

Empirical assessment of website information utility

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ABSTRACT

This study investigates the relationships between website information content utility and various outcomes of user interactions with retail websites. Although previous research has consistently identified high quality information content as a critical factor of successful e-commerce websites, those studies have not reported how to identify the specific information cues that comprise high-utility information content. In this study, we demonstrate how the MaxDiff statistical method can be used to assess website information content utility.

Keywords: Conjoint analysis, information utility

INTRODUCTION

The results of scores of peer-reviewed empirical studies demonstrate how understanding user-website interactions may be one of the most practical and cost-effective paths toward creating sustainable competitive advantages in the on-line environment. Consequently, the user-website interaction, or "UWI", has become a central focus for researchers and practitioners who want to know why UWIs between e-tail businesses and their customers result in (or fail to result in) customers making on-line purchases.

Although the growth of the UWI body of knowledge has greatly enhanced the abilities of investigators to describe and predict the course of UWIs, there are still significant gaps in the understanding of how website information content affects the outcomes of UWIs. Specifically, a significant body of work has demonstrated that specific website information cues can be identified, and that the effects of these information cues can be meaningfully measured and assessed. Hence, along with factors such as design, security, and privacy, information content has been consistently reported to be one of the most influential factors in determining website success. (Song & Zahedi, 2005; Evans & Wurster, 1999; Palmer 2002).

With the understanding that providing all available information does not equate to providing high quality website information content, one of the fundamental questions being asked by investigators is "for a given e-commerce website, what information constitutes high quality information content, and what are the relationships between information content and visitor perceptions and behaviors?"

Hence, this research is motivated by the following question: What are the relative utilities of the information cues presented at a given e-tail website?

Contributions of this research

This research formally presents and defines the construct "information cue utility", and demonstrates how relative information cue utility can be meaningfully measured on an interval scale. The information utility measurement method demonstrated in this research (Maximum Differential Scaling) moves practitioners and managers towards empirically based, as opposed to heuristic based, investigations of the relationships between website information content and UWI outcomes.

LITERATURE REVIEW

Several early investigations sought to identify major elements (site design, functionality, information content, etc.) of successful websites (Huizingh, 2000; Liu, Arnett, Capella & Beatty, 1997; Agarwal & Venkatesh, 2002). A few papers have sought to not only identify major website components, but to assess their relative importance to website success. For example, in their 2001 study, Mateos, Mera, González, and López, identified 4 major factors of successful websites (Accessibility, Speed, Navigability, and Content Quality) and assigned each factor a relative importance a priori, based on a 100 point scale. Ranganathan and Ganapathy (2002) found four key dimensions of Business to Consumer websites (information content, design, security, and privacy). Using multiple discriminant analysis, they determined the relative importance of the factors to be security, privacy, design, and content. Zhang and von Dran (2001) investigated the relative importance of fourteen website features (information accuracy, information completeness/comprehensiveness, information currency/timeliness, engaging, information reliability/reputation, information representation, navigation, visual design, product

and service concerns, readability/comprehension/clarity, relevant information, security/privacy, site accessibility/responsiveness, and site technical features) within six different domains (finance, e-commerce, entertainment, education, government, medicine/health).

User-website interactions

User-website interactions have been the focus of considerable attention in information systems, marketing, and economics. The term "User-Website Interaction" can be applied to any interaction between a user and a website. In the context of this research, a UWI refers to a much more narrowly defined set of users, technologies, contexts, and tasks. Specifically, when investigating whether and why consumer visits to websites result in, or fail to result in, purchase behavior, UWI's refer to interactions between website users (individuals) who visit the websites (technologies) of product or service providers (context) and purchase products or services (task) as a result of their visit. Furthermore, in this article we focus on consequential user interactions with transaction-oriented business-to-consumer websites. Here, a "consequential interaction" refers to activities such as Web-surfing, browsing, information-seeking, online shopping, or other activities that can lead to on-line transactions. Transaction-oriented business-to-consumer (B2C) websites are defined as websites that draw revenue directly from interactions with users, either through direct purchases of products or services made through the website, or from other behavior (e.g., telephone calls) that lead to purchases of products or services. In this context, web portals and search engines are not considered transaction-oriented websites because their income is obtained from advertisers, not directly from users purchases.

