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# ENHANCING VISIBILITY OF BUSINESS WEB SITES: A STUDY OF CYBER-INTERACTIVITY

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## Abstract

*Cyber-interactivity is becoming a strategic tool to improve the quality of web sites. A quality business web site should not only show professionalism but also meet user's communication needs. This study investigates five dimensions of cyber-interactivity and their relationships with site popularity. Findings suggest that playfulness and reciprocal communication are the most salient predictors for site popularity. Implications and suggestions were drawn upon the results.*

## Introduction

Building business web presence is a known strategy to reach more potential customers. Traditional media have been predominately a one-to-many model where the same business message can be broadcasted to multiple recipients. However, the effect of using traditional media to reach target customers has been very limited. Ducoffe (1996) reported that traditional marketing channels suffer from four limitations:

- It is difficult for advertisements to achieve significant effects because individuals have been desensitized to it due to large daily exposure.
- The majority of advertising reaches individuals at a time when they are not shopping.
- Advertisements in the traditional approach are not as effective because of the low cognitive effort necessary for the purchase of low risk and packaged items.
- Most advertising fails to capture the consumer's attention.

In 1994, the web had just started to be exploited by business; there were not many web pages published. An early search engine, World Wide Web Worm indexed a mere 110,000 pages (McBryan, 1994). In the last five years, the Internet has grown exponentially with the number of available web pages in the billions. The Google search engine alone (<http://www.Google.com>) has currently indexed over 1.3 billion pages.

With the explosion in total web pages on the Internet, searching for a specific item has become more difficult. Using a search engine is not always intuitive and is often very frustrating. A search term can yield hundreds and thousands of hits, with only a few of them of any value to the viewer, and they may be buried deep within the results.

The issue of how a search engine develops and prioritizes its indices is important. Search engines are based on keywords; they walk web sites indexing the pages based on the non-common words they find at that site, in the body of text, the title, or meta-tags. Additionally, some search engines such as Lycos, Google, and Yahoo will attempt to prioritize the result based on the sites' popularity. External links pointing to a site are termed backward links or link referrals. These backward links represent the importance or the popularity of the target sites. The rationale is that a Webmaster or a site designer determines to link to a site because he/she sees that the target site as having value to the visitors of his/her own site (see <http://www.lycos.com/help/lycospro-help.html>). If many people create links to a site, it might indicate that the site has valuable content or is considered important. The most popular sites will have the most backward links pointing to them. Thus, these sites are more likely to be returned at top of the search engine results.

It is therefore in a site's best interest to have as many back linked sites as possible. This can be accomplished in a number of ways, such as entering into alliances or associations with other sites, or to somehow entice a site owner via the characteristics at the site

to link back to it. Some organizations try to entice a viewer to consider linking their sites by the introduction of a trendy user interface. A philosophy that focuses on enticing individuals to creating links based on the look of a site is likely to be ineffective; individuals generally do not create backward links solely for aesthetic features. The functionality and the content of a site are considered more important than just the user interface alone.

Usability studies have suggested that web users are very impatient. If users cannot find the information of interest, they would just leave with frustration. However, a clean design that strictly follows usability guidelines can also result in a dull site where there is little to entice the users to stay at the site. From the business standpoint, the lack of web features that engage visitors can severely damage the purpose of creating online business presence. Therefore, the authors suggest that mechanisms of engaging users at the site can be equally important to creating a usable web site.

Rafaeli and Sudweeks (1997) suggest that interactivity of a site was an important factor to engage users. Hence, a web site equipped with interactive features is likely to attract and engage web visitors. These visitors are likely to recommend the site to others or create backward links on their web pages. At this moment, very little research has addressed the issue of encouraging users to link to another site.

## **Background**

Interactivity is a part of a multi-dimensional communication medium for participants to exchange messages regardless of distance or time (Blattberg and Deighton, 1991). Interactivity is also a continuous construct, which facilitates two-way communication (Alba et al., 1997). Rice and Williams, (1984) indicate interactivity delivers communication in real-time. An important aspect of an interactive message is that its content can be modified in “real time.” Further, messages involved in the same communication session should be related (Rafaeli and Sudweeks, 1997).

