting a website, and consider how consumer expectations can be met by management.

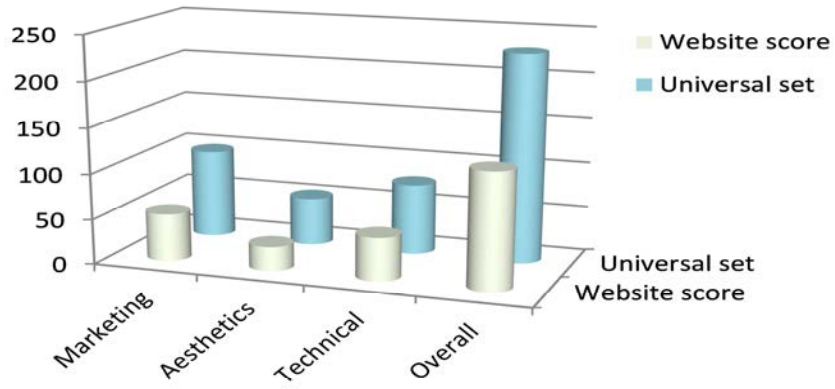


Figure 4.2: Effects recognition in website benchmarking

Cognitive Theory

Ajzen's (1991) *theory-of-planned-behaviour* suggests a consumer intends to do something - such as visiting a website. From *motivational-theory*, some website consumers respond to their intrinsic needs and anticipate personal internal benefits yet to be obtained from a website - such as pleasure, satisfaction, or enjoyment (Lin &Lu, 2011; Luo et al., 2011; Wakefield, Wakefield, Baker, & Wang, 2011). Others are motivated to then pursue their extrinsic needs, and to seek useful benefits - such as obtaining information, social interaction, or casually passing time (Luo et al., 2011; van der Heijen, 2011). Thus, consumer motivation to engage a website leads to consumer consumption of some offering on the website, and this is captured as consumption theory. Further, a level of reflective consumer gratification about the website follows consumption. This is captured as user-gratification theory.

At a chosen website, the successes in motivating a consumer's consumption (LaRose & Eastin, 2004) reflects on the website's ability to intrinsically and/or extrinsically meet each consumer's cognitive goals (often gauged against this consumer's acceptable cognitive cost) (Kim et al., 2007). Hence, when the net motivation-to-consumption-to-

gratification outcomes pathways are positive (Hamilton & Tee, 2013), consumers likely display a greater tendency to reuse the website (Lin & Lu, 2011; Wakefield et al., 2011).

Thus, managers can design their website by recognising their consumers' likely motivations. Past studies suggest that a sequencing of the consumer expectations/ motives-to-consumptive-acquisitions-to-gratifying/revisitintentions (Hamilton & Tee, 2013) may increase revisiting. Hence a stronger suite of engaging and consumer-targeted behaviourally-focused website offerings may draw additional consumers into using (and reusing) the website.

DSRM Demonstration and Evaluation of the WAM artefact

To demonstrate the WAM artefact universal set as suitable for website benchmarking, standards can be developed across chosen industry-sector websites - but commercial IP issues may hinder access to such websites. A second WAM artefact universal demonstration can see a few similar business websites undergoing sequential changes in specific component areas - but obtaining permission to instigate such ongoing changes remains difficult.

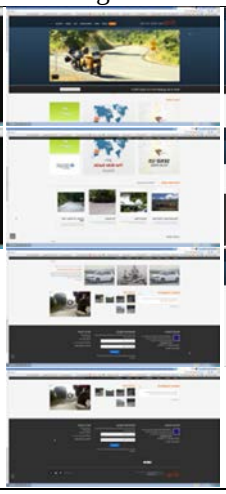
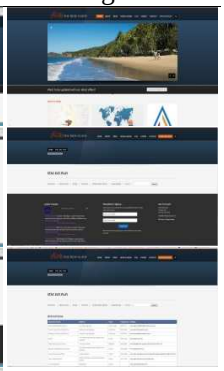
This study opts to demonstrate the WAM artefact universal set through the build of a non-commercial (tourism-consumer targeted) website. The study adopts a tourist information website, specifically built for the region's niche market of motorcycle tourism. This sequential build adds consumer-engaging components stage-by-stage. Each build stage remains commercial, fits the chosen existing marketplace, and has sufficient consumer reach. Also, at the appropriate development stage all normal website tools (SEO, Facebook, Twitter, Flickr, YouTube and Forums) are deployed. This study employs Google advanced analytics server statistics (and other supporting web-analytics services) to monitor six consecutive build stages of *www.therideguide.com.au*.

This study was conducted over 100 weeks between mid-2012 and mid-2014. Each website stage is live, and is tracked for at least 12 weeks, and each stage incorporates additional components - ones designed to advance the website's overall capabilities, and to grow its consumer base.

Homepage screen captures of each website stage are shown at Table 4.2 (and all screen capture pages are retained). Once the five website stage developments

conclude the website ownership is transferred to a national web-marketing company and is to undergo further regional and national motorcycle ride-tourism development.

Table 4.2: The Ride Guide Homepage at each change

Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
				

Stage one is a static one page ‘brochure’ of limited information. This represents the simplest website presence for www.therideguide.com.au. Stage two is a static website of five pages – with basic ride information, photos, static-weather and news, frequently asked questions, an about-us section, and a contact-us section. Stage three adds the basic motivations of communications, static maps, additional ride details, and a YouTube channel.

Stage four commences the build that caters for additional expectations. It includes the interactive consumptive value additions of live map variations (day, street and 3D) and basic social media (twitter, Facebook, forums), along with embedded videos, and a photo gallery. The gratification component of the website includes a ‘send us your rides’ and a forum section. These additions are designed to improve the website’s value and to grow consumer traffic.

Stage five houses a fuller suite of consumptive interactive components, plus a significant rider-selection database of activities, ideas, information, and accommodation - designed to add to the motorcycle rider’s experiences. Again the study maps consumer traffic connections and the cycles of actions they pursue. Hence, I test the WAM artefact using staged component additions across the development cycle of this commercial website. I stepwise expand the motivation, consumption, and user-gratification component areas that likely appeal to motorcycle riders.

Lastly, stage six moves the website beyond this study and into a commercial management and national reach status - where future competitive analysis is limited.

At each stage of www.therideguide.com.au's development its function, domain and website scores are calculated using the above formulae (from the rough-cut mutually-exclusive set-theory and causation theory section). Table 4.3 shows the nine Aesthetic Domain scores (A1 to A9) grouped across the five stages of my planned website development (as the number of components possible per function, the number of components present per function, the normed score per function and the domain totals).

Table 4.4 provides the three website domain scores at each stage of development for therideguide.com.au, along with the corresponding benchmark score and the corresponding percentage of the total score possible.

Table 4.3: Aesthetic Domain calculations

Function	**Possible Components**	**Present Components**					**Normed out-of 10 Component Score**				
		Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
A1	9	3	8	8	8	8	3.33	8.89	8.89	8.89	8.89
A2	7	4	5	5	6	6	5.71	7.14	7.14	8.57	8.57
A3	5	0	0	0	0	0	0	0	0	0	0
A4	4	1	2	2	3	3	4	5	5	7.5	7.5
A5	5	3	3	3	4	4	6	6	6	8	8
A6	4	0	0	0	0	0	0	0	0	0	0
A7	4	2	4	4	4	4	5	10	10	10	10
A8	7	1	3	4	4	4	1.43	4.29	5.71	5.71	5.71
A9	8	0	0	0	0	0	0	0	0	0	0
Total	**53**	**14**	**25**	**26**	**29**	**29**	**25.47**	**41.32**	**42.74**	**48.67**	**48.67**

Table 4.4: Domain and Stage Calculations

Domain	**Stage 1**	**Stage 2**	**Stage 3**	**Stage 4**	**Stage 5**
Aesthetic	25.47	41.32	42.74	48.67	48.67
Technical	19.85	36.59	36.59	50.72	52.66
Marketing	7.57	23.69	25.6	38.33	38.33
Benchmark Score	52.89	101.60	104.93	137.72	138.55
Possible score %	18.89	36.28	37.48	49.19	49.48

The visual effects recognition of this (therideguide.com.au) website summarises the internal website analysis against the WAM artefact universal set. This website (www.therideguide.com.au) enlists fewer components than available in the WAM artefact universal set. After the WAM artefact comparison, and focus group feedback,

management then selects which missing components are to be specifically added to the website, and at what stage. The focus groups include commercial website developers, website marketing executives, motorcycle riders, and academics. Hence, management-guided changes to the website, whilst introducing subjectivity, do add website components, and each of these changes yield higher website benchmarking scores (Tables 4.3 and 4.4, and Figure 4.3 and 4.4).

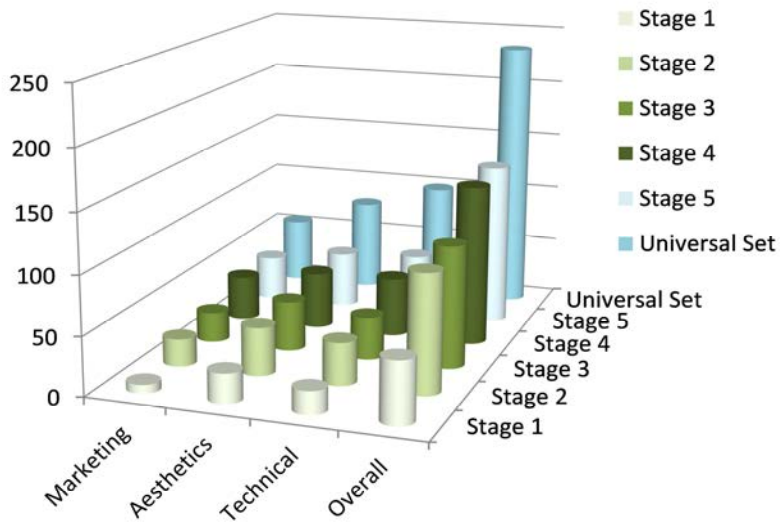


Figure 4.3: Effects recognition (www.therideguide.com.au)

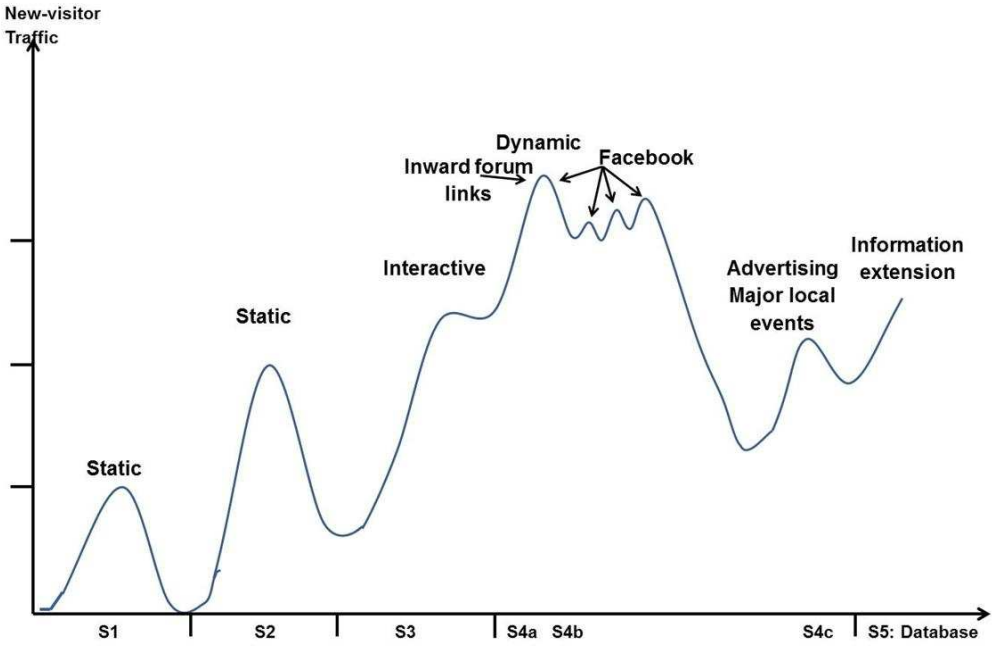


Figure 4.4: Longitudinal tracking: www.therideguide.com.au's website changes

Figure 4.4 summarises the above website change process as a timeline against first-time-consumer/user traffic. Stage one's single page 'Brochure' shows visitors but soon loses its appeal. Stage two's static five page approach doubles stage one's first-time-consumer/user traffic, however again quickly loses most of its peak consumer market. Stage three's interactive five page approach wins, and likely retains more consumers. It adds the basic motivations of communications, static maps, additional ride details, and a YouTube channel.

After stages one, two, and three, consumer numbers initially peak each time with more components winning more consumers, but with no ongoing change in the website these numbers decline. However, an increasing, but minimal number of consumers still continue to visit the website as the 12 weeks per stage study continues. Consumer traffic shows this is due to the website's growth in the breadth of its domestic and international market reach over time.

Stage four sees the introduction of broad consumer interactivity. Here inward links from appropriate forums and a Facebook site rapidly build the consumer market to a new peak (more than triple first-time-consumers at stage one). In stage four there is a lot of activity. At 4a traffic growth occurs quickly, however without continued Facebook postings, the traffic again begins to fall. When three subsequent and closely-spaced Facebook postings at 4b are added they generate three small peaks in traffic – with each peak higher than the previous. This indicates that continual closely-spaced new Facebook postings do continue to draw new consumers to the website. Once again with no additional links, forums or Facebook activity, first-time-consumer numbers again decline rapidly. Thus, social media communication approach can be used to engage with like-minded (or similarly behaving) consumers, and it can be used to drive additional consumer traffic to the website.

The recognisable peak in the data at 4c (prior to stage five update) is produced by visitor 'overflow' from several internationally-advertised major sporting events occurring in this study's region. This indicates new consumer traffic can result from regional activities - especially ones that appear to be complementary, even without building behavioural connections (such as showing these consumers that this website provides great regional images and alternate ways to see some regional attractions). Hence, when a major event aligns to the website's target market, the website should cross-promote its complementary offerings towards the major event's consumers, and should

pursue winning their positive word-of-mouth comments, thus capturing additional website traffic.

Lastly stage five adds a useful database of accommodation, eateries, and attractions, but without advertising this is slowly sourced by consumers, and so the growth in new visitors is slower but still significant.

Hence, the addition of website components, specifically designed to target a chosen consumer-group, results in an increase in first-time-consumer traffic over time. This traffic can be increased when more components and more personal interactivity are both added to the website. However, when forums, inbound links and social media (Facebook) are each behaviourally-focused at this website's consumer group, traffic can rapidly increase.

Implications of Research

Theoretical implications

This study addresses benchmarking theory, and an online benchmarking gap in the literature. Through the design science paradigm (Fink & Nyaga, 2009) it solves the website benchmarking problem using Peffers et al.'s (2007) DSRM approach. This DSRM approach incorporates rough-cut (Zhu, 2007) mutually-exclusive set-theory (Boisvert & Caron, 2006) and Aristotle's 4-step theory-of-causation (Falcon, 2011) with a typological collation of literature-described components - that are point-in-time, multi-level, and objectively (present/absent) based.

Components are likeness-grouped first into function subsets, and then into the larger domain subsets of the WAM artefact. Thus, by identifying, investigating, and then choosing to add new website components, researchers can further develop the WAM artefact (and its subsets of website components). The artefact can also be used to generate component-recognition algorithms, and researchers can investigate these for specific internal or external industry requirements.

A single function represents less than 4% of the benchmarking score, and each is of equal weighting. The three domains also equally contribute to the website score. Website function scaling does introduce minor subjectivity, but this approach allows direct comparisons between websites. It also controls subjectivity between functions and their components. Future studies may offer refinements in this area.

Practical implications

A business, benchmarking against its competitors, tends to advance its website only sufficiently to cover its comparative weakness (Kim & Mauborgne, 2005). To be competitive, a corporate's website requires ongoing development, and so must deliver a suitable return-on-investment. However to understand what and how to benchmark first the website must be accurately scored, and then interpreted to competitively draw its consumers into making behavioural decisions regarding the corporate's transaction offerings.

The WAM artefact has a solid theoretical underpinning and holds its existing components within 28 functions and 3 domains of the website. As each component is programmable a 'desired level of completeness' as a website benchmarking software solution can be established against the available universal set of components (or against other chosen external websites). This deployable software approach also allows researchers and management to use the WAM artefact components to reposition their website well beyond those of their competition - and into an untapped or 'blue ocean' market space (Kim & Maurborgne, 2005). This shift is applied at activity 4 of the DSRM.

Future Research

Measurement aspects

The WAM artefact contains 230 differentiated components that currently exist within the literature. As new components emerge the WAM artefact adapts to include them. This comprehensive collation allows managers to understand website benchmarking in-depth and to new levels.

With continual literary updates arising, the universal set of WAM artefact components requires constant monitoring to remove obsolete components, and to add new components (such as socially-interactive components develop and new social domain), and also to promote the connectivity of certain components when they are deemed as being of higher importance to the consumer. To ensure the website benchmarking algorithm remains current researchers must incorporate these alterations into the WAM artefact.

The WAM artefact is designed to permit regular inclusion/removal updates when new literature-identified components emerge; inclusion of new functions is also possible

if/when needed. As research into social networking gains momentum the possibility of a fourth domain may occur.

When new disruptive or radical change technologies emerge (Benner & Ranganathan, 2012; Manyika et al., 2013), the WAM artefact approach can also incorporate such technologies by the inclusion of a measurement suite of the newly identified components and even functions. Thus, WAM artefact additions and removals ensure the website benchmarking algorithm remains current.

Theoretical aspects

Websites differ in purpose; hence, not every WAM artefact component is necessary, suitable, or required, for every website. As new technologies emerge the components of the universal WAM artefact require updating. This is an ongoing area of research, and of component, function and domain classification considerations. Such research can also incorporate unique industry-focused component and universal set refinements.

Prior to this study, industry-specific website benchmarking remained inadequately and inconsistently researched. This study's WAM artefact approach can now be deployed to provide multi-level, industry-specific, targeting (or niche) comparison studies. These are rich areas for future and/or refined website benchmarking industry studies.

Management aspects

Previous website benchmarking studies generally engage limited numbers of website components, typically concentrating on specific website areas (Kim et al., 2009). Other website benchmarking approaches do not deliver timely results - forcing management to implement changes post hoc (Pang, Suh, Kim, & Lee, 2009).

Being adaptable to an industry's target requirements, researchers can use the WAM artefact as an efficient and/or effective, manual and/or software, monitoring tool. This objective website benchmarking approach suggests researchers and managers of the corporate may find further new solutions (as scenarios or choice-options). The WAM artefact is also a usable management tool when considering/framing the early development stages of a website.

Conclusion

As a valuable global reach resource the website should be a consumer-connecting window, helping to maintain a corporate's competitiveness. Previous studies have considered various groupings across a combined total of well over 150 component measurements. This study resides within the design science paradigm of information systems (Fink & Nyaga, 2009) and engages the Peffers et al., (2007) DSRM framework. However, outside this DSRM study, no previous approach has engaged both a theoretical and a universal set of website components that currently exist within the literature.

The WAM artefact, developed through DSRM, is comprehensive, with a robust literature-basis, combining rough-cut set-theory with mutual-exclusivity, and applied at a specific point-in-time. When combined with the theory-of-causation, website components are literature-linked and grouped by presence thus creating function, domain, and website scores at level which can be rated against the current universal set of website benchmarking components. Hence, an in-depth website analysis method (WAM) is delivered.

This DSRM WAM artefact is programmable (present/absent), adaptable (business/consumer specific), and expandable (new component inclusions). It solves the identified website benchmarking problem for industry, fills the gap in website benchmarking literature, and provides a theoretical framework for comprehensive website benchmarking assessments. It can also be further linked to relevant information systems and to management studies.

The WAM artefact's website benchmarking scores can be employed, and tactically improved, when pursued in conjunction with theories encompassing planned-behaviour, motivation, consumption and user-gratification. These approaches offer new behaviourally-emphasised components as new website development combinations which can be selectively-developed and placed into appropriate functions and domains as new differentiators against competitive websites.

Paper five, that constitutes this chapter, covers activity 3 of the DSRM. Now the artefact has been developed it requires demonstration, this is activity 4 and is discussed across papers six, seven, eight, and nine in chapter 5.

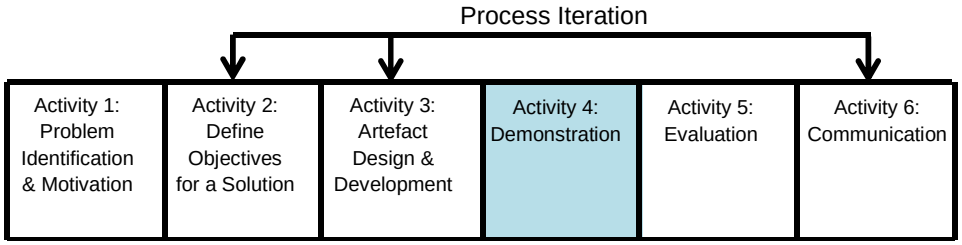
Chapter 5

5.0 Demonstration

This chapter consists of four published papers. Paper six, in proceedings of the 2013 International DSI and Asia Pacific DSI conference [6]; paper seven in the 2014 proceedings of ACIS[7]; the eight in proceedings of CAUTHE 2015[8]; and paper nine in the proceedings of ICEB for 2014[9].

Chapter 5 tests the validity and effectiveness of the components. Firstly demonstrating how website components can be collated on likeness into quality functions (paper six). Paper seven considers if specific components have a standard placement on a website homepage and can therefore be termed web objects. This paper also seeks to determine if a web objects position and consumer mental models align.

Papers eight and nine expand on the investigation of website traffic to www.therideguide.com.au (chapter 4). Here, the influence of website component additions, on first-time visitor traffic (paper eight) is determined. In paper nine the effect of these component additions on first-time visitors is compared and contrasted with return visitor traffic to the website. This relates to activity 4 of the DSRM.



[6] Cassidy, L. J., & Hamilton, J. R. (2013). A comprehensive approach to capturing website qulity measures. *In Proceedings of the 12th International Decision Sciences Institute and 6th Asia-Pacific Decision Sciences Institute Conference,* Nusa Dua, Bali, Indonesia.

[7] Cassidy, L. & Hamilton, J. (2014). Location of service industry web objects: developing a standard. *In Proceedings of the 25th Australasian Conference on Information Systems (ACIS),* Auckland, New Zealand.

[8] Cassidy, L., Hamilton, J., & Tee, S. (2015). Generating first time visiting consumer traffic: a live case study. *In Proceedings of the 25th CAUTHE Conference,* Gold Coast, Australia.

[9] Cassidy, L., Hamilton, J., & Tee, S. (2014). Generating return visitor website traffic. *In Proceedings of the 14th International Conference on Electronic Business,* Taipei, Taiwan.

5.1 A Comprehensive Approach to Capturing Website Quality Measures

Published: *12th International Decision Sciences Institute and*
6th Asia-Pacific Decision Sciences Institute Conference

Introduction

Several researchers investigate the quality of websites (Aladwani, 2006; Chang & Cheng, 2008; Fink & Nyaga, 2009). Others study e-Service quality (Lee & Wu, 2011; O'Cass & Carlson, 2012), content quality (Dickinger & Stangl, 2013), design quality (Fan & Tsai, 2010; Ha & Im, 2012), information quality (Kartavianus, & Napitupulu, 2012), and e-Commerce quality (Kim, Galliers, Shin, Ryoo, & Kim, 2012). However, Cox and Dale (2002) consider a number of website KQFs.

Measured components from such studies of quality sometimes overlap. Based on the following review of the literature (Tables 5.1 to 5.6) I believe that components from each study of quality can be grouped into one or more of the following six functions of quality – e-service, content, design, information, security, and technical (Figure 5.1). Hence, in website research I believe studies of quality should consider all six perspectives.

Quality

Views differ as to what is 'quality' – especially when related to a website, and to what components best represent quality (Webb & Webb, 2004). In 'bricks-and-mortar' in-store quality studies, links to trustworthiness of the store often emerge (Chang & Chen, 2008). However in online store studies the quality of the website may offer links to trustworthiness of the website, rather than the store itself (Chang & Chen, 2008).

Researcher(s) show preference in defining how quality can be measured, as opposed to what quality is, and so conclude if certain results occur – then quality exists. The following section considers differing ways quality is measured.

When studying website quality Aladwani (2006) includes technical quality in his list of components to be measured, whereas Chang and Cheng (2008) use the term 'technical aspects.' Although these terms differ they measure the same basic components. Such similarities are prevalent in other studies, and where possible these similar/same components into a generic function. Some components (or variants to these components) regularly appear in many past studies.

The most common components in website quality studies are content quality (Aladwani, 2006; Chang & Cheng, 2008; Kincl & Strach, 2012; Lim et al., 2009); usability (Bai et al., 2008; Barnes & Vidgen, 2003; Fink & Nyaga, 2009 Law & Bai, 2008); information quality (Barnes & Vidgen, 2003; Cao et al., 2005; Fink & Nyaga, 2009; Yoon & Kim, 2009); satisfaction (Bai et al., 2008; Kincl & Strach, 2012; Law & Bai, 2008); and security (Lim et al., 2009; Wells, Parboteeah, & Valacich, 2011; Wolfinbarger & Gilly, 2003).

A full list of components measured in website quality studies (typologically classified) is provided in (Tables 5.1 to 5.6). While several components, such as, content quality, satisfaction, information quality, service quality, customer service, loyalty, overall quality, system quality, perceived usefulness, ease of use, riskiness, accessibility, and design, are regularly measured in website quality studies still more quality measures appear in other studies (Tables 5.1 to 5.6). Here, these website quality components from 27 empirically supported studies are grouped, into six representative functions of quality (e-service, content, design, information, security, and technical) at Figure 5.1. The following sections discuss each quality grouping, its definitions and key component measure focus, with key links to past literary studies.