Information content

As previously mentioned, high quality information content has consistently been identified as a dimension of successful e-commerce websites. Knowing this, two questions logically present themselves: What is information content, and what constitutes "high quality" information content?

According to Resnik and Stern (1977), information content is composed of information 'cues', which are the information points that allow consumers to compare and differentiate products. Overwhelmingly, the information cues investigated in the literature refer to discrete, explicit information cues included within a website's copy or media content. In the context of this research, we define information cues as these discrete elements. We do not attempt to measure or account information that may or may not be implied through website design, organization, or visual content (Kirmani and Rao 2000, Nadkarni & Gupta 2007). For example, though a picture of an electronic device (such as a GPS) in use under extreme conditions (e.g., rain) could be used to make inferences about the quality of the device, very few IS studies have investigated these implicit cues or their effects, and we do not attempt to account for such inferred messages here.

Previous investigations of information content in the e-commerce literature

In several previous studies, researchers have investigated how specific information cues influence UWI outcomes. Song and Zahedi (2005) found that five categories of web-site information cues (defined by them as promotion, service, external interpersonal, ease of use and

navigation, and purchase facilitation) influence visitors' beliefs about both the website and their own self-efficacy. Positive feedback ratings were also associated with higher price premiums for 13 of the 18 products the authors investigated. Kovar, Burk, and Kovar (2000) found that website visitors who noticed the seal or who had been exposed to WEBTRUST advertising had more positive expectations of their interaction with the site and stronger purchase intention to make an on-line purchase than did their counterparts. Agarwal and Venkatesh (2002) found a significant positive relationship between website content quality and website visitor satisfaction. Lee, Love and Han (2006) found a strong relationship between information quality (understandability, readability, usefulness, clarity, and relevance of information) and website user satisfaction.

Utility

In the simplest sense, utility is a subjective assessment of value, desirability, or satisfaction provided or derived from a good, service, or experience (Hair et al., 2006). The subjectivity of utility is rooted in the fact that even if a seemingly objective measurement of value can be assigned (e.g., a financial value), the emotional value assigned to an object will vary across individuals.

In the basic additive model of utility (Huber 1974), overall utility is the sum of the values, or "part-worths", that a user places on each attribute or factor that influences the global assessment of utility, such that:

$$\text{Utility} = \text{part-worth of factor 1} + \text{part-worth of factor 2} + \text{part-worth for factor n}$$

By using statistical methods of assessing information utility, it is possible to assess the individual part-worths of individual information cues, and, subsequently, the overall information utility of an information set composed of those cues. Additionally, if a method is used that supplies part-worth utility measurements on an interval scale, then the relative contributions of individual information cues can be meaningfully compared. This article demonstrates a method of calculating information cue part-worth utilities, and then examines the relationships between calculated information utility and perceived website quality, trust, perceived risk, engagement, and actual purchase behavior.

Gaps and Opportunities

The large body of high-quality studies reported in the peer-reviewed literature since the commercialization of the public Internet have demonstrated that relevant, comprehensive, and timely information content is a critical component of successful B2C websites.

This research demonstrates how well-established theories and practices from the field of utility theory can be used to make empirically-based decisions about website information content management. Specifically, this research demonstrates how information cue utility can be meaningfully measured. The information utility measurement method demonstrated in this research (Maximum Differential Scaling) is relatively cheap and easy to implement, and the results are simple, concrete, and easy-to-interpret. Hence, this research is valuable not only to researchers who are well-versed in the UWI literature, but to general practitioners as well.

SAMPLE AND PROCEDURE

Using input from 3 subject matter experts, the most common information cues presented by the websites of 5 regional authors were identified. Specific instances (author name, picture, etc.) of the most common cues were then created for each author's site. The final cues used in the survey are listed in Table 1 (Appendix).

Participants

To recruit participants for phase two (the information cue utility calculation task) of the study, 263 participants (university staff and graduate students) were recruited. 86 responses were received, and 84 provided usable responses.

