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ABSTRACT

The goal of this research is to develop and test a theoretical model of the effects of intrinsic and extrinsic motivations on user acceptance of Internet-based information services. The model, referred to as the integrated model of technology acceptance, is being developed with two major objectives. First, it should improve our understanding of user acceptance behavior, providing new theoretical insights into the successful design and implementation of Internet-based information services. Second, the integrated model should provide the theoretical basis for a practical system design and analysis approach that would enable practitioners to develop new information services or modify their current services.

For user acceptance to be viable, the model of user acceptance must be valid. The present research takes several steps toward establishing a valid motivational model of the user, and aims to provide the foundation for future research that will lead toward this end. Research steps taken in the present research include: (1) choosing U&G (Uses and Gratifications) theory, a well-studied theoretical approach from mass communication to formulate an integrated technology acceptance model with TAM (Technology Acceptance Model); (2) developing and pre-testing the measures for the model's factors in two pilot studies; (3) conducting two rounds of data collection and analyze them to prove that the integrated model is applicable to the present context; (4) reviewing literature in both information systems and mass communication to demonstrate that empirical support exists for various elements of the proposed model, and (5) using advanced statistical technique, structural equation modeling (SEM), to test the model's structure.

The results confirm our proposed integrated model. The model posits that entertainment motivation is another important factor in determining the use of online services in addition to the behavioral intention, as postulated by TAM. The integrated model also confirms that TAM's belief constructs, perceived ease of use and perceived usefulness, are predictors of behavioral intention. Furthermore, perceived usefulness predicts behavioral intention. It also argues that the level of use influences the degree of satisfaction. Satisfaction is a construct that is heavily studied due to its important role as an indicator of system success.

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LIST OF ABBREVIATIONS

Constructs	Abbreviations
Perceived Ease of Use	PEU
Perceived Usefulness	PU
Behavioral Intention	BI
Behavioral Usage	BU
Satisfaction	S
Models	
Technology Acceptance Model	TAM
Uses and Gratifications Theory	U&G Theory

CHAPTER 1

INTRODUCTION

The Internet represents the most important technological development of our generation. With the introduction of the World Wide Web (WWW), information on the Internet has expanded to multi-media presentation including text, graphics, audio, and video. Today, this new medium becomes a more navigable resource; users could track information on the Internet with browsing software which incorporates intelligence agents.

Business use of the Internet is bound to grow as businesses figure out how to reach their customers electronically. It is a trend that business deploys the Internet commerce in the electronic delivery of goods and services. Despite the dot com bust in the late 1990s, the strategic importance of the Internet remains. For small businesses, the Internet is a low-cost means of reaching customers; for large businesses, they are finding that they now must add Internet access to keep their proprietary networks from being isolated from other users (Hudson, 1997).

Providing information services over the Internet is an alternative for business to acquire customers and to save costs. Take the banking industry, the costs of online-banking and investment services are dramatically lower than that of traditional services (Farhoomand & Lovelock, 2001). Besides their brick and mortar bookstores, Barnes and Noble has their online shop to attract more customers. Similarly, traditional newspapers look for the opportunity of electronic delivery of news services. Major daily newspapers all had their self-administered Websites to provide information services by

1995 (Russell, 1995). In 1997, 2,297 online newspapers were available in cyberspace (Editor & Publisher, 1997).

The acceptance of the Internet-based information services becomes an issue because of the business values of these services. Understanding users' adoption of these services would help business in creating favorable user reactions to the information services.

The goal of this research is to develop and test an integrated model of the effect of intrinsic and extrinsic motivation on user acceptance of the Internet-based information services. First, it should improve our understanding of the user acceptance process. Secondly, the integrated model should provide the theoretical basis for a practical system design and analysis approach which would help practitioners to improve the information services. We begin the thesis by presenting the definition of information services. In section 1.2, 1.3, 1.4, and 1.5 respectively, we address an example of information service: online newspapers, the problem statement, research objectives, and subsequently present a guide to the dissertation.

1.1 Definition of Information Services

"Information services" is a generic term, which refers to services provided via telecommunications. Information services involve the processing of information that is transferred through a communication system. According to Newton's Telecom Dictionary (Newton, 2004), the information services have been defined as follow:

The term "information service" means the offering of a capability for generating, acquiring, storing, transforming, processing, retrieving, utilizing, or making available information via telecommunications and includes electronic publishing, but does not

include any use of any such capability for management, control, or operation of a telecommunications system or the management of a telecommunications service.

As the capacities of communication systems increase, the information services diversify into many different forms and application areas. In the telephone era, mainly voice could be transmitted through the telecommunication networks. The information services were available for users including fax store and forward, electronic publishing, text to voice conversation, and text-based news services. Today, the Internet-based information services are diverse in their capacities of storing, retrieval, sharing, and optimal use of information, so the business use of these services increases. Currently, the information services available on the Internet are penetrating almost every industry and business in some manner or form. Examples include online banking, online travel services, commercial video-on-demand system, and online newspapers. Here are some information services currently available on the Internet (adapted from Farhoomand & Lovelock, 2001):

Online banking: It is one of the Businesses to Customer (B2C) e-commerce arenas that show a rapid rate of growth. The population of the users was expected to be more than 24.2 million in 2004. The most common banking transactions conducted over the Web are checking balances on savings, checking and loan accounts, transferring money among accounts and paying bills.

Online travel services: The travel industry was one of the earliest industries to make use of the Internet. Many airlines, hotels, car rental companies, and tourist organizations went online. Their information services on the Internet provide users huge databases, services, features, and accepted enquiries and booking online.

Video-on-demand service: The world's first commercial video-on-demand system was launched by Hong Kong Telecom's Interactive Media Services (IMS) in 1998. It was regarded as the first of the next generation of full-service interactive television (iTV) systems. Services provided include video-on-demand, payment services, electronic yellow pages, network games, home shopping, and home banking.

Online newspapers: Electronic publishing gradually became popular in the early 1990s. The online newspaper is a new form of publishing adopted by media industry worldwide. The U.S. newspapers and a number of Asian publishers currently have their Websites to provide news services. The content of an online newspaper may include selected full-text articles, advertisements, job database, archive search, and so forth.

Other information services with rapid growth rates are entertainment services. The fast growing entertainment Websites are those that offering services such as online computer games, gambling, and adult contents. The above information services empower users by enabling them to personalize the services offered, to compare and select products, and to communicate instantly with others.

Among information services available on the Internet, we choose to study a type of news information service, online newspapers, because the media industry makes continuous efforts to deliver news services electronically by using the cutting-edge technologies. It appears that the media industry has been involved with many experiments of promoting technology innovation to customers, but not all the experiments were successful. For instance, a huge amount of money invested in the digital news services, teletext and videotext; however these services were failed in the

1980s and the investment was proved to be a waste. So, the big question of the industry is: why do customers accept a news information service? We see that the adoption of the news information services has great impact on the industry, so we investigate this question by involving well-established theories which we will describe in the later section.