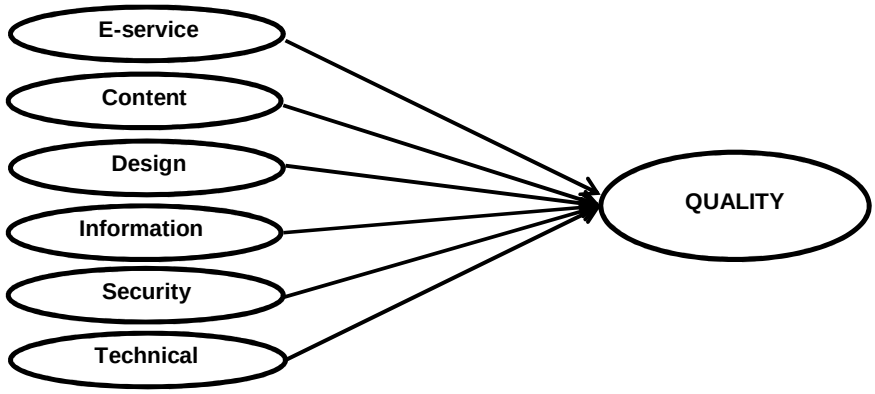


Figure 5.1: Comprehensive Website Quality Model

Function dimensions of website quality

E-service

Website e-service (or electronic service) does not show general agreement regarding a precise definition. However, Parasuraman et al., (2005) define e-service as 'the extent to which a website facilitates efficient and effective shopping, purchasing, and delivery.' Other researchers define e-service as relating to customers perceptions, possibly delivering a highly innovative experience (O'Cass & Carlson, 2012), or fulfilling a

customers' expectations (Lee & Wu, 2011; Santouridis, Trivellas, & Tsimonis, 2012 Udo et al., 2010) with e-service perceived positively by its customers. Hence, components such as perceived service value, perceived service quality, perceived service outcome, service convenience, and entertaining (Table 5.1) are grouped as e-service.

Table 5.1: e-Service quality components

e-Service	Researcher(s)
Personalisation	Aladwani, 2006, Barnes & Vidgen, 2003, Cao, Zhang, & Seydel, 2005, Fink & Nyaga, 2009, Wolfinbarger & Gilly, 2003, Yoon & Kim, 2009
Customer service	Cox & Dale, 2002, Wolfinbarger & Gilly, 2003
Customer support	Aladwani, 2006, Barnes & Vidgen, 2003, Chang & Chen, 2008, Lim, Heinrichs, & Lim, 2009, Nusair & Kandampully, 2008, Wolfinbarger & Gilly, 2003
Word of Mouth behaviour	O'Cass & Carlson, 2012
Behavioural intentions	Udo, Bagchi, & Kirs, 2010
Purchase intentions	Bai, Law, & Wen, 2008, Law & Bai, 2008
Perceived service value	Lee & Wu, 2011, Santouridis, Trivellas, & Tsimonis, 2012
Perceived service quality	Kim, Galliers, Shin, Ryoo, & Kim, 2012, Xu, Benbasat, & Cenfetelli, 2011
Perceived service outcome	Xu, Benbasat, & Cenfetelli, 2011
Perceived usefulness	Cao, Zhang, & Seydel, 2005, Lee & Wu, 2011
Perceived satisfaction	Bai, Law, & Wen, 2008, Kim, Galliers, Shin, Ryoo, & Kim, 2012, Kincl & Strach, 2012, Law & Wen, 2008, Lee & Wu, 2011, Udo, Bagchi, & Kirs, 2010
Perceived sacrifice	Xu, Benbasat, & Cenfetelli, 2011
Site conveys a sense of competency	Barnes & Vidgen, 2003, Fink & Nyaga, 2009
Site creates a positive experience	Barnes & Vidgen, 2003
Creates a sense of community	Barnes & Vidgen, 2003, Cao, Zhang, & Seydel, 2005, Hong & Kim, 2004
Customer/business interactive feedback	Cao, Zhang, & Seydel, 2005, Lim, Heinrichs, & Lim, 2009, Nusair & Kandampully, 2008, Wolfinbarger & Gilly, 2003
Efficiency	Parasuraman, Zeithaml & Malhotra, 2005, Santouridis, Trivellas, & Tsimonis, 2012
Fulfilment	Parasuraman, Zeithaml & Malhotra (2005), Santouridis, Trivellas, & Tsimonis, 2012
Overall quality	Barnes & Vidgen, 2003, Ho, Kuo, & Lin, 2012, Santouridis, Trivellas, & Tsimonis, 2012
Service convenience	Udo, Bagchi, & Kirs, 2010
Service quality	Cao, Zhang, & Seydel, 2005, Udo, Bagchi, & Kirs, 2010, Yoon & Kim, 2009
Perceived shopping value	Kim, Galliers, Shin, Ryoo, & Kim, 2012
Entertaining	Dickinger & Stangl, 2013, Lim, Heinrichs, & Lim, 2009, McKinney, Yoon, & Zahedi, 2002
Different languages	Bai, Law & Wen, 2008
Reliability	Cao, Zhang, & Seydel, 2005, Webb & Webb, 2004, Wolfinbarger & Gilly, 2003, Yoon & Kim, 2009
Assurance	Webb & Webb, 2004, Yoon & Kim, 2009
Accessibility	Aladwani, 2006, Chang & Chen, 2008, Cox & Dale, 2002, Rotondaro, 2002, Webb & Webb, 2004

Content

A customer often visits a website for the content (Kincl & Strach, 2012). Thus, content may determine how a customer perceives e-service of the website (Udo et al., 2010). Content is business-related and is provided to engage with the customer/consumer (Cox & Dale, 2002), and it should relate to the business, and be presented logically and efficiently (Mohammed, Fisher, Jaworski, & Paddington, 2004). Thus, content should be unique, possibly innovative, objective, trustworthy, and useful – and grouped as per Table 5.2.

Table 5.2: Content quality components

Content	Researcher(s)
Useful content	Dickinger & Stangl 2013
Clarity	Aladwani, 2006, Chang & Chen, 2008
Contact information	Aladwani, 2006, Bai, Law & Wen, 2008, Chang & Chen, 2008, Nusair & Kandampully, 2008, Fink & Nyaga, 2009
Product details	Aladwani, 2006, Bai, Law & Wen, 2008, Chang & Chen, 2008
Unique/innovative	O'Cass & Carlson, 2012
Complete	Chang & Chen, 2008
Objective	Hong & Kim, 2004
Virtual activities	Nusair & Kandampully, 2008
Photos/videos	Nusair & Kandampully, 2008
Content quality	Aladwani, 2006, Chang & Chen, 2008, Dickinger & Stangl, 2013, Kincl & Strach, 2012, Lim, Heinrichs, & Lim, 2009, Udo, Bagchi, & Kirs, 2010
Trustworthy content	Dickinger & Stang,l 2013
Enjoyment	Dickinger & Stangl, 2013

Design

Design captures the overall look of a website (Aladwani, 2006), and should reflect the company/organisation image (Cox & Dale, 2002). Therefore, design components include the appropriateness of the design (Barnes & Vigden, 2003; Wolfinbarger & Gilly, 2003; Fink & Nyaga, 2009), how attractive the design is (Wolfinbarger & Gilly, 2003; Fink & Nyaga, 2009; Kincl & Strach, 2012), and are fonts and colours properly used (Hong & Kim, 2004; Aladwani, 2006; Chang & Chen, 2008). These and other design components are grouped in Table 5.3.

Table 5.3: Design quality components

Design	Researcher(s)
Internet customisation	Fan & Tsai, 2010
Design quality	Fan & Tsai, 2010, Ha & Im, 2012, Kartavianus, & Napitupulu, 2012
Internet marketing strategy	Fan & Tsai, 2010
Pleasure & arousal	Ha & Im, 2012
Word of Mouth intentions	Ha & Im, 2012
Ease of use	Aladwani, 2006, Bai, Law, & Wen, 2008, Barnes & Vidgen, 2003, Dickinger & Stangl, 2013, Law & Bai, 2008, Fink & Nyaga, 2009, McKinney, Yoon, & Zahedi, 2002,Wolfinbarger & Gilly, 2003,Yoon & Kim, 2009,
Attractiveness	Aladwani, 2006, Barnes & Vidgen, 2003, Cao, Zhang, & Seydel, 2005, Chang & Chen, 2008, Fink & Nyaga, 2009, Ha & Im, 2012, Hong & Kim, 2004, Kincl & Strach, 2012, Lim, Heinrichs, & Lim, 2009, Wolfinbarger & Gilly, 2003
Appropriate	Barnes & Vidgen, 2003, Dickinger & Stangl, 2013, Fink & Nyaga, 2009, Wolfinbarger & Gilly, 2003
Proper use of colours	Aladwani, 2006, Chang & Chen, 2008, Ha & Im, 2012, Hong & Kim, 2004, Kincl & Strach, 2012, Wells, Parboteeah, & Valacich, 2011
Proper use of fonts	Aladwani, 2006, Chang & Chen, 2008, Ha & Im, 2012, Nusair & Kandampully, 2008
Proper use of multimedia	Aladwani, 2006, Chang & Chen, 2008, Ha & Im, 2012, Nusair & Kandampully, 2008
Layout & graphics	Bai, Law, & Wen, 2008, Chang & Chen, 2008, Hong & Kim, 2004, Kincl & Strach, 2012, Wells, Parboteeah, & Valacich, 2011
Completeness	Aladwani, 2006
Consistent	McKinney, Yoon, & Zahedi, 2002

Information

The information provided on a website may influence a customer's perception of the quality of a website. Hence, information should be accessible, relevant, accurate, believable, and in a format that is easy to understand (Barnes & Vidgen, 2003; Lim et al., 2009; Yoon & Kim, 2009). Information may also be structured in downloadable or interactive formats (Mohammed et al., 2004). Thus information collates another dimension at Table 5.4.

Table 5.4: Information quality components

Information	Researcher(s)
Information quality	Barnes & Vidgen, 2003, Cao, Zhang, & Seydel, 2005, Fink & Nyaga, 2009, Ha & Im, 2012, Kartavianus, & Napitupulu, 2012, Kim, Galliers, Shin, Ryoo, & Kim, 2012, Yoon & Kim, 2009
Firm's reputation	Kartavianus, & Napitupulu, 2012
Perceived ease of payment	Kartavianus, & Napitupulu, 2012
Benefits of online shopping	Kartavianus, & Napitupulu, 2012
Trustworthy	Kartavianus, & Napitupulu, 2012
Accurate	Aladwani, 2006, Barnes & Vidgen, 2003, Cao, Zhang, & Seydel, 2005, Chang & Chen, 2008, Fink & Nyaga, 2009, Hong & Kim, 2004, Lim, Heinrichs, & Lim, 2009, McKinney, Webb & Webb, 2002, Yoon, & Zahedi, 2002
Believable	Barnes & Vidgen, 2003, Fink & Nyaga, 2009, McKinney, Yoon, & Zahedi, 2002, Webb & Webb, 2002,
Relevant	Barnes & Vidgen, 2003, Cao, Zhang, & Seydel, 2005, Dickinger & Stangl, 2013, Fink & Nyaga, 2009, Lim, Heinrichs, & Lim, 2009, McKinney, Yoon, & Zahedi, 2002, Wolfinbarger & Gilly, 2003, Yoon & Kim, 2009,
Current	Aladwani, 2006, Barnes & Vidgen, 2003, Chang & Chen, 2008, Hong & Kim, 2004, McKinney, Yoon, & Zahedi, 2002, Yoon & Kim, 2009
Ease of understanding	Barnes & Vidgen, 2003, McKinney, Yoon, & Zahedi, 2002, Yoon & Kim, 2009
Conciseness	Aladwani, 2006, Chang & Chen, 2008, McKinney, Yoon, & Zahedi, 2002, Wolfinbarger & Gilly, 2003,
Quality	Bai, Law & Wen, 2008
Correct level of detail	Barnes & Vidgen, 2003, Fink & Nyaga, 2009
Correct format	Barnes & Vidgen, 2003, Fink & Nyaga, 2009
Update frequently	McKinney, Yoon, & Zahedi, 2002
Useful	McKinney, Yoon, & Zahedi, 2002

Security

Website security may be defined as the sites ability to protect personal/private information provided to it by customers (Madu & Madu, 2002). A website should meet (exceed) customer expectations of safety, information security (including all communication and transactions) while providing easy transactions (Table 5.5).

Table 5.5: Security quality components

Security	Researcher(s)
Perceived risk	Fink & Nyaga, 2009, Lee & Wu, 2011, O'Cass & Carlson, 2012, Udo, Bagchi, & Kirs, 2010
Perceived trust	Yoon & Kim, 2009
Privacy/Security	Parasuraman, Zeithaml & Malhotra, 2005, Santouridis, Trivellas, & Tsimonis, 2012, Yoon & Kim, 2009
A feeling of safety/security	Barnes & Vidgen, 2003, Cao, Zhang, & Seydel, 2005, Fink & Nyaga, 2009, Lim, Heinrichs, & Lim, 2009, O'Cass & Carlson, 2012
Information is secure	Barnes & Vidgen, 2003, Hong & Kim, 2004, O'Cass & Carlson, 2012, Wolfinbarger & Gilly, 2003
Confidence in site	Cao, Zhang, & Seydel, 2005, Dickinger & Stangl, 2013, Lim, Heinrichs, & Lim, 2009, Wolfinbarger & Gilly, 2003
Communication is secure	Fink & Nyaga, 2009, Wolfinbarger & Gilly, 2003
Transactions are secure	Fink & Nyaga, 2009, Lim, Heinrichs, & Lim, 2009, Wolfinbarger & Gilly, 2003
Transactions are easy	Lim, Heinrichs, & Lim, 2009, Wolfinbarger & Gilly, 2003
Trust seals	Nusair & Kandampully, 2008, Yoon & Kim, 2009
Customer policies	Aladwani, 2006, Chang & Chen, 2008, Nusair & Kandampully, 2008

Technical

A competitive imperative suggests business should pursue keeping the technical attributes of their website current. In addition technical currency also influences the retention of customers (Aladwani, 2006). Technical components such as valid links, page load speed, ease of navigation, availability of the site, interactivity, and availability of search functions are some that require continual assessment and/or updating (further components are in Table 5.6).

Table 5.6: Technical quality components

Technical	Researcher(s)
Technical quality	Aladwani, 2006
Technical adequacy	Chang & Chen, 2008
System quality	Cao, Zhang & Seyde,l 2005, Kim, Galliers, Shin, Ryoo, & Kim, 2012, Yoon & Kim, 2009
System availability	Aladwani, 2006, Dickinger & Stangl, 2013, McKinney, Yoon, & Zahedi, 2002, Parasuraman, Zeithaml & Malhotra, 2005, Santouridis, Trivellas, & Tsimonis, 2012
Functionality	Bai, Law, & Wen, 2008, Law & Bai, 2008
Interactivity	Aladwani, 2006, Chang & Chen, 2008, Fink & Nyaga, 2009
Navigation (easy & consistent)	Aladwani, 2006, Bai, Law & Wen, 2008, Barnes & Vidgen, 2003, Chang & Chen, 2008, Dickinger & Stangl, 2013, Hong & Kim, 2004, Kincl & Strach, 2012, McKinney, Yoon, & Zahedi, 2002, Wells, Parboteeah, & Valacich, 2011, Wolfinbarger & Gilly, 2003, Yoon & Kim, 2009
Speed (pages)	Aladwani, 2006, Cao, Zhang, & Seydel, 2005, Cox & Dale, 2002, Hong & Kim, 2004, McKinney, Yoon, & Zahedi, 2002, Yoon & Kim, 2009
Search facilities	Aladwani, 2006, Chang & Chen, 2008, Cao, Zhang, & Seydel, 2005, Fink & Nyaga, 2009, McKinney, Yoon, & Zahedi, 2002, Nusair & Kandampully, 2008, Wolfinbarger & Gilly, 2003
Fast search display time	Nusair & Kandampully, 2008
Valid links	Aladwani, 2006, Chang & Chen, 2008, McKinney, Yoon, & Zahedi, 2002
User interface	Bai, Law & Wen, 2008
Multimedia capability	Cao, Zhang, & Seydel, 2005
Adequacy	Chang & Chen, 2008
Stable operation	Hong & Kim, 2004
Site map	Nusair & Kandampully, 2008
3D manipulation	Nusair & Kandampully, 2008

Implications and Limitations

Management implications

Websites of a higher quality attract and retain customers/users, but such online offerings are not tactile, and present limited input to the customer's sensory detectors (Dickinger & Stangl, 2013). Customers finding a website that lacks in quality can reposition elsewhere with a click of a 'mouse' (Cox & Dale, 2002). Managers treating their websites as quality delivery vehicles that emulate their business and its deliverables can consider adopting this study's broad six functions approach to assess their customer's and their differing perspectives of the business' website. Assessed

from an acceptable customer perspective, this approach offers a detailed understanding of the website. Further, weak website quality functions can then be enhanced or modified, while stronger quality functions can be differentiated or promoted as potential leading edge considerations against competitors.

Theoretical implications

This typological study collates website quality components, and exposes a new approach to understanding how the customer perceives the business' website 'quality' offerings. As a large number of website quality components are exposed – but embedded within only six functions, new and theoretical studies can re-develop the understanding of website quality. This 'new' Comprehensive Website Quality Model can then be assessed against satisfaction, trust and loyalty as a means to engage the customer more closely and repeatedly with the business.

This typology assessment of existing website quality studies sources 27 empirically-supported quality works. Of these, 26 employ Likert scaling (Tables 5.1 to 5.6), but Likert questionnaires remain slow to develop, and only offer delayed-responses to present-time or 'now' situations.

Website studies must also be carefully developed. Cognitive theory of response order-effects show questionnaire weaknesses including: question-order (or list-position); survey-verbiage; rating-scale-range; and responsiveness-to-situations-investigated – and, each can affect the customer's individual answers (Brunelle, 2009; Krosnick & Alwin 1987; Krosnick, 1991). Well-designed questionnaires (Sekaran, 2000) that also capture question clarity and conciseness of verbiage can improve customer response accuracy (Baker, Burkman, & Jones 2009; Brunelle, 2009). Provided implementation is appropriate (Christian, Dillman, & Smyth, 2007) astute website quality interpretations may be possible.

Practical implications

As 26 of the 27 empirical studies use Likert measures and these can be transposed into dichotomous scales (Dolnicar & Grun, 2007) a new computer programmed approach to trawling and gauging website quality is feasible (Cassidy & Hamilton, 2012b). Managers can then weight these computer trawling assessments and so gain instant assessments of their website changes. These can be tested against recent customer perception, questionnaire responses. Customer website surveys of the business' website can also be moved online (and can be modified as new quality

features are added), or into social networks, where customer responses can be continually logged, and then mapped to show changes in customer trends. When matched against results from the computer trawling of the existing website, differences (and areas to be fixed) can be readily exposed. Thus, a new responsive way to assess website quality emerges directly from this study.

Future research

Theoretical

This approach and above implications delivers opportunities to reframing website quality and should be adopted for other literature considered customer value dimensions - including performance, servicing and economic value. Such an approach likely teases out new conceptual frameworks, that in the future, offer mangers accurate, near-real-time understanding of website customers. This allows the website to become a strategic management tool. This negates the traditional physical website survey approaches – connected to point-in-time customer/user opinion. Such studies rarely capture representative website users – as they do not reach the global market.

Past studies seeking website usage information have asked whether: the site was easy to use (Fink & Nyaga, 2009); navigating the website is easy (Cao et al., 2005; Chang & Chen, 2008); the site conveyed a sense of competency; the information was believable (Fink & Nyaga, 2009); the website provided accurate information (Cao et al., 2005); the web site used colours properly (Chang & Chen, 2008). Such studies can yield enhanced information if researchers ask ‘why’ or ‘how’. This elicits added information relating to the website and demonstrates the thoughtfulness of the respondent in considering their answer. Such questions also restrict the coverage of a study, so careful question consideration is required in the survey construction phase.

Measurement

Each set of relevant functions of website quality can be further segregated into individual components, with each tested for relevance and capability to convey a sense of quality to the business’ customers and/or to casual website visitors.

This study shows the quality of a website is one dimension of a customer’s requirements, and that quality can be determined from at least three domain considerations – marketing, technical and design. This is a rich area for further research.

Conclusion

Numerous approaches to measuring the quality of websites exist. Here 27 empirical studies are typologically classified herein into a six function Comprehensive Website Quality Model. This approach captures the broad divisions of website quality in one study. I suggest first breadth and then depth must be considered when assessing a business' website quality.

This paper demonstrates that website components can be typologically collated on likeness. In this instance components are grouped in differing quality functions. This next section (paper seven) seeks to determine if website components have specific locations on service industry websites and if so, do they align with consumer mental models.

5.2 Location of Service Industry Web Objects: Developing a Standard

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Introduction

In today's global economy, websites show increasing importance to the company and to its marketing strategy (Hernandez et al. 2009). Consumers now source globally, often obtaining products, services, or information from beyond their own region or country (Park and Gretzel 2007). Globally, internet use has moved from around 360 million users (December 2000) to over 2.4 billion (June 2012) (Internet World Stats, 2013). To tap this large consumer market, Lynch and Horton (2008) suggest company websites should target their consumers' design expectations and also offer universally usable services.

Over time, website interacting consumers develop perceived expectations concerning the placement, and the location, of common web objects (Roth et al. 2013). These perceived expectations may be viewed as the consumer's 'mental positioning model' (Roth et al. 2010; Shaikh, Chaparro, & Joshi, 2006), where consumers predict or infer the position of web objects, and how these contribute to their navigation within the website (Linxen, Heinz, Muller, Tuch, & Opwis, 2014).

Baharum and Jaafar (2014) show the consumer mental positioning model operates independent of age. Websites conforming to the consumer mental positioning model are more likely to display a competitive advantage over those who do not conform (Baharum & Jaafar, 2014; Linxen et al. 2014). However, few website content analysis studies (such as those involving the specific location of web objects) have been conducted, and these studies remain limited, focusing on particular types of websites such as agricultural university websites (Suresh & Gopalakrishnan 2012), and library websites (Raju & Harinarayana 2011).

Hence, this study seeks to understand whether there is alignment between existing consumer mental positioning models and the actual placement of specific web objects by business. Here, content analysis is utilised, and considers the location of 22 common web objects across 5 services industries in each of 10 countries, to determine whether a standard website homepage location exists for each of these web objects.

Relative Placement of Web Objects

Several web object location studies use Bernard's (2001a) grid squares (Table 5.7) to place-card overlay the grid position of web objects on a webpage. Roth et al. (2010) tests consumer mental positioning models with specific computer software, where respondents resize, drag, drop, and position web objects, and these placements are analysed using grid squares (Table 5.7) positioning. Roth et al. (2013) employs eye tracking with results grid-mapped and then analysed. Like Shaikh and Lenz (2006), Raju and Harinarayana (2011) use a 5 x 5 grid but use it to map their content analysis of library websites. Suresh and Gopalakrishnan (2012) employ a finer 8 x 7 grid (Table 5.7) in their content analysis of agricultural university websites. Table 5.7 shows finer grids offer more content placements squares, and so enable more precise positioning of web objects.

Table 5.7: Studies and Grid Sizes Used

Authors	Studies	Grid	Squares
Di Nocera, Capponi & Ferlazzo 2004	1	4x4	16
Shaikh, Chaparro & Joshi 2006; Shaikh & Lenz 2006; Raju & Harinarayana 2011	3	5x5	25
Bernard & Sheshadri 2004	1	7x6	42
Baharum & Jaafar 2014	1	7x6 (3x3)	42 (9)
Bernard 2001a; 2001b; 2002; 2003; Suresh & Gopalakrishnan 2012	3	8x7	56
Roth et al. 2010; Roth et al. 2013	2	12x8	96
This Study	1	38x21	798

Table 5.7's differing grid sizes and the inconsistency of web objects (Table 5.8) investigated make cross study comparisons difficult. Further, there is a lack of consistency of web object selection by the same authors, for example, Bernard's 2001b paper considers the *advertisement banner* web object, but he excludes this from his 2002 and 2003 articles. Also, Roth et al. (2010) list the web object *conditions-of-use*; however this is not included in the Roth et al. (2013) study.

Table 5.8: Web Objects and Studies

Web Bus. Domain	Web Bus. Function	Web Object	Definition	Past Studies and / or Key Reference
Aesthetics	Visual Aesthetics	Logo	Comp name/ logo	Baharum & Jaafar 2014; Roth et al. 2010; Roth et al. 2013
	Usability	Search	Internal search	Baharum & Jaafar 2014; Bernard 2001a; 2001b; 2002 & 2003; Raju & Harinarayana 2011; Roth et al. 2010; Roth et al. 2013; Shaikh et al. 2006; Shaikh & Lenz 2006
Technical	Flow	Navigation	Is consistent	Roth et al. 2010; Roth et al. 2013
	Security	Copyright statement	Written statement	Cao et al. 2005
	Privacy	Conditions-of-use	What you agree to	Roth et al. 2010
		Privacy-notice	Protects your details	Roth et al. 2010
		Copyright Symbol	©	Cao et al. 2005
	Design	Header	Across top third page	Lynch & Horton 2008
		Footer	Across bottom of page	Lynch & Horton 2008
Marketing	Content	Site Map	Text view content	Olsina & Rossi 2002
	Context	Internal Ads/links	Ads connect to comp	Baharum & Jaafar 2014; Bernard 2001a & 2001b; Bernard & Sheshadri 2004; Shaikh et al. 2006; Shaikh & Lenz 2006
	Communications	Contact Us	Comp contact details	Roth et al. 2010; Roth et al. 2013
		FAQs	Frequent ask questions	Roth et al. 2010
		Newsletter	Emailed to consumers	Roth et al. 2010
	Community	Social Media	Facebook, Twitter, etc.	Zhao & Dholakia 2009
	Commerce	Shopping Cart	Link to purchasing	Bernard 2002; 2003; Bernard & Sheshadri 2004; Roth et al. 2013
	Customerisation	Login	Password protected zone	Baharum & Jaafar 2014; Bernard 2002; 2003; Roth et al. 2010; Roth et al. 2013
	Customisation	Help	When assistance is required	Bernard 2002; 2003; Bernard & Sheshadri 2004; Raju & Harinarayana 2011; Roth et al. 2010
	Connection	About Us	Company information	Raju & Harinarayana 2011; Roth et al. 2013; Shaikh et al. 2006; Shaikh & Lenz 2006
	Non-Customers	RSS Feeds	Electronic updates/info	Cao et al. 2005
		External Links	Non-company links	Baharum & Jaafar 2014; Bernard 2001a; 2001b; Bernard & Sheshadri 2004; Roth et al. 2010
		External Ads (banner ads)	Ads external to comp	Bernard 2001a; 2001b; Bernard & Sheshadri 2004; Baharum & Jaafar 2014; Roth et al. 2010; Shaikh et al. 2006; Shaikh & Lenz 2006

Table 5.8 splits the web objects of past studies into recognisable groups – first as functions and then as larger website domains - marketing (which attracts consumers), aesthetics (which appeals to consumers), or technical (which operationalises the

website for consumers) (Cassidy and Hamilton 2011a; 2012a). Some past study measures such as *back-to-home* are excluded as *logo* now serves the same purpose. *Archive* is not considered, as it only appears in a study by Roth et al. (2010).