However, certain web site features such as email, newsgroups, and mailing lists, while interactive in nature, are largely asynchronous. They do not facilitate real-time communication (Dysart, 1998). Although the scope of interactivity has not been identified to a commonly agreeable point, recent studies have started to tackle this issue by identifying possible dimensions that could further help capture its multi-facet characteristics. Alba, et al. (1997) suggested two interactivity dimensions: response time and response contingency. Response contingency refers to the degree to which the response by one party is a function of the response made by the other party. Ha and James (1998) support the idea that Web visitors have different communication needs. To that end, they identified five dimensions of interactivity: 1) playfulness, 2) choice, 3) connectedness, 4) information collection, and 5) reciprocal communication.

The concept of interactivity relies on how technology features or communication media deliver messages to the participants. Messages can only be interactive if the computer-mediated environment or the technology infrastructure supports it. Some technology features offer a sense of “real-time” communication, while others do not. It is important to differentiate features into dimensions within the interactivity construct and explore how they are related to measures such as quality, performance, popularity, and others.

In this paper, we chose to study the relationships between interactivity dimensions and web site popularity. To the authors’ knowledge these relationships have not yet been assessed in the literature. Therefore, the goals of this study include 1) assessing the literature to provide a theoretical foundation for the dimensions of interactivity, and 2) providing a preliminary assessment of the relationships among interactivity dimensions and popularity of web sites.

## **Research Hypotheses**

The hypotheses developed in this study are based primarily on the interactivity model developed by Ha and James (1998). Five dimensions were assessed: playfulness, choice, connectedness, information collection, and reciprocal communication.

### ***Playfulness***

Playfulness presents the enjoyable context that attracts users (Eighmey, 1997). Playfulness is using devices that can attract the attention of web visitors and involve them with the web site during the visit (Ha and James, 1998; Webster and Martocchio, 1992). A site that incorporates playful features does not imply that the site is “unprofessional” or comic strip like. Mechanisms that

might potentially enhance the level of playfulness include: online games, software downloads, and question and answer (Ha and James, 1998). Playfulness can lead to higher levels of user satisfaction, which might entice the users to recommend the sites to their friends and associate verbally and with backward links. Therefore, we conjecture that

**H1:** Online playfulness features are positively related to the popularity of business web sites.

### ***Choice***

The choice dimension addresses the site's ability to offer customization features. The concept of choice assumes that the users' browsers are capable of handling these features. Some web site developers design solely towards a single type of web browsers or with state of the art features that have not had enough time to be assimilated by the viewing community. Thus it is reasonable to assume that sites that accommodate web browser's differences and allow users the capability to customize the viewing environments are less likely to cause confusion and frustration, and thus enhance user's online experience. We, therefore, conjecture that

**H2:** Choice is positively related to the popularity of business web sites.

### ***Connectedness***

Connectedness refers to the site's presentation format in which the contents are closely related to the company, the products, the third-party information, and other deliverables of interest to the visitors. Devices that can enhance connectedness include video clips, audio clips, site tours, product demonstrations, and others. These web features improve the marketing messages using the multimedia forms, and further enhance understandability. We conjecture the following:

**H3:** Connectedness is positively related to the popularity of business web sites.

### ***Information Collection***

The nature of the HTTP protocol makes it hard for the web server to identify visitors on a per session basis. To circumvent these drawbacks and allow for collection of online user behavior, user-tracking devices, such as cookies, server generated images, and online surveys, are often incorporated within a web site. By "mining" this behavioral data, web designers can tailor a site towards a specific user's preferences. Additionally, mined information can be used generically towards creation of better web sites. The web designer must make ethical judgments as to how, when, and whether to use this information. Assuming this feedback information is utilized, we posit the following hypothesis.