We turn next to the definition of online newspapers and a brief discussion of some issues of online news delivery.

1.2 An Example of Information Services: Online Newspaper

Online newspapers refer to Internet-based news information services provided by traditional newspapers. Based in the World Wide Web portion of the Internet, these news information services often largely mimic the content of the print versions. In an online newspaper frontage, news stories often presents with a menu-based format and a much wider variety of information options. Unlike its print version, an online newspaper is not constrained by space and is able to provide a large number of stories on any given topic. It is an interactive medium which gives customers substantially more choice and control. It also provides easy access to information that is often buried in the depths of traditional newspapers. With the hyperlink feature, online services frequently incorporate links between news items and related studies and Web sites. Nevertheless, customers are able to participate in online polls, chat rooms, and news discussion on the Websites. The following figure shows a typical Website of an online newspaper.

Figure 1. The Website of a News Information Service

The emergence of the Internet brings opportunities to the media industry and this new medium has a great advantage for users as a news information source. From the news publishers' perspective, their online counterparts enable them to offer up-to-date information, advertisements, and value-added services via an additional communication channel. Today, newspaper publishers could design customized interface and update information many times a day. From the users' perspective, this kind of news information service allows users to be interactive, to have rapid access to a large amount of information, and to be paperless (Neuberger, Tonnemacher, Biebl, & Duck, 1998).

Given the advantages of the online services, recent Internet surveys document the rapid emergence of the Internet as a news source (The Pew Research Center, 2000; The UCLA Internet Report, 2003). Forty-eight percent of online users in general went online in the past six months for local news (Coats, 2002). Apparently, news information services attract younger and better-educated readers. Nearly half of those under age 30 (46%) go online for news at least once a week. Many more college graduates under the age of 50 go on the Internet every day rather than regularly watch one of the nightly network news broadcasts (The Pew Research Center, 2000).

Although the online services have become one of the major news sources, researchers caution that the user acceptance issue is very important. In the evolutionary process of electronic delivery of news, publishers experienced technologies such as teletext, videotext, fax, and telephone news services prior to the adoption of the Internet. When videotext was developed in the mid 1980s, media conglomerates invested a huge amount of money; however, almost all commercial videotext projects failed because of lack of the critical mass. Times Mirror's Gateway was a videotext system launched in the late 1980's, and it had only 500 subscribers by mid 80's (Rogers, 1986). Therefore, researchers note that in order to avoid commercial failure like the videotext, today's Web-based online newspapers are trying to discover content and format that will achieve audience acceptance (Cameron, Curtin, Hollander, Nowak, & Shamp, 1996).

In fact, competition in the digital world is extremely high. With millions of sites to choose from the Web, WWW use often clusters around a few sites (Tewksbury, 2003). The average at-home Internet user goes online 29 times in a month and visits only about 58 different Websites in that month. The top 10 most popular properties on the Web are

the big brand names like Yahoo!, Microsoft, MSN, AOL, or Google (Nielson/Netratings, 2005). Although researchers found that the Internet audience still relies on the traditional news publishers for current events information when they go online (Margolis & Resnick, 2000), these portal Websites make competition intensified.

In sum, the advent of the Internet makes it possible for publishers to deploy this new technology to deliver news services online. The news consumption phenomenon also indicates that reading online news is a major activity of Internet users. However, users rely on these big brand names while looking for information online. To launch a successful news information service, publishers need to understand what reasons affect the user acceptance of news information services. Lessons learned from previous technological experiments like the videotext confirm that it is important to better understand the users. In the following section, we address the problem statement, in which we attempt to clearly define the problem area of this research.

1.3 Problem Statement

The adoption of information technologies is an important and long-standing research question in information systems (IS). The most widely used theory is the technology acceptance model (TAM) by Davis (1989). TAM is a theory that has great potential for further development (Lee, Kozar, & Larsen, 2003).

One of the directions to further develop TAM is to extend the application of the theory to WWW context (Lee et al., 2003). In WWW context, the use of information technologies is voluntary, while in organizational context the use is mandated by organization. So, IS researchers extended the explanation of why users behave in

particular ways toward WWW (Agarwal & Karahanna, 2000; van der Heijden, 2004; Lee, Cheung, & Chen, 2005). Their findings help practitioners to make design and implementation decisions.

Communication researchers have a different perspective from IS researchers who have studied the technology acceptance issues from a point of view of system development. Some of the communication researchers have argued that the use of WWW is similar to mass media usage. For instance, they found that the reasons that people use WWW and watch television are similar. So, they believe that WWW can be a functional alternative to television (Kaye, 1998, Ferguson & Perse, 2000). The literature in communication may bring new perspectives and insights to IS to enhance our understanding of WWW use behavior. We therefore propose to involve TAM and a theory in communication which can be used to study the WWW use. After reviewing previous media studies, we found that uses and gratifications (U&G) theory is an appropriate theory which can be applied in WWW context. We also found that the theory should be developed into a parsimonious and robust model.

U&G theory is a cutting-edge theory that naturally can be applied to explain and predict WWW use, adoption, and evolution patterns (Morris & Ogan, 1996; Ruggiero, 2000; Stafford & Stafford, 2001). In comparison to communication theories that focus on media adoption, U&G theory is more appropriate to be applied in continuous use of a medium (Stafford, Stafford, & Schkade, 2004). Recent studies applying U&G theory on the use of the Internet are abundant (Kaye, 1998; Ferguson & Perse, 2000; Stafford & Stafford, 2001).

Even though U&G theory is constantly applied in the WWW context, no theoretical efforts have been made to develop the theory into a parsimonious and robust model to explain the Internet usage. Researchers are still only looking for motivational factors specific to Internet use (e.g., Kaye, 1998; Papacharissi & Rubin, 2000; Ferguson & Perse, 2000; Stafford & Stafford, 2001; Stafford, Stafford, & Schkade, 2004) without theoretically developing a model which could depict the Internet use by specific predictors. In our point of view, U&G theory should be advanced by structurally identifying the causal relationship of predictors to Internet use. That is, identifying the key predictors of Internet usage and elaborating the relationships of these predictors should be a direction to advance U&G theory.

Communication researchers have examined the diffusion and adoption of interactive media and found factors contributing to media technology adoption and patterns of the way technology use develops in community (Rogers, 1983; Markus, 1987; Rogers, 2002); however, previous studies in media generate a mixture of findings with little theoretical integration or comparisons of results from study to study (December, 1996). Therefore, when investigating media like WWW, we have to focus on theoretical integration or comparing the findings from previous studies.