The *main area* (or centre) of the webpage is not considered as it is generally text and image based. As web objects typically reside around the periphery of a webpage the *header* section (generally containing *logo* and *search*) and the *footer* section (generally containing *privacy-notice* and *copyright symbol* web objects) are included. Further, *website date* is excluded as it only appears once (Lynch and Horton 2008), and *to-the-top* is excluded as only Roth et al. (2010) consider consumer positioning of this web object. *Login* and *shopping cart* generally appear on the homepage, but *account/order* is now, normally found on an internal webpage and therefore is excluded. *Social media* and *RSS feeds* are included, as today they are web objects linked to the consumer's interactions with the business website. The remaining Table 5.8 web objects are those considered in this study.

Grid approach deployed

From past empirical studies, consumers positioning of web objects (according to their mental positioning models) are compared against the actual positioning of web objects (through content analysis) in 5 services industries across 10 countries. I also check, whether over the passage of time, basic web objects remain in the same grid position or location (Lynch and Horton 2008).

These consumer-based studies employ large grid sizes (Table 5.7) allowing an approximation of a web object's position. A darker grid square indicates a specific web object occurs more frequently at this grid location (Bernard 2001a; 2001b; 2002; Roth et al. 2010;Shaikh and Lenz 2006). However, the exact location of a web object within the large grid square is not reported in these studies.

In this study, for greater accuracy, I deploy a much smaller grid size. In addition I develop, and deploy, a software program that provides a 3D visual representation of the concentration of each web object at a specific grid position. This *3D Web Objects Visualiser* is available to readers at www.adamrehn.com/tools/webobjects/. Here, the position of each web object is gauged against my grid and plotted on an excel grid, converted to a .csv file, and then imported into the *3D Web Objects Visualiser*. A 3D graph of the web object's position is thus produced. This process is also used to overlap and compare the same objects existing on the websites used in this study.

3D web objects visualiser grid comparison

Since 2000, 11 consumer-based and two content analysis studies have placed web objects. For general comparative purposes, a visual representation of eight of these studies is provided. These are rescaled into the mapping grid, added to the *3D Web Objects Visualiser*, and are shown as Figures 5.2 to 5.9. The remaining five studies are not included as Suresh and Gopalakrishnan (2012) provide scant grid information, Raju and Harinarayana, (2011) and Shaikh et al. (2006) give few general measures, Linxen et al. (2014) only offer an initial study, and Baharum and Jaafar (2014) complicate positioning using a double grid.

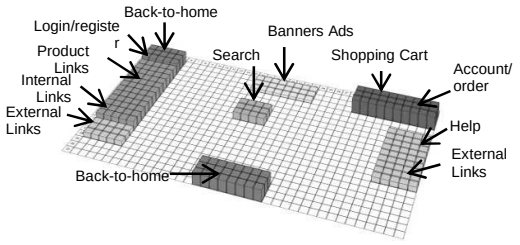


Figure 5.2: Web object placement (Bernard, 2000)

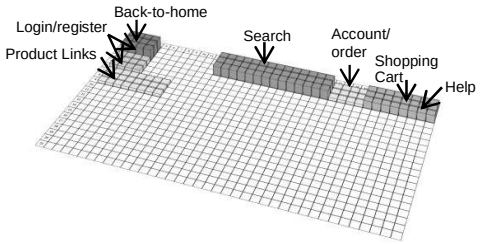


Figure 5.3: Web object placement (Bernard, 2002)

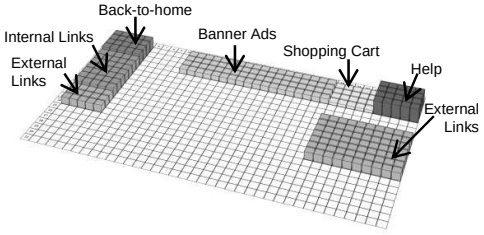


Figure 5.4: Web object placement (Bernard & Sheshadri, 2004)

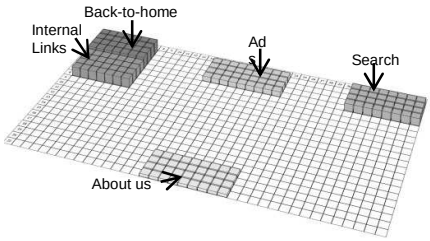


Figure 5.5: Web object placement (Shaikh & Lenz, 2006)

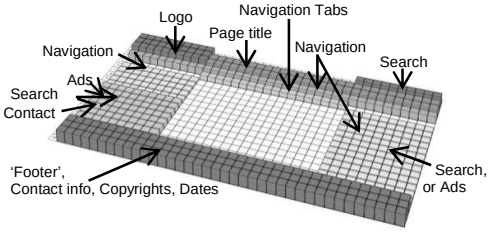


Figure 5.6: Web objects placement (Lynch & Horton, 2008)

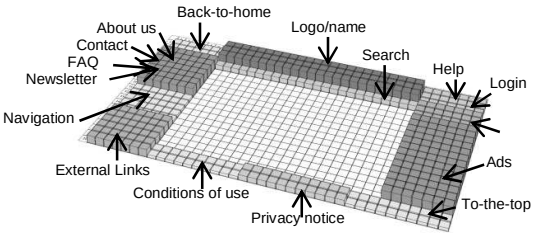


Figure 5.7: Web objects placement (Shop Webpage – Roth et al., 2010)

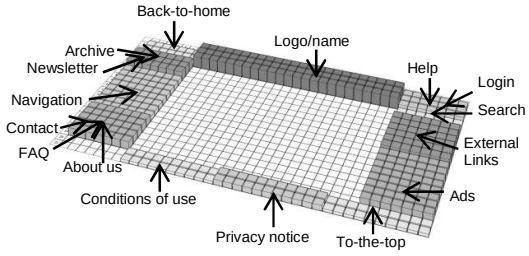


Figure 5.8: Web objects placement (News Portal Webpage – Roth et al., 2010)

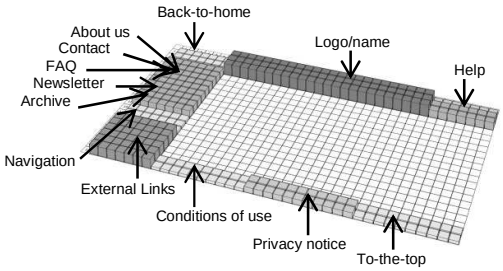


Figure 5.9: Web objects placement (Company Webpage–Roth et al., 2010)

After reviewing the placement of web objects in Figures 5.2 to 5.9 and Raju and Harinarayana's (2011) content analysis of web object placement, the following home page hypotheses are proposed:

H_1: Web objects *about us* and *logo* are located in a specific area upper-left.

H_2: Web objects *help*, *shopping cart*, *login*, *social media, RSS feeds* and *search* are each located in a specific area upper-right.

H_3 Web objects *contact us; external links, FAQs, navigation*, and *newsletter* are each located in a specific area on the left side.

H_4: The *internal links* web object is located on the left or the right side.

H_5 Web objects *conditions-of-use*; *copyright notice, copyright symbol, privacy-notice*, and *site map* are located in the footer.

H_6: Web objects *external ads (banner ads)* are located top-middle.

H_7: The *header* is the top-third of the webpage.

H_8: The *footer* is the bottom of the webpage.

This study now tests the above hypothesis on the websites from 5 industries across 10 countries.

Methodology

Content analysis is applied across 10 countries, and 5 substantive industry websites (tourism, financial, government, postal, and retail). In each country, all five industries have an English language version of their website. There are nine developed countries (Australia, Canada, USA, Hong Kong, Japan, Taiwan, Germany, the UK, and Singapore), each with a GDP (gross domestic product) PPP (purchasing power parity) per capita between $36,000 and $65,000, and an internet penetration above 75% (Internet World Stats, 2013).

India, although a developing country with a GDP PPP per capita of only $4,077.057 (international), is included as the tenth country because their service sector is one of the largest in the world (India Brand Equity Foundation, 2014) accounting for 60% of local GDP. It has 85 million mobile internet users concentrated in urban areas and 25 million users in rural areas (Internet and Mobile Association of India 2014) and has the third highest number of internet users world-wide (Internet World Stats 2013).

Measures

A comparison of 22 web objects of prior studies (Bernard 2000; Bernard & Sheshadri 2004; Cassidy & Hamilton 2011; 2012; Roth et al. 2010) is conducted. Table 5.8 links these into their previously defined functions and domains (Boisvert & Caron 2006; Cassidy & Hamilton 2011b; 2012b), placing each web object into only one function.

To allow comparison, some of the past study web objects are consolidated under one name. *Logo,* for example, represents the company name and/or *logo*. It provides visual aesthetic appeal, and fits within this website function under the aesthetic domain. Many past studies' respondents consider the *Logo* position as an intuitive return-to-homepage link housing a consumer mental positioning model of an embedded, non-visible back-to-home link.

This study uses an Acer Aspire 5560G laptop, an AMD A8-3500M APU, and a Radeon™ HD graphics 1.5GHz, and a 64bit operating system. The 15.6 inch HD LED LCD screen resolution is 1366 x 768 and the Google Chrome browser is version 28.0.1500.72m to consistently determine the position of all 22 web objects. The study uses 'point-in-time' capture of each website's homepage.

Content Analysis

A 38 (horizontal) x 21 (vertical) grid of 798 positioning squares (each representing 36.5 pixels x 36.5 pixels) allows each small square to remain visually discernible. It is superimposed over each website homepage's screen capture. The actual position of each web object is then encapsulated (pin-pointed) using this fine grid structure. Any homepage website scrolling is conducted as twenty-one grid row blocks per scroll. Thus, each web object's positioning results are transferable to an excel spreadsheet, convertible to a .csv file, and then available for *3D Web Objects Visualiser* analysis.

The most common location of a web object is represented by how often a specific grid square is used, and whether or not there is consensus across the services industries

for all ten countries. The main web objects for each services industry's website are shown as 3D grid representations (Figures 5.10 to 5.14). The darker and the higher is the grid square, the more often this web object is concentrated at this particular location.

Results

My literature research shows no definitive agreement as to why, or where, web objects are located (or as to where they should be located). However, regardless of country, some basic web objects such as *logo*, *search*, and *navigation* do show industry-specific consistency in their grid placement.

Table 5.9: Support for Hypothesis

Hypothesis	Financial	Government	Postal	Retail	Tourism
H_1	Partially	Partially	Partially	Partially	Partially
H_2	Partially	Partially	Partially	Partially	Partially
H_3	Not supported	Not supported	Not supported	Partially	Not supported
H_4	Not supported	Not supported	Not supported	Partially	Not supported
H_5	Partially	Partially	Partially	Partially	Partially
H_6	Not supported	Not supported	Not supported	Not supported	Not supported
H_7	Supported	Supported	Supported	Supported	Supported
H_8	Supported	Supported	Supported	Supported	Supported

As per Table 5.9, H_1 is partially supported with the web object *logo* located in a specific upper-left position of website homepages across all 5 industries (Figures 5.10 to 5.14). However, the web object *about us* (and when present) varies across industries. H_2 is also partially supported with the web object *search* located upper-right on finance, government, postal, and tourism website homepages (Figures 5.10, 5.11, 5.12 and 5.14). The retail website homepage (Figure 5.13) has *search* moved towards the middle (away from upper-right) to make room for web objects *shopping cart* and *login*. *Social media, RSS feed* and *help* (web objects) show no specific location on website homepages either within or across industries. H_3 is partially supported with some *navigation* on the left side of retail industry homepages (Figure 5.13). When present on a website homepage, *contact us* is generally in the *footer*, while *external links, FAQs,* and *newsletter* have no specific location. The retail industry website homepages (Figure 5.13) provide partial support for H_4 with *internal links* present on the right side of a website homepage (but not the left). H_5 is partially supported across all industries. Here, when present, *conditions-of-use, copyright symbol, privacy-notice* and *site map* are located in the *footer*, however *copyright notice* has no specific location. H_6 is not supported with *external ads* having no specific location across industry websites. H_7 is

supported across industries. H_8 is supported across industries, however it should be noted the size of the *footer* does vary.

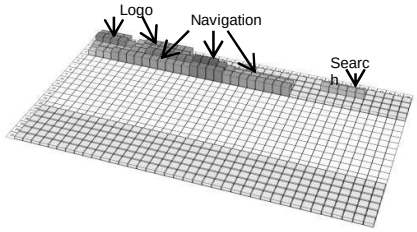


Figure 5.10: Financial websites

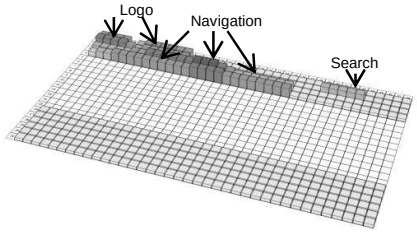


Figure 5.11: Government website

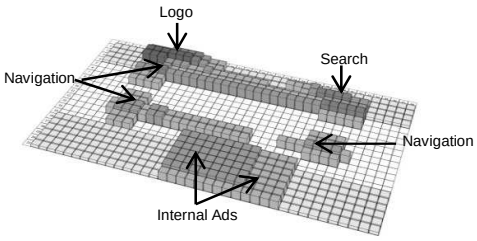


Figure 5.12: Postal websites

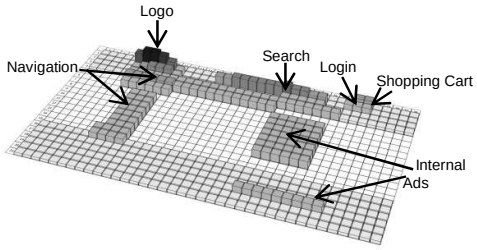


Figure 5.13: Retail websites

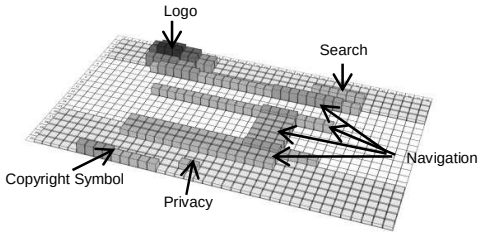
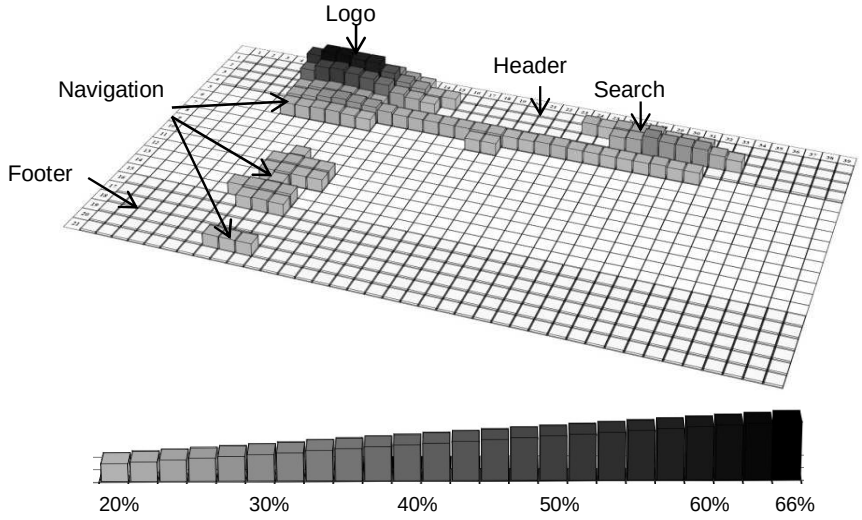


Figure 5.14: Tourism websites

This study demonstrates that in the 'real world' web object placement is subjective, complex and/or often limited. However, from this study of 5 services industries websites (Figures 5.10 to 5.14) across 10 countries I propose generic locations for several web objects (Figure 5.15).

The *header* covers approximately the top one-third of the webpage. Within the *header* the upper-left is the favoured placement for *logo* and upper-right for *search*. Main *navigation* is placed below the *logo* typically stretching horizontally across the page (to under *search*). Secondary *navigation* is in three distinct vertical positions on the left of the webpage. Retail websites are different to the other services industries as they

typically possess a *shopping cart* and *login* (both located to the right of the *search* web object).



(% of websites that utilise a particular square)

Figure 5.15: Agreement of web object location

Regardless of scrolling the *footer* sits lowest and across the base of the webpage. When present, *conditions-of-use*, *privacy-notice*, *copyright symbol*, *site map*, and *contact us* are located within the *footer*. Here, object placement varies across websites regardless of services industry or country.

A cluster of web objects show no specific placement or consistency-of-occurrence on a webpage, these can include: *social media, help, about us, RSS feeds, FAQ links, newsletter, external advertising,* and the *copyright statement.*

Implications

Theoretical implications

The homepage is the introductory view of the website. Bernard (2001a; 2001b; 2002), Bernard and Sheshadri (2004), Roth et al. (2010), Roth et al. (2013), and Shaikh and Lenz (2006) use grid-mapping to identify homepage placement of web objects, but do so through consumer perspective studies. Others, go further and use between 99 and 150 web objects spread across entire websites (Olsina & Rossi 2002; Stepchenkova et al. 2010) to assess consumer perspectives. This research extends such studies by comparing the actual fine placement of web objects by the business against past consumer predictive perspectives of where such web objects should be found. The

study is further extended by comparing 5 services industries across 10 countries. This study establishes a grid-mapping approach that can now be used to align the business' provided web objects against consumer predicted perspectives.

Websites can been studied in fine detail using a three domain perspective (marketing, technical and aesthetics), with each domain further segmented into its unique set of functions, and with each function made up of its own unique set of like component objects. (Vilenkin 1986; Boisvert & Caron 2006; Cassidy & Hamilton 2011a; 2012a) For example, a marketing domain's community function houses social network communication component objects such as Facebook, Tumblr and Twitter. Thus a three level approach to collating web component objects offers new scope for theoretical associative research.

In this homepage and services industries study, each of the 22 web objects deployed belongs to only one function within only one domain. This approach offers a quick way to consider whether the website's coverage is effective.

Table 5.8 compares web objects from past service industries studies with this study's web objects. With only 22 web objects (one - per function), I suggest beyond the marketing domain, homepage coverage within the technical and aesthetic domains remains weak. This 3 domain, grid-mapping, approach to understanding website homepages remains an investigative opportunity for future theoretical research.

Practical implications

Today services industries business-to-consumer website homepages show improvement across many areas. However, with their increasing global reach, managers and/or designers of these websites should give consideration to consumer mental positioning models (or perceived expectations) of web objects.

When a website shows inconsistency in its web object placement for its services industry, then the website may not align with its consumer groups' mental positioning models (Lynch & Horton 2008; Shaikh et al., 2006) – resulting in the consumers' early abandonment of this website.

To determine any alignment between web object positioning on websites and consumer mental positioning models a content analysis was conducted, across 5 industries from 10 countries. These results confirm there is no consistency for web

object placement between services industries. However, there is some consistency within industry-specific websites.

The development of a standard, website homepage position, for each web object per service industry helps alleviate consumer frustration, and builds further alignment towards their personal mental positioning models. Thus, managers and/or designers of services websites should look globally within their services industry and across other services industries, and apply the grid-mapping approach developed in this study to determine the most common (or standard) position of each of their homepage web objects.

When a standard placement of web objects is achieved through grid-mapping, consumer interactions with the website improves, particularly if the consumers' mental positioning models adjust towards their expectations of what is to be fulfilled (Roth et al. 2010; Shaikh et al. 2006). As a guide to standard positioning of a web object, managers and/or designers can follow Nielsen's (1999) 'rule' which states - when more than 80% of websites (from a particular segment) place a web object in one position, this is considered the *defacto* standard.

For Figure 5.15's web objects, the *defacto* standards across 5 services industries and 10 countries include: *logo* and *search* being placed upper-left and upper-right respectively, *navigation* best located below the *logo* web object and stretching horizontally to the right (with secondary navigation scattered along the left-side of the webpage), header located in the top third of the webpage, and the footer remaining at the very bottom (regardless of the screen-scrolls downwards). This *defacto* standard for these services industries aligns with consumer mental positioning models of their web objects. Further development of a global standard for web object placement on business-to-consumer websites is required.

Future Research

Measurement aspects

This study's webpage grid overlay approach facilitates comparison of web objects regardless of page scrolling. It captures presence and placement of web objects (across marketing, aesthetic and technical domains) from top to the bottom of the page – even if the *footer* is two or more scrolls further down.

The software deployed herein involves a time-consuming manual preparation of the web object placement input data. Grid placement measures are recorded as an excel spreadsheet and then imported as a .csv file into the *3D Web Objects Visualiser*.

Version two of this *3D Web Objects Visualiser* software is under development, and is to be a commercial package. Version two pastes a grid overlay across each website page and allows for a paint-over measurement of a web object. Each recorded web object is data warehoused, and then directly-imported, and graphically-displayed, under the *3D Web Objects Visualiser*. Hence, website pages and/or web object data is made available for business intelligence studies involving the establishment web object placement standards (in various industry-specific or country-specific studies), including the comparative benchmarking of web object placement and/or presence. Thus the *3D Web Objects Visualiser* software approach offers researchers and managers a visual and comparative website benchmarking tool.

Theoretical aspects

The grid-mapping of web objects and the determination of their relative placement is a comparative benchmarking approach. To date there is no measurement or benchmarking system that can capture or position all available web objects. This fine grid-mapping, although cumbersome for large websites, and unable to capture all aesthetic, and all technical measures, does deliver a visual assessment of the website. This study's approach does show the business homepage web objects can be aligned to its consumers' mental positioning models concerning their perceived location of each of these homepage web objects.

This fine grid-mapping approach and its complementary *3D Web Objects Visualiser* software is part of the practical approach to automating the measuring and comparison of websites. This study's contribution is a part of the testing of a general website benchmarking solution.

Research to build the additional tools that complement (and further automate) this grid-mapping approach and research to measure non-grid-captured web objects such as the use of cascading style sheets, download speed, or image resolutions, has the capability to deliver a useful comparative benchmarking tool for industry. Such research moves the understanding of web object placement beyond that of consumer (or website developer) perception, and into the domain of comparative actuality.

Management aspects

The *3D Web Objects Visualiser* offers a cheap approach from which business researchers can now check for homepage web object presence and relative placement, and can then compare and benchmark the homepage against other website homepages of interest.

As websites change regularly, and homepages are their most viewed pages, researchers using the approach herein can regularly monitor and compare chosen website homepages against competitors or others in the same industrial sector. Thus over time, the competitor's web object changes can be intelligently interpreted as a priorities list (rating the importance of web object components on websites). This area remains an important area for ongoing research and explanation as it can provide a basic map from which researchers and managers can re-assess their homepage's relative competitiveness.

Further, where many web homepages are compared, patterns for web object location across countries and/or languages may emerge. Here, consumer mental positioning model studies and business homepage web object positioning can be conducted concurrently. This allows point-in-time comparisons between each actual web object's placement, and the actual consumer perceptions of the expected location of each web object. Further, this type of comparative study can also be run between countries, and across languages.

Conclusion

This services industries study, across 5 industries and 10 countries, shows this fine grid visual overlays (36.5 x 36.5 pixels) approach to web object placement (and presence) is a cheap and useful way for business and/or researchers to compare the homepage of websites – either against others within a services industries sector, or against this services sector's competitors. Such studies can also be used to compare differences between selected countries.

When designing websites for global reach, services industries managers and/or designers should ensure they incorporate all web objects that show widely-agreed and consistent home page positioning as indicated in Figures 5.10 to 5.14.

Compared to past 2D research models, this *3D Web Objects Visualiser* software extends the comparative interpretability of multi-site graphical webpage overlays.

Extension to the software (with automated data capture, intelligent display processes, and *defacto* 80% placement position comparisons) is currently under development into a commercial tool.

Within the services sector and countries studied, a basic *defacto* 80% standard homepage placement layout (Figure 5.15) exists for just 5 of the 22 web objects studied. These 5 web objects fit within only 4 of the 19 aesthetic and IT functions. This indicates that across the services sector marketing plus many of the aesthetic and IT functions of Table 5.8 exhibit inconsistent placement of the web objects within a generalised industry website. Utilising tools such as the *3D Web Objects Visualiser*, conducting comparison studies between websites, and running consumer mental positioning models studies allows the build of a database that is then capable of further homepage (or website) web object placement, measurement, and optimisation. I note except for H_6 all other hypotheses are either fully or partially supported.

Within specific services industries (Figures 5.10 to 5.14) the *logo, header, search*, and *navigation* web objects are prominently top-of-page positioned on the homepage as they provide the basic operational connections into other sections of the website. For retail websites that 'sell items', the *shopping-cart,* and *login,* web objects are also placed top-of-page. The bottom *footer* typically offers less important but required information about the website and its obligations, and it sometimes includes external links to other affiliated websites.

