Proposing the content perception theory for the online content industry – a structural equation modeling

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Keywords

Worldwide web, Information retrieval, Mathematical modelling, User studies, Consumer behaviour

Abstract

This study chooses the content perception perspective to develop a theoretical model portraying the psychological activities of Web surfers exposed to content Web sites. After collecting 549 empirical observations in a controlled lab environment, tests the theoretical relationships by using the structural equation modelling (SEM) technique. The results strongly indicate that effective content perceptual dimensions can help content Web surfers to develop positive attitudes toward content sites, which in turn induce favorable behavioral outcomes such as frequent site usage and loyalty. Such a proposed theoretical model not only has the potential to enrich the theoretical underpinning of Internet studies but also presents a practical framework to guide content strategy formulations for the online content industry. Detailed implications for both managerial research and practice are discussed.

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Introduction

With the proliferation of the World Wide Web (WWW) over the Internet (Cheung, 1998; Kim and Eom, 2002), both academic researchers and business managers are eager to investigate why and how people like to visit or use specific Web sites, because attracting visitors may bring in huge direct or potential commerce benefits (Song and Zahedi, 2001; Supphellen and Nysveen, 2001). These issues are crucial for the online content industry since, currently, the revenue source of the online content industry still mainly stems from online advertising, forming a large part of Web site traffic generated by Web users (Afuah and Tucci, 2001; Eisenmann, 2002).

Although most content Web sites have tried to explore profitable revenue models such as content subscribing, online brokerage, or even retailing, Web users' intentions to pay for the online content or transact with the Web site have remained low (Eisenmann, 2002). Therefore, how to effectively manipulate Web site content strategies to make Web site content attractive or favorable for massive Web users and keep them revisiting to generate advertising revenue has inevitably become one of the most important issues for the online content business (Dreze and Zufryden, 1997; Eisenmann, 2002).

Despite of acknowledging the importance and urgency of developing systematic knowledge to guide Web content design for the online content industry, to our knowledge, there has been relatively little research investigating how the content perceptions molded by content providers influences Web users' psychological responses and behavior. As a matter of fact, many researchers have indicated that studying the attitudinal psychology of Web site users will eventually pay off more than those page-view counts recorded on the Web service log, because Web log techniques only provide very limited information of Web users' inner thoughts that will be the truly major factors determining their subsequent behavioral responses toward Web sites (Singh and Dalal, 1999; Chen and Wells, 1999; Balabanis and Reynolds, 2001).

Therefore we decide to thoroughly review the literature of the attitude toward the Web site ("A_{web}" hereafter), which is an academic construct that reflects a Web surfer's predisposition to respond favorably or unfavorably to Web content (Chen and Wells, 1999), and seek appropriate theoretical perspectives focusing on the content-related variables to construct and test a coherent

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theoretical model specifically for the online content industry from the content perception perspective. In response to the urgent managerial needs for practical content strategy theories, we hope to build up the basis of content strategy formulation for the online content industry through modeling and clarifying the psychological influencing paths among Web surfers' content perceptions, attitudes, and behavioral outcomes. Specifically, we plan to investigate the research questions as follows:

- What content perceptual dimensions would affect Web surfers' attitudes toward content Web sites?
- What behavioral outcomes concerning the online content industry would be driven by Web surfers' attitudes toward content Web sites?

The remainder of this paper is organized as follows. First, we thoroughly review related literature of the A_{web} research and give a commentary. Second, we adopt the conceptual framework proposed by Singh and Dalal (1999) to follow its logical flow of arguments in systematically investigating the relationships among Web content exposure, perceptions, attitudinal and behavioral reactions. Specifically, a research model mainly integrating the A_{ST} theoretical model (Chen and Wells, 1999; Chen *et al.*, 2002), telepresence theory (Steuer, 1992; Kim and Biocca, 1997; Coyle and Thorson, 2001), and the functionalism theory of attitudes (Katz and Stotland, 1959; Katz, 1960) is developed through the content perception perspective. Third, in order to solidly test our proposed theoretical model, an elaborately designed lab investigation utilizing the structural equation modeling technique is presented. Finally, we discuss the implications based on the research findings of this study for both managerial research and practice, and conclude with general recommendations for the online content industry.

Literature review

Attitude toward the Web site (A_{web})

Attitudinal research has already been fruitful in the literature of behavioral science and marketing research (Lutz, 1991). The role that attitude plays has been repeatedly been important in determining human behavioral intention, which in turn drives further actual behavior (Ajzen and Fishbein, 1980). After recognizing the WWW as a powerful medium for marketing communication (Palumbo and Herbig, 1998; Hsieh and Lin, 1998), the attitudinal research concerning the Web site inherits much knowledge from the literature of attitude toward advertising to study its causes and outcomes for electronic commerce strategy formulations (Chen and Wells, 1999; Singh and Dalal, 1999). It has been indicated that understanding why and how people develop positive A_{web} would help to enhance the commercial performance of Web sites (Singh and Dalal, 1999), and studying the antecedent and consequence variables for the A_{web} construct could also provide a behavioral rationale for explaining Web surfers' Web site preferences and subsequent online behavior associated with Web sites (Singh and Dalal, 1999; Balabanis and Reynolds, 2001).

Therefore, we comprehensively review the empirical literature of A_{web} to seek theoretical bases for this study. There have been many factors argued to be associated with the A_{web} construct, indicating that the knowledge on A_{web} has started to accumulate. For the purpose of sketching the overall picture of the A_{web} literature, we follow the research space framework proposed by Berthon *et al.* (2002) and select major research parameters including antecedents, perspective categories, consequences, empirical context, research methodology, and testing method as important attributes to profile each empirical literature. The descriptive findings are presented as Table I.

Commentary on the literature

As tabulated in Table I, we can learn that the A_{web} construct has been drawing much attention from the researchers. Many variables have been argued to be associated with it from both antecedent and consequent sides. Some antecedent views for the A_{web} construct have been explored, including system function, interface, marketing promotions, content perceptions, Web design style, site holder's brand perceptions, shopping information, and user characteristics. Also, through the empirical validations of the linkage between the A_{web} construct and Web users' behavioral variables such as intention to revisit or shop, the A_{web} research has also preliminarily justified its importance and business implications for the electronic commerce industries. Therefore, its potential of becoming one of the major theoretical bases in Internet behavioral studies can already be seen.

Although we agree the A_{web} knowledge has begun to accumulate, we observe that systematic investigations with unified perspectives on the A_{web} construct are rarely seen. Most studies in the A_{web} literature have lacked specific perspectives and just fragmentedly try to explore significant predicting variables of A_{web}, and are thus less beneficial to the maturity of a newly emerging research area in social sciences or managerial studies (Hunt, 1991; Hair *et al.*, 1998).

Table I Empirical literature concerning the A_{web} construct

Literature	Antecedents of A_{Web}	Antecedent perspectives	Consequences of A_{Web}	Empirical context	Methodology	Testing method
Wu (1997)	Convenience (+) Navigation (+) Economic incentive (+) Entertainment (+) Informativeness (+)	System function Interface Marketing promotion Content perceptions		Book shopping sites	Lab survey	Correlation
Singh and Dalal (1999)	Web page personality – emotional rating (+) Web page personality – rational rating (+)	Web design style		Commercial company sites	Lab survey	Regression
Chen and Wells (1999)	Informativeness (+) Entertainment (+) Organization (+)	Content perceptions		Commercial company sites	Survey	Regression
Wu (2000)	Convenience (+) Navigation (+) Economic incentive (+) Entertainment (+) Informativeness (+)	System function Interface Marketing promotion Content perceptions		Book shopping sites	Lab survey	SEM (EQS)
Coyle and Thorson (2001)	Interactivity (+) Vividness (+)	Content perceptions		Shopping sites	Experiment	ANOVA
Childers *et al.* (2001)	Usefulness (+) Ease of use (+) Enjoyment (+)	System function Content perception		Grocery shopping sites	Lab survey	SEM (LISREL)
Chen *et al.* (2002)	Informativeness (+) Entertainment (+) Organization (+) Trust (+)	Content perceptions Site holder's brand perception		Commercial company sites	Survey	Regression
Huang (2000)	Shopping information complexity (−) Shopping information novelty (+)	Shopping information	Desire to shop (+)	Shopping sites	Survey	SEM (LISREL)
Stevenson *et al.* (2000)	Background complexity (−)	Interface	Advertisement attitude (+) Brand attitude (+) Purchase intention (+)	Lottery shopping site	Experiment	ANOVA Correlation
Jeong and Lambert (2001)			Intention to use information (+) Information use (+)	Commercial – travel lodge sites	Survey	SEM (LISREL)
Balabanis and Reynolds (2001)	Brand attitude (+) Involvement (+) Internet knowledge (+) Internet experience (−)	Site holder's brand perception User characteristics	Time spent (+)	Clothes shopping sites	Lab survey	SEM (LISREL)
Supphellen and Nysveen (2001)	Brand loyalty (+) Functionality (+) Layout (+)	Site holder's brand perception User characteristics Interface	Intention to revisit (+)	Commercial – airline company site	Survey	Correlation Regression