We attempt to develop an integrated model integrating TAM and U&G theory that can fully explain technology adoption. By doing so, we hope to make theoretical contributions to information system research and to communication research. It is our goal to inform the practitioners, particularly those in the news industry, what factors

influence the use of news information services.

1.4 Research Objectives

Taking a theory-building approach, we are particularly interested in explaining the user acceptance of news information service by developing and testing a theoretical model of the effect of intrinsic and extrinsic motivations on user acceptance of Internet-based information services. The model, referred to as the integrated model of technology acceptance, is being developed with two major objectives.

- (1) This integrated model should improve our understanding of user acceptance processes, by considering the relationships among users' motivations, intention, use behavior, and satisfaction to Internet-based information services.
- (2) The integrated model should provide the theoretical basis for a practical system design and analysis approach that would enable practitioners to develop new information services prior to their implementation, or modify their current services. Our research can provide useful information about the relative likelihood of success of information services.

It is our intent to develop a valid motivational model; therefore, the present research takes several steps toward establishing a valid motivational model of the user: (1) choosing U&G theory, a well-studied theoretical approach from mass communication to formulate an integrated technology acceptance model with TAM; (2) developing and pre-testing the measures for the model's factors in two pilot studies; (3) conducting two runs of data collection to prove the integrated model applicable to the present context; (4)

reviewing literature in both information systems and mass communication to demonstrate that empirical support exists for various elements of the proposed model, while at the same time the model goes beyond existing theoretical specifications, building upon and integrating previous research, and (5) using an advanced statistical technique, structural equation modeling, to test server competing models and refinements to the integrated model.

1.5 Guide to Dissertation

This chapter addressed general context, the research statement, and research objectives. We defined the concept of information services and provided some examples. Among the information services, we specifically reviewed the development of information services in the media industry. Our research objectives were to have more understanding of users' acceptance behaviors and to provide the theoretical basis for a practical system design and analysis approach.

Chapter 2 reviews the technology acceptance studies and uses and gratification theory. Since this dissertation is grounded in the technology acceptance theory, section 2.1 of the literature review presents the evolution of the technology acceptance model developed by Davis (1989). Section 2.2 presents the key U&G constructs and the relationships of these constructs. In section 2.3, we explain how a motivational perspective pertains to WWW use. In section 2.4, we review TAM's elaborations and evaluate their applicability in a customer context.

In chapter 3, we propose three questions corresponding to tests of TAM, U&G theory, and the integrated model. We discuss the importance of verifying the relationships

of constructs in each of the models by using our empirical data. The constructs involved in this research are perceived usefulness, perceived ease of use, motives, behavioral intention, behavioral usage, and satisfaction.

Chapter 4 focuses on the methodology employed to investigate these research questions. The research design, subjects, construct adaptation and operationalization, and the methods of data collection are discussed. This chapter presents the procedures used for the testing of TAM, U&G theory, and the integrated model.

In chapter 5, the responses to the surveys are reported along with the descriptive statistics on the demographics of online newspaper users. The statistical results of two studies are reported in this chapter. We also report the statistical results of the pooled data by presenting the measurement model and structural model of the integrated model.

The last chapter discusses the theoretical implications of the findings, the limitations of this research, and possible explanation of the inconsistencies with previous TAM studies. We also make recommendations for future information technology (IT) adoption research which provide a richer understanding of users' adoption behavior on the Internet-based information services.

CHAPTER 2

LITERATURE REVIEW

Technology acceptance model (TAM) by Davis (1989) is considered to be the most influential and commonly employed theory for explaining users' acceptance of technology. Since its development in the late 1980s, TAM became a research stream and it laid the foundation for further research. TAM draws a great deal of replications and few elaborations. TAM2 (Venkatesh & Davis, 2000) and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh, Morris, Davis, & Davis, 2003) are considered as two most important elaborations.

These two elaborations of TAM have significant impact on developing the next generation TAM that synthesizes the previous effects and in resolving the limitations raised by previous studies (Lee et al., 2003). With the inspection of the development of TAM studies across two decades, we present the evolution of TAM and we argue that the current elaborations have their limitations which can be overcome by involving motivational perspective theory, uses and gratifications (U&G) Theory.

Uses and gratifications approach is a media use paradigm for mass communications studies that inquires into the reasons why people use the media and the gratifications derived from media usage and access. In the U&G studies, users' media consumption is purposive and they actively seek to fulfill their needs from a variety of uses (Katz, Blumler, & Gurevitch, 1974).

We foresee U&G theory's distinct capabilities and applications that are not provided for in the TAM and its elaborations. There is an opportunity of merging TAM and U&G theory to substantially advance technology acceptance theory. In the following section, we start the literature review from TAM, U&G theory, motivational perspective, and sequentially address TAM's elaborations and summary of literature.

2.1 Technology Acceptance Model

2.1.1 Major TAM Constructs

The theoretical grounding for this research derives from technology acceptance model (TAM) introduced by Davis (1986; 1989). Developed from the social psychology theory of reasoned action (TRA) (Fishbein & Ajzen, 1975; Ajzen & Fishbein, 1980), TAM asserts that information system use is determined by the following constructs:

- *Perceived Usefulness and*
- *Perceived Ease of Use*

Perceived Usefulness (PU) is defined as “the degree to which a person believes that using a particular system would enhance his or her job performance.” In contrast, *Perceived Ease of Use* (PEU) refers to “the degree to which a person believes that using a particular system would be free of effort.” In TAM, these two beliefs, PU and PEU, are the determinants of *Behavioral Intention* (BI). Additionally, PEU has influence on BI through two causal pathways, a direct effect as well as an indirect effect through PU. *Behavioral Usage* (BU) was found to be significantly correlated with BI. In general, PU was found to be more influential than PEU in driving BU. Figure 2 presents the

constructs and their relationships in TAM.

Figure 2. Causal Diagram of TAM

2.1.2 Causal Relationships of the Constructs

The construct validity of PU and PEU was established by using principal components extraction and oblique rotation. The two constructs were comprised of six items each and the reliability coefficients of these two constructs were above .90 across studies (Davis, 1989). The variability of BI explained by PU and PEU ranged from 31% to 74%.