**H4:** Information collection mechanisms are positively related to the popularity of the web sites.

### ***Reciprocal Communication***

The nature of this dimension is two-way communication. Reciprocal communication differs from the information collection dimension, in that users can control the content of the messages and whether to provide information or not. While information is two-way, it does not have to be real-time or synchronous. Communication happens when the parties respond to each other and the message content shows some degree of relatedness. Web features for this dimension include email, online shopping, chat rooms, bulletin boards, mailing lists, and search engines. Communication features because of their "interactiveness," are by definition, user "involving." These communication features allow a user to gain a better understanding of the firm objectives, product, and service offerings. Questions regarding the firm and its products can be answered in a timely basis when reciprocal communication is enabled. Thus, we further hypothesize:

**H5:** Reciprocal communication is positively related to the popularity of business web sites.

## Methodology

### Sampling and Procedures

The sample was randomly selected from Fortune 500 companies in the year of 2001. Of the 150 company web site, one site was down during the selection process and therefore was excluded from this study.

A Web site's interactivity dimensions were measured by counting the presence of features that were defined for each dimension. The interactivity index (II) was calculated individually for each site and each interactivity dimension. The design of interactivity dimensions follows Ha and James (1998) for the purpose of extending their study scope. Ghose and Dou, (1998) who coined the term interactivity index, used the same counting mechanism for measuring interactivity. The interactivity index was also used to quantify the degree of interactivity for each dimension. All IIs were normalized to a maximum of five (5) and a minimum of zero (0).

A logistic regression was conducted to assess the relationships between site popularity and five interactivity dimensions. The popularity of a web site was measured by Lycos link referrals. The link referrals (or backward links) are very diverse for business sites under this study, with the lowest number being 19, and the highest being 3,133,280. The mean was 29,798 and the medium was 1513. Because the sites by selection (from the Fortune 500) were expected to be somewhat popular, a measure of discrimination was needed to determine if a difference in magnitude had an impact. The cutoff/crossover point was determined via the use of a modified classification approach. The point was determined by visual inspection, by a natural occurring break in the data, and by the calculation of differences between the data points. The cutoff point was 5,000 referrals.

### Analysis and Results

All the selected web sites (149) were successfully evaluated. Among the sites surveyed, 45.3% were manufacturing firms, 34.7% were in the service sector, and 20.0% were in retail and wholesale industries. ANOVA analysis shown in Table 1 indicates no statistical difference in interactivity dimensions among these three categories of businesses.

The correlation analysis among interactivity dimensions is shown in Table 2. The web site popularity, as defined via Lycos link referrals, correlated with all the interactivity dimensions. Some dimensions were moderately correlated with each other. To that end, a series of multiple linear regression analyses were run to test for multi-collinearity. For each variable a regression was run against the other variables. All dependent variables with  $R^2$  greater than 0.50 were excluded from further logistic regression analysis. The variance inflation factor (VIF) was also calculated. None of the multiple regression resulted in high VIF values. Therefore, all dimensions were included in the logistic regression analysis.

**Table 1. ANOVA Analysis for Industry Types**

		Sum of Squares	Df	Mean Square	F	Sig.
Playfulness	Between Groups	.901	2	.451	.799	.452
	Within Groups	82.347	146	.564		
	Total	83.248	148			
Choice	Between Groups	.272	2	.136	.144	.866
	Within Groups	138.088	146	.946		
	Total	138.360	148			
Connectedness	Between Groups	1.759	2	.879	.804	.449
	Within Groups	159.651	146	1.093		
	Total	161.409	148			
Information collection	Between Groups	3.605	2	1.803	2.805	.064
	Within Groups	93.818	146	.643		
	Total	97.423	148			
Reciprocal communication	Between Groups	2.343	2	1.171	1.536	.219
	Within Groups	111.325	146	.762		
	Total	113.667	148			

**Table 2. Correlation Analysis for Interactivity Dimensions**

	Popularity	Play	Choice	Conn.	Info. Coll.	Reci. Comm.
Popularity	1.00					
Playfulness	.35**	1.00				
Choice	.178*	.25**	1.00			
Connectedness	.244**	.28**	.14	1.00		
Information Collection	.205*	.07	.16	.24**	1.00	
Reciprocal Communication	.362**	.32**	.22**	.37**	.28**	1.00

\*\*Correlation is significant at the 0.01 level.