In addition, nearly all of them have been empirically scoped under shopping or commercial Web site contexts, and not reached into the content site surfing yet. This certainly provides limited insights for the A_{web} knowledge of non-shopping contexts where the online content industry resides, because there have been many theories with empirical support indicating that, under shopping contexts, people exhibit more involvement and mental effort for the information processing of consumer choice decision making (Bettman, 1979; Pereira, 1999). Therefore, it can be expected that the behavioral patterns of Web surfers will be different from Web searchers or shoppers and thus deserve further clarifications (Hoffman and Novak, 1996; Singh and Dalal, 1999).

Along with recognizing the deficiencies of the A_{web} literature and the need to develop practical

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theories to guide the strategy formulation of the online content industry, our research goals of choosing the content perception perspective to build and test a theoretical model based on the A_{web} literature have been further strengthened.

Research model development

Previous studies concerning the A_{web} construct have been fragmented and short of unified perspectives. As a matter of fact, this study believes that choosing the content perception perspective to study the A_{web} construct would be a suitable starting point for building the Web surfers' behavioral model for the online content industry. Such a perspective will not only directly echo the arguments recognizing the importance of content strategy manipulations (Dreze and Zufryden, 1997; Eisenmann, 2002), but also help to solidly clarify the effects of Web content perceptions molded by content providers upon Web users and thus provide a basis for their content policy making. In addition, although there have been many antecedent factors shown in the literature including user characteristics such as involvement, knowledge, and experience, we believe that investigating content-related variables would also contribute to the content strategy formulations of content providers for their common inadequacies regarding user's personal information (Chang, 1998; Huberman *et al.*, 1998; Wen and Peng, 2002).

In order to systematically investigate how content perceptions affect Web users, we adopt the conceptual framework proposed by Singh and Dalal (1999) to structure the relationships among Web content exposure, perceptions, attitudinal and behavioral reactions. We will develop a research model with theoretical foundations to answer the research questions of this study.

Conceptual framework

Singh and Dalal (1999) have integrated the literature of advertisement communication and proposed an effective Web communication model (a simplified version of which is shown in Figure 1) that is allows this study to follow its logical paths and to insert all the research variables concerning the central issue for the online content business. In their arguments, an attractive Web site would be just like an effective communication media with the capability to persuade its viewers to spend time exploring the site as well as engaging favorable behavior through the development of positive perceptions and attitudes (Singh and Dalal, 1999). And we are going to follow this model.

Theoretical foundations and hypotheses

After reviewing on the A_{web} literature to seek appropriate theoretical perspectives focusing on the content-related variables for theoretical model construction, we believe that integrating the A_{ST} theoretical model (Chen and Wells, 1999; Chen *et al.*, 2002) and telepresence theory (Steuer, 1992; Kim and Biocca, 1997; Coyle and Thorson, 2001) would exhibit the most potential to capture the major content perceptual dimensions in explaining the A_{web} construct, which will in turn lead to behavioral responses of content site surfers. We propose the research model of this study as shown in Figure 2 and then derive hypotheses in subsequent sections.

Content perceptual antecedents of the A_{web} construct
The A_{ST} theoretical model for A_{web}. In their important research findings, Chen and Wells have developed the scale measuring the A_{web} construct (termed as the A_{ST} scale in their study), and then factor-analyzed 76 items collected from an extensive review on attitudinal antecedent literature in advertising. They have also extracted three major meaningful dimensions and termed these dimensions as informativeness, entertainment, and organization respectively. These three dimensions reflect the content attributes perceived favorably or not by Web users and can also be viewed as the scores rated by Web users in informational, recreational, and representational ways to judge the overall evaluations of the Web content. Informativeness, entertainment, and organization have also been put into the regression model as the independent variables to explain and predict the A_{web} construct. In their series of empirical testing results, these three factors have significantly accounted for over 50 percent variation of the A_{web} construct, and

Figure 1 Conceptual framework and research scope

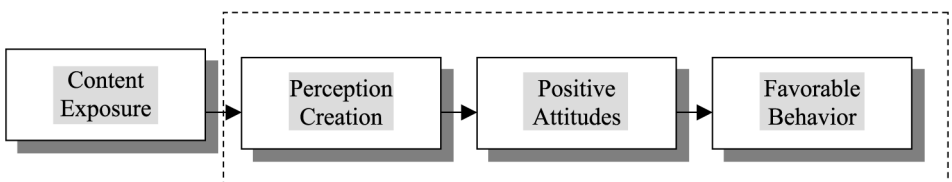
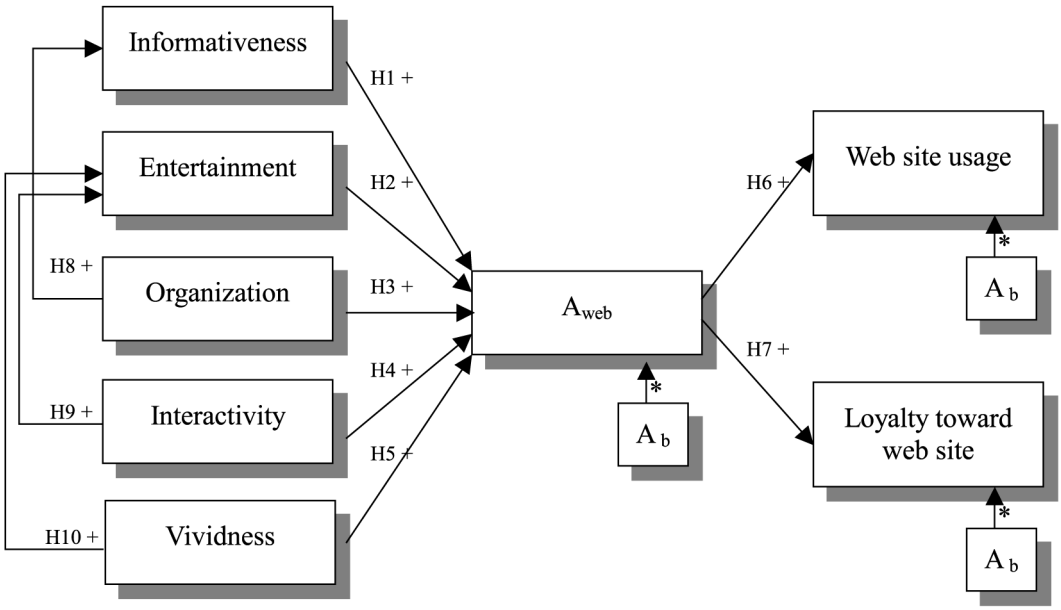


Figure 2 Research model



Note: *Controlling extraneous effect to solidify proposed causal relationships

thus have been characterized as the A_{ST} model (Chen and Wells, 1999; Chen *et al.*, 2002).