It is shown that some website components do have specific locations on website homepages and hence can be termed web objects. These web objects align with consumer mental models, therefore meeting consumer expectations.

The following two papers take component validity testing to the next step, by adding specific components to a purpose designed and constructed non-commercial niche tourism targeted website. The influence of these component additions on first time visiting consumers (FTVCs) is detailed next in paper eight.

5.3 GENERATING FIRST TIME VISITING CONUSMER WEBSITE TRAFFIC: A LIVE CASE STUDY

Published: *25th CAUTHE Conference*

Introduction

Business recognises websites as a mechanism for reaching their consumers. Attracting new visitors and maintaining existing visitors to the website is important to continue the business' customer reach. The website's first point of contact with consumers is through its first time visiting consumers (FTVCs).

The growth of consumer traffic into the website remains an ongoing quest for today's businesses. In this online environment the business competes feverishly to establish its brand recognition, and to win consumer awareness (Ilfeld & Winer, 2001). Various Internet-based analysis tools are used to real-time track each consumer's traffic and their individual pathways around the website (Glommen & Barrelet, 2004). Bursts of website promotions, or social communications, or the inclusion of a new innovative idea each represent website modifications, and each potentially alters the consumers' residence time within the website. Such modifications then complicate any existing algorithmic calculations previously designed to provide real-time website measurement (Wang, Madhyastha, Chan, Papadimitriou, & Faloutsos, 2002).

As website traffic typically follows the consumer's pursuits/transactions (including retrieval of information, purchasing, or engaging in discussions), it also captures consumer behavioural connotations (Choi & Limb, 1999). Still further behavioural connotations also emerge when the consumer shifts from the various social network environments (including Facebook or Instagram) back into the business website.

Research studies that monitor website traffic whilst also linking with social networks remain selective, non-generalisable, and are typically approached as 'small-world' studies, or as power-law degree distributions, or as network transitivities, or as community structures (of fused like-minded informative community groups) (Girvan & Newman, 2002). Further, within the business' website and social network environments there remains a lack understanding of how to be effective, and as to what performance (or traffic) aspects should be monitored, and as to whether business social media strategies should be consistent across their digital and traditional media environments (Hanna, Rohm, & Crittenden, 2011). Thus, studies of what constitutes website traffic remain warranted.

Today, social networks can extend the reach of the business. Here, selected consumers with large personal followings/likes can be employed by the business to co-create brand/marketing content avenues, and to generate additional traffic to the website. This behavioural approach allows the business to build a unique online social traffic perspective that actually reaches into new online social-world spaces where potential and existing consumers 'live' and interact. Thus, the research remains behind current consumer market behaviours, and there is a need to further understand website traffic.

Previous website research has examined factors influencing consumers visiting websites. From a socio-technical perspective researchers have examined: perceived ease of use, perceived usefulness (Herrero & San Martin, 2012), website design (Sreedhar et al., 2010), website effectiveness (Lopez & Ruiz, 2011), website quality (Tsai et al., 2011), value deliverance (Soltani & Gharbi, 2008), consumer satisfaction (Park, Bhatnagar, & Rao 2010), site brand recognition (Lowry, Vance, Moody, Beckman, & Read, 2008), trust (Green & Pearson, 2011), and security (Chen & Barnes, 2007). Some social psychological studies have followed the elaboration likelihood method (Tang et al., 2012) considering consumer attitudes and decision making processes for visiting a website. Few studies have looked into website-to-consumer connectivity.

This tourism study develops a website consumer connection model by embedding both socio-technical and social psychological perspectives for FTVCs. I engage FTVCs and examine how website component levels and richness influence FTVCs decisions to visit a website.

Hence for tourism websites this study applies three independent business offerings (website richness, website posts and website interactivity) as positive consumer behavioural connectors capable of growing consumer website traffic.

Literature Review

Early website studies were predominantly subjective. These studies generally involve small groups of consumers, suppliers and academics (Huizingh, 2000; Robbins & Stylianou, 2003), often with limited experience across on-line exchanges and transactions. Hence, early research typically delivered non-generalisable findings. Over time, larger quantitative methods studies emerged (Cebi, 2013; Rahimnia & Hassanzadeh, 2013), with some incorporating various computer-automated methods

(Li & Huang, 2007). However, generalisability issues still remained. More recently, combinations of qualitative and quantitative studies have been trialled (Chiou et al., 2010; Law et al., 2010).

The above early approaches did not extend to the behavioural considerations of what motivated a consumer to begin to browse, and of what website deliverable aspects were consumed (transacted) in meeting the consumer's gratification requirements, and of what influenced FTVCs to revisit (Huang, Hsieh, & Wu, 2014) as multi-time visiting consumers (MTVCs).

These website performance approaches broadened understanding around the consumer's behaviour and were sometimes gauged through website consumer 'traffic' responses (Jiang, Chan, Tan, & Chua, 2010). Current research studies, and their commercial measurement applications, are now pursuing the integration of psychology, computer science, engineering and benchmarking performance processes (Law et al., 2010; Cassidy & Hamilton, 2014a; Pallud & Straub, 2014). Thus over time, website research has transitioned as shown in Figure 5.16.

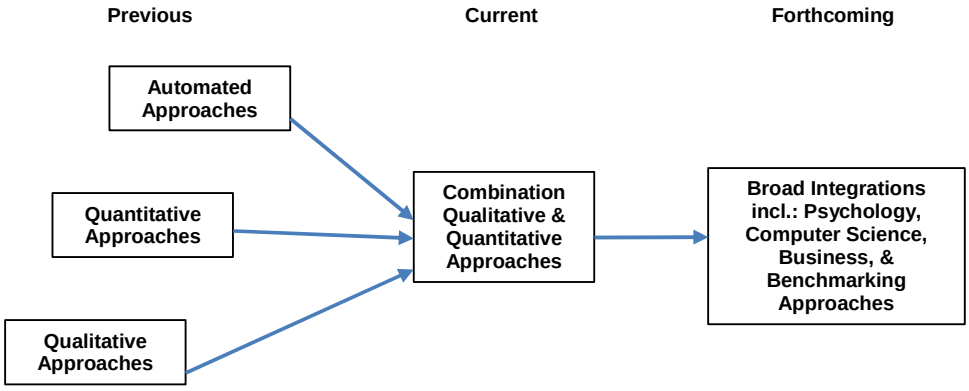


Figure 5.16: Transitions in website evaluation approaches (adapted from Law et al., 2010)

Website Richness

Websites remain the corporate's direct window into the consumer's domain, and can be deployed to provide information, social-connection, or entertainment content (Heinonen, 2011). Further understanding of website consumer differences between business and social networks is provided by Hamilton and Tee (2013). Using Shao's (2009) consumer (interactive, participatory, or production-related) aspects, and Heinonen's (2011) 9 levels of motivational content (involving differing mixes of media)

each present a differentiated consumer perception concerning the richness of the website and its social network (de Vries, Gensler, & Leeflang, 2012).

Richness, or vividness (Cvijikj & Michahelles, 2013) is enhanced when the online content includes feeds from additional social media content 'posts' (Gerlitz & Helmond, 2013) or when offering value-adding website additions. This richness is termed high (Fortin & Dholakia, 2005; Cvijikj & Michahelles, 2013) when offering dynamic animations (videos), and/or contrasting visuals and pictures, and/or interactive linking connections into other websites (Cyr, Head, & Larios, 2010; Jiang et al., 2010; Sabate, Berbegal-Mirabent, Canabate, & Lebherz, 2014). Provided the website is well sequenced and well designed, greater website richness generates greater traffic (Palmer, 2002).

There are many ways to increase the website richness (or vividness) of online content, for example, benchmarking procedures can show where website content is lacking. Consumer-targeted online promotional marketing can also be employed to increase the website's appeal, or to enhance website aesthetic/design appeal, or to build new information technology offerings that speed the integrative collation of the consumer's desired transaction/sourcing requirements (Law et al., 2010).

As richness is interpreted in many ways, consensus regarding its coverage remains inconsistent. Hence, in looking for ways to capture various website 'richness' contributions a benchmarking approach, is adopted. This allows the comparison of functions of a business' website against a universal benchmarking set of all possible website features. This approach suggests further website feature inclusions deliver further 'richness'.

There are numerous website components, for example in tourism studies, Law et al., (2010) collate over 140 qualitative and quantitative website components. Studies including those by Francis, (2009), Kim et al., (2009), Zhu et al., (2009) classify website components into likeness groups. Cassidy & Hamilton (2013) typologically refine the existing quantitative works into 230 measurable website components encompassing 28 functions (or likeness groups), with each function placed into 1 of 3 website domains (marketing, aesthetics, technology). Hence, website richness can be represented through the strength of each functions' presence as it currently exists within its domain within the website. Thus, a tourism website offering greater richness should exhibit greater strength across each of its domains (and each of its embedded functions). This

is likely to be a positive consumer motivator, and likely encourages greater consumer website traffic.

Website posts

Well-designed and carefully-implemented website 'posts' from social media inbound links add currency and are functional additions to the website (Bai et al., 2008; Lee & Kozar, 2008; Gerlitz & Helmond, 2013). These enhancements typically link the consumer into an awareness, a sense of belonging, a connectedness, and/or a pleasure perception regarding the website (Lin, Fan, & Chau, 2014) and its informative usefulness (Milano, Baggio, & Piattelli, 2011; Tsai, 2011). This positive consumer motivation further promotes traffic (Gerlitz & Helmond, 2013).

Kabadayi and Gupta (2011) show a website with increasing content (which may be a new post feed from a social network site) further strengthens consumer visitations. Posts also bring new consumer-perceived richness, engagement-connections, and greater attention, into the website (Sabate et al., 2014; Chung, Animesh, Han, & Pinsonneault, 2014). Thus for tourism websites consumer-perceived website inclusions (established from posts) deliver greater traffic.

Website interactivity

The level of interactivity offered within a website is another positive consumer motivator (Jiang et al., 2010). Building interactivity into websites gives the consumer a sense of control and challenge, and this increases the likelihood of their intention to be involved in the website's environment (Korzaan, 2003; Weinberg, Berger, & Hanna, 2003; Bilgihan, Okumus, Nusair, & Bujisic, 2014). From a relationship marketing perspective website interactivity enhances consumer perceptions regarding the quality of their relationship with the website, and further induces the likelihood of them visiting and communicating with this website (Merrilees, 2002). This additional convenience, usefulness and enjoyment helps to drive consumer website traffic, and also increases the likelihood of revisits (Tsai, 2011). Kabadayi and Gupta (2011) show that websites allowing customisation (and ones with ready/convenient access), also incite consumer visits. Thus for tourism a website's interactivity likely induces further traffic.

Consumer website traffic: Separating first timers

Online consumers can be behaviourally split into consumptive, (usage or downloading of content) or creative (uploading of created content) groups (Ghose & Han, 2010; 2011). The former consumptive group typifies the FTVC, whilst the later creative group

typifies the MTVC (Albuquerque, Pavlidis, Chatow, Chen, & Jamal, 2012; de Vries et al., 2012). To discriminate between FTVCs and MTVCs, Albuquerque et al., (2012) assess each group from referral (posts), search/browsing (interactivity) and direct, or familiarity with website engagement perspectives (website richness). Toufaily, Ricard, and Perrien, (2013) note FTVCs differ from MTVCs, and using a typological grouping of the literature they show consumer, environment, product/service, company, and website characteristics each affect the online revisitor traffic into a business' website.

FTVCs initially locate and explore the website. If these FTVCs then revisit the website, they do so as MTVCs. Hence like Toufaily et al., (2013) I recognise MTVCs likely possess an understanding of the website and its offerings, and so may behave differently. Thus, in this section I segregate and discuss FTVCs.

Website complexity

Websites can be simple and static – showing no change in their structure or format. Such websites likely experience weak traffic flows over time. Fortunately, most of today's websites are interactive, and many deploy differing social media connectivity approaches such as those displayed in Table 5.10 (Stelzner, 2011).

Table 5.10: Social media marketing approaches

On-line Consumer-Connection Approaches			
Email marketing	Press releases	Print display ads	Radio ads
SEO	On-line ads	Sponsorships	TV adds
Event marketing	Direct mail	Webinars/teleseminars	YouTube promotions

Compared to static websites, those offering interactivity options likely experience greater consumer traffic, and websites with differing interactivity degrees/approaches likely generate differing degrees of consumer traffic.

Thus, to gauge a website's traffic, I first build a new tourism website, and then periodically add new components to increase its benchmark score. This process begins with measuring the FTVC traffic into a static website, and then increasing its degrees of richness. Next whilst again measuring FTVC traffic richness is progressed into increasing the website's degrees of interactivity. This is done by selectively adding new consumer-targeted static components, and then by increasing interactivity components at subsequent stages of the website's development.

Model

From the above literature relationships I propose a 'website - consumer connection model' exists for FTVCs, and present this as Figure 5.17.

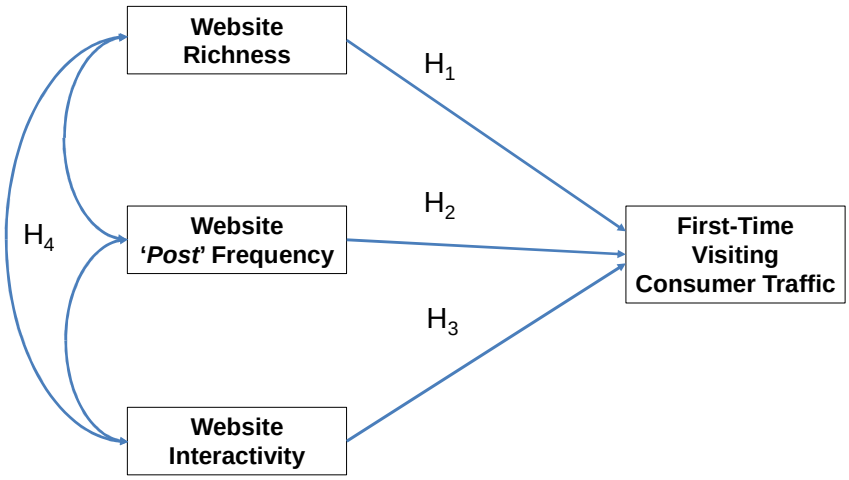


Figure 5.17: Website-Consumer Connection Model for FTVCs

In varying degrees, higher levels of website richness, website posts, and website interactivities each contribute towards building a positive behavioural perception change in FTVCs, and if suitably targeted, this net change can show as increased FTVC website traffic. Hence these three independent variables (website richness, website post frequency, and website interactivities) co-vary as hypothesised (H_4) in Figure 3.17. Further, as all three independent variables each link with dependent FTVCs, hypotheses H_1, H_2 and H_3 are proposed to exist.

Hence, I propose the following relationships for this tourism website:

- H_1: Website richness influences FTVC website traffic
- H_2: Website external post frequency (from social and informative connections) influence FTVC website traffic
- H_3: Website interactivity influences FTVC website traffic
- H_4: External posts (from social and informative connections) co-vary with website richness and interactivity

Methods

This tourism study applies the design science research approach of Figure 1.1 (Peffers et al., 2007) to answer real-life questions by creating innovative artefacts that are

useful to understand the root problem and to then contribute new knowledge (Hevner & Chatterjee, 2010).

This study applies a purpose designed website (www.therideguide.com.au) as activity 5 (Figure 1.1) and collects FTVC traffic over 100 weeks. The web hosting provider's Google analytics are used to identify and separate FTVCs from return visitors, web crawlers, web bots, and other non-consumer website traffic sources. Website changes are made periodically, data collected is then trend analysed in six stages. The six stages are as follows: (1) A 1-page static brochure, (2) A 5-page static content-rich webpages, (3) A 7-page content-rich with interactivity, (4) inclusion of forum and Facebook posts, (5) engage connectivity with like or complementary events, and (6) addition of a large database containing information on complementary destination activities such as accommodation, tourism attractions, and restaurants.

This trend analysis approach shows a dynamically-changing product-life-cycle (PLC) approach (Finch, 2008) to FTVC traffic. This offers a visually interpretable methodology to tracking FTVCs and to locating the change points for subsequent website enhancement initiation.

Results and Discussion

This new tourism non-commercial, informational, website is purpose designed, and monitored to capture a niche of high consumer appeal (Kim & Mauborgne, 2005). Google analytics provides the ongoing data feed. The consumer data feed is first 'cleaned' to remove the 'chance' (bounce, crawler, bot) visitor components that are typically present in website traffic data. Further, MTVCs are also removed from this traffic data. Thus daily FTVC visits are accurately analysed.

To clarify this dynamically-changing PLC trace, and to visually reduce the daily saw-toothed nature of FTVC traffic, an 8-week-running-average approach (Finch, 2008 p.424) is used. This curve smoothing approach allows me to project when I should introduce the next website change. Thus as shown in Figure 5.18, over this 100 week study the website is logically modified at selected time intervals, with each enhancement introducing further richness. Each of these modifications to the tourism business' website is relaunched as a new upgraded website version.

The study commences at Stage one with a one page static tourism brochure website. A growth in FTVC traffic occurs, and with no changes made to this brochure website, the

FTVC traffic soon peaks, and then declines towards zero. This simplest of tourism websites is shown as the first (left-hand) peak of Figure 5.18. It is soon 'out-of-date' and it follows a normal, but short-lived, PLC curve (Finch, 2008) and is of little additional relevance to a MTVC.

Stage two is then initiated – this time as a five page static website - but with its additional richness. This additional targeted richness/content offers more tourism-related aspects and consequently generates a higher PLC peak. Again, with no additional changes, over time the FTVC traffic again falls back to near zero. This indicates FTVCs (and the web crawlers) see the website over time as lacking currency, variety and value, but that a five page website holds more value than a one page brochure website. Traffic does not fall to zero as the website is live and the occasional new FTVC continues to discover its presence. This supports H_1.

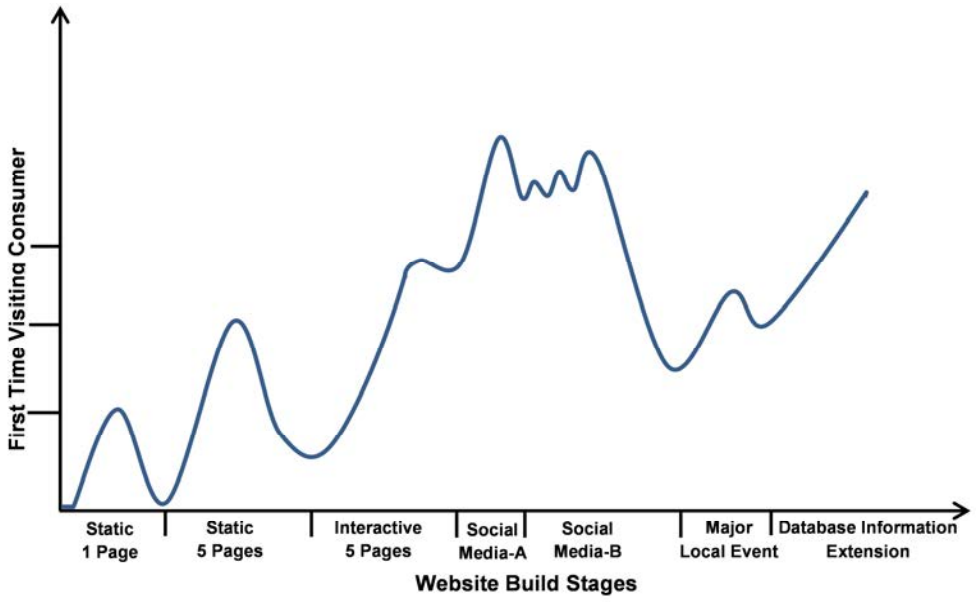


Figure 5.18: One hundred week timeline of website traffic generated by first-time visiting consumers

Stage three moves the tourism website into a five page interactive mode - where FTVCs can initiate some personal changes, observe real-time downloaded-to-website information, and participate in personal downloads and/or basic communicative feedback transactions. In this instance the business' tourism website, with its increased richness, attains greater FTVC traffic, but does so over a slightly longer time period. This supports H_3 and further supports H_1.

Stage four (social media-A) is initiated immediately after the third PLC cycle peak is observed. At this point dynamically interactive aspects are added across a seven page website. Here, I add both forum and Facebook feeds, along with more extensive interactivity options. These dynamic offerings quickly generate a steeper increase in tourism website traffic, and with no further input by the business another (but greater) PLC peak is delivered.

Once this fourth PLC peak subsides, Stage four (social media-B) adds a new Facebook post. This stops a decline in FTVCs traffic, and generates a small fifth PLC peak. Again, once a first Facebook post decline is recognised, a second (and then a third) Facebook post is added, and these generate the sixth and seventh PLC peaks.

Provided these Facebook posts are sufficiently close together time-wise, and each presents dynamic, well-targeted consumer responses into the website, then each subsequent post can be considered as a possible way to further grow (or maintain) the business' website FTVC traffic. This supports H_2.

For stages one to four external posts co-vary with website richness and interactivity. Hence H_4 is supported. With no further forum or Facebook contributions added by the business, the FTVC traffic falls – but at a slower rate due to some consumer-lead Facebook activity still generating ad hoc consumer-to-consumer (and link-back) traffic.

Stage five tags the tourism website into an annual tourism major event (one that closely relates to this website's tourism area). Again an eighth PLC peak is observed, but linked-traffic from this source soon falls away once the major event is underway.

Thus, when a major event aligns to the target market of a tourism business' website, then where possible, vigorous cross-promotion (and advertising) should be aligned to be complementary to those of the major event. In particular, the website designers should link FTVC major event 'wants' to relevant pursuits within their tourism area, and should pursue these through avenues such as positive word-of-mouth, and/or forum contributions, and/or social exchanges (including Facebook posts).

Stage six aims to increase website's relevance, longevity, and to extend the tourism business' dynamic reach over time. Here, a major business linkage database of tourism materials relevant to the targeted consumer group is introduced. These extensive value-adding cross-linkages are designed to increase the website's appeal

as a broader destination tourism website. In this instance, the FTVC traffic growth is slower (as the database is accessed via a menu selection from the home-page), but again FTVC traffic growth is significant, and remains in growth mode at the conclusion of this study. This supports H_1 and H_3.

Conclusions and Implications

This 100 week FTVC study finds the three independent variables - website richness, website post frequency and website interactivity each offer contributions towards growth in the tourism business' FTVC website traffic. Hence all three co-vary as hypothesised in H_4. The business' website FTVC traffic is influenced to varying degrees by each independent variable. For example when richness rises, traffic rises, when interactivity rises traffic rises (and when posts or forums) are added, traffic rises. Hence hypotheses H_1, H_2 and H_3 are supported. Although The MTVCs also depend on the same 3 independent variables, in this study the MTVCs are not considered. Hence further hypotheses are reserved for a subsequent comparison study.

When additional (new) website richness sets are specifically-directed at the business' potential FTVC group, then website traffic increases. Further, with no additional website changes, a PLC peak arises, and the traffic declines over time toward a lower position. However, this traffic does not decline to zero – probably because the website is on search engines, and as some additional FTVCs find it by 'searching' around the business' content coverage area.

Over-time website FTVC traffic grows generically – but slowly. This generic website traffic growth can be accelerated by adding relevant richness, and/or by expanding personal-interactivity, and/or by dynamically-supporting and continually-maintaining each set of expanded personal-interactivity offerings.

The addition of a substantive consumer-relevant business database with extensive cross-linkages delivers a steady but strong growth in FTVC website traffic. Here the website operates as a destination tourism website. Although the Stage six PLC growth curve is less steep than the other component website inclusions, once found by FTVCs it is deemed to be of value. Thus, provided the tourism business' forums, Facebook feeds, and other inbound social links into its website are suitably behaviourally-focused towards its consumer groups and it is well supported by a quality (and developing) destination tourism database, then an increase in FTVC traffic is readily achievable.

Across all six stages the consumptive deliverables (richness, posts, and interactivity) influence and drive differing levels of FTVC traffic. Interactivity also plays a significant role in engaging FTVCs. Hence continual engagements and interactions with FTVCs likely increases their loyalty, and revisit intentions.

By including (and maintaining the currency of) the above six stages of the 'website-consumer connection model' into one comprehensive dynamic website solution, this study posits new tourism destination websites can be dynamically-designed to specifically target substantive FTVCs.

This section has discussed FTVCs, next, paper nine, follows on and compares and contrasts FTVCs website influences with those of MTVCs.

5.4 GENERATING RETURN VISTOR WEBSITE TRAFFIC

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Introduction

From the emergence of the internet in the early 1990's websites have been recognised as a consumer reach mechanism for business. Early studies considered consumers as applying reasoned action (Fishbein & Ajzen, 1975) where technology acceptance by consumers provided a belief that influenced attitude, then instilled intention, and then established behaviour. Davis, Bagozzi and Warshaw (1989) extended this concept with consume-perceived-usefulness and ease-of-use of technology determining attitude (to using), behavioural intention (to use) and actual system use. Hence, researchers have considered the marketing, technology and/or design causes of website effectiveness. Studies have included site recognition, comprehension, connection, interactivity, value, quality, performance, and outcomes focused studies in satisfaction, trust, and loyalty (often gauged as revisiting).

Psychology social approaches enable additional reflection around the website consumer. Petty and Cacioppo's (1981) 'elaboration-likelihood-model' builds a cognitive persuasive assessment of the consumer first from their central and carefully-reasoned, logical, and thoughtful perspective. Here, the consumer is motivated to assess the website against personal specific frames-of-reference, and if the website is deemed supportive, then the consumer's motivation remains over time. In addition, a second peripheral 'elaboration-likelihood-model' assessment pathway arises through the consumer's attitudinal perception (Petty & Cacioppo, 1983; Petty & Capioppo, 1986; Petty, Cacioppo, & Schumann 1983). This emanates from peripheral experiential (or chance) cues (such as activating a link from a similar content website), but these peripheral cues can engender short-term motivational effects within the consumer.