\*Correlation is significant at the 0.05 level.

The result from stepwise logistic regression is shown in Table 3. The dependent variable, site popularity, is dichotomous by design. The independent variables were the five dimensions of the interactivity index. Playfulness and reciprocal communication using the Wald statistic were significant at the 0.01 level. The likelihood ratio tests also showed that these variables were significant. Choice, connectedness and information collection dimensions failed to enter the regression equation.

During the forward stepwise process, the log likelihood value was reduced from 157.570 to 128.029. The non-significant value of Homer-Lemeshow goodness-of-fit test indicated that the model prediction did not significantly differ from the observed values.

The results shown in Table 3 failed to reject hypotheses 1 and 5. As a result, two interactivity dimensions (i.e., playfulness and reciprocal communication) were considered predictors for the site popularity. Interestingly, Table 3 also shows that the choice, connectedness and information collection dimensions were not strong enough to predict popularity.

**Table 3. Logistic Regression**

	Beta	S.E.	Wald	Df	Sig.	R
Variables in the equation						
(1) Playfulness	.800	.304	6.918	1	.009	.176
(2) Reciprocal Communication	.889	.266	11.216	1	.001	.242
Constant	-2.956	.462	40.906	1	.000	
	Score	df	Sig.	R		
Variables not in the equation						
(1) Choice	.789	1	.374	.000		
(2) Connectedness	1.174	1	.279	.000		
(3) Information Collection	.539	1	.463	.000		
-2 Log Likelihood	128.029		<b>Hosmer and Lemeshow Goodness-of-fit test</b>			
Goodness of Fit	146.024		$\chi^2$	df	Sig.	
Cox and Snell R <sup>2</sup>	.180					
Nagelkerke R <sup>2</sup>	.276		12.221	7	.094	

## Discussions and Implications

This study empirically tested how interactivity is related to the popularity of web sites. Following Ha and James (1998) model in defining five dimensions, the current study suggests that successful strategies for expanding site visibility should include interactivity and its dimensions. As Ha and James (1998) suggested, these dimensions were developed to identify communication needs for web users.

The findings of this study suggest that reciprocal communication is the most influential component of site popularity. Reciprocal communication involves web functions such as email exchange, shopping, online chat, bulletin boards, and mailing lists. Watson et al. (1998) noted that the interaction of this type is a way to interact with the medium rather than mere reaction to the medium. While a firm may not incorporate all the interactive features in their web sites, this study indicates that increasing reciprocal communication is likely to engage the visitors in a positive manner, perhaps inspiring them to link back to the firm business site.

Responsiveness requires that the participants be able to take control in the two-way communication media. Compared to other dimensions, reciprocal communication requires responsiveness from both parties. Each party has control over the content and duration of the communication. This type of communication greatly mimics social communication forms in daily life. Ovans (1999) indicates that people treat interacting with computers as social encounters and unconsciously expect a set of rules of interpersonal behaviors. This is why reciprocal communication was a strong predictor for site popularity in the current study.

Playfulness also demands interactions between users and web sites. This dimension has the potential to deliver both online and offline interactivity. Even though online playfulness was the focal point in Ha and James study, we strongly believe that business site designers can also utilize the offline extension of playfulness. For example, software, such as games, screen savers, and utility software, can be downloaded from the business web site for offline use. Offline playfulness extends business reach to potential customers.

The information collection dimension of interactivity failed to be an influential predictor of web site popularity. Current practices regarding site design tend to focus on data collection from the perspective of acquiring user information for marketing purposes. This practice ignores the aspect of feedback to improve the web site. Schonberg et al. (2000) recommend that e-business intelligence should play a strategic role in the electronic commerce environment. E-business intelligence refers to the information collected about visitors to an e-business web site. Good business practice should utilize the e-business intelligence to guide the design of all web site features. It is recommended that web marketers seriously consider possible uses of this e-business intelligence for site improvements. Information collected about users should become a feedback to constant site design and redesign for it to better meet web users communication needs.

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