As a matter of fact, there has also been related literature providing alternative arguments and empirical supports for similar relationships shown in the A_{ST} model. Childers *et al.* (2001) have extended the TAM theory (Davis, 1989) to propose the enjoyment of Web site content as one of their three antecedents for A_{web} and found it positively significant. Similarly, Wu has also empirically validated that navigational pleasantness, content entertainment, and content informativeness are significant factors positively associated with A_{web} (Wu, 1997, 2000). We can observe that these factors are all close or similar to the three antecedent variables in the A_{ST} model, and this surely strengthens our confidence toward the robustness of its nomological validity. Therefore we adopt the A_{ST} model to compose the first part of our antecedent model of A_{web} in the content Web surfing context. However, since the empirical context is going to dramatically change into a non-shopping one in this study, we expect that the effects influenced by these three content perceptual dimensions shall be somewhat variant from contexts where they have been originally explored and thus also worthy of further empirical examinations.

In their arguments within the A_{ST} model, informativeness of the Web content satisfies the basic needs for seeking information online and thus helps Web users to attain motivational gratification and reserve favorable impressions toward the site (Chen and Wells, 1999; Chen *et al.*, 2002). In fact, we conjecture that under the content Web surfing context considered in this study, people shall not be as highly involved as searchers in the shopping contexts, implying that the effect induced by informativeness upon A_{web} might be mitigated. However, we never know the exact nature of people's daily motivations online, for being a searcher or surfer is a matter of dynamics in mental activities (Hoffman and Novak, 1996). Besides, according to the Web user survey reports, searching for various kinds of information always retains its high ranking in people's daily online surfing (Peng and Hsu, 2002), hence, we believe the influencing effect of informativeness upon A_{web} shall still be evidenced in the content Web surfing context. We propose:

H1. The perceived informativeness of Web content will be positively associated with content Web surfers' A_{web}.

In their arguments within the A_{ST} model, entertainment of the Web content functions as the emotional conditioning feeling that may easily bind Web users to positive credits of a Web site, and therefore partially provides the rationale for people's Web site preferences (Chen and Wells, 1999; Chen *et al.*, 2002). Under the content Web surfing context, in fact, we believe the influencing effect of entertainment upon A_{web} shall be even stronger than under the shopping context. In their deductions from the elaboration likelihood model (ELM) theory (Petty and Cacioppo, 1981), Singh and Dalal (1999) have proposed that the

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emotional aspects of the Web content will tend to exert greater persuasive influences than the informational component, for there is no specific task involved in surfers' minds, meaning that the effects aroused by peripheral cues dominated by pleasant sensory feelings become stronger. Accompanied with many other empirical supports for the effect of entertainment upon positive attitude or feeling toward Web site (Eighmey, 1997; Eighmey and McCord, 1998), we are very confident of the reappearance of this path in our context. We propose:

H2. The perceived entertainment of Web content will be positively associated with content Web surfers' A_{web}.

In their arguments within the A_{ST} model, organization of the Web content affects the development of A_{web} in two ways. The higher the organization perceived by Web users, the lower the irritation of Web users. Also, the higher the organization perceived by Web users, the easier it is for Web users to find their desired content. These effects are all helpful to develop positive attitudes toward the Web site (Chen and Wells, 1999; Chen *et al.*, 2002).

Whether in a commercial context or not, we believe the importance of content organization to induce A_{web} shall be approximately invariant. In hypermedia or WWW studies, delivering organized Web content has been explored by many research resources and recognized as one of the dominant factors influencing users' attitudes or preferences toward Web sites (Carolyn, 1989; Shneiderman, 1998; Nielsen, 1999). Therefore, we are very confident of the reappearance of this path in our context. We propose:

H3. The perceived organization of Web content will be positively associated with content Web surfers' A_{web}.

The telepresence theory for A_{web}. Besides the A_{ST} model variables leading to A_{web}, we believe there is still explanatory space left for other content perceptual variables. In fact, although Chen and Wells (1999) have claimed that their A_{ST} model incorporating informativeness, entertainment, and organization already captures the major perceptual dimensions of Web content toward explaining the A_{web} construct, they have seemed to miss the other parts that also powerfully characterize the Web media – the interactivity and vividness, which are going to be introduced as the second part of our antecedent model of A_{web} in the content Web surfing context.

Scholars have devoted lots of effort to understanding the realness feeling generated under the hypermedia environment that has also been gradually forming into a research area termed as the telepresence theory (Steuer, 1992; Kim and Biocca, 1997). The applications and investigations of telepresence theory in mediating studies have also been fruitful, well recognized, and started to exhibit its potential for Internet studies (Coyle and Thorson, 2001). Coyle and Thorson have designed a lab experiment to test the positive causal effects induced by the vividness and interactivity dimension of the telepresence variable upon Web users' attitudinal reactions. Although they have successfully acquired the empirical support for the telepresence theory (Coyle and Thorson, 2001), they still have not extended their empirical conditions into the non-shopping context and also not incorporated many other important content-related variables into their research scope due to the major limitations of the experiment manipulation methodology.

As a matter of fact, the interactivity and vividness have been viewed as important and powerful characteristics of the Internet media (Shneiderman, 1998; Nielsen, 1999; Afuah and Tucci, 2001; Eisenmann, 2002), and also modeled into the explanatory framework of browsing behavior over the Internet hypermedia environment. In the proposed framework, the telepresence variables – interactivity and vividness – are important content characteristics affecting people's psychological responses and browsing behavior; nonetheless, they are still not well examined empirically (Hoffman and Novak, 1996). Therefore we observe that a niche for theory integration combining the A_{ST} model and the telepresence theory is not only emerging but also going to help us to incorporate more comprehensive content perceptual dimensions in determining the A_{web} construct under the hypermediated Web environment.

In their telepresence model for A_{web}, Coyle and Thorson (2001) have argued that the more people experience the vividness and interactivity, the higher directness of feeling people have within mediated environments, leading to people developing more positive attitudes and favorable predispositions toward the marketing media. As to the non-marketing contexts, we still believe their potential to reside in the explanatory content dimensions toward A_{web}; however, to date, the solid empirical knowledge of the effects induced by these telepresence variables is still absent. This further strengthens our desire to test these paths toward A_{web} in the content Web surfing context. Therefore we propose:

H4. The perceived interactivity of Web content will be positively associated with content Web surfers' A_{web}.

H5. The perceived vividness of Web content will

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be positively associated with content Web surfers' A_{web}.

Proposed behavioral consequences of the A_{web} construct

In the A_{web} literature, the consequences related to A_{web} are mainly developed for marketing implications; however, what is focused on in this study is exploring behavioral outcomes that are determined by the A_{web} construct and concerned mostly with the online content industry.

Intention to revisit the site is of primary concern to content providers, and has been empirically found to be positively influenced by the A_{web} construct. The more positive Web users' A_{web} are, the higher intentions they will exhibit to revisit that Web site (Supphellen and Nysveen, 2001; Jeong and Lambert, 2001). However, just the intention to revisit is not strong enough to generate a revenue source: what is really wanted by the content providers is frequent site usage or even loyalty. In the economics of the online content industry developed by Eisenmann (2002), it is indicated that the keys to the content site's success are to dramatically lower the average acquiring cost for each content user and to turn site traffic into advertising revenue, which can be added to by repeat visits by retaining its users. In other words, if a site's content policy can eventually lead to content users' frequent site usage or even loyalty toward the content site, the viability of a content Web site will be greatly increased for a relatively low cost and revenue sources secured.

The functionalism theory of attitudes. In fact, the logical linkage from A_{web} to frequent site usage or even loyalty may be deduced from looking back to the traditions of attitudinal psychology. In their proposed functionalism theory of attitudes, Katz and Stotland (1959) developed a taxonomy comprised of four types of functions relevant to attitudes – knowledge, utilitarian, ego-defensive, and value-expressive (Katz and Stotland, 1959; Katz, 1960). Within these types, knowledge function means one of the functions of attitudes is to organize and simplify human's recognition and experiences of the world. On the other hand, utilitarian function means one of the functions of attitudes is to enable people to maximize rewards in the environment and to minimize punishments. Combining the arguments of these two attitudinal functions, in short, once people develop positive attitudes toward an object, their mental flags will also be set as signs to simplify the search processes and thus it will become easy for them to consistently exhibit higher favorable behavior tendencies for acquiring the positive feelings and perceived utilities.