Note that in Davis' (1989) study, BI was theorized as the precursor of BU and they were proved to be correlated with each other (.35 and .63 for 1 hour and 14 weeks after introduction of the system, respectively). Other TAM studies also provided the evidences for the relationship of BI and BU. The standardized regression coefficient of BI to BU was .52 and was statistically significant at .001 level (Venkatesh & Davis, 2000). The results of partial least square analysis suggested that BI had a causal effect on BU, given regression coefficient .52 ($p < .001$) (Venkatesh et al., 2003)

2.2 Uses and Gratifications Perspectives

Uses and gratifications (U&G) theory is a media theory which concerns media use and its implications. It has been continuously developed for more than 80 years and is regarded as one of the most influential theories in mass communication (Kamhawi & Weaver, 2003; Ruggiero, 2000). U&G researchers inquire “not what media do to people, but what people do with media” and this voices the concerns that researchers call for scrutinizing the communication process by embracing the concept of an active audience (Palmgreen, Wenner, & Rosengren, 1985). Given the applications of U&G theory include media of all kinds (Herzog, 1944; Berelson, 1949; Lazarsfeld & Stanton, 1942; Rubin, 1983; Kaye; 1998; Papacharissi & Rubin, 2000), it exemplifies a transformation of the theory building process in mass communication.

2.2.1 Uses and Gratifications Theory and its Constructs

The uses and gratifications (U&G) approach involves a number of assumptions. A key item, in contrast to a notion of a passive audience, is that the audience makes a conscious and motivated choice among channels and content on offer (McQuail, 1987).

Among the several varieties of theory, one much quoted statement is by Katz et al. (1974):

The approach is concerned with the social and psychological origins of needs, which generate expectations of the mass media or other sources which lead to differential patterns of media exposure (or engagement in other activities), resulting in need gratifications and other consequences, perhaps mostly unintended one.
(p.20)

In the foregoing statement, some of the concepts have been studied by researchers dating back 60 years. For instance, motives are key components of media studies in which the relationship of motives and media use is often studied. On the contrary, some of the concepts stated above have proved to be less relevant to understanding audience activities and behavior. In particular, emphases on needs and expectations have been much reduced in a good deal of research. The former have proved to be redundant while the latter is seen to be difficult to verify (McQuail, 1987).

An elaborate conceptual scheme by Rosengren (1974) outlines the general dimensions of a paradigm for U&G research. Figure 3 presents the visualized diagram.

Note: The effects of individual characteristics, media structure, and other social/political/cultural/economic structure in society are mediating factors not shown in the diagram.

Figure 3. Visualized Paradigm for Uses and Gratifications Research

In the foregoing paradigm, an individual's basic needs (Maslow, 1954) make him/her identify perceived problems and perceived solutions. The combination of perceived problems and perceived solutions constitute motivations which lead to media consumption and other behaviors. Media consumption can fulfill a wide range of gratifications.

Among the abundant research findings, motives and gratifications are most related to media use or IT acceptance. Three crucial constructs are frequently studied in media studies:

- *Motives*
- *Behavioral Usage*
- *Gratification*

Motives are defined as “general dispositions that influence people’s actions taken to fulfill a need or want” (Papacharissi & Rubin, 2000). Types of motives vary from one medium to another. For example, five Internet motives are interpersonal utility, pass time [sic], information seeking, convenience, and entertainment (Papacharissi & Rubin, 2000). Similarly, entertainment, pass time [sic], and relaxation are major motives of Web surfing (Ferguson & Perse, 2000). *Behavioral Usage* is defined as different patterns of media exposure (Papacharissi & Rubin, 2000). *Satisfaction/Gratification* is defined as an affective outcome derived from the reinforcement of behavior (Hecht, 1978) and it refers to the gratification of needs and confirmation of expectations (Hecht, 1984).

2.2.2 Motivations for Web Use

Recent U&G research suggests that people use the Internet for various intrinsic reasons such as for fun, entertainment, and interpersonal communication (Stafford & Stafford, 2001; Kaye, 1998). Significant, though weak, correlations indicate that the greater the number of hours spent on the Web per week, the more likely the Web users use it for entertainment, social interaction, and escapism (Kaye, 1998). Going to news sites is predicted positively by entertainment motive and negatively by pass time motive [sic] (Ferguson & Perse, 2000).

Frequent use of the Web was found to be significantly related to motives such as searching updates and resources, getting new and unique things, and social purposes (Stafford & Stafford, 2001). Convenience motive is found to be the only significant (but

negative) predictor of the duration of overall Internet use. Interpersonal utility motive is the only predictor of amount of Internet exposure (Papacharissi & Rubin, 2000).

Previous studies found a positive relationship between satisfaction/gratifications and media usage. Readers who were satisfied with the newspaper's cost and information spent more time reading these newspapers (Burgoon & Burgoon, 1980). Intention to disconnect cable was related to satisfaction with the cable company's customer service (LaRose & Atkin, 1988). Moreover, satisfaction has been a strong predictor of program choice (Palmgreen, Wenner, & Rayburn, 1981; Rayburn, Palmgreen, & Acker, 1984).

Based on the above findings cross studies, a simplified U&G diagram which depicts the relationship of motives, behavioral usage, and gratifications is presented in Figure 4. This simplified model will be integrated with TAM in our study.

Figure 4. Relationships among Motives, Usage, and Gratifications

2.3 A Motivational Perspective of Technology Acceptance

2.3.1 Motivations Studies in U&G and TAM

The purpose of this section is to discuss theoretical considerations upon which our thesis is grounded. Particular attention of this section is directed to the conceptual definition of intrinsic/extrinsic motivations and studies in motivational perspective, the

latter of which provides a major conceptual foundation for the present research. Motivational perspective appears in both U&G and TAM studies; it concerns intrinsic and extrinsic motivations as predictors of technology use of choice.

Traditionally, researchers categorize motives into two categories, intrinsic and extrinsic. Among the various definitions of intrinsic and extrinsic motives, Deci and Ryan (1985) provided a widely accepted definition. They defined:

- *Intrinsic Motivation* as performing an activity for itself, in order to experience pleasure and satisfaction inherent in the activity.
- *Extrinsic Motivation*, on the contrary, refers to a wide variety of behaviors where the goals of action extend beyond those inherent in the activity itself.

Abundant research findings identify intrinsic and extrinsic motives of using media.

Table 1 presents various media contexts studied in the U&G approach.

Table 1. Intrinsic and Extrinsic Motives of Technology Use

Authors	Medium	Intrinsic	Extrinsic
Berelson (1949)	Newspaper	Source of security Ceremonial/Ritualistic Tool for everyday living Escape	Searching for information Social contact for conversational purpose
Rubin (1983)	TV	Information Entertainment Companionship	Information Companionship
Kaye (1998)	WWW	Escape Entertainment Pass time	Social interaction Information Web Site Preference
Papacharissi & Rubin (2000)	Internet	Entertainment Pass time	Interpersonal utility Information seeking Convenience
Stafford & Stafford (2001)	Commercial Web sites	Entertainment factor	Search factor Cognitive factor News and Unique factor Social information
Ferguson & Perse (2000)	TV-related Web surfing Motives	Entertainment Pass time Relaxation	
Charney & Greenberg (2002)	Internet	Diversion/Entertainment Peer identity Good feelings Coolness	Keep informed Communication Sights and sounds Career

Note that intrinsic motivations listed in Table 1 have not yet been discussed in TAM literature, but certainly U&G studies found that intrinsic motives were as important as extrinsic motives in using media. We therefore argue that intrinsic motive is a missing factor in TAM. TAM substantially explains IT acceptance in an organizational context; however, TAM lacks a perspective on intrinsic motivation which is important to IT use in a customer context. More specifically, when studying voluntary use in a customer context, U&G theory supplements TAM in its capacity to identify both intrinsic and extrinsic motives.