Thus, the 'elaboration-likelihood-model' houses a central persuasion route where consumers are motivated and can jointly comprehend a raft of complementary frames-of-reference. This persistent motivation behaviour has application in consumer outcomes studies such as website loyalty and revisiting intentions. In website business consumer reach studies such as marketing, advertising, and human-computer-interface perceptions, consumers are best motivated through peripheral (and repetitive) persuasion approaches.

The central and peripheral persuasion approaches of the 'elaboration-likelihood-model' are extended when behavioural considerations are included. Where the consumer is motivated to browse a website, each is more likely to consume (transact or engage), and where each consumption delivers suitable value, then a reflective consumer gratification process occurs - and this also influences the likelihood of revisits (Huang et al., 2014).

Consumer involvement is another feature of websites. Involvement fits within social judgment theory (Sherrif & Cantril, 1947) and today involvement is often termed interactivity. Like involvement, interactivity is induced by a circumstance, a stimulus or an occasion and is an emotive arousal or a motivation into action (Bloch, 1982; Mitchell, 1981). Some consider involvement a moderator to persuasion (Tang et al., 2012), yet persuasion likely precedes involvement. In this study involvement is considered to be portrayed as website interactivity – and involvement can be business and/or consumer generated.

Consumer website interactivity

The interactivity offered within a website is a positive consumer motivator (Jiang et al., 2010). Website interactivity gives consumers a sense of control and challenge, and also increases their intention to engage with the website (Bilgihan et al., 2003; Weinberg et al., 2003). From a marketing perspective, greater web interactivity levels build the consumers' perceptions of their relationship with the website, and may increase their connection with this website (Merrilees, 2002) as FTVC or MTVC. Added convenience, plus usefulness and enjoyment, enrich the consumer's view of the website. This in-turn promotes the likelihood of a revisit (MTVC) (Tsai, 2011), and in websites with ready and convenient access, interactivity (through personalisation components) incites FTVC and MTVC traffic (Kabadayi & Gupta, 2011). Thus interactivity induces further traffic, and is also linked to website components.

Hence, I propose the following website relationship:

H_1: website interactivity influences website traffic

Consumer website functions

Psychology, computer science, engineering and benchmarking studies have dissected the website into their perceived function comparison sections. To interpret and compare websites Cassidy and Hamilton (2011a; 2011b) typologically classify website

components under three domains (marketing, technology and aesthetic). They further divide each domain into nine differing, but recognisable functions. Others have recognised the website contains functions and have deployed qualitative, quantitative, or mixed method approaches to divide specific areas of websites according to functions. Static websites (content providers that do not change) typically engage low levels of components. Interactive websites (where degrees of change, and allowing both business and consumer upgrades are available) typically engage mid-levels of components. Dynamic websites with a substantive range of connectivity (including social/forum feeds, intelligent database responses, and customisable features) typically engage higher levels of components. Thus more components induce further FTVC and MVC traffic, and greater levels of components can provide consumers with more dynamic websites.

Hence, I propose the following website relationship:

H_2: website component level influences website traffic

Consumer website posts

The community function is linked with content posts – particularly posts into social networks. These external communications about the website can influence website traffic. Bai et al., (2008), Lee and Kozar (2008), and Gerlitz and Helmond (2013) recognise that well-targeted and well-implemented external social media 'posts' draw the social consumer back to the website - where an additional awareness, a sense of belonging, and sometimes additional pleasure perceptions or experiences may be derived (Lin, Fan, & Chau, 2014). These external social and informative post connections can motivate both FTVCs and MTVCs to pursue additional consumption options within the website (Chung, Animesh, Han, & Pinsonneault, 2014; Sabate et al., 2014), and to hold positive perceptions regarding its informative usefulness (Milano et al., 2011; Tsai, 2011). The combinations of positive social network posts (along with external forums and/or blogs) build the consumer's motivation to repetitively engage, and to add to MTVC traffic (Gerlitz & Helmond, 2013). Kabadayi and Gupta (2011) show that at higher levels of relevant consumer-targeted website content, website traffic increases - especially where each website content block is also suitably promoted. Thus, external social and informative post connections directing consumers towards specific website inclusions typically results in greater website traffic.

Hence, I propose the following website relationships:

H_3: external posts (from social and informative connections) influence website traffic

H_4: external posts (from social and informative connections) co-vary with website component level and interactivity

Consumer website traffic

The business website competes feverishly to establish its brand recognition, and to win consumer awareness (Ilfeld & Winer, 2001). Many businesses engage Google analytics to assess their consumers and to monitor their transactions (including retrieval of information, purchasing, or engaging in discussions) but they also seek to capture their consumer's behavioural connotations (Choi & Limb, 1999), and to monitor when consumers shift into the website from the business' social networks (including Facebook, Instagram or Twitter). Traffic from social networks arises through differing social media connectivity approaches including email, events, ads, news-releases, sponsorships, and videos/webinars (Stelzner, 2011).

Other Internet-based analysis tools - like Google analytics, offer real-time data feeds suitable to track individual consumer website pathways (Glommen & Barrelet, 2004), However, social networks that link traffic back into websites typically remain selective, non-generalisable, use point-in-time reference points, and so deliver point-in-time social community traffic comparisons (Girvan & Newman, 2002; Hanna et al., 2011). Hence, ad hoc changes to a website (or its connecting social network) complicate both the data capture, and the interpretation of website traffic algorithm calculations (Wang et al., 2002).

Consumer consumption

Online consumer consumption appears as either transactional, or usage, or content-downloading behaviour. This group behaviour typifies the FTVC (Ghose & Han, 2010; Ghose & Han, 2011). The MTVC often pursues more creative behaviours such as uploading of their consumer-created content (Albuquerque et al., 2012; de Vries et al., 2012). Albuquerque et al (2012) discriminates between FTVCs and MTVCs by assessing each group from referral, search (browsing) and direct (or familiarity-with-website) engagement perspectives. Toufaily et al., (2013) typologically groups literature showing FTVCs differ from MTVCs in regard to the consumer, the environment, the product/service, the company, and the website's characteristics, and suggest these factors influence the online MTVC traffic into a business' website.

Website design approaches

Early websites typified a static information design, and were initially described through subjective research and simple objective traffic studies (Huizingh, 2000; Robbins & Stylianou, 2003). Gradually, as new website build tools emerged and exposed various reasons why consumers visited, websites added interactivity. This allowed website consumers to communicate via set channels with the business, and moved website traffic studies further into quantitative approaches (Cebi, 2013; Rahimnia & Hassanzadeh, 2013). With the emergence of social networks, dynamic consumer changes in perception, at times, showed rapid website traffic shifts. Thus, traffic studies shifted into the realms of psychology, with in-depth benchmarking approaches engaging near-real-time computer science algorithm solutions (Li & Huang, 2007), or point-in-time qualitative and/or quantitative studies (Chiou et al., 2010; Law, Qi, & Buhalis, 2010).

Website design approaches today

Website consumer traffic studies are now including the specifics of consumer behaviour - such as transactional-to-revisit traffic studies (Huang et al., 2014; Tang et al., 2012) or motivation-consumption-user gratification studies (Hamilton & Tee, 2013), or expectations-loyalty/revisiting studies. Such website traffic studies engage computer science, engineering, or benchmarking style approaches (Law et al. 2010; Cassidy & Hamilton, 2014a; Law et al., 2010; Milano et al., 2011).

FTVCs versus MTVCs traffic

Website traffic arises when FTVCs enter the website and explore its functional deliverables. FTVCs can be directed to this website, or they can be ‘chance’ visitors who find the site through search processes. MTVCs revisit the website because they recognise it likely offers a consumptive deliverable that may meet one of their specific requirements. This typically involves the consumer interacting with some aspect of the website, and can be gauged against the website traffic (Tang et al., 2012). Other psychological links into the website arise from social networks and consumers are likely influenced by posts. Thus, as their visiting behaviours’ differ, and for the reasons discussed above and so may relate to changes in website traffic for FTVCs and MTVCs.

Website connection to consumers

Websites directly connect with the consumer. As different businesses pursue different consumer markets, and each offers website content differences – typically focused at

information, or social-connection, or entertainment content (Heinonen, 2011). These website content groups can be termed consumer consumptive (interactive, participatory, or production related) aspects (Shao, 2009), or alternatively trisected into 9 alternative groupings (Hamilton & Tee, 2013) Table 5.11.

Table 5.11: SNS Consumer targeting matrix

MOTIVATION	Interaction	Participation	Production
Entertainment	Create games, scenarios and/or on-line content.	Build creative tools for users' daily activities. Enable different user generated content sections for entertainment practices.	Connect users in real-time games, and/or serious scenario environments.
Social Connection	Enable interactions between users. Build Chat functions. Build on-line communities.	Support activities and interactions. Build business's image on-line.	Enable and facilitate interactive social connections. Create new solutions by learning from discussions.
Information	Provide product/service information and free downloads. Link business and offering to current activities that user advocates.	Create real-time reviews and product/service tests. Clarify relationships between user and business (and its offerings).	Provide tools that enable daily practices. Invite customers into the development of new offerings.

Each consumer group is motivated to choose their level (or aspect) of website involvement and each consumer opts to consume either low, or medium, or high levels of immersive content-rich media (Cvijikj & Michahelles, 2013; Fortin & Dholakia, 2005). Website traffic from social networks (deVries et al., 2012) can be further enhanced (Cvijikj & Michahelles, 2013) with external content-related posts (Gerlitz & Helmond, 2013) and with dynamic animated-video content, colour-contrasts, highlight images, and interactive linkages (Sabate et al., 2014) with other stimulating websites (Cyr et al., 2010; Jiang et al., 2010). Provided the website remains suitably sequenced, and is of quality design, then as the consumer's perception of accessible content rich media increases, and this shows as an increase in website traffic (Palmer, 2002).

Where content-rich media is benchmarked, it can then be consumer-targeted, with online promotional marketing to increase the website's appeal; or with better aesthetics; or with more appealing designs; or with faster and latest information technologies; integrating the consumer's desired transaction or sourcing packages (Law et al., 2010). As content enhancements and website coverage remain inconsistent this study adopts benchmarking and compares existing website components (and any added component inclusions) against the 'universal' set of benchmarking components.

Francis (2009), Kim et al., (2009) and Zhu et al (2009) classify the components of websites into likeness groups. Cassidy and Hamilton (2013) typologically refine existing quantitative website studies into 230 components- further grouping them into 28 functions (likeness sets) and fitting each function into 1 of 3 larger website domains (marketing, aesthetics, technology).

Law et al's (2010) 140 qualitative and quantitative components are listed and likeness re-grouped. When the website's content is enhanced its suite of components expands, and the relative presence of some functions improve. As greater (and targeted) content offers more reasons for the consumer to engage with the website, it is likely to be a positive consumer motivator, and is also likely to encourage greater consumer website traffic.

Hence, I propose the following website relationship:

H_5: websites providing a consumptive deliverable to FTVCs positively influence MTVC website traffic

Website Consumer Engagement Model

From the above literature, and hypothetical relationships, I note that where the website provides higher interactivity, and/or higher levels of components and/or where SNS, blog and forum posts are provided by the business consumer traffic into the website can be improved. I also note that FTVCs are typically single-minded and visit for a single specific purpose, whereas MTVCs have detailed or multiple agenda requirements.

The three independent variables (website interactivity, website component level, and website posts) all show positive variance and co-vary with website traffic. Both FTVCs and MTVCs draw on these offerings when deciding to engage. These independent variables each link with the intermediate FTVCs, and all link with the final dependent MTVCs. Built from the above literature derived hypotheses, I relate, and summarise, these consumer considerations of the business website-related deliverables as Figure 5.19's 'website-consumer engagement model.'

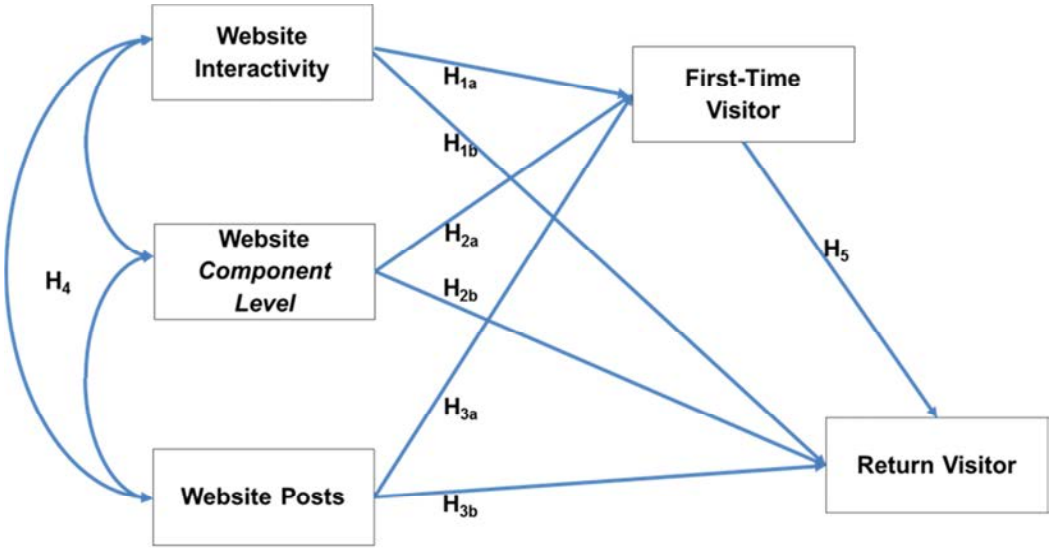


Figure 5.19: Website-Consumer Engagement Model

Methodology

As the business' understanding generated from consumer website traffic flow studies remains mixed, this website traffic study follows others and engages full access to Google analytics to monitor its website traffic patterns. Hence, the website is continually monitored and logged daily, and unique group traffic is segregated into FTVC and MTVC groups.

At set times the website is step-by-step enhanced through the inclusion of component addition development stages. These stages are pre-determined and introduced based on pre-launch decisions, framed by the researchers. Each staged website inclusion represents a stepwise enhancement, specifically designed to build consumer appeal, and so to generate further consumer traffic.

To minimise traffic interpretations, and to ensure real traffic comparisons, a new commercial website business is lean-canvas modelled, feasibility-tested, financed, planned to completion, built, and launched in stages. This new website fills a current business niche, has a substantive market reach, and after this 100 week study is absorbed by a large commercial enterprise. Normal market reach content procedures are appropriately included at specific stages of the website's development, and its format and overall structure remains consistent.

Stage one of the website build is a one page static brochure. This simplest of sites is projected to deliver traffic. Stage two is a static content-rich five page website. Stage three is a five, then seven page content-rich site. It allows some simple consumer interactivity such as image uploads, email, GPS location and weather. No external traffic-driving links are employed prior to the Stage four blog/forum/Facebook/posts website additions.

These additions bring external consumers into the website's FTVC and MTVC community. Stage five engages connecting with 'like' consumers. This approach taps complementary tourist activities to those of a forthcoming major event. These major-event-driven FTVCs or MTVCs typically visit my website by mistake, but once they enter, I seek hold their interest in my tourist-related activities. Stage six adds a diverse broad-ranging database of supporting and complementary destination activities, suggestions and costing.

The consumer traffic is continually captured through Google analytics. This data feed is cleaned to remove the 'chance' visitor traffic related to bounce, crawlers, and bots. Consumer traffic is analysed as either FTVC or MTVC groupings across 100 weeks. The study captures each day's traffic. To clarify the consumer traffic trends this study adopts a 5 week running average curve approach (Finch, 2008). This visual smoothing of the graphical traces highlights consumer traffic trends.

Analysis and Discussion

This new business website operates in a blue ocean niche (Kim & Mauborgne, 2005). It is purpose-designed to capture high consumer appeal. Its periodic modifications upgrade the website with additional components, and as shown in Figure 5.20. Each staged re-launched offers a different and extended set of traffic drivers for the website.

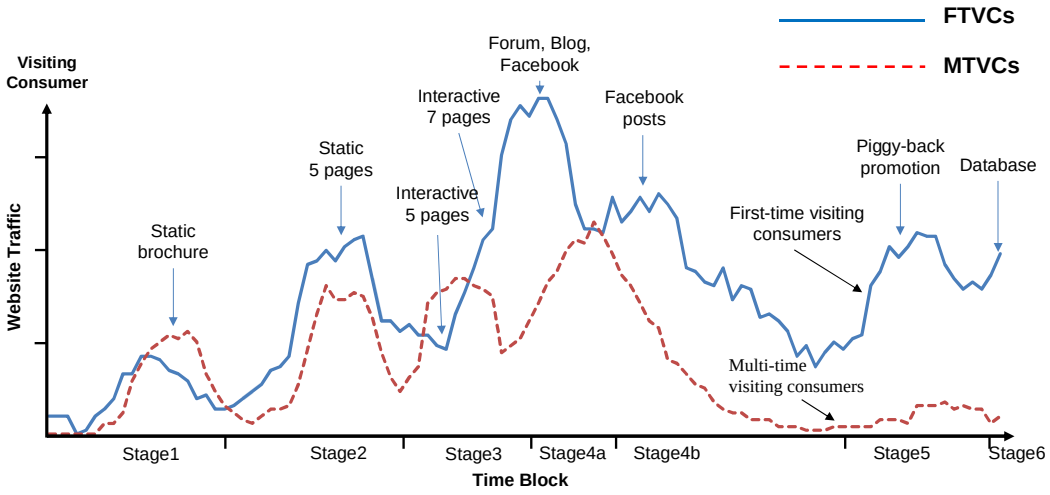


Figure 5.20: FTVC and MTVC website traffic (100 week timeline)

The one page static brochure website sees FTVC traffic rising, peaking and declining to almost zero. The MTVC traffic starts later and reaches a lower peak before falling to near zero. Throughout this Stage one of website development no changes or additions are made. This simplest of websites is soon 'out-of-date' and being of little value to the FTVC, also has a low revisit rate and both traces follow a typical product life cycle (LC) trace (Finch, 2008).

Stage two's static five pages of aesthetically-aligned, and contextualised content, adds additional reasons for FTVCs and MTVCs to visit (or revisit) the business website. As Stage two's content remains static, and non-changing, traffic again falls back to near zero. This stage shows an increase in website components does generate more traffic when compared to the fewer component Stage one. Thus H_2 is supported for FTVCs and for MTVCs. Stage one sees most FTVCs do return as MTVCs (and that they check on what is forthcoming for this new website). In contrast and in Stage two, FTVCs see a typical static website but they return less frequently as MTVCs.

Stage three introduces interactivity first as a five page site that allows for video views and additional information regarding consumer related activities. This increase in traffic just exceeded Stage two's traffic peak. Next further interactivity and content is added. This includes consumer uploads, comments, and additional videos, continually-updating weather, and targeted content. In line with H_1, additional traffic is generated, and the change in FTVC traffic is both rapid and significant.

Figure 5.21 highlights the traffic trend line for additional component inclusions, and does so for FTVCs (steeper trend) and for MTVCs (flatter trend). This also supports H_2. The steeper line suggests that FTVCs are likely more influenced by new components than are MTVCs (flatter trend).

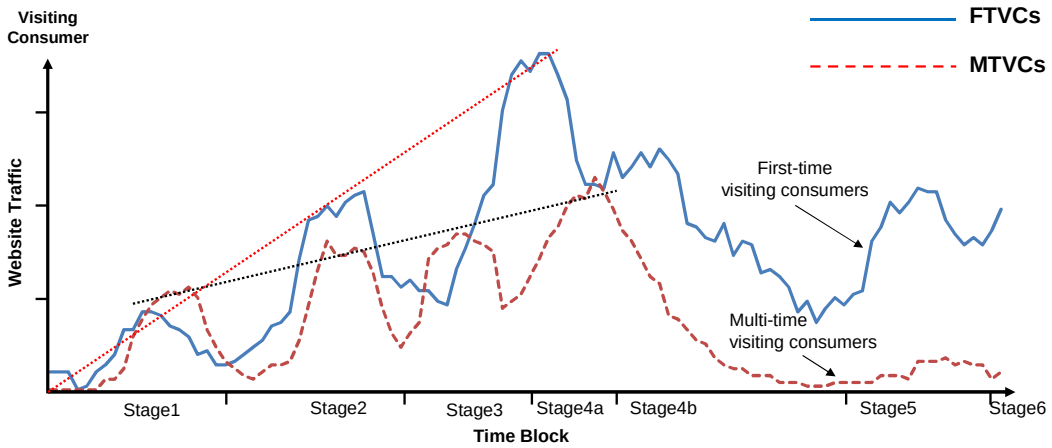


Figure 5.21: FTVC and MTVC website traffic trend as components added (100 week timeline)

Stage 4a represents the forum, blog and facebook inclusions but it does not include posts or inputs from the business. Thus FTVC traffic quickly subsides to the starting point of Stage 4b. Here, the business does make contributions with posts to facebook and immediately a FTVC response is generated as a small peak. Subsequently, two more posts also drive small peaks. Then, with no further posts the traffic steadily declines. This trend suggests external posts do influence the website traffic of FTVCs, but not for MTVCs. Hence H_3 is partially supported.

Considering the traffic trend across Stages one to four, component inclusions, interactivities and external posts drive FTVC traffic, and again H_4 is supported for FTVCs, but partially supported for MTVCs. Hence H_4 is partially supported.

Figure 5.20 indicates Stage one's FTVCs do return as MTVCs. This is also indicated in Stage two, but this trend is less clear for subsequent stages of this study. Across all stages one to six consumptive deliverables (including more components, interactivities and posts) influence and drive differing levels of traffic. Hence this provides some support for H_5 combinations.

Conclusion

In summary, this study finds three independent variables each contribute towards growth in the business' website traffic. Thus H_1, H_2 and H_3 are supported, and when all three co-vary, as shown in Figure 5.19, H_4 is partially supported. The shift of FTVCs into MTVCs is more complex and is only partially supported.

FTVC's are influenced by website component presence, by the levels of interactivities available, and by the extent and frequency of external posts. As these levels broaden, the business influences become more important in the continuous engagement of FTVCs. This study did not provide clear evidence on how FTVCs migrate to MTVC status. However, some evidence suggests component levels, interactivity and posts do play a significant role in attracting consumer traffic. But, at what level of engagement the FTVC is converted into a MTVC (and likely remain loyal), remains a challenge for the ongoing website business.

By including, and maintaining the currency of all the above six stages of website development into one comprehensive, dynamic and interactive website solution, this study posits targeted websites can be successfully delivered for both FTVCs and MTVCs.

This study's approach to investigating consumer traffic relationships generated across the 'website-consumer engagement model,' can be easily adapted and refined to suit individual website situations, and as a framework for further research studies.

This concludes activity 4 of the DSRM, chapter 6 continues with activity 5, the evaluation of the artefact. This evaluation is contained in papers 10 and 11. Paper 10 is a pilot study extending quality testing from chapter 5. While paper 11, evaluates an abridged WAM in a major study of tropical tourism websites.

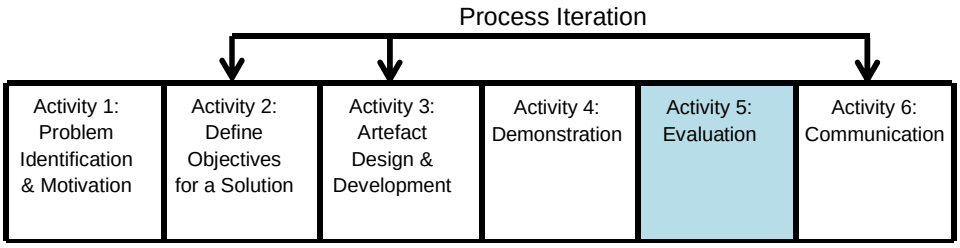
Chapter 6

6.0 Evaluation

This chapter is activity 5 of the DSRM and contains papers 10 and 11. Paper is published in the proceedings of the 2014 CAUTHE conference[10] and paper 11 has been submitted to Benchmarking: An International Journal[11].

First a pilot study is used to test my website benchmarking theory and website analysis method, advancing chapter 5's study of website quality (paper 10). Here I assess 30 tropical tourism websites using website quality functions and components.

Paper 11 continues with the results of a larger study of 280 tropical tourism websites locate within the global tropic zone (Figure 1.2) using an abridged WAM.



[10] Cassidy, L. & Hamilton, J. (2014). Tropical tourism website qualities. *In Proceedings of the 24th CAUTHE Conference,* Brisbane, Australia.

[11] Cassidy, L. & Hamilton, J. (2015) Website Benchmarking: an abridged WAM study. *Submitted to: Benchmarking: An International Journal.*

6.1 TROPICAL TOURISM WEBSITE QUALITIES

Published: *24th CAUTHE Conference*

Introduction

The travel and tourism industry is globally important, and generates significant contributions to the gross domestic product (GDP) of many tropically-located countries. The World Travel and Tourism Council's (WTTC) Global Summary (2013) finds the 2012 travel and tourism industry contributing $2.1 trillion (US), with total global contributions to GDP at $6.6 trillion (US).

Travel and tourism significantly contributes to the GDP of many tropical areas (Table 6.1) and, the 'single largest category of products sold through websites' (Burgess, Parrish, Cooper & Alcock, 2009). Hence, websites remain essential to tourism destination marketing (So & Morrison, 2004).

Table 6.1: Travel and Tourism Direct and Total Contributions to GDP

Country	*Direct Contribution	% GDP	**Total Contribution	% GDP
	2012	***2013	2012	***2013
Bahamas	22.0	27.2	48.4	53.4
British Virgin Islands	27.1	27.3	77.3	77.6
Fiji	13.0	20.8	35.8	42.8
Maldives	22.4	25.0	48.7	52.6
Seychelles	24.7	25.7	63.0	64.1
Vanuatu	17.6	27.3	50.7	59.2

* total spending on travel and tourism within a country by residents/non-residents for business/leisure' (includes spending by government on travel and tourism services for visitors)
** includes indirect/induced impacts on the economy (incl. employment)
***estimated contribution to GDP for 2013
Source: WTTC Economic Impact Reports 2012 & 2013

In this pilot study I define website quality from a business perspective, and apply the literature components presented herein as means to assess 30 tropical tourism websites across 6 tropical regions (Australia, Indian Ocean, Caribbean, Islands south of the equator to the Tropic of Capricorn, Islands north of the equator to the Tropic of Cancer, and Asia) around the globe. Cities as well as countries are included, as in Australia's case, only part of the country is tropical. Customers visiting these websites are likely comparing tropical destinations/experiences prior to decision making. Convenience sampling is employed, however, coverage is wide and not restricted by area, or tourism sector size, plus my interests reside with the tropical tourism domain.