Therefore, applying similar logic, we may see these relationships reappearing in the content Web surfing context and infer that the positive A_{web} developed toward a favorable content site shall also be able to induce frequent visiting or even loyalty toward that site. Especially under the situation of facing nearly countless content sites over the Internet (Peng and Hsu, 2002), the effects induced by the knowledge and utilitarian functions of A_{web} might be even stronger than ever. However, in the literature to date, the empirical knowledge of whether A_{web} can successfully lead to users' frequent site usage or loyalty is still absent; besides, in their operationalization of the A_{web} construct, the concept of intention to revisit has already been incorporated (Chen and Wells, 1999; Chen *et al.*, 2002). Therefore, in order to avoid the risk of testing a tautology that is meaningless in a proposition or hypothesis (Hunt, 1991), and also to further extend the explanatory ability from revisit intention to Web site usage and loyalty concerning the online content industry, we bypass the revisiting issue and propose:

H6. The Web users' A_{web} will be positively associated with content Web surfers' Web site usage.

H7. The Web users' A_{web} will be positively associated with content Web surfers' loyalty toward Web site.

Interrelationships within the content perceptual antecedents

Since this study integrates two different theoretical systems of A_{web}'s antecedents, we have to also examine the interrelationships among these antecedent variables that still have not been explored in the literature.

In their series of empirical testing of the A_{ST} model, the inter-correlations among informativeness, entertainment, and organization have been found but unexplained (Chen and Wells, 1999; Chen *et al.*, 2002). Certainly, whether these covariations stem from inner causal relationships or the common consequence effect on A_{web} is not well understood. We examine these antecedents and look for the theoretical relationships in the literature, and find there shall be some stories.

The so-called "embedded digression problem" or "art museum phenomenon" is to describe a browser losing his way or retaining very limited impressions in surfing within the hypermedia environment (Carolyn, 1989). Researchers in human-computer interaction or hypermedia areas have tried to develop navigational mechanisms or rules of delivering organized content to solve such a problem (Carolyn, 1989; Shneiderman, 1998; Nielsen, 1999), for a Web media distracting or irritating users is very likely to provoke undesired

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attitudinal or behavioral responses (Chen and Wells, 1999; Chen *et al.*, 2002).

However, past literature has seemed to over-emphasize the effect of the perceived organization upon attitudinal responses and rather neglect the relationship between organization and informativeness. In fact, there is nearly infinite space to provide informational content on the Web (Singh and Dalal, 1999; Eisenmann, 2002). Content providers in particular usually have trouble in designing an efficient interface to deliver their plentiful content products (Shneiderman, 1998; Nielsen, 1999). Therefore, it can be expected that if the organization of Web content is increased, the efficiency of browsing for wanted information of a user is also raised, which in turn satisfies a user's informational needs and thus enhances the perceived informativeness of the Web content. We therefore propose:

H8. The perceived organization of Web content will be positively associated with content Web surfers' perceived informativeness of Web content.

In their proposed explanatory framework of online browsing behavior, Hoffman and Novak (1996) have linked the telepresence variables to the flow construct, which is a concept reflecting the users' perceptions of the medium as playful and thus close to the entertainment concept. In their arguments, the telepresence variables – interactivity and vividness – can directly lead to the enjoyment of users by its effects of generating sensorial directness of feeling in a virtual space, or indirectly exert the mediated influences upon the enjoyment of users by increasing the focused attentions toward the media. Both influencing paths are eventually helpful in driving the playful feelings of users; nonetheless, such a relationship has not been empirically well understood, encouraging us to incorporate and test these paths in our study. We therefore propose:

H9. The perceived interactivity of Web content will be positively associated with content Web surfers' perceived entertainment of Web content.

H10. The perceived vividness of Web content will be positively associated with content Web surfers' perceived entertainment of Web content.

Control variable in the explanatory model

In order to solidify all the explanatory relationships among content perceptions, attitude, and behavioral consequences in our research model, we also include a control variable – attitude toward brand (A_b hereafter), which has been argued and supported to be associated with the attitudinal or behavioral variables in commercial contexts (Stevenson *et al.*, 2000; Balabanis and Reynolds, 2001; Supphellen and Nysveen, 2001).

The A_b construct has been found to be linked with the A_{web} construct, from both antecedent and consequent perspectives. In these studies, their basic logic is to demonstrate the conditioning effect of A_b that may easily blind Web users to the positive aspects of a Web site. No matter how the causal direction is specified, the associating relationship is already evident, implying that there might be still a threat to the viability of the explanatory variable set under the non-shopping context. Therefore the A_b construct is going to be treated as an extraneous variable that is outside our research scope but is going to be collected and controlled in explanatory models of attitudinal and behavioral variables.

Methodology

Data collection and analytic methods

The methodology of this study is a lab-controlled survey, which is a questionnaire survey on subjects under specific laboratory environment and thus helpful for increasing the internal validity of research findings than a field setting design (Cooper and Shindler, 1998). We use gifts as incentives to recruit 183 volunteer college students from three major universities in northern Taiwan as convenient samples. They are invited and instructed by the researchers to participate in this study in campus Internet labs. These Internet labs have broadband streaming at 100 kbps or above and are all equipped with Pentium-III multimedia PCs operating in an Windows98/IE environment in order to rule out the effects of variant performances of network transmission, hardware, and software.

The Web surfing context for the online content industry is set as the e-news sites, for their representativeness and major share in sectors of the online content industries (Eisenmann, 2002; Peng and Hsu, 2002). In total, 18 e-news sites held by the three major types of news content providers online in Taiwan are sampled in the site pool (see Table AI in the Appendix) as the stimulus candidates to anchor the perceptions of research subjects. For automating the control process, the researchers develop a Web-based system to randomly generate a site link within each category of e-news site and display them in random orders to avoid systematic perceptual biases caused by fixing the visiting sequence of site types. The procedure is to let subjects follow their given lists of visiting three e-news sites and freely browse each site for a certain period of time, and then complete the questionnaire corresponding to that site.

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Therefore, a total sample size of 183 college students is expected to create $3 \times 183 = 549$ empirical observations.

In addition to basic descriptive analysis, this study mainly uses principal component factor analysis (PCFA) to preliminarily examine the measurement quality and then the structural equation modeling (SEM) technique to simultaneously test the measurement and structure model of our proposed theoretical relationships (Hair *et al.*, 1998; Kadipasaoglu *et al.*, 1999). All the analytic procedures are conducted by SPSS 10.0 and EQS for Windows 5.3.

Measurement

All the research variables shown in the research model can be operationalized through referencing the well-developed instruments in the literature. We adapt scales the literature for the empirical context of content Web surfing and have several discussions to examine the content validity of the scales (Hair *et al.*, 1998). In addition, a series of pre-tests and group interviews with graduates and under-graduates are also held to further secure the validity of the scales (Hair *et al.*, 1998). According to the insights provided by these procedures, only minor adjustments in the questionnaire statements are conducted. All the research constructs, items, and references are provided in Table AII in the Appendix.

Data analysis

Descriptive analysis of samples

We tabulate the major characteristics of subjects in Table AIII in the Appendix to sketch out the sample profile. From this, we can observe the sample features to assess the sample quality of this study. They majority are female (57.9 percent), young (17-24 years old, 92.3 percent), and regular Internet users with years of Internet usage experiences (3-6 years, 70.9 percent). Therefore, collecting a convenient sample for the purpose of employing the lab-controlled survey methodology produces moderately homogenous sample pool, which is often regarded as inevitable in campus-recruiting studies. However, such a sample profile provides an appropriate mapping to the latest real picture of e-news site visitors in Taiwan, who are characterized as mainly early 20s, highly educated, and predominantly female (Li, 2002). Thus these subjects are sufficiently knowledgeable to provide answers to Web-related questionnaires and still representative to some extent in reflecting the real characteristics for the population of news site surfers.