Procedure

One of the main objectives of this research is to demonstrate the measurement of relative utility of various website information content cues using an interval, rather than ordinal, scale. One technique that facilitates this is the Maximum Differential Scaling technique, otherwise known as "MaxDiff". MaxDiff is a measurement and scaling technique based on the principles of best-worst conjoint analysis (Cohen, 2003). Conjoint analysis is a decompositional approach in which respondents are presented with various product profile options and asked to make definite choices of preference between the product options. Traditional methods of conjoint analysis focus intra-attribute comparisons of attribute levels (e.g., preference levels for blue, red, or silver color options), but do not allow for inter-attribute comparisons that would allow managers to assess the relative importance of attributes (e.g., the relative importance of color options versus gas mileage), because the scaling of the attributes is unique to each attribute (Hair et al., 2006). The MaxDiff method permits inter- and intra-attribute scaling by measuring each attribute preference level on a common, interval scale (Cohen, 2003).

To determine the relative part-worths of the twelve information cues examined in this study, the Sawtooth Software suite was used to create a website that presented fifteen different conjoint tasks. Each conjoint task presented 4 information cues and asked the question, "When deciding whether to purchase a book on-line... If you consider only these 4 features, which is the most important and which is the least important?" An example screenshot showing one of the conjoint tasks is shown in Figure 1. To increase the quality of the task outcomes, we followed guidelines from Sawtooth Software to ensure the orthogonality of the attributes under study. Orthogonality is a mathematical test of the independence of part-worth estimates. If part-worth estimates are not independent, then the use of an additive utility model is called into question because an additive utility model does not account for interactions between attributes. The minimum number of questions to ask in order to achieve orthogonality is $3(K/k)$ where K is the number of items total and k is the number of items in each set (source). Since this survey evaluated twelve items, and presented four items in each set, a minimum of $(12/4) * 3$ (nine) questions were required to achieve orthogonality. Our survey asked fifteen questions to ensure the orthogonality of the cues.

MaxDiff Results

The results of the MaxDiff exercise are shown in Table 2 (Appendix).

CONCLUSION

The results of the MaxDiff exercise indicate that the relative utility of various website information cues can be reliably measured, and the differences of the utility of the cues are significant. Future investigation may aspire to investigate whether varying levels of information utility, as measured using MaxDiff methods, influence consumer perceptions of websites or consumer behaviors.

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APPENDIX

Table 1: The general cues manipulated at the experimental test websites.

Author website information cue
A picture of the author
Book reviews
A biography of the author (100 to 300 words)
Book synopsis
Samples of the book (text that you can read)
Samples of the book (audio that you can listen to)
Upcoming readings/appearances by the author (location, time)
Awards for the book or the author
The name of the publisher(s) of the author's books
A list of stores or websites where the book can be purchased
The author's contact information
A picture of the book cover
Price

When deciding whether to purchase a book on-line...

If you consider **only** these 4 features, which is the **most** important and which is the **least** important?

Most Important		Least Important
<input type="radio"/>	A list of stores or websites where you can purchase the book	<input type="radio"/>
<input type="radio"/>	Upcoming readings by the author (locations and times)	<input type="radio"/>
<input type="radio"/>	Book synopsis (description/summary of each book the author has written)	<input type="radio"/>
<input type="radio"/>	Samples of the book (text that you can read)	<input type="radio"/>

Click the 'Next' button to continue...

Next

Figure 4.1: Each visitor was asked to indicate the most important and least important cues in sixteen conjoint tasks.

Table 2: Results of the MaxDiff investigation of cue utility

Label	Average	95% Lower	95% Upper
Samples of the book (text that you can read)	19.12	18.29	19.96
Book reviews	18.53	17.76	19.30
Book synopsis (description/summary of each book the author has written)	18.38	17.48	19.29
Samples of the book (audio that you can listen to)	9.70	8.15	11.25
A list of stores or websites where you can purchase the book	9.19	7.68	10.71
Awards for the book or the author	7.98	6.78	9.19
A picture of the book cover	7.51	6.15	8.86
A biography of the author (100 to 300 words)	6.69	5.86	7.52
The name of the publisher of the author's books	0.98	0.35	1.60
A picture of the author	0.87	0.49	1.24
Upcoming readings by the author (locations and times)	0.75	0.48	1.02
The author's contact information (e-mail and/or phone number)	0.30	0.17	0.43