Each tropical website is analysed for the presence (or absence) of each literature supported measure of quality. Commonalities across these tropical websites are determined, and quality areas that may benefit by further website development identified.

Literature Review

Researchers investigating websites apply differing quality approaches including: the quality of websites (Aladwani, 2006; Chang & Chen, 2008; Fink & Nyaga, 2009), e-service quality (Lee & Wu, 2011; Madu & Madu, 2002), content quality (Dickinger & Stangl, 2013), design quality (Fan & Tsai, 2010; Ha & Im, 2012), information quality (Kartavianus & Napitupulu, 2012) and e-commerce quality (Kim et al., 2012), whilst others (Cox & Dale, 2002) choose a range of KQFs. This diversity of quality approaches and study types means certain components are applied differently while others just overlap.

Hence, this study collates the existing quality components into a comprehensive six dimensional, website quality approach. In the following sections, quality is discussed with existing literature quality components grouped into six functions. A business assessing the quality of its tropical website may gain better insights when using this comprehensive six function approach.

Quality

Early definitions see quality as specified servicing – where customers compare expected technical and performance qualities against their perceptions of what they receive (Gronroos, 1983), and how a specified service consistently aligns with their expectations (Lewis & Booms, 1983). Parasuraman, Zeithaml, and Berry (1985, 1988, 1994) split service quality into measurement dimensions (tangibles, reliability, responsiveness, assurance, and empathy) encompassing customer perspectives of actual experiences.

In retailing business-to-customer engagement quality is often linked through to customer outcome constructs – including satisfaction (Hennig-Thurau & Klee, 1997; Rosen & Surprenant, 1998) and trustworthiness (Chang & Chen, 2008). Thus, researchers often define how to measure quality by relating it to other factors such as visitor retention rates (Douglas & Mills, 2004) and/or customer satisfaction (Nusair & Kandampully, 2008; Udo et al., 2010) , rather than, what is quality, and so conclude, if

certain results occur, then quality exists. These are potential consumptive motivators when quality is considered by customers.

This next section considers what website components are part of quality and gauge their presence or absence on the selected tropical tourism websites.

The literature offers the following six function groupings for quality (Figure 5.1): e-Service Quality (Barnes & Vidgen, 2003; Cao et al., 2005; Kim et al., 2012; Lee & Wu, 2011); Content Quality (Chang & Chen, 2008; Cox & Dale, 2002; Dickinger & Stangl, 2013; Lim et al., 2009); Design Quality (Cox & Dale, 2002; Dickinger & Stangl, 2013; Ha & Im, 2012); Information Quality (Barnes & Vidgen, 2003; Cao et al., 2005; Fink & Nyaga, 2009; Ha & Im, 2012); Security Quality (Dickenger & Stangl, 2013; Kartavianus & Napitupulu, 2012); and Technical Quality (Aladwani, 2006; Chang & Chen, 2008; Morrison, Taylor, & Douglas, 2004).

Next literature-identified quality components are typologically classified, with each fitting into only one of the above six functions. Hence these likely behave as mutually-exclusive quality functions. Website quality functions and components are presented as Tables 6.2 to 6.7. This approach is adopted because many existing website studies remain selective and/or narrowly define their perspectives of quality. Such studies often fail to capture the diversity of website qualities that can exist.

Drawing on past literary studies, each of the six website quality functions, their definitions, and their embedded components are discussed.

E-Service

Parasuraman et al., (2005) define e-service as: the extent to which a website facilitates efficient and effective shopping; purchasing, and delivery. Others see e-servicing as related to customers' perceptions and as a driver towards a higher innovative experience (O'Cass & Carlson, 2012) – especially one that further fulfils a customers' expectations (Lee & Wu, 2011; Santouridis et al., 2012; Udo et al., 2010). This study focuses on which e-service quality components (Table 6.2) contribute to tourist perceptions.

Table 6.2: E-Service Quality

e-Service	Researcher(s)
Customer service	Cox & Dale, 2002; Wolfinbarger & Gilly, 2003
Customer support	Aladwani, 2006; Barnes & Vidgen, 2003; Lim et al., 2009; Nusair & Kandampully, 2008
Personalisation	Aladwani, 2006; Barnes & Vidgen, 2003; Cao et al., 2005; Fink & Nyaga, 2009; Wolfinbarger & Gilly, 2003
Social Media Ready	Hess, Lang, & Xu, 2011; Zhang, Jansen, & Chowdhury, 2011

Content

Many website customers are content seekers (Kincl & Strach, 2012). Content influences how a tourist perceives the website as an e-servicing vehicle (Udo et al., 2010). Content is often business-related, and presents a means to engage with individual customers (Cox & Dale, 2002). Customer retention can improve where content is presented logically and efficiently (Mohammed et al., 2004). Thus, the content quality components can include: appropriate number of page levels, extras such as trip planners, maps, and weather information, plus further relevant components as included in Table 6.3.

Table 6.3: Content Quality

Content	Researcher(s)
Contact Information	Chang & Chen, 2008; Fink & Nyaga, 2009
Appropriate No. Page Levels	Law & Bai, 2008
Destination Photos	Douglas & Mills, 2004
Videos	Douglas & Mills, 2004
Product Details	Aladwani, 2006; Bai et al., 2008
Extras (planner, maps, etc.)	Dutta & Manaktola, 2009
Support Links	Dickinger & Stangl, 2013
Language options	Law & Bai, 2008

Design Quality

Design epitomises the appearance and layout of the website (Aladwani, 2006), and it often visually represents the business' image (Cox & Dale, 2002). Thus, design elements can be measured for: presentation (Barnes & Vidgen, 2003; Dickinger & Stangl, 2013) use of consistent fonts and colours (Aladwani, 2006; Chang & Chen, 2008; Hong & Kim, 2004) and customisation capabilities (Fan & Tsai, 2010). These and other quality-related design components are grouped under Table 6.4.

Table 6.4: Design Quality

Design	Researcher(s)
Presentation (white space etc)	Barnes & Vidgen, 2003; Dickinger & Stangl, 2013
Consistency	McKinney, Yoon, & Zahedi, 2002
URL easy to remember	Han & Mills, 2006
Ease of use	Aladwani, 2006; Dickinger & Stangl, 2013; Law & Bai, 2008
Site customisation	Fan & Tsai, 2010
Marketing segmentation	Morrison, Taylor & Douglas, 2004
Layout not cluttered	Douglas & Mills, 2004
Graphics 3D view (manipulation)	Nusair & Kandampully, 2008
Proper use of colours	Aladwani, 2006; Chang & Chen, 2008; Hong & Kim, 2004
Proper use of fonts	Aladwani, 2006; Chang & Chen, 2008; Hong & Kim, 2004
Proper use of multimedia	Aladwani, 2006, Ha & Im, 2012; Nusair & Kandampully, 2008
Logo	Han & Mills, 2006; Kokash, 2012
Slogan	Han & Mills, 2006; Kokash, 2012
Background	Han & Mills, 2006; Kokash, 2012
Header Frame	Kokash, 2012
Page scrolling (1 scroll max.)	Douglas & Mills, 2004

Information

Websites act as information providers and in the case of tourism websites customers want information on the location and its history (Kartavianus & Napitupulu, 2012). Information must be updated frequently (McKinney et al., 2002). Information relating to weather, news, currency, and climate (support information) give added value to the website from a customer's perspective (Kokash, 2012). These components are in Table 6.5.

Table 6.5: Information quality

Information	Researcher(s)
Online shopping available	Kartavianus & Napitupulu, 2012
Company/firm history/reputation	Kartavianus & Napitupulu, 2012
Transactions are easy	Kartavianus & Napitupulu, 2012
Relevant to industry	Dickinger & Stangl, 2013; Fink & Nyaga, 2009; McKinney et al., 2002
Update frequently	McKinney et al., 2002
Support info (weather, news, currency)	Kokash, 2012

Security

Website security protects the personal and/or private information provided by the website or by its customers (Madu & Madu, 2002). Website security should exceed its customers' expectations concerning: safety, information security, security of all personal communications and transactions. Security should be simple, safe, correct, predictable, trustworthy, and consistent. The quality components relating to security are captured in Table 6.6.

Table 6.6: Security quality

Security	Researcher(s)
Communication is secure	Fink & Nyaga, 2009; Wolfinbarger & Gilly, 2003
Customer policies (site use/terms use)	Aladwani, 2006; Chang & Chen, 2008; Nusair & Kandampully, 2008
Information is secure (privacy policy)	Barnes & Vidgen, 2003; O'Cass & Carlson, 2012
Transactions are secure (trust seals)	Fink & Nyaga, 2008; Lim et al., 2009; Wolfinbarger & Gilly, 2003

Technical

The technical dimension to quality has been widely recognised. This website dimension also presents competitive imperatives that often push the business to pursue improving the current technical capabilities (and deliverables). Websites displaying out-of-date technologies can incur lower customer retention rates (Aladwani, 2006). Technical components such as valid links, page load speed, ease of navigation, search functions are typically utilised in continual assessments and/or updating processes. These website technologies should be current, appropriate, reliable, interactive, simple, fast, and findable. These and other technical quality components are displayed in Table 6.7.

Table 6.7: Technical quality

Technical	Researcher(s)
Fast search <5 sec	Nusair & Kandampully, 2008
Multimedia capability	Cao et al., 2005
Navigation (easy & consistent)	Aladwani, 2006; Chang & Chen, 2008; Hong & Kim, 2004; Kincl & Strach, 2012
Search (words, directory, interactive)	Aladwani, 2006; Chang & Chen, 2008; Fink & Nyaga, 2009; Nusair & Kandampully, 2008
Site map (with active links)	Nusair & Kandampully, 2008
Speed (homepage)	Aladwani, 2006; Cox & Dale, 2002, Hong & Kim, 2004; Yoon & Kim, 2009
Valid links (none broken)	Aladwani, 2006; Chang & Chen, 2008; McKinney et al., 2002
System available (all browsers)	Morrison et al., 2004
System available (mobile device)	Morrison et al., 2004

Methods

For this initial study to determine the presence (absence) of 47 components on 30 tropical tourism websites content analysis is employed. I, as an experienced website analyser, conducted the content analysis over a period of five days to reduce the chance of fatigue related errors.

The selection of the 30 tropical tourism websites is based on location of the corresponding city or country being situated on or between the Tropic of Cancer, the Equator, and the Tropic of Capricorn. The locations selected, their regions and website addresses are in Appendix 1.

To enable comparison between quality functions I sum score and weight each quality group out-of 10, for example a score of 7 for content which contains 8 components would be calculated as $\frac{7}{8} \times \frac{10}{1} = \frac{70}{8} = 8.75$ (Cassidy & Hamilton, 2011a). This method permits us to allocate a website quality score out-of 60 to each of the tropical tourism websites involved in this study.

Results

The overall quality scores for the 30 tropical tourism websites employed in the study range from a low of 15.8 (Andaman & Nicobar Islands) to a high of 43.3 (Seychelles) out-of 60 (Table 6.8). Out-of 30 websites, only 7 have a website quality score less than 30 out-of 60.

Table 6.8: Tropical Tourism Website Sum-Weighted Scores

Location	e-Service		Content		Design		Info.		Security		Technical		TOTAL
	*	**	*	**	*	**	*	**	*	**	*	**	**
Australia													
Broome	1	2.5	5	6.3	7	4.4	3	5	2	5	7	7.8	**31**
Darwin	2	5	7	8.8	11	6.9	3	5	2	5	8	8.9	**39.6**
Cairns	2	5	7	8.8	12	7.5	2	2.5	2	5	4	4.4	**33.2**
Mackay	2	5	7	8.8	10	6.3	3	5	1	2.5	9	10	**37.6**
Derby	1	2.5	6	7.5	10	6.3	4	6.7	4	10	6	6.7	**39.7**
Indian Ocean													
Maldives	2	5	8	10	13	8.1	4	6.7	0	0	8	8.9	**38.7**
Seychelles	2	5	8	10	14	8.8	4	6.7	2	5	7	7.8	**43.3**
Phuket	2	5	5	6.3	10	6.3	3	5	0	0	6	6.7	**29.3**
Madagascar	1	2.5	7	8.8	10	6.3	3	5	2	5	8	8.9	**36.5**
Mauritius	2	5	8	10	12	7.5	4	6.7	2	5	6	6.7	**40.9**
Caribbean													
Jamaica	1	2.5	6	7.5	11	6.9	4	6.7	2	5	5	5.6	**34.2**
St Maarten	0	0	5	6.3	10	6.3	4	6.7	2	5	4	4.4	**28.7**
British Virgin Islands	1	2.5	8	10	13	8.1	4	6.7	1	2.5	9	10	**39.8**
Bahamas	1	2.5	8	10	13	8.1	3	5	2	5	8	8.9	**39.5**
Barbados	1	2.5	8	10	11	6.9	4	6.7	1	2.5	8	8.9	**37.5**
Tropic of Capricorn to the Equator													
Tonga	2	5	6	7.5	14	8.8	4	6.7	2	5	8	8.9	**41.9**
Fiji	3	7.5	6	7.5	13	8.1	3	5	2	5	9	10	**43.1**
Vanuatu	1	2.5	6	7.5	14	8.8	4	6.7	2	5	9	10	**40.5**
Samoa	1	2.5	5	6.3	12	7.5	4	6.7	0	0	7	7.8	**30.8**
Solomon Islands	1	2.5	5	6.3	13	8.1	4	6.7	0	0	4	4.4	**28**
Tropic of Cancer to the Equator													
Hawaii	1	2.5	8	10	12	7.5	4	6.7	2	5	8	8.9	**40.6**
Marshall Islands	1	2.5	6	7.5	11	6.9	2	2.5	2	5	8	8.9	**33.3**
Yap	0	0	5	6.3	10	6.3	3	5	0	0	5	5.6	**23.2**
Palau	0	0	8	10	8	5	3	5	0	0	5	5.6	**25.6**
Kiribati	1	2.5	6	7.5	12	7.5	4	6.7	0	0	6	6.7	**30.9**
Asia													
Bali	2	5	6	7.5	9	5.6	4	6.7	0	0	8	8.9	**33.7**
Brunei	0	0	5	6.3	12	7.5	3	5	0	0	6	6.7	**25.5**
Singapore	2	5	6	7.5	12	7.5	3	5	2	5	9	10	**40**
Palawan	2	5	6	7.5	11	6.3	4	6.7	1	2.5	6	6.7	**34.7**
Andaman & Nicobar Islands	0	0	2	2.5	8	5	3	5	0	0	3	3.3	**15.8**

*Raw score **Sum-weighted score

I now consider the six different website quality regions (functions) that contribute to each website score (Figure 6.1). For e-service quality, websites (sum-weighted) scored

from ‘0’ to ‘5 out-of 10’. When the individual components contained in e-service are viewed only social media consistently appears across the websites (83.3% presence).

Figure 6.1: Website Quality Scores

Content quality (sum-weighted) scores range from 2.5 (Andaman & Nicobar Islands) to 10 (8 sites have all components present). However, videos of the destination appear on only 36.7% of the websites and language options on only available 50%.

Design quality has the most components (16) with (sum-weighted) scores ranging from 4.4 (Broome) to 8.8 (the Seychelles and Tonga). In this instance site customisation is available on 10% of the websites. The availability of 2D/3D viewing and manipulation is 3.3% of the websites in this study. However all sites scored maximum points for ‘layout – uncluttered’ and ‘proper use of colour’.

The next website quality function is information, here the lowest (sum-weighted) score is 2.5 (Cairns) with several websites scoring a high of 6.7. The relatively low scores for this function occur because only one website has an online shop and hence is the only site to score on related components. Websites score reasonably well with support information such as weather, currency, and geography (86.7%) and 80% demonstrate they are updated frequently (in the previous 3 months).

Security is a quality function that (sum-weighted) scores rather poorly across the websites in this study. Here only one website has the full 10 points (Derby) again as

this is the only website with online shopping. Security scores range from a low of 0 points (9 websites) to 10 points, with the next highest score being 5 points.

The final website quality function is 'technical'; scores (sum-weighted) here range from a low of 3.3 points and a high of 10 points. The component measure, 'site map' only appears on 46.7% of the tropical tourism websites. Further one may expect modern websites to operate in all browsers regardless of browser version; however this occurs in only 73.3% of websites. The website quality raw scores, prior to sum weighting are shown in Figure 6.2.

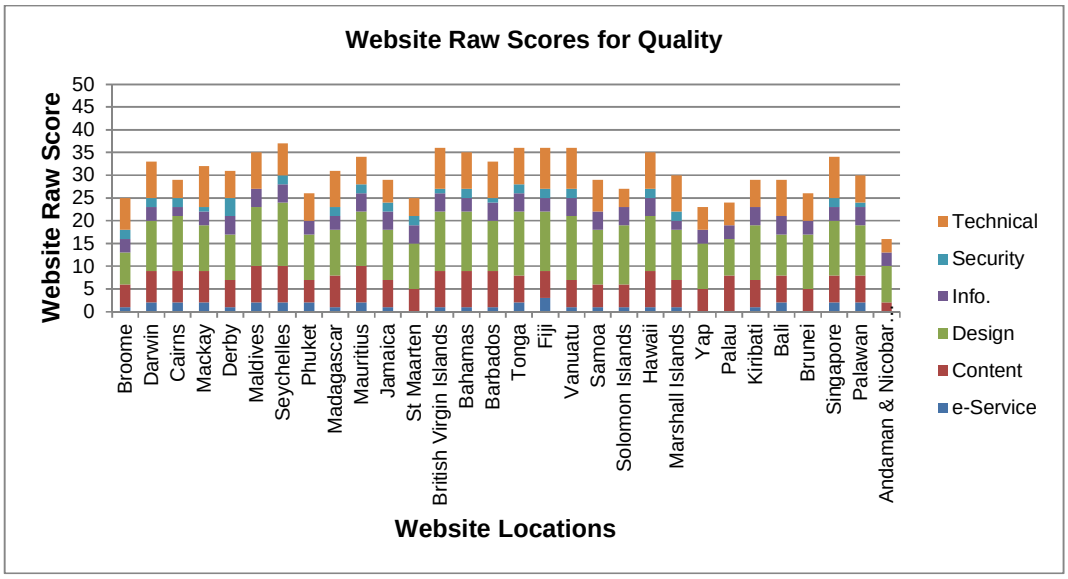


Figure 6.2: Website Quality Raw Scores

Discussion

From this initial study of tropical tourism websites the two worst performing quality functions of the 30 tourism websites are e-service and security. The majority of websites score poorly in customer service and customer support (e-service quality), communication security and trust seals (security quality). This may occur because the websites in this study are in general state (or national) tourism (or visitor centre) websites.

Surprisingly only 63.3% of the websites have a privacy policy. These components may not be seen as vital, whereas they are essential for travel/tourism sales sites (Nusair & Kandampully, 2008). However, when it comes to social media presence (e-service)

83.3% of the websites have at least Facebook and Twitter available. Thus customer engagement needs to be an ongoing and future focus for significant improvement.

Website testing on browsers and mobile devices reveal that all operate on differing versions of Firefox and Google Chrome, but 26.7 % of the websites do not operate on internet explorer (i.e.) browsers prior to version 10. However 86.7% of the websites work properly on mobile devices (including smart phones), with three websites having mobile specific pages.

A website should be accessible with all browsers (Constantinides, 2004). When a website does not operate correctly (or may not operate correctly) in all browsers compatibility advice should be easy to locate (Kim et al., 2009)

Implications and Limitations

Management Implications

Website managers and designers may have differing views on what are important quality components for tropical tourism websites. However they should be aware if their website is lacking in the quality features expected by the customer, changing websites is just a mouse click away.

Theoretical Implications

This initial study approaches website quality from a presence (or absence) perspective of quality components. This provides further interpretation of website quality through the assessment of the underlying components, and does not rely on management or customer perception.

Practical Implications

This study contributes to a larger study involving the typological collation of 230 literature-identified website components. The components are typologically collated into mutually-exclusive functions and then into mutually-exclusive website domains (marketing, aesthetic and technical). This is an objective approach to benchmarking of a website.

Future Research

Theoretical Aspects

This website quality approach enables managers to internally and externally compare their website. The present (absent) approach shows where website improvements may be applied. It delivers website analysis results much quicker than those achievable with a survey, permitting management to amend websites in a timely manner.

Measurement Aspects

Website quality is only one consideration of customers when visiting a tropical tourism website or any website. The next stage in this research involves content analysis across 280 tropical tourism websites. Any new literature identifying website components are easily added within current quality dimensions. This larger study may demonstrate specific reasons for differences in website quality scores. Location, how developed the tourism industry is in the region, population, and regional stability may be strong influences to tourism and its associated website developments.

This study's quality measures can also be employed to assess and compare other websites, including: alpine tourism, and adventure tourism websites.

Conclusion

Tropical tourism websites are vitally important to those countries (cities and regions) where travel and tourism is a vital contributor to GDP. All 30 tropical tourism websites in this initial study failed to reach maximum points for website quality components.

The majority of websites scored poorly for e-service quality and security quality, with several not operating correctly in all browsers. When customers visit websites they have a certain level of expectation as to the offerings available. If customer expectations are not met due to missing website quality components, the customer may abandon the site and go elsewhere.

This approach to assessing website quality permits website managers to quickly and easily check for missing website quality components and rectify the problem in a timely manner. Hence the tropical websites can be kept up-to-date with current and new technology and customer's changing expectations.

As the pilot study shows, it is possible to determine differences in websites. Here, in paper 10, different website quality functions and components were tested. Paper 11

reports on the results of testing of an abridged WAM. Of the 230 components of the full WAM 77 (easily viewable) components are used. These components are across all 28 functions and 3 domains, hence a broad test of WAM's viability.

6.2 Website Benchmarking: an abridged WAM study

Submitted: *Benchmarking: An International Journal*

Introduction

In 2013 tourism accounted for 9% of global gross domestic product (GDP), and 6% of the worlds' exports (World Tourism Organization, 2014). In June 2014 Internet users topped 3.035 billion (Internet World Stats, 2014). Hence, there is strong global competition for tourists and their dollars (Lee, & Gretzel, 2012; Stepchenkova et al., 2010).

Managers, designers and owners of non-commercial tourism websites operate in competitive online marketspaces, and to understand their marketspace they benchmark their website against perceived competitors (Fernandez-Cavia, Rovira, Diaz-Luque, & Cavaller, 2014; Law et al., 2010; Morrison et al., 2004). To improve/optimise the competitive range of their website's components they seek benchmarking approaches that are cost-effective and comprehensive whilst also delivering easy-to-interpret website results (Fernandez-Cavia et al., 2014).

This study follows the website benchmarking theory developed by Cassidy and Hamilton (2016) and tests their Website Analysis Method (WAM) on 280 non-commercial Tropical Tourism Information Websites. The WAM benchmarking approach covers the 230 website components identified in the literature. It groups each of these website components into one of three domains (aesthetics, technical, or marketing) and then into one of 28 functions. WAM recognizes each website component as being either present or absent, and it delivers comparison scoring at three levels (website, domain, or function). It is also a programmable website benchmarking approach.

This benchmarking study is global, time, and size restricted, and compares 280 non-commercial tropical tourism websites. For each website from the 230 components available, we engage only 77 publically-viewable components. These are spread across all 28 functions. In this study we analyse the following tropical tourism website research questions:

1. Are website score discernibly different at the
    a) website level;
    b) domain level;
    c) function level; and
    d) component level?

2. Are score results influenced by continental area?
3. Are subjective website rankings consistent between individual experts?
4. Are subjective website rankings consistent between groups of experts?
5. Do individual experts agree on the presence/absence of specific website components?

Literature review

As WAM delivers a programmable benchmarking approach this literature review concentrates on website studies that engage fully automated, or partially automated benchmarking processes.

Sreedhar et al., (2010) investigate website design and check the number (and size) of webpages, webpage errors, and download times. They achieve this with an automated link checker and markup validation service identifying broken links and general website errors, including HTML tag errors.

Bauernfeind and Mitsche (2008) utilise 'data envelopment analysis' (DEA), a programmed model that delivers a mathematical result on the efficiency of a website according to set inputs and outputs. Shi (2006) monitors web accessibility through the 'bobby online free portal'. Whereas Karkin and Janssen (2014) test website usability, content accessibility, broken links, updates, and cascade style sheet (CSS) validation. Here 'sortsite evaluation'; 'Xenu's link sleuth'; 'Mozilla update scanner'; and 'jigsaw' are employed. Each of these automated measurement studies only captures a unique, selected and very specific portion of the website.

As part of a modified BSC approach several researchers deploy various automated tools to assess website technical aspects. These tools include: 'netmechanic' (Choi, & Morrison, 2005; Douglas, & Mills, 2004; Ismail, Labropoulos, Mills, & Morrison, 2001; Kline et al., 2004; Lee, & Morrison, 2010; Stepchenkova et al., 2010), 'LinkPopularity' (Choi, & Morrison, 2005; Douglas, & Mills, 2004; Stepchenkova et al., 2010), and 'website garage' (So, & Morrison, 2004).

Others develop their own full or semi-automated approach to website benchmarking. Bowers' (1996) automated system for website quality assurance - termed 'Weblint', provides an ad-hoc HTML validation program. 'KWARESMI' (Beirekdar et al., 2002) is employed to test website usability with 'guideline definition language' and HTML.

Accessibility guidelines and HTML are used by Abascal et al., (2004) in their 'EvalIris' automated approach.