Preliminary measurement validation and purification

In this study, a total of 37 five-point scale items for measuring nine factors shown in the research model are collected. In order to preliminarily examine and purify the measurement models, the PCFA is utilized. As depicted in Table AIV in the Appendix, after deleting the undesired item that failed to be firmly governed by its corresponding factor (AWEB1, communality < 0.5), the result encouragingly shows that all the measurement models exactly produce single-factor solutions and acquire the Cronbach α value in the interval of 0.74-0.92. Therefore, the reliability and convergent validity of the measurements are preliminarily secured and thus appropriate for the further conduction of SEM (Hair *et al.*, 1998).

SEM

To strictly test our proposed theoretical relationships, the contemporary second generation multivariate analytic technique, SEM, is employed (Fornell, 1982). The full model simultaneously incorporating the measurement and structural model is specified to test the fitness between theoretical specifications and the empirical data set. Encouragingly, it reaches an acceptable fit (CFI = 0.911, IFI = 0.911, NNFI = 0.902, RMR = 0.061) (Bentler, 1990; Gerbing and Anderson, 1993; Byrne, 1994). The full SEM is presented in Figure 3.

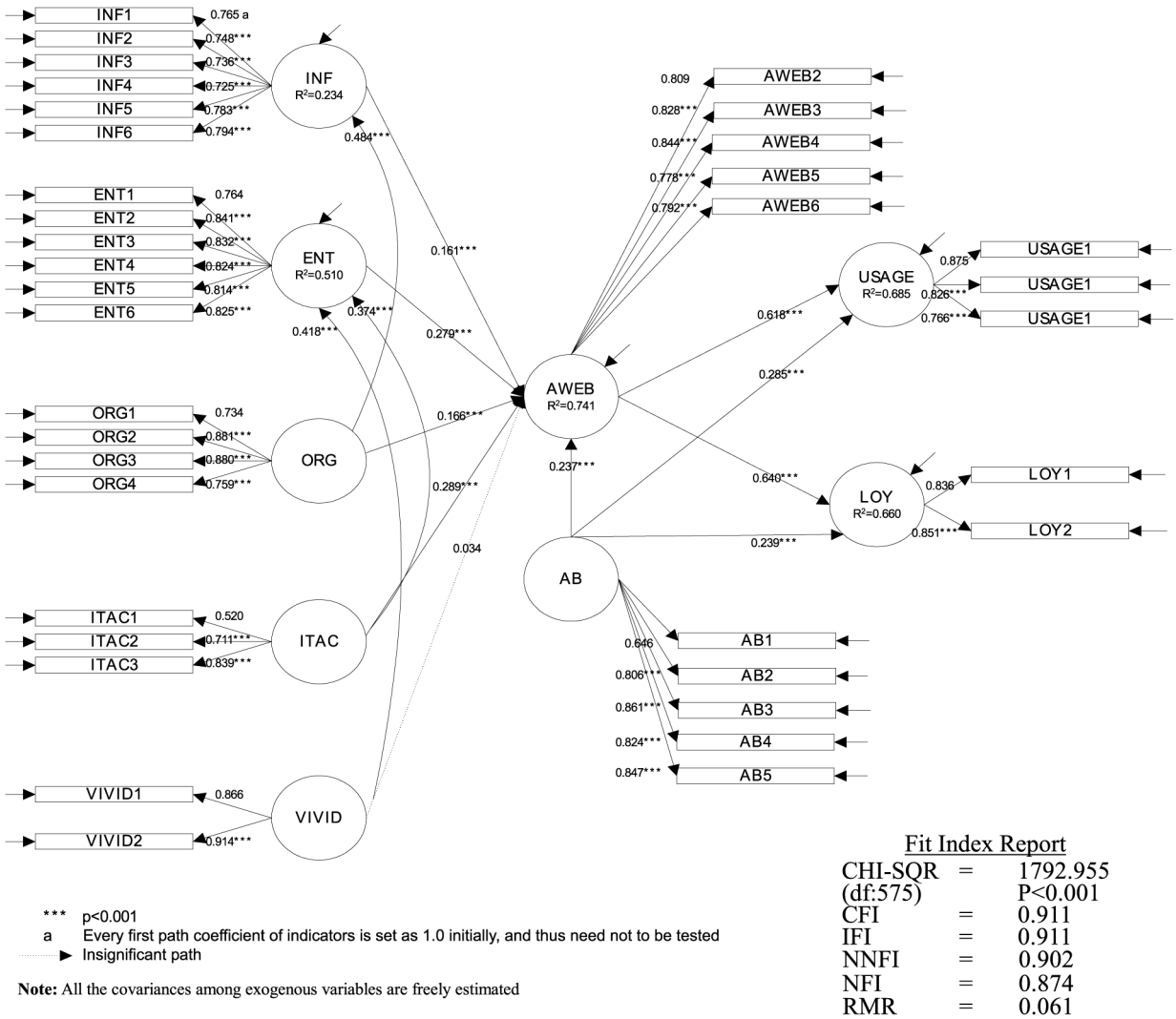
Measurement model estimation

To further examine the construct validity of the measurement, we observe the indicators' path solutions estimated by the full modeling procedure. From examining the measurement model estimation solutions provided in Table AV in the Appendix, each item's factor loading is greater than twice its standard error ($p < 0.001$) and thus convergent to the corresponding construct (Anderson and Gerbing, 1988). Besides, combined with considering the factor correlation matrix reported by the EQS software (as in Table AVI in the Appendix), and the items' variances extracted by factors (as in Table AIV in the Appendix), each explained variance (squared correlation) between latent factors is smaller than the items' variance extracted by factor, thus indicating that all the constructs are sufficiently discriminant (Fornell and Larcker, 1981; Hair *et al.*, 1998). Therefore, the measurement quality of this study found to be more than sufficient by the SEM technique.

Structural model estimation and hypothesis testing

Statistical assumptions. Although the overall acceptable fit with the empirical data set is achieved in the SEM analysis, before examining

Figure 3 Full structural equation modeling diagram



the testing results of hypotheses, we still have to diagnose whether statistical assumptions are well satisfied. There are three important assumptions associated in path analytic techniques – normal distribution of variables, absence of multicollinearity among variables, and the number of variables in the model (Hair *et al.*, 1998).

Using *z*-values to test the normality of the composite score for the nine constructs, five of the nine fail to pass skewness normality test and two of the nine fail to pass kurtosis normality test (skewness: 0.002-0.721, $z = 0.019$-6.866; kurtosis: 0.005-1.361, $z = 0.023$-6.511). However, the risk of overly relying on statistical tests for diagnosing normality has been indicated (Hair *et al.*, 1998). Thus we use a graphical tool – the QQ plot suggested by Sharma (1996) – to diagnose the normality of each construct. Encouragingly, as depicted in Figure A1 in the Appendix, all plots displayed are close to being acceptably linear, indicating that it can be judged as no significant violation to the normality assumption. We can also observe that each composite score's skewness is not higher than 2 and each composite score's kurtosis is not higher than 5, indicating that these variables are well distributed and that the subjects are not from a biased sample (Ghiselli *et al.*, 1981). Therefore, the external validity of the research findings can be expected to some extent as well.

The multicollinearity problem in the explanatory variable set can be diagnosed through observing the factor correlation matrix in SEM (as in Table AVII in the Appendix). None of the coefficients is greater than 0.8, indicating that it can be judged as no significant violation to the non-multicollinearity assumption. This also provides a robust basis for the interpretations of

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the results in path analysis (Anderson and Gerbing, 1988).

As to the number of parameters estimated in SEM, there is still no absolute mechanism to diagnose this assumption; however, according to the working log reported by the EQS software, all the parameter estimations and tests converged and were solved in six iterations. This certainly frees the concerns of the parameter number problem. After all the assumptions are diagnosed, we can then check the results of the hypothesis testing reported in Table AVIII in the Appendix and make sense out of them.

Hypothesis testing. In *H1-H5*, we propose the content perceptual antecedent model for the A_{web} construct. With controlling the A_b's extraneous effect, the standardized effects generated by informativeness, entertainment, organization, interactivity, vividness upon A_{web} are 0.161 ($z = 4.645$, $p < 0.001$), 0.279 ($z = 6.024$, $p < 0.001$), 0.166 ($z = 4.010$, $p < 0.001$), 0.289 ($z = 4.414$, $p < 0.001$), 0.034 ($z = 0.746$, insignificant) respectively. Therefore *H1-H4* are strongly supported. However, *H5* is not supported.