In fact, TAM researchers are moving their focus of attention to intrinsic motivation. Davis, Bagozzi, and Warshaw's (1992) motivational theory is an exemplary. In Davis et al. (1992), perceived usefulness is concerned with performance as a consequence of use; as a result, it is regarded as an extrinsic motivation of system use. Intrinsic motivation, on the contrary, is concerned with the reinforcement and enjoyment related to the process of performing a behavior. System use, therefore, is determined not only by extrinsic motive (i.e., perceived usefulness) but also by intrinsic motive (i.e., perceived enjoyment). Other TAM studies confirm that both intrinsic and extrinsic motives are significant predictors of behavioral usage (Igbaria, Parasuraman, & Baroudi, 1996; Atkinson & Kydd, 1997; Moon & Kim, 2001; Venkatesh, Speier, & Morris, 2002). The intrinsic-extrinsic dichotomy not only improves TAM's explanation power but also gives researchers a new perspective for TAM's improvement. Table 2 summarizes the intrinsic motives studied in previous TAM research.

Table 2. Summary of Prior TAM Studies Incorporating Intrinsic Motives

Authors	Main Constructs	Context	Subjects	Methodology	Key Findings
Davis et al. (1992)	PEU, BI, PU (extrinsic motive) Perceived enjoyment (intrinsic motive)	WriteOne Chartmaster Pendraw	200 MBA students (study1) 40 MBA students (study2)	Survey, Lab experiment	PU→ BI Perceived enjoyment→BI PEU mediates the effects on BI of PU and Perceived enjoyment. PU→ BU
Igbaria et al. (1996)	PU, BU, Perceived fun/enjoyment, Social pressure	Microcomputer	471 professional and managers in 62 companies in North America	Survey	The effect of Perceived fun/enjoyment is small but its potential may need to be closely examined.
Atkinson & Kydd (1997)	PU, PEU, Computer ability Microcomputer playfulness, Enjoyment	WWW (course related purpose)	78 undergrad students (study1) 84 graduate students (study2)	Survey	Microcomputer playfulness→BU Intrinsic motive (Enjoyment) associated with BU for entertainment; Extrinsic motive associate with BU for course work
Teo, Lim, & Lai (1999)	PU, PEU, BU, Perceived enjoyment	Internet	1370 online users	Web-based survey	PU→BU PEU→BU PEU→PU PEU→ Perceived enjoyment Perceived enjoyment→BU
Venkatesh et al. (2002)	PU, PEU, BU, Intrinsic motive, Computer self-efficacy, Playfulness	Virtual workplace system (game-base training vs. traditional training)	Knowledge workers	Field experiment	PU→BI PEU→PU Intrinsic motive→PEU BI→BU
Moon & Kim (2001)	PU, PEU, A, BI, BU, Perceived playfulness	WWW	152 graduate students	Survey	PU→ BI Perceived Playfulness→BI
van der Heijden (2004)	PU, PEU, BI, Perceived enjoyment	Dutch movie Website	1144 registered Website user	Online survey	PU→ BI PEU→ BI Perceived enjoyment→BI
Lee, Cheung, & Chen (2005)	PU, PEU, A, BI, Perceived enjoyment	Internet-based learning medium	544 undergrad students	Survey	PU→ BI Perceived enjoyment→BI

Note: A= Attitude; PE= Perceived Usefulness; PEU= Perceived Ease of Use BI = Behavioral Intention; BU= Behavioral Usage

The findings of intrinsic motive in recent TAM studies confirm our assumption that the motivational perspective would enhance the understanding of IT use. However, the above studies found only one intrinsic motivation (i.e., perceived enjoyment or fun) as an

additional predictor. The improvement of TAM can be accomplished by adding intrinsic motivations from U&G theory. U&G theory has a variety of motivations related to the media use so it supplements TAM.

Apart from motives, we argue that that gratifications/satisfaction, another construct from U&G theory, should be added to TAM. By doing so, we attempt to extend technology acceptance from usage to satisfaction. We turn next to the discussion of the importance of satisfaction to IT choice and use.

2.3.2 Extending Technology Acceptance from Usage to Satisfaction

User satisfaction leads to system use and therefore should be preferred as a measure of IS success (Baroudi, Olson, & Ives, 1986; DeLone & McLean, 1992; Zviran & Erlich, 2003). Given its importance of measuring IS success, we argue that it has to be taken into account when studying technology acceptance. Unfortunately, the concept of satisfaction is not included in TAM. In the real world, IT adoption is a continuous behavior which is influenced by the evaluation of the initial use. Satisfaction toward an IT application refers to the evaluation of use so adding this factor to TAM will therefore give us a holistic view of IT acceptance. Ultimately, the model with the satisfaction component will help us understand IS success.

2.3.3 Technology Acceptance in Consumer Context

The consumer context refers to a context in which use of IT is the free choice of user. On the contrary, an organizational context is the workplace where a user adopts IT to increase his/her job performance or comply with norm of an organization. Oftentimes, the IT choice is to comply with the goals of the organization. The motivational model by

Davis et al. (1992) was developed in an organizational job-related context in which the technology acceptance has already occurred through organizational selection. As a result, extrinsic motive (i.e., perceived usefulness) then becomes the major indicator for its significant relationship with job performance (Stafford et al., 2004). Whereas the use of the Internet in a customer context is voluntary, IT choice may involve fulfillment of psychological needs and expectations. U&G offers a social-psychological perspective of IT use which supersedes the view point of the motivational model.

Different types of information systems may evoke different users' motives, because users fulfill different needs through system use (van der Heijen, 2004). In comparison to utilitarian information systems use, hedonic information system aims to provide self-fulfilling values strongly connected to home and leisure activities. It focuses on the fun aspects of using information and encourages prolonged use so that using such systems may involve intrinsic motivations. The Internet is a typical example of such a system. In contrast, utilitarian information systems provide the instrumental value to users and stress on the productive use. Most of the information systems in organizational settings are systems of this type, and users would fulfill extrinsic needs by utilizing this type of system.

