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Mary Jones
Mississippi State University

Timothy Kayworth
Baylor University

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Mary C. Jones, Mississippi State University, mjones@cobilan.msstate.edu
Timothy C. Kayworth, Baylor University, timothy_kayworth@baylor.edu

Abstract

This paper presents findings of an exploratory case study that was undertaken to assess web performance evaluation in three petroleum energy firms in the Southwest. Findings indicate that although senior management has not yet asked for performance justification, some firms are attempting to develop standard measures for web performance. We explore these measures, and examine the link between developer expertise and performance evaluation.

Introduction

Commercial use of the World Wide Web has become one of the fastest growing electronic commerce applications of the decade. Total purchases over the web are estimated to grow to $228billion U.S. dollars by 2001 (Commerce by Numbers, 1999). Web sites offer a variety of potential benefits to firms, including reduced transaction, advertising,marketing, and distribution costs, elimination of third party intermediaries, reduced time to complete transactions, and the ability to monitor customer choices and gather market intelligence (Hoffman, Novak, and Chatterjee, 1995). Other benefits include ability to deliver information to stakeholders faster, offer customized advertising, promotion, and customer service, and operational benefits like reduced errors, time, and overhead costs, easier entry to new markets, and faster time to market (Magid, 1995; Wilder, 1995). In spite of these potential benefits, only 30% of commercial web sites worldwide are reported to be profitable (Commerce by Numbers, 1999). Informal discussions with web site managers also indicate that firms do not believe that their web sites are as effective as they initially thought they would be. Evidence further suggests that consumers often feel that web sites do not meet their needs, and that the presentation of goods/services seems vague or intangible to them (Jarvenpaa and Todd, 1996). Yet, few firms have performance measures in place to regularly monitor how effective the site is. This is partially because the web is still in an evolving stage, and standard criteria for such evaluation is limited (Ho, 1997).

This paper presents a discussion of findings about web performance evaluations gathered as part of a larger case study of commercial web site innovations. It addresses the types of performance measures firms are using, the extent to which web developers are held accountable by upper management for web performance, and the relationship between web expertise and developers' self-perceptions of the performance of their respective web sites. Theory indicates that self-appraisals may be valid predictors of performance: individuals who view themselves as capable of performing tasks tend to do so successfully (Bandura, 1986; Schunk, 1989). Thus, developers who view themselves as having high web expertise may view their web sites as being more successful than those with less expertise.

Data Collection and Profile of Firms

We examined firms in a single industry to help control for cross industry effects that might confound the results of the study. Three firms in the petroleum energy industry in the Southwest were chosen. Although products in this industry do not lend themselves to directs sales over the web, these firms can and do use web sites to provide information to end consumers and other external stakeholders and to exchange transactions with business trading partners. Northco is an integrated, international petroleum company with assets of over $13 billion and annual revenues of over $15 billion. It is a major oil and gas producer, and one of the largest producers of gas liquids in the United States. Midco is an energy services provider that operates separately within a larger corporation that operates other non-energy related businesses worldwide. It provides sales, storage, and distribution of energy products such as natural gas, electricity, refined products, and petroleum liquids. It also provides natural gas services such as gathering, processing, and dehydration. It has assets of over $3.9 billion and annual revenues of $1.5 billion. Southco is a privately held company engaged in the refining, marketing, and transportation of petroleum products including gasoline, diesel fuel, jet turbine fuel, heating oils, petrochemicals, lubricants, and petroleum-based industrial fuels. It is a wholly owned, separately operated subsidiary of one of the world's largest oil companies. It owns several refineries that are among the largest in the U.S., and markets branded gasoline through over 14,000 independent retail outlets. It has one of the largest shares of the U.S. gasoline market and is among the largest owner/operators of U.S. bulk petroleum storage facilities.

On site interviews were administered to two key respondents at each of the firms over one week: the person most responsible for managing the firm's web site content and the person most responsible for the technical management of the site (e.g., webmaster). This allowed a richer understanding of the web process by providing both business and technical perspectives.

Web Expertise

Southco and Midco both perceive that their internal business units and external users have low levels of experience both using and developing Web site content. However, the difference between these two companies is that Southco is attempting to train its employees and external stakeholders to help them better understand the uses and value of the Web. In

contrast to Southco and Midco, Northco perceives a much higher level of internal business unit experience with Web site use and development of content. There are several reasons for this. First, a high percentage of employees have access to the internet since many have computers at home and many workers were upgraded to high end PCs at work recently due to the implementation of another technology based application. Northco's employees appear to be more comfortable with the Web browsing environment than at the other two firms.

Southco and Midco also appear to have high levels of internal Web expertise on their Web development teams. Northco, however, indicates that its web development team has a low level of Web expertise. Northco feels it missed a significant window of opportunity to hire skilled Web expertise because of a corporate hiring freeze in effect when the site was first developed. Furthermore, Northco's webmaster is the only one who does not come from the information systems area. In contrast, both Midco's and Southco's webmasters are highly experienced with regard to the web. Midco's webmaster gained Web experience working at Midco, whereas the content manager had helped develop a corporate Web site for another firm prior to joining Midco. One weakness at Southco is that the content manager had only held her position six months at the time of the interview, and had no prior web experience. However, she was attending meetings inside and outside the firm and reading web-related material to get knowledge necessary to do her job.