In *H6* and *H7*, we propose the behavioral consequence model for the A_{web} construct. When controlling the A_b's extraneous effect, the standardized effects generated by A_{web} upon Web site usage and loyalty are 0.618 ($z = 12.460$, $p < 0.001$), 0.640 ($z = 11.808$, $p < 0.001$) respectively. Therefore, *H6* and *H7* are strongly supported.

In *H8-H10*, we propose the interrelationships within the content perceptual antecedents. The standardized effect generated by organization upon informativeness is 0.484 ($z = 9.483$, $p < 0.001$); the standardized effects generated by interactivity, vividness upon entertainment are 0.374 ($z = 5.970$, $p < 0.001$), 0.418 ($z = 7.565$, $p < 0.001$) respectively. Therefore, *H8-H10* are strongly supported.

Discussion

The content perceptual antecedent model of A_{web}

For A_{ST} variables

Based on the results of the hypothesis testing, with control of the extraneous effect of A_b, all the content perceptual variables suggested by the A_{ST} model are still found to be strongly significant in explaining the A_{web} construct and thus successfully extended into the non-commercial context by this study. However, as we expected earlier, the influencing effects induced by informativeness, entertainment, organization upon A_{web} varied from the commercial contexts where they were originally explored. In the content Web surfing context of this study, comparing to the phenomenon that the informativeness dimension is the strongest factor within the three A_{ST} variables driving A_{web} under the commercial contexts, we observe that the entertainment dimension has become the strongest one. We shall seek probable reasons for this deviation. Possible explanations of the findings above may be attributed to the motivational issues of Web users and the information quality offered by online content providers.

According to the Internet survey reports, in recent years, seeking sources of digital content for recreational purposes has been one of the major activities performed by Web users on e-news sites (Peng and Hsu, 2002). Therefore, from the motivational perspective, being satisfied with the entertainment attributes of a news site may generate the most positive experiences for Web users, and may help to develop the most favorable attitudes toward a news site. We can also find literature foundations supporting such an argument. For Web surfers without pre-specified tasks in minds, Singh and Dalal (1999) have proposed that the emotional aspects of the message content will tend to exert greater persuasive influences than the informational component. In similar arguments, Hoffman and Novak (1996) also have positioned the Web browser as fun-seekers rather than information searchers in most cases, and therefore they have introduced the flow concept to explore the explanatory factors inducing people's feelings of enjoyment.

On the other hand, online content providers today are facing a channel conflict dilemma on the decision of content delivery vehicles (Peng and Hsu, 2002). Driven by the fear of a decline in their existing content product sales, they are reluctant to offer high-quality information online. This certainly may lead to lowering the average level of expectations of Web users for acquiring knowledgeable information on news sites and thus dilute the effect of informativeness on A_{web}.

Besides the phenomenon above, the organization is also found to be effective in leading to the perceived informativeness of Web surfers. This finding not only supports the rationale for the human-computer researchers to devote time to exploring mechanisms for efficiently navigating users on Webs, but also further clarifies the interrelationships within the content perceptual dimensions that have not yet been considered in the A_{ST} theoretical model (Chen and Wells, 1999; Chen *et al.*, 2002).

For telepresence variables
Based on the results of the hypothesis testing, with control of the extraneous effect of A_b, the content perceptual variables suggested by the telepresence theory are not both found to be significant in explaining the A_{web}. Only interactivity significantly explains A_{web}, while vividness does not survive in the independent variable set. It shows that under the non-shopping context, Web surfers experiencing vivid content tend to insufficiently and indirectly develop positive attitudes toward the Web site, implying that there might be needs for theory modifications in the telepresence theory for A_{web} in non-shopping contexts.

By combining the empirical evidence for telepresence variables significantly explaining the perceived entertainment of Web surfers, and the A_{ST} variables' ability to successfully induce A_{web}, we believe that under the non-shopping context, the effect generated by vividness upon A_{web} may indirectly affect the mediation of entertainment, rather than directly linking to A_{web}. Certainly, such a proposition shall be further examined through more sophisticated empirical validations. However, we tend to be convinced by such empirical evidence to modify the telepresence theory for A_{web}. In online marketing studies, delivering vivid product information or advertisements has been argued and found to be crucial for its effectiveness in raising online shoppers' attitudes and purchase intentions (Coyle and Thorson, 2001; Eisenmann, 2002). Nonetheless, in free-surfing situations without shopping tasks in minds, it seems reasonable for people not to rely on vivid content to develop favorable attitudes, so the direct relationship between vividness and A_{web} might be weakened.

The behavioral consequence model of A_{web}

What we propose as the behavioral consequences of A_{web} are Web site usage and loyalty, which are especially crucial for the online content business. Encouragingly, with control of the extraneous effect of A_b, the A_{web} construct can be found to induce them successfully. Such a finding not only extends the explanatory capability of A_{web} to more favorable behavior toward Web site than just revisiting, but also sets up the robust basis to persuade content providers to pay attention and create effective content strategies to induce favorable attitudes in Web surfers. Especially in the Internet business, managers are trying their best to keep their online customers from switching to other sites, but this is no easy task (Afuah and Tucci, 2001; Eisenmann, 2002). Now that we have demonstrated that A_{web} works in leading Web surfers to frequently and loyally use the content site, both managerial scholars and practitioners in electronic commerce industries may particularly be interested in this research finding.

The justification for the mediating effect of the A_{web} construct

Within the traditions of attitudinal psychology, there has long been a debate regarding the existence of the attitude construct, because its highly predictive power concerning behavioral intentions, or even actual behavior, makes critical researchers posit the challenge that the construct is virtually created for just academic games (Eagly and Chaiken, 1993). To observe the empirical evidence related to the debate described as above and fully explore the interrelationships residing in the proposed theoretical model as well, a series of LM-tests are also conducted to examine whether there are any significant reasons to add additional causal linkages between variables shown in the SEM model (Byrne, 1994).

According to the LM report by the EQS software, however, no suggestion is made for inserting any path from the content perceptual antecedents to the behavioral consequences in order to significantly increase the model fit. It shows that although the relationships between A_{web} and behavioral consequences are extremely significant, all the content perceptual antecedents still have to indirectly influence the behavioral consequences through the mediation of the A_{web} construct. Therefore, it is evident that the important mediating role of the attitudinal construct is again justified in this study and thus deserves sustained investigations in Internet studies.

Conclusion

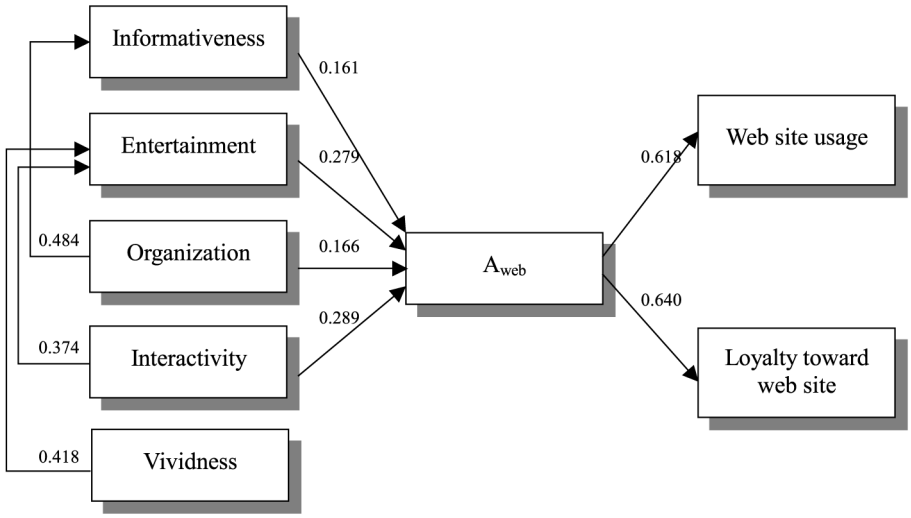
Summary and the proposed theoretical model

The purpose of this study is to choose the content perception perspective to develop and test a coherent theoretical model proposed especially for the online content industry. After carefully setting up the theoretical foundations with elaborate empirical testing, we believe the clarification of the relationships among content perceptions, attitude, and behavioral outcomes is going to greatly affect content policy making in the online content industry. We name this theoretical model as the "content perception theory", which is proposed and summarized in Figure 4.