Olsina and Rossi (2002) investigate website quality with 'WebQEM', a catalogue of direct and indirect website components. Althoug WebQEM offers a more extensive automation some components are not mutually-exclusive, they are subjectively weighted, and can appear in multiple domains (Olsina, & Rossi, 2002). Ivory and Hearst (2002) interpret a website's developing design quality with WebTango by comparing its specific components against those in top design rated sites. Thus partially completed websites can be offered a list of possible improvements - but only in select areas.

Chan and Law (2006) developed an 'automatic website evaluation system' testing website performance of the homepage of selected Hong Kong Hotel websites. This limited, one page comparison, restricts its usefulness as an analysis tool for websites. A broader approach termed 'Weblyzard' (Scharl, 2004), automatically gathers data from thousands of websites each month, creating website profiles.

The WAM approach (Cassidy & Hamilton, 2016) differs. It engages three mutually-exclusive website domains - aesthetic, technical, and marketing. Each domain contains only mutually-exclusive, but related, website functions. Each website function contains only mutually-exclusive, but related website components. WAM tests websites for the presence/absence of currently measurable components. This approach provides scores at three increasingly-specific levels. WAM allows the current universal set of website analysis components to be compared to the website under investigation. It also allows a comparison with the components present in competitor websites, and across domain, function, and component levels.

This study applies the abridged WAM approach to a global spread of tropical tourism websites, and tests it as a viable method to benchmark websites.

Methodology

Website sample

This WAM website study is targeted globally at tourism across the tropics (between the Tropic of Cancer and the Tropic of Capricorn – Figure 1.2). For comparison purposes it segregates the tropics into four blocks or continental areas: Africa (Figure 1.3), Asia (Figure 1.4), Oceania (Figure 1.5), and the Americas (Figure 1.6). Each website is

informational - providing tourist information relating to the specific area, and it is a non-commercial website that markets within its unique regional area.

Tourism-related commercial websites may be owned globally by just a few companies - such as hotel chains, 'Lonely Planet' or large adventure activity providers. For branding, development/maintenance and operational reasons these commercial companies largely retain a global website model across their different tropical global locations (Ting et al., 2013). Hence, the comparison between tropical blocks of commercial tourist information websites adds complications and so is avoided in this tropical tourism website study.

Websites selected must appear on the first page of each Google search - with the higher ranked website selected. Consumers trust Google, and in general, click on the highest ranked link in search results (Pan, 2015; Pan et al., 2007). Hence our website selection process imitates the tourist's search patterns across informational websites (Blum & Fallon, 2001).

To enable valid statistical comparison between websites within each of the four tropical continental blocks 70 non-commercial tropical tourism informational websites were selected per block (total 280 websites).

Instrument

This study employs WAM (Cassidy & Hamilton, 2016) to answer the research questions. WAM contains three domains housing 28 functions and 230 components. For time and simplicity of technical access reasons this study engages an abridged version of WAM containing 3 domains housing all 28 functions, but enlisting only 77 of the 230 components possible (Figure 6.3).

As functions can vary in the number of components they house, scaling (out-of 10) is applied (Cassidy & Hamilton, 2012b; 2013) at the function level. Hence, where one function has two of four components present, and another function has four of five components present, then scaling results in comparative scores of 5 out-of 10 and 8 out-of 10.

Data collection and analysis

The author, as a website programming, marketing and design expert and researcher, conducted a thorough content analysis of each website to determine presence/absence

of each of the 77 observable components. To maintain consistency of display, this high skills assessment applied to each website the same computers, screens and broad-band network.

Data (component present ‘1’ or component absent ‘0’) entered to an excel spreadsheet is appropriately collated, added and scaled out-of 10 for each function. These function scores are added to provide each domain level score. Domain scores are then added and provide an overall score for the website.

Between website comparison

Figure 6.3 uses the abridged WAM (still covering all 28 WAM functions) to represent the components present on the Hong Kong Tourism Website. At the top level of WAM the overall website score for Hong Kong is 214.17 (out-of a possible 280). At the second level the aesthetic domain scores 65 out-of its possible 90; the marketing domain scores 69.17 out-of 90, and the technical domain scores 80, out-of its possible 100.

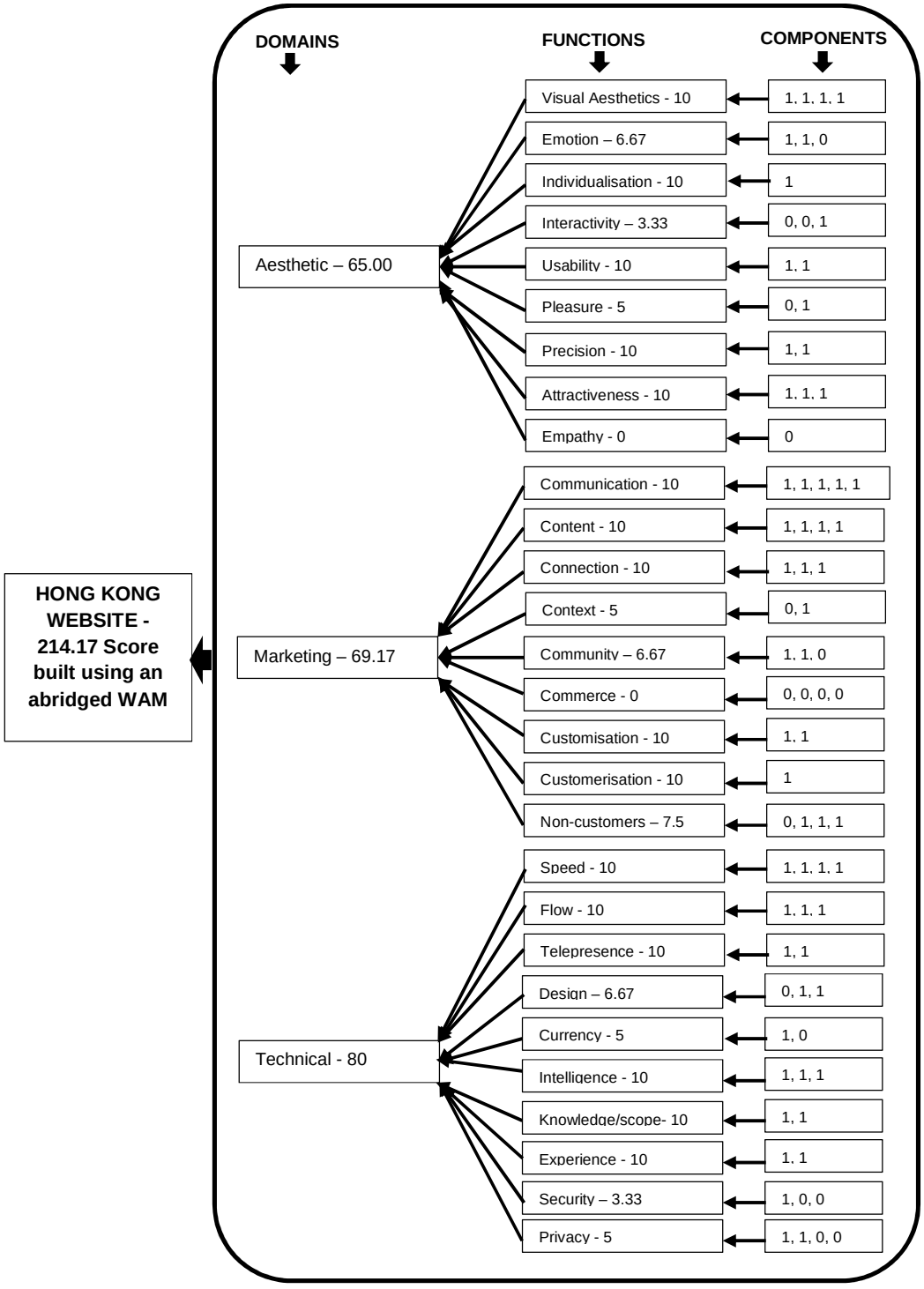


Figure 6.3: Results for Hong Kong website using the abridged WAM

At the third level this approach allows the determination of which function(s) contribute most to the domain scores and which are lacking (remembering each function score is out-of a maximum of 10).

Finally at the fourth (measurable) component level the website can be assessed to determine exactly where it is most lacking and as to what missing components may be considered for possible future inclusion.

Instrument Application and Analysis

The 77 components of all of the 280 websites are analysed using the abridged WAM approach. The top 10 websites are shown at Tables 6.9 to 6.11. The Hong Kong website benchmarks as the top score overall, yet it is not the top score for any one domain. For the top 10 websites, Tables 6.9 to 6.11, display the number one score for aesthetics is Columbia with 71.67 and for marketing is Quito with 72.50 and for the technical domain is Reunion Island with 80.83.

The (abridged) WAM approach also shows where domains closely match, for example, Reunion Island only marginally leads Hong Kong in its technical offerings. The (abridged) WAM generated Tables 6.9 to 6.11 show which of the top 10 websites house optimised functions, for example, Columbia and Hong Kong in the aesthetic domain both have optimised the visual aesthetic, usability, precision, and awareness functions; however Columbia and Hong Kong can add components to improve their emotion and pleasure functions. Hong Kong differentiates from Columbia with an optimised individualisation function but lacks optimized scores for interactivity or empathy, whereas Columbia has optimised scores for empathy and interactivity but not individualisation. A sub optimal score indicates that some components are missing from the function. Consequently these component areas remain potential areas for future website enhancement.

Table 6.9: Aesthetic domain results for Top 10 websites

	Hong Kong	Columbia	Reunion Island	Peru	Quito	Namibia	Indonesia	Montserrat	Malaysia	Cayman Islands
Visual Aesthetic	10.00	10.00	7.50	7.50	10.00	7.50	7.50	7.50	10.00	5.00
Emotion	6.67	6.67	6.67	3.33	6.67	6.67	6.67	3.33	3.33	6.67
Individualisation	10.00	0	0	0	10.00	0	0	0	0	0
Interactivity	3.33	10.00	3.33	6.67	3.33	6.67	6.67	3.33	0	6.67
Usability	10.00	10.00	5.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Pleasure	5.00	5.00	5.00	0	0	0	0	0	5.00	0
Precision	10.00	10.00	10.00	10.00	5.00	10.00	5.00	10.00	5.00	10.00
Attractiveness	10.00	10.00	6.67	6.67	3.33	10.00	10.00	6.67	10.00	6.67
Empathy	0	10.00	10.00	10.00	0	0	0	10.00	10.00	10.00
Total	**65.00**	**71.67**	**54.17**	**54.17**	**48.33**	**50.83**	**45.83**	**50.83**	**53.33**	**55.00**

Table 6.10: Marketing domain results for Top 10 websites

	Hong Kong	Columbia	Reunion Island	Peru	Quito	Namibia	Indonesia	Montserrat	Malaysia	Cayman Islands
Communication	10.00	8.00	10.00	6.00	10.00	10.00	6.00	10.00	10.00	8.00
Content	10.00	7.50	10.00	10.00	10.00	7.50	7.50	10.00	7.50	10.00
Connection	10.00	6.67	10.00	6.67	10.00	10.00	10.00	10.00	10.00	6.67
Context	5.00	5.00	10.00	10.00	5.00	10.00	10.00	10.00	10.00	5.00
Community	6.67	6.67	6.67	3.33	10.00	3.33	6.67	6.67	6.67	10.00
Commerce	0	2.50	0	0	0	0	0	0	2.50	0
Customisation	10.00	5.00	0	10.00	10.00	5.00	5.00	5.00	10.00	5.00
Customerisation	10.00	10.00	0.00	10.00	10.00	10.00	10.00	10.00	0	10.00
Non-customers	7.50	10.00	7.50	10.00	7.50	7.50	10.00	7.50	7.50	7.50
Total	**69.17**	**61.33**	**54.17**	**66.00**	**72.50**	**63.33**	**65.17**	**69.17**	**64.17**	**62.17**

Table 6.11: Technical domain results for Top 10 websites

	Hong Kong	Columbia	Reunion Island	Peru	Quito	Namibia	Indonesia	Montserrat	Malaysia	Cayman Islands
Speed	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Flow	10.00	10.00	10.00	10.00	6.67	10.00	10.00	10.00	6.67	6.67
Telepresence	10.00	10.00	10.00	5.00	0	5.00	5.00	5.00	10.00	5.00
Design	6.67	6.67	10.00	6.67	6.67	6.67	6.67	6.67	6.67	6.67
Currency	5.00	0	5.00	10.00	5.00	5.00	5.00	5.00	0	5.00
Intelligence	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Knowledge/ scope	10.00	0.00	5.00	0	5.00	5.00	5.00	0	0	5.00
Experience	10.00	10.00	10.00	5.00	10.00	5.00	10.00	5.00	10.00	5.00
Security	3.33	3.33	3.33	3.33	3.33	3.33	3.33	3.33	3.33	3.33
Privacy	5.00	5.00	7.50	2.50	5.00	7.50	5.00	5.00	5.00	5.00
Total	**80.00**	**65.00**	**80.83**	**62.50**	**61.67**	**67.50**	**70.00**	**60.00**	**61.67**	**61.67**

Influence of location comparison

To determine if the continental area a website is located shows significant differences when compared to website scores, domain scores, and function scores this study's data is analysed using one-way between groups ANOVA. Where a significant difference arises a post-hoc comparison is conducted with Tukey's honestly significant difference (HSD) test.

Website level

At the website level one-way ANOVA shows a significant ($p<.05$) difference between continental area and website score (Table 6.12), and Tukey's HSD test indicates the mean score for websites from The Americas is significantly ($p<.05$) higher than those from Africa, Asia, and Oceania.

Table 6.12: One-way ANOVA of website scores

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	12612.939	3	4204.313	4.867	.003
Within Groups	238425.653	276	863.861		
Total	251038.592	279			

Domain level

At the domain level there is significant (p<.05) difference between continental area and website aesthetic domain scores, and continental area and website technical domain scores; and between continental area and website marketing domain scores at p<.10 (Table 6.13).

Tukey's HSD test reveals the continental area websites within the Americas have a significantly (p<.05) higher aesthetic domain mean score than websites within Africa, Asia, and Oceania. The Americas have a significantly (p<.05) higher marketing domain mean score than Africa and Oceania websites, but show no significant difference with Asia websites. Across their websites, the Americas technical domain mean score remains significantly (p<.05) higher than for Asia websites, and significantly (p<.10) higher than Africa websites. Tukey's HSD test reveals no significant difference for website aesthetic, marketing, and technical domain mean score between any other groups. Thus, for non-commercial tropical tourism websites significant regional website differences do exist between different continental areas at the domain level.

Table 6.13: One-way ANOVA of domain scores

		Sum of Squares	df	Mean Square	F	Sig.
Aesthetic	Between Groups	2452.462	3	817.487	6.222	.000
	Within Groups	36261.107	276	131.381		
	Total	38713.569	279			
Marketing	Between Groups	1428.463	3	476.154	2.280	.080
	Within Groups	57651.723	276	208.883		
	Total	59080.186	279			
Technical	Between Groups	941.986	3	313.995	3.599	.014
	Within Groups	24077.550	276	87.237		
	Total	25019.535	279			

Function level

Table 6.14 shows at the function level one-way between groups ANOVA there is significant difference between continental areas, with the aesthetic domain functions of interactivity, usability, precision, and attractiveness showing significant (p<.05) difference, and empathy showing significant (p<.10) difference.

Table 6.14 shows the community, customization, non-customers functions within the marketing domain have significant (p<.05) differences, and the technical domain functions of speed, flow, telepresence, intelligence, and security has significant (p<.05) difference, but design and currency only show significant difference at p<.10.

Table 6.14: One-way ANOVA of Function scores

Aesthetic	F	Sig.	Marketing	F	Sig.	Technical	F	Sig.
Interactivity	3.120	.026**	Community	6.150	.000**	Speed	2.952	.033**
Usability	2.769	.042**	Customization	5.645	.001**	Flow	5.093	.002**
Precision	5.043	.002**	Non-customers	3.159	.025**	Telepresence	6.577	.000**
Attractiveness	4.506	.004**				Design	2.435	.065*
Empathy	2.254	.082*				Currency	2.124	.097*
						Intelligence	11.291	.000**
						Security	2.700	.046**

To determine the location of Table 6.14's significant differences, Tukey's HSD test is conducted on the functions within each domain. Table 6.15 shows the functions within the aesthetic domain with significance are: interactivity (Americas websites scoring significantly ($p<.05$) higher than Asian websites); precision function and attractiveness (Americas websites scoring significantly ($p<.05$) higher than both Africa and Oceania websites.

Using Tukey's HSD test the usability function shows the Americas websites have a significantly ($p<.10$) higher mean score than Africa and Oceania. The same significant ($p<.10$) difference applies to the precision function (Americas over Asia), and the empathy function (Americas over Oceania).

Table 6.15: Tukey HSD test Aesthetic Functions

Aesthetic Function	Continent (I)	Continent (J)	Mean Difference (I-J)	Sig.
Interactivity	The Americas	Asia	1.04729	.018**
Usability	The Americas	Africa	1.28571	.065*
		Oceania	1.28571	.065*
Precision	The Americas	Africa	1.71429	.006**
		Oceania	1.78571	.004**
		Asia	1.28571	.067*
Attractiveness	The Americas	Africa	1.90505	.004**
		Oceania	1.47571	.042**
Empathy	The Americas	Oceania	.85714	.075*

Tukey's HSD test shows similar significant $p<.05$ and $p<.10$ differences within the marketing domain functions (Table 6.16), and the Americas exhibit some significant differences from the other continental areas.

Table 6.16: Tukey HSD test Marketing Functions

Marketing Function	Continent (I)	Continent (J)	Mean Difference (I-J)	Sig.
Community	The Americas	Africa	1.38086	.001**
		Asia	.95157	.047**
		Oceania	1.33314	.002**
Customisation	The Americas	Africa	2.21429	.001**
		Oceania	1.78571	.011**
		Asia	1.42857	.062*
Non-customers	The Americas	Africa	1.03571	.017**

The Tukey HSD test on technical domain functions (Table 6.17) show: for speed and intelligence, the Americas websites are significantly (p<.05) different to Africa websites; for telepresence, Africa websites are significantly (p <.05) different to the Americas; for flow and intelligence, the Americas websites are significantly (p<.05) different to Asia websites; for flow Oceania websites significantly differ from Asia websites; and for intelligence, Oceania websites significantly differ from Asia and Africa websites.

The Americas websites are significantly (p<.10) different to Africa websites for design and security functions, to Asia websites for currency and security functions; and to Oceania websites for telepresence. For experience and telepresence Asia websites are significantly (p<.05) different to Africa websites.

Thus, for non-commercial tropical tourism websites significant regional website differences do exist between different continental areas at the function level.

Table 6.17: Tukey HSD test Technical Functions

Technical Function	Continent (I)	Continent (J)	Mean Difference (I-J)	Sig.
Speed	The Americas	Africa	.89286	.031**
Flow	The Americas	Asia	1.52457	.002**
	Oceania	Asia	1.28614	.013**
Telepresence	Africa	The Americas	1.85714	.000**
		Asia	1.00000	.082*
	Oceania	The Americas	1.00000	.082*
Design	The Americas	Africa	.62000	.074*
Currency	The Americas	Asia	1.35714	.073*
Intelligence	The Americas	Africa	1.47612	.000**
		Asia	1.33329	.000**
	Oceania	Africa	1.19043	.001**
		Asia	1.04760	.005**
Experience	Asia	Africa	.92857	.099*
Security	The Americas	Africa	.71400	.061*
		Asia	.66629	.091*

Component level

Significant differences between continental areas do occur at the function level. The components making up an individual function can now be considered. Table 6.18 shows the frequency contributions of the largest component contributor present within a significant function across the websites in each continental area. For example, the 'external-links-work' component exists in 85.7% of interactivity functions for the Americas websites and only 62.9% for Asia websites.

Table 6.18: Significant component frequency

P<.05 Function	Component	Africa %	Asia %	Oceania %	The Americas %
Interactivity	External links work	77.1	**62.9**	85.7	**85.7**
Precision	Logo is homepage link	50.0		44.3	**80.0**
Attractiveness	Logo is appropriate	70.0		61.4	**84.3**
	Tagline/slogan for site	37.1		**51.4**	**51.4**
	Adjustable video	32.9		40.0	**61.4**
Community	Social media present	57.1	60.0	60.0	**84.3**
Customization	Email Newsletter	20.0		27.1	**41.4**
	Online tools	14.3		15.7	**37.1**
Non-customers	Video present	35.7			**64.3**
	Maps	57.1			**80.0**
Speed	Search returns <5 seconds	47.1			**70.0**
Flow	Search is easy to use		27.1	**44.3**	**48.6**
	Navigation is consistent		67.1	**81.4**	**85.7**
Telepresence	Navigation is seamless	**85.7**	62.9		45.7
Intelligence	Operates on mobile devices	68.6	71.4	**90.0**	**92.9**

Focus group qualitative comparison

This study next deploys an eight member focus team to subjectively analyse a selection of this study's websites. These doctoral level experts each have extensive online and website expertise in the information technology and marketing and tourism fields.

This study's top 10 websites plus a random selection of another 10 average or lower ranking websites are individually compared. Each focus group individual separately and discretely visits each of the 20 websites in a random order and answer 12 yes/no questions. They then ranked each website from 1 (most preferred) to 20 (least preferred). Around four weeks later, the same experts were paired off, and asked to complete a second and different study of 20 websites.

(a) Expert answers to questions

Question 1: asks 'is the website viewable in different languages.' For 17 websites all participants selected the correct answer and in two websites there was only one

different answer. The last website had five yes answers and three no answers, but this website has an unusual approach to displaying its different languages – with click buttons that opened a new browser tab in the selected language.

Question 2: asks 'is there a site map link present.' A site map is accessed by opening a link to a page with a hierarchical layout with active links to various pages. The experts showed only a few instances of total agreement for the websites under consideration. These expert deviations arise where the site map is missed – such as when a site map link is of minimal size, illogically-placed and/or buried amongst a host of footer links.

Question 3: relates to the 'presence of social media links on the website.' Some minor disagreements may relate to positioning, colour, and/or the minimal size of the social media link.

Question 4: asks 'is there a search box' has minor disagreements.

Question 5: asks 'is the website layout crowded' seeks expert opinion. This again shows minor disagreement across most websites.

Question 6: asks the simple question 'is the website logo (or name) a link back to the homepage.' Here answers are split for one website (four yes and four no). Another two websites split expert opinion with three and five experts saying yes and five and three experts saying no. Of these websites, two required navigation away from the homepage before the logo/name activates as a link, and a third website works as a link when the mouse pointer moves over the logo/name (but a click does not activate this link).

Question 7: asks 'is the website search located upper-right.' Participants' interpretation sometimes varied – possibly due to how each defined 'upper-right'. Further, if the logo/name is located upper-left then the position of the search area is correctly described.

Questions 9 and 10: ask are page loads for the first visit to home page or to a search return each below 5 seconds – we note participants' personal home internet connections may affect these outcomes.

Question 11: asks is the website layout centred in the browser window'. In one case where just the navigation bar is not centred - one participant incorrectly says no.

Question 12: asks 'does a privacy policy or terms-and-conditions section exist?' Here except for one site there is unanimous and correct agreement.

Thus experts when considering even simple yes/no tasks still differ in their subjective interpretation of such tasks. This finding regarding experts has genuine implications for survey-based benchmarking – especially where consumer opinion is to be sought.
Also, when asked component positional questions – variation in participant subjectivity, interpretation of questions, and personal expectations all seem to interplay. Hence the WAM benchmarking approach is deemed more accurate in assessing the actual presence of components.

(b) Expert individual assessment

Task two for the expert focus group involved individually ranking 20 websites - the top 10 WAM-ranked websites plus 10 other WAM-assessed websites. Considering the top 10 rankings by each expert against the top 10 WAM-ranked websites - two experts matched eight, four experts matched seven, and two experts matched six. However compared to WAM-ranked websites, and compared to other experts, each individual expert's order-of-ranking differed somewhat.

These expert assessments were compared by gender, age, and area(s)-of-expertise. No grouping provided any uniquely identifiable influence. Hence, we conclude that experts also add individual subjective preferences across websites, and engage variables that are difficult to quantify - such as personality.

(c) Expert team assessment

All experts volunteered, four weeks after completing the above individual focus group tasks, to attend a computer laboratory. Experts were paired off - with one being an IT and web expert, and the other a tourism/marketing web expert.

From the original 20 different websites four lots of five were grouped, each lot was given to a different team for ranking. Each team of experts rated one lot of five websites, and provided written comments about their choice of ranking. This cycle repeated four times - with each expert team separately ranking all 20 websites.

The worst website in each lot was readily discerned in all teams – with one team, and only once, showing an inconsistency. Comments on the worst websites included: cluttered, tiny-text, crowded, too-much-white-space, and unprofessional. The selection of the top website in a lot showed greater variation - the best being 75% agreement for the top website and in only one of the four lots. Comments around the best website included: very-good-site, it-is-fun, pretty, interactive, attention-grabbing, easy-to-use, and visually-pleasing.

We conclude websites expert teams can readily select poor websites (with less features) from better ones. Expert teams also display weaknesses when distinguishing between higher-ranked websites (with more components). We conclude expert teams when confronted with many more assessable components begin to exhibit interpretation differences (against WAM-ranked websites).

(d) Individual versus team expert comparison

Next, against the WAM-ranked websites, we compared both the individual rank differences, and the team rank differences. We note that in teams – two experts collectively have a broader expert skills set, and they do more closely align to the WAM-ranking of websites. Here each expert team's rankings are around 75% correct overall, whereas individually they show broader fluctuations.

We conclude experts perform better in teams. They believe their combined, broader website expertise delivers better website rankings (when compared to their individual assessments). Their combined skills-set improves their ability to assess websites, and it significantly reduces interpretation differences when compared to the websites existing abridged WAM components.