Both Southco and Northco currently use outside companies to provide them with technical support for their Web site. Southco uses an external consulting firm for graphics design and Web architecture. Northco currently uses an external ISP to host their Web page and is considering the use of an outside consulting firm to assist with the Web content and overall design process. Midco currently uses an advertising agency for graphics, multimedia, and to monitor consistency among postings. While this ad agency provides some external support, it is not a technology based firm such as the one Southco uses. Midco also intends to do more in-house work on their Web site and to move away from using external service providers in order to gain more control over the development process. Thus, although Midco's web managers have the greatest web expertise, Southco and Northco are compensating for any lack of internal knowledge by seeking expertise outside the company. Both of these firms also belong to a seven

firm web benchmarking group in the industry that meets regularly to discuss web issues, problems, and successes.

Research Findings

The web benchmarking group Southco and Northco belong to has not widely addressed the issue of performance measurement and has not provided standard tools for measurement. Thus, it appears that member firms are largely on their own with regard to how to determine their respective web site's effectiveness. Southco currently monitors performance through Web trend reports such as number of visits and demographics on visitors. It also gets feedback about how satisfied the primary users are with the site. Southco is planning a major redesign of the site to focus on the needs of different target audiences, and will expand performance evaluations to include those new users. Other measures Southco is considering include reduced customer service time, how well the site meets constituent needs, how often the news media picks up stories from the site, and how often different stakeholders access the site. They also plan to use return on investment (ROI) when asking senior management for funding for redesign, yet the respondents are not sure how to measure ROI for the web at this point. Senior management has not yet asked the web development team to justify the site, thus there has been little incentive to develop strong measures. It is interesting to note that the goals for the redesign of the site are explicitly tied to business objectives, yet little thought has been given to establishing performance measures to monitor how well these objectives are met. Thus, Southco relies largely on qualitative performance measures to determine how effective the site is.

Northco relies primarily on cost as a measure of performance. It currently monitors development costs and number of daily visits to the site, and compares the cost per visit to the cost per person who might see an advertisement in a magazine or newspaper. Thus far, senior management has not asked for a justification of the site. However, Northco is also planning to redesign its site, and feels that senior management will ask for performance justification prior to funding the redesign. Like Southco, Northco wants to use ROI for this, but is also not sure how to apply ROI to the web.

Midco counts the number of visits, how long the visit is, where visitors go on the site, and where they came from. However the web managers believe that this does not really show how effective the site is, because it does not indicate whether the visit turned into sales. They would like to follow up on sales by asking the purchaser what influenced them to buy, and specifically ask whether the Web influenced them. Just as at Southco and Northco, senior management has not asked for justification of the site, so there has been no pressure to evaluate its effectiveness. Of the three firms, Midco appears to have the weakest performance measures in that they do not seem to be tied to anything in particular such as user satisfaction with the site (at Southco) or cost (at Northco).

When asked for self-evaluation of the performance of sites, each of the respondents rated their site as average compared to

others in the industry. Thus, without solid measures, it seems that people believe they are doing as well as anyone else. It is somewhat surprising that even Midco, who believes it has substantial web expertise on the web development team, rated the site as average, rather than above average. Thus, it appears that expertise has little bearing on these respondent's perceptions of web performance. However, there were differences in respondents' perceptions of their ability to improve the sites. Southco believes its ability to develop a better web site is moderate, Northco believes its ability is low, and Midco believes its ability is high. These self ratings parallel the expertise on the web development team. Northco believes it has limited expertise, Southco moderate, and Midco very high expertise.

Summary & Directions for Future Research

Three key findings emerge from this exploratory study. First, although few standard web performance measures exist, at least some firms are attempting to develop their own. Some are qualitative measures of how well the site meets user needs, while others are cost oriented. However, none are explicitly tied to organizational goals, or even to explicit objectives for the web site itself. This relates to the second finding; that senior management in none of these firms has yet asked for performance justification. One area for future research is to examine the influence of senior management's role and perspective on corporate web sites. Web managers are attempting to measure performance, but without direction from top managers, it is difficult to tie web performance to corporate goals, and thus to determine how the web site is actually benefiting the firm.

Another finding is that self-perceptions of expertise parallel perceptions of ability to develop more effective sites. Although there are many factors that influence web performance, self-perceptions of ability have been shown to influence actual performance in other contexts as well (Schunk, 1989). Thus, if web managers do not believe they can do much better, then indeed they may not take advantage of opportunities and make use of the resources necessary to improve site performance. Further research is needed to explore the strength of this link, and if it is strong, firms should take steps to ensure that people responsible for web development have/receive the education and training necessary to not only increase actual expertise, but to facilitate realistic perceptions of expertise and its role in effective web development.

With the phenomenal growth in corporate web site usage, it is becoming increasingly important for firms to measure the performance of their sites in order to determine whether they are realizing projected benefits. Firms need to measure performance and to understand what factors may influence performance in order to make effective decisions about the future of their sites. As standards begin to emerge, web sites will begin to be even more useful, and business will be able to take better advantage of the opportunities afforded by this new technology.

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