Implications

Selecting the content perception variables suggested by the A_{ST} model and the telepresence

Figure 4 The proposed content perception theory model



Note: Paths are in Standardized beta coefficients with controlling the extraneous effect of A_b upon attitudinal and behavioral variables

theory as the perspective to construct the research model helps us to successfully incorporate more comprehensive content perceptual dimensions to explain how Web surfers develop favorable attitudes and behavior toward content sites. In addition, extending previous theoretical arguments into the non-shopping context and specifically identifying the needs and ways to modify the existing theoretical models also echo the importance of theory replications and extensions in social sciences, which are dynamically evolved and complex in nature (Berthon *et al.*, 2002). It is certain that such a theoretical model should be taken into further validations for solidifying the substantive relationships. However, this study already provides both the logical derivations and the feasible empirical design and thus contributes to the theory building and testing for the electronic commerce literature.

Further, linking the attitudinal psychology model to the variables mostly concerned with the online content industry also enables us to cope with the most urgent managerial issues for the online content business. The concept is that a strategy means is a specific series of decisions and actions that managers take to achieve organization's goals (Hill and Jones, 1998). Since how to strive for content Web surfers' preferences, frequent visits, and loyalties through delivering major content perceptions is preliminarily uncovered by this study, online content business managers can now start to consider introducing the proposed theoretical model as a strategic framework to maximize the utilities of their content producing investments. From the theoretical model proposed above, we can tell the relative importance of every model path (Hair *et al.*, 1998), and thus acquire sufficient knowledge for the impact of each content perception upon content surfers. This certainly can directly help the content providers to examine and adjust their policies of Web content design. Based on the empirical findings, we recommend content providers to first produce Web content delivering more entertainment and interactivity perceptions for users in order to attract surfers more effectively and quickly. However, in the long run, how to set up the best portfolio of content materials may still remain a challenging issue and deserve further investigations.

Limitations and future research directions

Although variables shown in the research model provide significant implications for both the managerial research and practice of electronic commerce, readers ought to pay attention to interpreting the findings in this study. What we focus on for the theory building is selecting major content perceptual dimensions as the antecedent perspective for A_{web}, implying that the scope for the explanation and prediction toward the A_{web} construct and subsequent dependent variables is surely limited. In other words, there is still much potential in this area of research. Future studies may attempt to explore more antecedent views or to incorporate more content perceptual variables. They can also further trace backward to investigate what content materials and design elements would specifically induce the perceptual antecedents of A_{web}, or continuously seek forward from behavioral variables to identify actual site

performance variables for the online industry in order to coherently enrich and connect the theoretical systems of the A_{web} research.

Certainly, the sample quality concerns from the lab design of this study have to be relieved by future studies. A larger sample size, more heterogeneous subjects, and more diversified content site contexts are more desirable to effectively infer the real picture of the cyberspace and would certainly be helpful in raising the external validity and nomological validity of the proposed theory. Moreover, since a theoretical model portraying the psychological paths of content Web surfing has been proposed and preliminarily validated in this study, efforts should be also be made to exploit the theoretical model as an industrial analytic tool for comparing the advantages and weaknesses across different competing media or Web sites. The SWOT model usually adopted in strategy formulations may also be useful for collaborative considerations in such a research issue (Hill and Jones, 1998).

Concluding remarks

Individual psychological constructs have been very popular and play important roles in the social psychology and consumer behavior literature; however, they have been still relatively unexplored in the Web site success studies. This study is a preliminary attempt to investigate why and how people respond favorably to specific content sites and their implications for the online content business as well. We hope to introduce an innovative perspective and thus inspire more future studies to enrich the literature of electronic commerce industrial research.

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Appendix

Table AI News site pool of the empirical design

E-news site type	E-news site
Held by major Internet portals in Taiwan	http://news.sina.com.tw/newsCenter/index.html
	http://times.hinet.net/index.jsp
	http://news.pchome.com.tw/
	http://tw.news.yahoo.com/
	http://news.yam.com/
Held by major TV corporations in Taiwan	http://www.pts.org.tw/php/news/new_main.php
	http://www.ftvn.com.tw/
	http://www.ettoday.com/
	http://www.cts.com.tw/
	http://www.tvbs.com.tw/index/
	http://www.ttv.com.tw/HomeV2/News/default.htm
	http://www.chinatv.com.tw/ctv_news/a1.php
Held by major newspaper publishers in Taiwan	http://news.chinatimes.com/
	http://udn.com/NEWS/mainpage.shtml
	http://www.libertytimes.com.tw/
	http://www.taiwandaily.com.tw/synth.htm
	http://www.tssdnews.com.tw/paper.htm
	http://www.cdn.com.tw/welcome.htm

Table AII Measurements of this study

Constructs	Definition	Source or reference base	Items	Measures (five-point Likert scale)
Informativeness (INF)	The extent of insightful and knowledgeable content that a Web site delivers	Chen and Wells (1999) and Chen *et al.* (2002)	INF1	Informative
			INF2	Intelligent
			INF3	Knowledgable
			INF4	Resourceful
			INF5	Useful
			INF6	Helpful
Entertainment (ENT)	The extent of interesting and fun to watch for entertaining Web users	Chen and Wells (1999) and Chen *et al.* (2002)	ENT1	Fun
			ENT2	Exciting
			ENT3	Cool
			ENT4	Imaginative
			ENT5	Entertaining
			ENT6	Flashy
Organization (ORG)	Gauging how well a Web site presents itself and tour-guide its users	Chen and Wells (1999) and Chen *et al.* (2002)	ORG1	Not Messy
			ORG2	Not Cumbersome
			ORG3	Not Confusing
			ORG4	Not Irritating
Interactivity (ITAC)	The extent to which users can participate in modifying the form and content of a mediated environment in real time	Steuer (1992), Kim and Biocca (1997) and Coyle and Thorson (2001)	ITAC1	I feel it's fast when I interact with this Web site
			ITAC2	I feel there are lots of things for me to manipulate with on this Web site
			ITAC3	I feel it's easy and intuitive to interact with this Web site
Vividness (VIVID)	The representational richness of a mediated environment	Steuer (1992), Kim and Biocca (1997) and Coyle and Thorson (2001)	VIVID1	I think there are lots of sensorial materials on this Web site
			VIVID2	I think the sensorial materials of this Web site are quite vivid

(continued)

Table AII

Constructs	Definition	Source or reference base	Items	Measures (five-point Likert scale)
Attitude toward Web site (AWEB)	The reflection of a Web user's predisposition to respond favorably or unfavorably to Web content	Chen and Wells (1999) and Chen *et al.* (2002)	AWEB1	This Web site makes it easy for me to build a relationship with this company
			AWEB2	I may come to this Web site again in the future
			AWEB3	I'm satisfied with the service provided by this Web site
			AWEB4	I feel comfortable in surfing this Web site
			AWEB5	I feel surfing this Web site is a good way for me to spend my time
			AWEB6	Compared with other Web sites, I would rate this one as . . . (extremely bad-good)
Web site usage (USAGE)	The extent of how frequently and heavily a user uses the target media source	Johnson and Kaye (1998)	USAGE1	I would like to use this Web site frequently
			USAGE2	I would like to spend a lot of time on this Web site
			USAGE3	I would like to view this Web site as an important information source
Loyalty toward Web site (LOY)	The affective and mental loyalty exhibition toward a target Web site	Bloemer and Kasper (1995) and Supphellen and Nysveen (2001)	LOY1	I feel that I have a relationship to this Web site
			LOY2	I prefer this Web site even when other Web sites have better offers
Attitude toward the site holder's brand (AB)	The reflection of a Web user's predisposition of responding favorably or unfavorably to the Web site holder's brand	Aaker (1996) and Balabanis and Reynolds (2001)	AB1	Good value for money
			AB2	Innovative
			AB3	Admirable
			AB4	High quality
			AB5	Interesting