Current implications of research

Theoretical implications

WAM is a typological classification of existing literature components. It offers a broad, multi-level approach to in-depth website benchmarking. In answer to research question five, when asked to view even a selection of WAM's components across different tropical tourism websites, experts inconsistently recognise the presence/absence of individual components, and no recognition trend is discernible between individual experts.

This suggests the use of experts is of limited value in benchmarking websites. We observe experts when asked to exert choice regarding component presence do show no common trend when miss-specify the presence/absence of some components. This may be due to their personal preferences, or preconceived preferences, or area(s) preferences, or website structural preferences regarding the websites under study.

Practical Implications

This study demonstrates an abridged version of WAM is useful in delivering significant differences across websites. A full WAM comparison is more detailed and is most useful for complex or large commercial websites. The abridged version of WAM engages the readily-accessible website components, and it is applicable to less complex websites such as non-commercial sites.

Future implications and opportunities for research

Measurement Aspect

In this study even an abridged WAM shows which domains and functions of the website are missing key components, and consequently may require updating and/or improvement. This knowledge enables managers/owners of websites to both focus and select where their online offerings may be better attuned to this business' chosen target markets.

Theoretical Aspects

Supporting research question one (a, b, c, and d), websites can be meaningfully measured and can provide differential scores across multi-levels of discernible interpretation. Although no commercial websites are deployed, and an abridged WAM is used, findings herein do provide justification towards expecting that either an abridged (or a full) WAM procedure is likely to deliver discernible benchmarking information regardless of type of website under study.

Management Aspects

Website managers/owners can apply WAM to benchmark their websites. The components present and those absent can be used at-level as a fine-focus for areas of future improvement (or ongoing advantage). In this tropical tourism field comparing destination website visitor analytics and website-initiated travel enquiries against actual visitor numbers before and after WAM induced website improvements remains an area for valuable ongoing and performance-related research.

Conclusion

Non-commercial tropical tourism websites can be benchmarked using an abridged WAM approach. At the website, domain and function levels, significant regional and continental areas differences exist, supporting research question two. Individual tropical tourism websites show individual, identifiable, and comparable website benchmark scores. A website with the highest overall benchmark score does not necessarily have the highest benchmark score for each domain. After identifying which domains and functions are lower scoring it is possible to determine the components missing from each function.

Experts seemingly behave subjectively and when asked to make simple yes/no choices regarding the existence of website component often provide inconsistent responses. When asked component positional questions these experts again offer inconsistent results. This holds implications for survey-based benchmarking – especially where consumer opinion is sought. Thus we deem the use of an abridged (or a full) WAM approach as a more reliable, accurate and useful benchmark solution.

In answer to research question three, experts can readily recognise websites with fewer components as the worst in a group of tropical tourism websites. WAM also rates these as poor websites. However, when confronted with websites possessing many of the abridged WAM components experts exhibit interpretation differences (against WAM-ranked websites). It appears that in their assessment they include their personal subjective preferences of a website, and that they sometimes engage variables that are difficult to quantify, such as personality, and life experience.

In this study experts performed better in teams, and their combined broader website expertise did deliver more accurate website rankings compared to the abridged WAM scores and to their individual scores (answering research question four). Team feedback concurred they believed team discussions helped consolidate their interpretations and ratings.

This study concludes that for tropical tourism website managers/owners and researchers wishing to benchmark their website an abridged WAM approach is objective, at-level, easy-to-interpret, quick-and-easy to use, and suitable for non-commercial websites. This study suggests the deployment of the objective full WAM approach is preferable over any subjective or any survey-based approach.

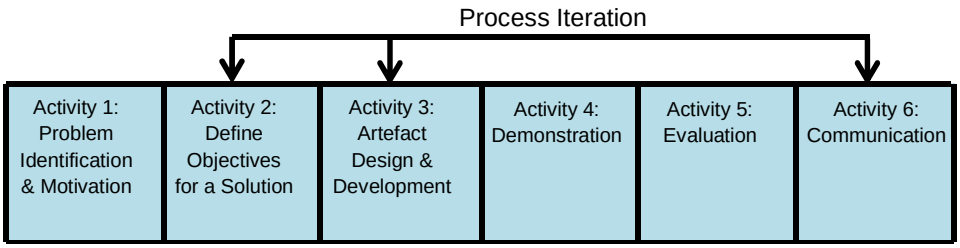
This concludes activity 5 of the DSRM. Activity 6 is covered in chapter 7 communicating, in a general discussion, the findings of this research.

Chapter 7

7.0 Communication

Communication is activity 6 of the DSRM. The communications of the results of this research are firstly in the 10 published papers and one submitted paper that are the basis for this thesis, and secondly this thesis itself.

I now conclude with a general discussion of the outcomes of this research and how they align with my research objectives, identifying my theoretical, empirical, and real world contributions, and recommendations for further research.



7.1 General Discussion

Introduction

As discussed in chapter 1 current website benchmarking studies are generally either subjective based surveys, or experimental design, or content analysis, and in some instances a combination of one or more approaches. These approaches are limited in their assessment of websites with reduced coverage, usually considering only one domain or a very limited number of components across domains. These approaches are time-consuming in preparation, delivery, and analysis. Further, there is limited agreement on what should be measured on a website, how components should be grouped, and how website benchmarking should be conducted.

Hence, the aim of this research is to build a theoretically-supported, objective, website benchmarking approach by consolidating website components into present/absent, thus allowing benchmarking comparisons of websites.

As this research is based on Peffer's et al's (2007) DSRM I follow the six designated activities; identifying a problem and motivation for solving the problem; the definition of objectives for the solution; the design and development of the artefact; demonstration of the artefact; evaluation of the results from artefact demonstration; and communication of each stage to interested parties.

Thesis Outcomes

Chapter 2

In this chapter I identify different website benchmarking approaches contained in the literature from 2001 to 2012. I demonstrate that these approaches can be grouped into either studies with a business focus or those with a consumer focus and all can be placed in a common framework for website benchmarking.

Business focused studies concentrate on effectiveness, usability, strategies, and performance components, however almost 53% exclusively employ web-analytics. The studies, from the consumer perspective, are focused on satisfaction, design, loyalty, and quality. In consumer perspective studies only 7% use web-analytics, whereas almost 41% are opinion (subjective) based.

None of these approaches truly delivers a comprehensive website benchmarking method. There is no agreement on what components of a website should be measured or indeed how to measure them.

As website benchmarking components, functions, and domains differ between studies it makes direct comparison difficult. A significant number of studies use university students as respondents; hence generalisations (from these results) remain difficult. Further, due to the time-delay and cost associated with subjective website benchmarking approaches they are generally not suitable for website managers/owners who require results in near real-time. This Indicates an online website benchmarking approach would be more practical.

This chapter establishes my research question: How can a website benchmarking approach be developed that is objective, contains all current literature-identified components, and is theoretically-supported?

Chapter 3

To define the objectives for a solution to the business problem identified in chapter one, a model is introduced and survey approaches are tested, initial steps for a website benchmarking theory and measurement approach are explored, and my hierarchical design is specified.

A proposed hierarchical concept model for website benchmarking is introduced (Figure 3.1). This model offers three levels of website benchmarking. Level one provides the combined score, level two gives the score for each domain, and level three delivers nine functions (sub-groups) for each domain. Initial groupings of website components are proposed. I then investigate whether a benchmarking approach, using a survey, suitably assess a website at all three levels.

A dual approach is used to test a 7-point (strongly agree to strongly disagree) Likert survey and a 2-point – present/absent dichotomous survey approach. Survey questions are built on components from the aesthetic, marketing, and technical domains of a website. Several 'dummy' questions are used as validity checks. The respondents complete one survey at a time with a one week interval between to limit short-term subjective memory influences between the surveys.

Results show the dichotomous survey was found to be simpler and faster to complete by respondents. The dichotomous survey results can be quickly and easily interpreted using a sum scored out-of 10 (Table 3.1). Using a dichotomous survey approach to website benchmarking is rarely used in the literature.

This section of my research demonstrates the aesthetic, marketing, and technical domains successfully capture literature-identified website benchmarking components. Further, even though the dichotomous survey delivers more accurate results than the Likert survey when checked against actual features on the website, they both fall short, with each delivering several incorrect results. Therefore, there is justification for the development of an online website benchmarking approach that encompasses all domains, functions, and components of a website.

A hierarchical website benchmarking approach has been proposed, now a theory and a measurement approach are required. There is no definitive theory of website benchmarking in the literature, nor a comprehensive website benchmarking approach. Here I propose using Aristotle's 4-step theory-of-causation with rough-cut set-theory to

develop a theory of website benchmarking. Here the universal set contains all current literature-identified components, this set is infinite, allowing new components to be added and redundant ones removed as necessary. A simple website benchmark score can be calculated as the number of components present over the number of components possible (those in the universal set). This proposed website benchmarking process is visually theorised at Figure 3.2. Through this typological approach I combine aesthetic, marketing, and technical domain components into a present/absent item. When a component is present on a website this causation, rough-cut, set-theory approach numerically collates each component as contributing to website subset domain, and one of the domain's functions. This approach delivers a comprehensive, hierarchical balanced measurement interpretation.

To complete chapter 3, I revisit the literature and confirm website benchmarking is still generally performed with subjective techniques such as Likert style surveys, modified WebQual, and modified balanced scorecard. These approaches can have several issues, such as, sample groups not being representative of the wider community (not generalisable), 'learning effect' occurring when multiple websites are visited, and answer bias where respondents try to please the researcher by providing answers they expect the researcher requires.

On occasion when an objective approach is used it is not unusual for a subjective rating to be applied to results. I do not give weighting to any of my website components, and deem each component to be as important to a website as the next. Instead I use a numerical approach with a score out-of 10 for components present in each function. This means regardless of the number of components housed in each function (whether 4, 5, 9 or even 12) a score out-of 10 can be determined to enable direct comparison. Figure 3.3 demonstrates the refined hierarchical approach to website benchmarking, and how components, functions, and domains contribute to an overall website score. Here I propose a tentative name for this website benchmarking approach as WebMATRs. Figure 3.4 demonstrates how, by adding missing components identified using the objective WebMATRs approach, a website can move closer to the universal set and beyond competitors.

Results from these three papers provide justification for my overall research aim to build a theoretically supported, objective website benchmarking approach by consolidating website components into present/absent, thus allowing benchmarking comparisons of websites.

Chapter 4

Websites are of increasing value and importance to commercial and non-commercial entities in this global economy. As such the urgency for an objective, easy to implement website benchmarking approach is apparent. However some still insist on using subjective survey approaches. Complications associated with this method are, for example, a respondent's possible restriction in their level of understanding of a website's aesthetic, marketing, and technical language terminologies; and task-time fatigue when large amounts of data are required. The design and development of the DSRM artefact is now undertaken.

The WebMATRs approach from chapter 3 is refined and further developed into a Website Analysis Method (WAM – Figure 4.1). Through the design science paradigm and DSRM I incorporate rough-cut mutually-exclusive set-theory and Aristotle's four-step theory-of-causation with a typological collation of literature-identified components. The WAM artefact can generate component-recognition algorithms, which researchers can then use for internal/external industry specific requirements.

The WAM artefact has been developed and designed with a solid theoretical base (research objective 2). WAM holds its existing literature-identified components in 28 functions and 3 domains (research objective 1). As each of these components is seen as present/absent, a programmable, updatable, software solution is possible. Next, in chapter 5, I conduct a number of differing tests with the identified website components to ensure their validity.

Chapter 5

Demonstrating the validity of component collation by likeness I look at 27 empirical studies relating to different qualities of a website. I determine that individual quality components can be grouped on likeness into e-service, content, design, information, security, and technical to give an overall quality score for a website. As a means to engage the consumer more closely with the organisation's website, this quality model can be assessed against satisfaction, trust, and loyalty. This paper (paper six) demonstrates the effectiveness of typological collation of components. Next, in paper seven, I look at web object positioning.

Web objects are components that have a specific place on a website. Subjective methods have been employed in prior research into web object placement, with the results being mapped onto a 2D grid representation of a website homepage. Here, I investigate the 'actual' placement of web objects on websites from 5 industries and across 10 countries and plot the results on my software programmed 3D Web Objects Visualiser. I then compare the actual placement of web objects with consumer mental positioning models reported in earlier studies.

Working on Nielsen's (1999) rule, if more than 80% of websites place a web object in one position this becomes the defacto standard. The defacto standard for web objects logo, search box, navigation, header, and footer align with consumer mental models. These results enable specific website components to be refined to placement queries. Papers eight, and nine in chapter 5 address research objective four – to determine if adding different components at different stages of a website's development delivers changes in website traffic.

To test consumer traffic on a website a publically-accessible niche tourism information website was constructed in six stages, and monitored over 100 weeks. Data was collected from Google analytics. The data was 'cleaned' to remove any non-human visitor hits, such as website crawlers and bots that regularly inflate normally reported visitor numbers.

Paper eight concentrates on actual first-time visiting consumers and how changes to the website alter visitor numbers. This study finds three independent variables, website richness; website post (from Facebook/forums) frequency; and website interactivity contribute towards growth in first time visiting consumer numbers to this niche tourism website. All four hypotheses are confirmed; therefore an increase in website richness;

website external post frequency from social and informative connections; and website interactivity, all influence first time visiting consumer traffic. Further, external posts co-vary with website richness and interactivity.

Overtime website first time visiting consumer traffic can grow, but relatively slowly. This growth can be accelerated by increasing website richness, by expanding interactivity at the personal level, and/or by dynamically supporting and maintaining each set of offerings, enabling specific targeting of first time visiting consumers. This now leads us into the paper nine in this study relating to return visitor traffic to the website.

Website traffic originates when first time visiting consumers locate the website and explore its functionality. The first time visitor can be directed to the website or find it by chance. These first time visitors become multi-time visiting consumers when they recognise the website offers consumptive deliverables that may meet their specific requirements. Consumers may also be influenced by posts on social media networks.

All five hypotheses are confirmed in this paper. That is website interactivity does influence website traffic; website component levels influence website traffic; external posts from social and informative connections influence website traffic and co-vary with website component levels and interactivity; and websites providing consumptive deliverables to first time visiting consumers positively influence multi-time visiting consumer website traffic. Hence, to successfully target first time visiting consumers and multi-time visiting consumers, development of a website should be one comprehensive, dynamic, and interactive solution, with currency maintained.

This chapter confirms typological collation of website components is a valid approach. It shows certain components have specific positions on a webpage, and hence they are web objects. Further, the addition of components to a website does influence first time and multi-time visiting consumer traffic to a website. I have validated the use of components and now in chapter 6 I evaluate the DSRM artefact WAM.

Chapter 6

Here research objective three, to apply DSRM from information systems with WAM to website benchmarking; and research objective five to test websites with WAM are undertaken.

Paper 10 is a pilot study of the presence/absence of 47 website quality components across 30 tropical tourism websites. Here the majority of websites scored poorly for e-service quality and security quality. The highest score overall for the websites tested is 43.3 out-of 60. The score for 56.7% of websites lies between 30 and 40, with only 20% scoring 40 and above. Here I am able to analyse websites using the presence/absence of specific components. However website quality is only one consideration for customers visiting a website. As this pilot study proved successful the next stage in the research is to conduct a larger study across more websites with components from each function, and functions from each domain contained within WAM.

Paper 11 contains the results of a study of 280 non-commercial tropical tourism websites from within the world's tropical zone (Figure 1.2). To analyse these websites an abridged WAM is employed as not all components of a website are readily visible. This abridged WAM contains all 3 domains, and all 28 functions, however the component number is limited to 77.

Here, I answer five research questions. Determining, first, that website scores are discernably different at the website, domain, function, and component level. To answer the second research question I group websites by continental area, Africa (Figure 1.3), Asia (Figure 1.4), Oceania (Figure 1.5), and The Americas (Figure 1.6). Results show website location in continental area does influence a website score. Websites located in The Americas have an overall significant difference to those located in Africa, Asia, and Oceania continental areas. The abridged WAM can show where differences lie at the domain, and function level, and which components occur more on websites from which continental area; however it is not determinable if there are any underlying causes or influences. This remains an area for future research.

Research questions three, four, and five relate to website evaluation by experts. Here there is limited consistency between individual experts when ranking 20 websites from the 280 studied. When the experts are placed in groups of two the consistency between groups is more consistent than between individuals, however experts are still less accurate than the objective, abridged WAM.

Ranking of websites may be influenced by subjective variables that are difficult to quantify, such as personality, or motivation. Experts do concede it is easier to distinguish between lower scoring websites (those with fewer components) than higher scoring websites (more components present).

The experts had one more task, to consider the presence/absence of 12 specific components across the 20 websites. Here inconsistency with agreement still occurs, this may hold implications for survey-based studies seeking consumer opinions.

Results demonstrate that it is possible to use an abridged WAM to benchmark tropical tourism websites successfully. This abridged WAM is objective, it provides results at-level, these results are easy to interpret; the approach is quick and easy to use and suitable for non-commercial website application.

My research aim to build a theoretically-based, objective website benchmarking approach by consolidating website components into present/absent, allowing benchmarking comparisons of websites has been achieved. Hence, the abridged WAM is successfully demonstrated.

Theoretical Contribution

This study uses Design Science Research (DSR) guidelines and Design Science Research Methodology (DSRM) from Information Systems is used in a new way. First, developing a definitive theory of website benchmarking (paper five), which is recognised and accepted by the top global benchmarking journal, Benchmarking: An International Journal, for publication. Secondly, this applied research thesis is constructed following the same process.

Likert scaled survey measures can be converted to dichotomous measures without loss of meaning (paper two). As such the existing literature defined website benchmarking (Likert or dichotomous) measures can likewise be viewed as present or absent (Cassidy & Hamilton, 2013; Dolnicar & Grun, 2007), and so a more objective approach to measurement is delivered.

The measures from existing website benchmarking studies in the literature are typologically re-classsified into likeness groups. When benchmarking websites these measures can now be viewed as present or absent. Thus a mutually-exclusive measurement approach can benchmark a website (papers three and five). This set-theory approach was successfully trialed in a limited study by Boisvert and Caron (2006).

Benchmarking, in general, was investigated by Moriarty (2011). He trialed Hume's theory-of-causation to account for chance occurrences and so provided background ideas for website benchmarking (paper five).

This study contributes to the literature by employing Aristotle's 4-step theory-of-causation in combination with mutually-exclusive, rough-cut, set-theory, developing a definitive theoretical basis of website benchmarking (paper five). Here, the 6 activities of DSRM are used: – 1) problem recognition and motivation; 2) define the objectives for a solution; 3) artefact design and development; 4) demonstration; 5) evaluation; and 6) communication (papers 1 to 11).

Applying DSRM, and the above theory, the universal set of (literature-identified) website components is determined (papers 3 to 5, and 11). These components exist within the (hierarchical) DSRM artefact, termed WAM. The components are

typologically collated by likeness into mutually-exclusive functions; these functions are collated by likeness into mutually-exclusive domains (paper 5 and 11).

Using WAM, components existing on a website can be uniquely identified and compared to the universal set of mutually-exclusive components. As WAM looks for the presence/absence of website components, this process can be automated, and built in to a software benchmarking solution that is programmable and updateable (papers 5 and 11).

Thus this study also follows the Design Science Paradigm of Hevner and Chatterjee (2010), answering questions relevant to website benchmarking by creating an innovative artefact - WAM, and thus contributing new and theoretical knowledge to the field. The developed website benchmarking theory and WAM artefact is useful and fundamental to understanding how a website benchmarking approach can be developed that is objective, allows the inclusion of all current literature-identified components and is theoretically-supported. It delivers progress, improvement, and understanding to the body of knowledge concerning the theory and application of website benchmarking (papers 1 to 11).

Empirical Contribution

This study demonstrates WAM delivers interpretable website scores at the website level, domain level, and function level. WAM can also drill down to the component level (paper 11).

Herein, Tropical Tourism Websites are analysed and scores compared at each level of WAM. This study shows WAM can deliver key significant differences between websites, such as comparisons of those from The Americas continental area against the Asia, Africa, and Oceania continental areas (paper 11).

WAM also delivers easy to interpret scores at the website, domain, and function levels. It allows comparison between competitors at each level, demonstrating that just because a website has the highest overall score it does not necessarily follow that it scores highest for each domain. Thus understandable information from each level of WAM can be deduced (paper 11).

Using WAM, the absence of individual components is highlighted when a function does not attain the maximum score. Once identified as absent, these components can be considered for future inclusion in the website (paper 11).

This study also shows (in paper seven), some consistent component locations for web objects do convert, and agree with, user mental positioning models. The 3D Web Objects Visualiser also delivers a defacto standard for a component. It shows specific 3D-view grid positions are each consistently occupied by a different component (Nielsen, 1999).

This suggests common components or web objects show consistent placement, particularly for specific industries and in some cases, across industries. As these placements align with consumers' mental model expectations, business has a set of baseline web objects around which the fully targeted website can be formed.

Further, when an increasing number of components are added to a website first-time visitor numbers increase (paper eight). This increase in components also leads to increases in multi-time visitor numbers to the website (paper nine), but at a slower rate. This indicates that by adding appropriate components, that build richness, and interactivity from the latest materials, website traffic should increase.

This study also demonstrates that the frequency of posts on social media and incoming links from forums have a greater effect on first-time website visitors than multi-time visitors. Thus frequent and consistently designed website posts and external (inbound) links should be used to increase website traffic (papers eight and nine).

It also recognises first-time visitors become multi-time visitors if the website delivers the consumptive deliverables that meet their specific requirements. Hence to target first-time visitors, websites should be comprehensive, dynamic, interactive, and current in all aspects (paper nine).

Real World Contribution

Managers/owners/designers of websites have been seeking a comprehensive website benchmarking approach that is self-contained, easy to use, delivers easy to interpret results in near real-time, and is cost effective. Managers, owners, or designers of websites can now deploy a comprehensive website benchmarking tool. Website builders using the WAM approach can incorporate a more complete component set into their benchmarked website (paper five). They can also identify their website's strengths and/or weaknesses when seeking to improve their website's positioning (paper 11).

Using a WAM approach, researchers can evaluate websites and decide if focusing on one domain, or on a set of functions, could be beneficial (papers 5, 6, and 10). This is demonstrated in chapter 6 with the abridged WAM, which shows significant differences between websites can be delineated (paper 11).

In paper 11, when compared to WAM, individual experts ranking only a limited number of websites show inconsistencies in rank ordering. When expert groups of two rank the same components for even a limited number of websites, agreement in ranking is closer, but still somewhat inconsistent. This may be influenced by unidentified variables, such as, personality, or motivation. This study also finds that when experts search for a limited number of specific components on a website, inaccuracy of recognition still occurs (with some high disagreements noted).

This expert consideration study exposes subjective weaknesses in survey style website benchmarking studies. It further suggests that a WAM approach (which can be automated through a software programme) remains a better (and objective) option for future website benchmarking studies (paper 11).

Limitations

This study did not test all available WAM components, as many from the technical domain relate to the 'back-end' (programmed) area of a website and therefore not readily accessible. However, these unconsidered components are able to be captured using a specifically developed WAM software programme. Nevertheless, approximately 150 of the 230 components have been successfully and specifically tested across this thesis. The remaining 80 components are similarly testable but several require special software programmed algorithms, which are under consideration for future post-doctoral studies.

WAM is expandable and is designed to accommodate new components, functions, or domains. For example, currently there are limited studies into social networking and its website components. As such, the social aspects are currently included within WAM's existing domains – particularly in marketing. If warranted in the future WAM can include a separate 'Social' domain and associated new functions.

The major study contained in this research is of non-commercial, informational tourism websites located in the world's tropical zone (Figure 1.2). This is an area of particular interest to myself, and to my university. This study could be further benchmark replicated and tested against another industry sector's websites.

Recommendations and Future Research

It is recommended that as new website components are identified in the literature these should be added to WAM, and superseded components should also be removed. This is an area for ongoing website benchmarking research and this can deliver periodic updates into WAM.

Not every website component or function may be necessary on every website. Hence future research is of value to selectively-define specific website components required by specific industries.

A WAM benchmarking approach is also achievable for mobile devices; this is a new area for future and ongoing mobile benchmarking research.

The 3D Web Objects Visualiser can be applied to further benchmark replicate and compare web object positions. Visual and position testing of each web object can then be applied across multiple websites within (or beyond) an industry sector.

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Appendix 1 Chapter 6

Website Locations and Addresses

Group	Location	Website
1	**Australia**	
	Broome	http://www.visitbroome.com.au/
	Darwin	http://www.tourismtopend.com.au/
	Cairns	http://www.cairns-greatbarrierreef.org.au/
	Port Douglas	www.infoportdouglas.com.au
	Derby	www.derbytourism.com.au
2	**Indian Ocean**	
	Maldives	http://www.visitmaldives.com/en
	Seychelles	http://www.seychelles.travel/en/home/index.php
	Phuket	http://www.phukettourist.com/index.php
	Madagascar	www.madagascar-tourisme.com/en
	Mauritius.mu	www.tourism-mauritius.mu
3	**Caribbean**	
	Jamaica	http://www.visitjamaica.com/Default2.aspx
	St Maarten	http://www.st-maarten.com/
	British Virgin Islands	http://www.bvitourism.com/
	Bahamas	www.bahamas.com
	Barbados	www.visitbarbados.org
4	**Tropic of Capricorn to the Equator**	
	Tonga	http://www.thekingdomoftonga.com/
	Fiji	http://www.fiji.travel/
	Vanuatu	http://vanuatu.travel/index.php/en
	Samoa	www.samoa.travel
	Solomon Islands	www.visitsolomons.com.sb
5	**Tropic of Cancer to the Equator**	
	Hawaii	www.gohawaii.com
	Marshall Islands	www.visitmarshallislands.com
	Yaps	www.visityap.com
	Palau	www.visit-palau.com
	Kiribati	www.kiribatitourism.gov.ki
6	**Asia**	
	Bali	http://www.balitourismboard.org/
	Brunei	http://www.bruneitourism.travel/
	Singapore	http://www.yoursingapore.com/
	Palawan	visitpalawan.com
	Andaman & Nicobar Islands	www.andamans.gov.in