To date, the intrinsic reasons of system use are not included in the original TAM, so we argue that TAM and U&G theory can be merged based on the motivational perspective. Various intrinsic reasons such as for fun, entertainment, and interpersonal communication (Kaye, 1998; Stafford & Stafford, 2001) will complement intrinsic motivation of perceived enjoyment, fun, and perceived playfulness found in recent TAM studies (Agarwal & Karahanna, 2000; Moon & Kim, 2001; van der Heijen, 2004).

Overall, we contend that U&G theory provides a stronger theoretical foundation than the motivational model developed by Davis et al. (1992). First, U&G studies yield abundant findings that suggest that intrinsic and extrinsic reasons for media use. These findings enrich our understanding of media and IT choice in a customer context. Secondly, U&G theory was originally applied in customer context where hedonic system is often used, so the motivations in U&G theory will be very useful in studying the Internet-based information services. Thirdly, intrinsic motives in U&G supplement TAM's findings in intrinsic motivation of perceived enjoyment, fun, and perceived playfulness.

2.4 TAM and its Elaborations

2.4.1 The Development of TAM

TAM is a parsimonious theory which is widely used in predicting the use of information system applications across different user populations, contexts, and research settings (e.g., Adams, Nelson, & Todd, 1992; Szajna, 1996; Lucas & Spitler, 1999). It has not only constantly been replicated by researchers (e.g., Adams et al., 1992; Sambamurthy & Chin, 1994), but also evolved over time. Recent TAM variations, TAM2 (Venkatesh & Davis, 2000) and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003), synthesize the previous efforts and reflect the previous request for the model's elaboration.

TAM2 represents an important contribution to IS theory by addressing causal antecedents of the TAM belief construct, perceived usefulness. It incorporates TAM and additional theoretical constructs spanning social influence process (subjective norm,

voluntariness, and image) and cognitive instrumental processes (job relevance, output quality, and result demonstrability). TAM2 was strongly supported by longitudinal data across four different systems at four organizations, two involving voluntary usage and two involving mandatory usage, respectively. Up to 34%-52% of the variance in BI was accounted for by PEU, PU, and external variables of PU (Venkatesh & Davis, 2000).

As theorized in TAM2, the relationship between subjective norm and BI was significantly moderated by both experience and voluntariness. Also, the subjective norm-PU relationship was significantly moderated by experience. Furthermore, the effect of job relevance on PU was moderated by output quality. Including moderators and more precedent variables increases the variance explained in BI. Figure 5 presents the TAM2 constructs and their relationships.

Figure 5. TAM2

The Unified Theory of Acceptance and Use of Technology (UTAUT) develops TAM into a broader and comprehensive model of technology choice and use (Stafford et al., 2004). It attempts to integrate eight theories including aspects of the TAM, diffusion theory, motivation theory, and self-efficacy to explain technology acceptance at workplace. Four key constructs (i.e., performance expectancy, effort expectancy, social influence, facilitating conditions) accounted for up to 70% of variance in BI. Additionally, UTAUT incorporates four moderators to account for dynamic influences including organizational context, experience, and demographic characteristics. Figure 6 presents UTAUT's constructs and their relationships.

Figure 6. Unified Theory of Acceptance and Use of Technology (UTAUT)

TAM2 and UTAUT exemplify integration efforts to obtain a better understanding of IT acceptance (Lee et al., 2003). However, TAM and its elaborations have some limitations in applying to the voluntary use of the WWW. The following subsection discusses these limitations in greater detail.

2.4.2 Critics of TAM's Elaborations

The two major TAM constructs, perceived usefulness and perceived ease of use, only explain about 40% of variance in behavioral intention (Lucas & Spitler, 1999; Igbaria, Zinatelli, & Cragg, 1997; Agarwal & Pradsad, 1997; Szajna, 1996). Even though TAM2 incorporates several external variables, the results are not totally consistent or clear. This suggests that significant factors are not included in the models which extended TAM (Legris, Ingham, & Collette, 2003). For example, some researchers found social influence has a weak association with technology acceptance (Mathieson, 1991), while others found a significant relationship between them (Taylor & Todd, 1995; Lucas & Spitler, 1999). So, the added variables in TAM2 are not robust factors.

Besides, these added variables were found to impact on adoption mainly in organizational contexts (Chismar & Wiley-Patton, 2003; Hart & Porter, 2004). TAM2 can not be applied in a customer context, where the adoption of IT is a free choice of users. For instance, PC adoption at home was proved to be driven by utilitarian outcomes, hedonic outcomes (i.e., fun), and social outcomes (i.e., status) from adoption (Venkatesh & Brown, 2001). Rather, IT adoption in an organizational setting is impacted by social influence in the form of normative forces that serve extrinsic purposes related to compliance with organizational goals.

Similarly, UTAUT applies in an organizational context, in which the use of IT enables user to work efficiently and effectively. Such a choice and use of IT by its nature differs from a voluntary use of IT in a customer context (Stafford et al., 2004). UTAUT is concerned mostly with job-related usage choices and not immediately useful in consumer contexts that we envisioned in this study.

Previous research suggests that the adoption of IT at home involves some intrinsic aspects (i.e., entertainment, enjoyment, and playfulness); however, these aspects are not confirmed in UTAUT. Consequently, UTAUT focus solely on socio-cognitive aspects. Recall in the previous section, we discussed that there is an abundant literature which confirms that intrinsic reason plays a pivotal role of IT acceptance (Igbaria et al., 1996; Venkatesh, 1999; Venkatesh, 2000; Agarwal & Karahanna, 2000; Moon & Kim, 2001; Chung & Tan, 2004; van der Heijden, 2004; Shang et al, 2005). A theoretical model which explains the IT use in a customer context should involve the intrinsic aspect such as entertainment, enjoyment, and fun.

In conclusion, the original TAM has potential in involving significant factors in order to give a comprehensive view of technology acceptance. Secondly, both TAM2 and UTAUT are developed for an organizational setting, not for a customer context. Typically IT adoption at home would involve some affective aspects such as entertainment, enjoyment and fun. These two variations provide no support for affective aspects; rather, they stress mainly on the socio-cognitive aspects of IT choice and use.

2.5 Summary

This chapter provided an overview of U&G research, TAM studies, and the relevant models. We evaluated different models and explained why U&G theory fits best to merge with original TAM to study the consumer context. These reasons include:

- TAM lacks intrinsic motives, which can be provided by U&G theory
- The new elaborations of TAM, like TAM2 and UTAUT, are developed for the workplace context, and not very useful to an Internet-based information service with voluntary use in a consumer context.
- U&G theory is an appropriate theory to study the continued and increasing use.