Table AIII Sample demographics

Samples	Demographics	Levels	Percent
183 (183 × 3 = 549 observations)	Gender	Male	42.1
		Female	57.9
	Age (years)	17	0.6
		18	44.2
		19	38.1
		20	5.5
		22	3.3
		24	0.6
		28	1.1
		33-37	2.9
		40-60	4.2
	Internet usage (years)	1	6.2
		2	4.5
		3	11.8
		4	22.5
		5	15.8
		6	20.8
		7	15.2
		8	3.3

Table AIV PCFA of the measurement models

Factor loading	Mean	SD	Commu-nality	INF	ENT	ORG	ITAC	VIVID	AWEB	USAGE	LOY	AB	Eigenvalue	Variance extracted (%)	Reliability – Cronbach α
INF1	3.690	0.700	0.669	0.818									3.894	64.90	0.891
INF2	3.510	0.694	0.650	0.806											
INF3	3.650	0.664	0.638	0.799											
INF4	3.732	0.716	0.596	0.772											
INF5	3.728	0.691	0.669	0.818											
INF6	3.719	0.667	0.671	0.819											
ENT1	3.225	0.801	0.669		0.818								4.361	72.69	0.924
ENT2	2.894	0.799	0.650		0.806										
ENT3	2.791	0.820	0.638		0.799										
ENT4	2.815	0.842	0.596		0.772										
ENT5	3.068	0.925	0.669		0.818										
ENT6	2.901	0.901	0.671		0.819										
ORG1	3.485	0.839	0.664			0.815							3.027	75.66	0.891
ORG2	3.585	0.812	0.821			0.906									
ORG3	3.669	0.787	0.824			0.908									
ORG4	3.688	0.820	0.717			0.847									
ITAC1	3.321	0.721	0.534				0.731						1.965	65.52	0.737
ITAC2	3.434	0.778	0.702				0.838								
ITAC3	3.390	0.813	0.729				0.854								
VIVID1	3.229	0.872	0.887					0.942					1.776	88.79	0.874
VIVID2	3.059	0.890	0.887					0.942							
AWEB1[a]	2.998	0.799	0.479						0.692				4.115	68.58	0.911
AWEB2	3.379	0.848	0.760						0.872						
AWEB3	3.347	0.762	0.755						0.869						
AWEB4	3.377	0.770	0.771						0.878						
AWEB5	3.295	0.869	0.686						0.828						
AWEB6	3.507	0.745	0.664						0.815						
USAGE1	3.064	0.824	0.819							0.905			2.394	79.808	0.870
USAGE2	2.782	0.822	0.812							0.901					
USAGE3	2.934	0.943	0.762							0.873					
LOY1	2.908	0.782	0.857								0.926		1.713	85.66	0.829
LOY2	2.847	0.891	0.857								0.926				
AB1	2.826	0.710	0.543									0.737	3.562	71.23	0.898
AB2	2.996	0.765	0.743									0.862			
AB3	3.079	0.788	0.767									0.876			
AB4	3.039	0.758	0.778									0.882			
AB5	3.070	0.859	0.729									0.854			

Note: [a] Item failed to be firmly governed by corresponding factor (communality < 0.5)

Table AV Measurement model estimation solutions in SEM

Scale items	Factor loading estimates	Standard error	*z*-value	Significance level	Standardized path coefficient
INF1	1.000	/	/	/	0.765
INF2	0.985	0.057	17.313	*	0.748
INF3	0.916	0.054	17.022	*	0.736
INF4	0.953	0.057	16.724	*	0.725
INF5	1.018	0.056	18.227	*	0.783
INF6	0.977	0.053	18.516	*	0.794
ENT1	1.000	/	/	/	0.764
ENT2	1.086	0.053	20.524	*	0.841
ENT3	1.112	0.055	20.280	*	0.832
ENT4	1.165	0.058	20.045	*	0.824
ENT5	1.225	0.062	19.744	*	0.814
ENT6	1.193	0.059	20.057	*	0.825
ORG1	1.000	/	/	/	0.734
ORG2	1.154	0.058	19.839	*	0.881
ORG3	1.115	0.056	19.812	*	0.880
ORG4	1.028	0.060	17.060	*	0.759
ITAC1	1.000	/	/	/	0.520
ITAC2	1.431	0.133	10.771	*	0.711
ITAC3	1.772	0.155	11.459	*	0.839
VIVID1	1.000	/	/	/	0.866
VIVID2	1.050	0.047	22.123	*	0.914
AWEB2	1.000	/	/	/	0.809
AWEB3	0.896	0.041	21.968	*	0.828
AWEB4	0.945	0.042	22.542	*	0.844
AWEB5	0.981	0.049	20.121	*	0.778
AWEB6	0.845	0.041	20.635	*	0.792
USAGE1	1.000	/	/	/	0.875
USAGE2	0.940	0.041	22.861	*	0.826
USAGE3	0.982	0.048	20.497	*	0.766
LOY1	1.000	/	/	/	0.836
LOY2	1.166	0.058	20.083	*	0.851
AB1	1.000	/	/	/	0.646
AB2	1.344	0.086	15.621	*	0.806
AB3	1.461	0.089	16.395	*	0.861
AB4	1.358	0.086	15.877	*	0.824
AB5	1.564	0.097	16.200	*	0.847

Notes: / No estimation due to setting the path coefficient as 1.0. * $p < 0.001$

Table AVI Factor correlation matrix reported by SEM

	INF	ENT	ORG	ITAC	VIVID	AWEB	USAGE	LOY	AB
INF	1								
ENT	0.166	1							
ORG	0.484	0.343	1						
ITAC	0.254	0.635	0.525	1					
VIVID	0.17	0.652	0.351	0.625	1				
AWEB	0.403	0.674	0.578	0.762	0.604	1			
USAGE	0.293	0.543	0.447	0.646	0.518	0.798	1		
LOY	0.295	0.538	0.445	0.635	0.508	0.791	0.672	1	
AB	0.152	0.444	0.315	0.617	0.511	0.634	0.676	0.645	1

Table AVII Structural model estimation solutions in SEM

Endogenous variable		Explanatory variables									R^2	Error
		INF	ENT	ORG	ITAC	VIVID	AWEB	USAGE	LOY	Control variable (AB)		
INF	Path coefficient estimates			0.419							0.234	0.766
	Standard error			0.044								
	z-value			9.483								
	Significance level			*								
	Standardized path coefficient			0.484								
	Hypothesis testing result			*H8* supp.								
ENT	Path coefficient estimates				0.595	0.334					0.510	0.490
	Standard error				0.100	0.044						
	z-value				5.970	7.565						
	Significance level				*	*						
	Standardized path coefficient				0.374	0.418						
	Hypothesis testing result				*H9* supp.	*H10* supp.						
AWEB	Path coefficient estimates	0.202	0.307	0.179	0.506	0.030				0.345	0.741	0.259
	Standard error	0.043	0.051	0.045	0.115	0.040				0.063		
	z-value	4.645	6.024	4.010	4.414	0.746				5.499		
	Significance level	*	*	*	*					*		
	Standardized path coefficient	0.161	0.279	0.166	0.289	0.034				0.237		
	Hypothesis testing result	*H1* supp.	*H2* supp.	*H3* supp.	*H4* supp.	*H5* not supp.						
USAGE	Path coefficient estimates						0.658			0.440	0.685	0.315
	Standard error						0.053			0.073		
	z-value						12.460			6.017		
	Significance level						*			*		
	Standardized path coefficient						0.618			0.285		
	Hypothesis testing result						*H6* supp.					
LOY	Path coefficient estimates						0.612			0.332	0.660	0.340
	Standard error						0.052			0.069		
	z-value						11.808			4.780		
	Significance level						*			*		
	Standardized path coefficient						0.640			0.239		
	Hypothesis testing result						*H7* supp.					

Note: * $p < 0.001$

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Figure A1 The QQ-plot of the research constructs