U&G theory models users' behavior from the basic needs of an individual. It addresses the social/ psychological factors of medium use. In contrast, TAM takes into account mainly the utilities of a technology. The two theories complement each other in having components of intrinsic and extrinsic motivations so they can be merged into one complete theory which can explain the IT choice and use in customer context. In the following chapter, we present the research questions and discuss literature pertaining to these research questions.

CHAPTER 3

RESEARCH QUESTIONS

3.1 Introduction

This chapter presents the research questions and relevant literature to describe the importance of these questions. Given that Internet studies do not specifically determine the predictors of news information services use; we first test TAM in its application on one type of news information service, online newspapers. We then use U&G theory to find what are the motives that are most related to the use of online newspaper Websites. The relationship of usage and satisfaction is also of interest. By using so, we can ensure that both TAM and U&G theory can be applied in the WWW context to study the use of online newspaper Websites. Finally, we develop an integrated model which has both TAM and U&G theory components to explain behavioral usage. Since satisfaction is regarded as one of the factors attributed to IS success, we also test the relationship of usage and satisfaction in the integrated model.

3.2 Technology Acceptance Model in WWW Context

Replication studies have tested the relationship of TAM constructs as well as the psychometric properties of these constructs. Analysis of the results suggest that these constructs were measured by scales with both strong convergent validity and discriminant validity in heterogeneous user groups utilizing word processor, graphics software, spreadsheets, and voice and electronic mail (Davis, 1989; Adams et al., 1992). Research on personal computer usage in small firms found both perceived usefulness and perceived

ease of use have significant impact on usage, and the perceived ease of use has a strong effect on perceived usefulness (Igbaria et al., 1997). Other researches on GDSS, mailing system, and e-mail also yield similar results (Davis, 1993; Sambamurthy & Chin, 1994; Subramanian, 1994).

TAM is applicable and extremely useful in predicting Internet usage. In Gefen, Karahanna, and Straub (2003), TAM constructs and the trust construct explained a considerable proportion of variance in behavior intention when buying books and airline tickets online. Moon and Kim (2001) applied TAM in the Internet context in which perceived usefulness was the most significant predictors of behavioral intention for a work-related task. Similarly, the use of digital library can be significantly explained by perceived usefulness and perceived ease of use. Hong, Thong, Wong, and Tam (2001) studied 585 users of a university's award-winning digital library, and the results strongly support the utilization of TAM in explaining user's behavioral intention.

Previous studies suggested that TAM's scales are stable and that the relationships between TAM constructs are positive across contexts and user groups. We expect to see TAM constructs have the same explanatory power in other WWW context. Our first research question, therefore, uses TAM constructs to explain the use of a news information service, online newspapers.

Research Question 1: How well does TAM predict the usage of an information service?

In the following section, we propose the second research question which asks whether the online newspaper use can be explained by uses and gratifications theory.

Issues of interest are motives of using online newspapers and the relationship between usage and satisfaction.

3.3 Uses and Gratifications of WWW

3.3.1 Motives

Recall we have mentioned that some studies show that there is a positive relationship between motives and media usage. In Lin (1999), the online services can be explained up to 47% of the variance by three classic mass media motives (i.e., surveillance, escape/companionship/identity, entertainment). Charney and Greenberg (2002) found that two of motives (keep informed, communication) explained 36% of the weekly time spent on the Internet. On the contrary, some studies did not confirm the strong relationship between motives and computer media usage. For example, Kaye (1998) adapted TV motives to examine the use of WWW and found low correlations between weekly Web usage and entertainment motive ($r=.30$), social interaction ($r=.23$), and escape ($r=.17$). Ferguson and Perse (2000) found low correlations between Web usage and motives, entertainment ($r=.27$), pass [the] time ($r=.20$), relaxation ($r=.27$), social information ($r=.20$).

Given these findings are different across studies, we propose to test U&G theory prior to merging TAM and U&G theory. We take two steps toward establishing the relationship of motives and use. The first step is to identify the major motivation of using online newspapers. In the second step, we will test the relationships of motives and use to identify the most important motive of use.

There are two reasons we take these two steps to establish the causal relationships of U&G constructs. First, LaRose, Mastro, and Eastin (2001) note that there are only few studies in which a sufficient portion of variance in Internet usage can be explained by motive measures. Most of the U&G studies identify the motives but they do not explore the causal relationship between motives and use. This constrains the applicability of U&G theory in our study. Since the causal relationships of U&G constructs are not yet well established in an online newspaper context, it is necessary to test the causal relationship of constructs before merging TAM and U&G theory.

Secondly, a lot of uses and gratifications studies relied on motive items developed for TV research. For instance, Ferguson and Perse (2000) found TV-related motives, entertainment, relaxation, and social information, are major motivations of Internet users. Kaye (1998) adapted Rubin's (1983) TV motive scales to study the WWW and found that motivations of using the two media are almost identical. Papacharissi and Rubin (2000) incorporate TV motive items and interpersonal communication scale to study the Internet users. These researchers believe that surfing on the Web is similar to television viewing so that WWW can displace television use. In other word, WWW is regarded as the functional alternative of television and its use is undertaken for similar reasons (Ferguson & Perse, 2000).

Using TV-related motives may overlook some Internet specific motive (LaRose et al., 2001). The practice of asking about uses when giving TV-related motives may create a bias in favor of certain type of motives. As opposed to this practice, some researchers elicit new items by asking users open-ended questions. For example, Stafford and Stafford (2001) asked open-ended questions and they found five motives (i.e., search,

cognitive, new and unique, social, entertainment factors) that accounted for 21% of variance in commercial Website use. Stafford et al. (2004) found process and content gratifications as previously found in TV studies and an entirely new social gratification that is unique to Internet use.

Looking across the findings, we find existing empirical support for the relationship between motives and Internet use, although some found the association is weak. We also find that using motive items from TV research has its drawback. In order to identify motives specific to online newspaper use, we choose to adapt Papacharissi and Rubin's (2000) motive scales because their scales involve both media and interpersonal communication scales which are more reasonable as Internet motives. We will elicit new items by asking open-ended questions to users to avoid creating bias.

3.3.2 Satisfaction

Satisfaction has been an important concept in consumer research because it directs product purchase and consumption (Perse & Ferguson, 1993); however, it has been largely overlooked in mass communication theory (Palmgreen & Rayburn, 1985). In U&G studies, it is often addressed as one of the media effect (Kim & Rubin, 1997). Palmgreen and Rayburn (1985) were few researchers who introduced this concept into mass media studies. After comparing six gratification models to identify motives and satisfaction, they asserted that gratifications were derived from media consumption (i.e., the news broadcast).

Communication researchers found that there is a positive relationship between media usage and satisfaction. For example, Burgoon and Burgoon (1980) found that

readers who were satisfied with the newspaper's cost and information spent more time reading newspapers; however, their researches produce no theoretical rationale for this relationship. LaRose and Atkin (1988) found that intention to disconnect cable was related to less satisfaction with the cable company's customer service. Taking a discrepancy approach, researchers found that gratification obtained has been a strong predictor of program choice (Palmgreen, Wenner, & Rayburn, 1981; Rayburn, Palmgreen, & Acker, 1984). Taking the same approach, Dobos (1992) found satisfaction is a transitory expression of need fulfillment, pleasure, or displeasure. He also found that satisfaction is the comparison of actual to ideal outcomes associated with the communication experience. Their findings supported the positive relationship between satisfaction and the use of different communication channels.

Most of the findings on satisfaction related to program choice or traditional media use, not to the Internet satisfaction. Although researchers found the positive relationship between behavioral usage and satisfaction, their findings did not indicate that the variance of behavioral usage can be substantially explained by satisfaction. We therefore need to identify the causal relationship of these two variables.

Combined, prior to develop our integrated model to study the use of online newspapers, it is preferred to identify major motives, the causal relationship of motive and use, and the association between use and satisfaction. Drawing upon literature we ask the following research question:

Research Question 2: How well does U&G theory predict the usage of an information service?

3.4 The Integrated Model

We next consider how U&G components fit into the constructs and relationship underlying TAM. To reiterate, the following reasons support that the two can be merged in one model:

- TAM lacks intrinsic motives which can be complemented by U&G motives
- TAM does not include satisfaction, but U&G theory theorizes that this construct is the consequence of usage.

Conceptually, two constructs, motives and satisfaction, from U&G theory can be added to original TAM. Note that behavioral usage is the common variable in both models, so we hypothesize that motivations influence behavioral usage which in turn influence satisfaction. The structural relationships of TAM components remain unchanged. Figure 7 shows the constructs in the integrated model.

Figure 7. The Integrated Model of Technology Acceptance

A total of six concepts in TAM and U&G theory include: perceived ease of use, perceived usefulness, perceived usefulness, behavioral intention, behavioral usage, motive constructs, and satisfaction. Non-trivial empirical support already exists for the six individual causal relationships reflected in the integrated model. So, we hypothesized

that perceived ease of use has a causal effect on perceived usefulness; that perceived usefulness, perceived ease of use have significant impact on behavioral intention; that motive constructs influence behavioral usage; that there is a causal relationship between behavioral intention and behavioral usage; and a direct relationship between behavioral usage and satisfaction.

The present research adopts the position that TAM and U&G theory are complementary, and that the integrated model encompasses the effect of belief constructs on behavioral intention on the one hand, and the effects of motivations on behavioral usage on the other. Merging the two models into one is a logical next step toward advancing the frontier of theory pertaining to user acceptance process.

The theoretical foundation of the models supports such integration. Both models are derived from psychological theory which postulates that the use of IT is goal-directed and conscious behavior. TAM was developed by incorporating the theory of reasoned action which was built upon the expectancy-value model posited by Fishbein (1963). Similarly, evolved from the value-expectancy model, U&G theory postulates a motivational perspective of media use.

We examined the conceptual and operational definitions of the factors in the integrated model and had some observations. First, we found the similarities between the items in extrinsic motives in U&G theory and in TAM's belief constructs. For example, "it is easier" and "easier to e-mail than tell people" are similar to the items of perceived ease of use: "I would find it easy to get chart-master to do what I want it to do"; "It would be easy for me to become skillful at using chart-master"; and "I would find chart-master

easy to use” (Davis, 1989). We also found that U&G theory has functional constructs (i.e., information seeking, interpersonal utility) which may extend TAM’s perspective. Secondly, behavioral usage items mainly measure the degree, frequency, and duration of use. There is only one item for behavioral use which measures the degree of use in TAM. The items in U&G theory measure frequency and duration of use. In both theories, there is no contradiction between the conceptual definitions of use.

We also intend to be explicit in the causal relationships among the factor added to TAM. First, satisfaction has been studied in applied research spanning a variety of media studies (Burgoon & Burgoon, 1980; Palmgreen et al., 1981; Rayburn et al., 1984; LaRose & Atkin, 1988; Dobos, 1992). Unfortunately, it was not included in TAM. Second, as discussed previously, the causal relationship between motives and behavioral usage is supported by previous literature so it is included in the integrated model. Adding these causal relationships to the integrated model make it possible to advance both theories.

After reviewing the literature, discussing the definitions of construct, and evaluating the advantage of merging the models, we propose an integrated model which provides a theoretical explanation of what motivates people to use information services. We intend to establish the validity of the integrated model by comparing measured observations with theoretical predicted patterns. Collectively, we ask the following question:

Research Question 3: How well does an integrated TAM and U&G model improve prediction of information service usage?

CHAPTER 4

METHODOLOGY

Two studies were conducted to give empirical support for a new perspective of technology acceptance. In study one, we intended to prove the concept that the integration of both theories work. In study two, we hoped to confirm that the constructs were stable, that the relationships of constructs were correlated, and that the variance explained by the predictors has no shrinkage. Both studies examined information service usage in the online newspaper context. In the following subsections, we address research context, polite studies, two studies, and measurement scales, respectively.

4.1 Research Context

Online newspapers were chosen as our research context. An online newspaper refers to a Website whose primary offering is news content. Unlike news content provided by portal Website such as Yahoo!, MSN, and AOL, an online newspaper offers news content which is available on the traditional print newspaper. To be sure that our respondents understand the online newspapers refer to the online news sites provided by traditional print newspaper owners, we asked filter questions in the survey. Appendix A provides the details of the filter questions.

Prior to the main studies, we conducted two pilot studies. The first pilot study was to understand whether undergraduate students use news information services as a source of information. The second pilot study was to determine the motive items specific to news information services.

4.2 Pilot Studies

The first pilot study involved a survey of online newspapers use among 30 business school students who enrolled in a 300 level IT course during in Spring, 2004 at a major U.S. university. These students were given a paper-and-pencil survey questionnaire with four behavioral usage questions from both TAM and U&G theory. A total of 29 responses were collected. The findings of the first pilot study suggested that 82.76 % of respondents used online newspapers. The results not only validated all the items in measuring behavioral usage but also suggested that online newspapers were one of the information sources of the undergraduate students. Using online newspapers as a context to examine the use of WWW as an information source should be appropriate. Also, items of behavioral usage both from U&G theory and TAM were appropriate measurements.

The second pilot study aimed to determine key motives items specific to online newspapers. We recruited 23 business school students in a 300 level IT course at a major U.S. university. The subjects responded to a questionnaire with four open-ended questions that were designed to elicit a list of motive items associated with the use of online newspapers. Their responses to four open-ended questions¹ suggested that weather information, world news, up-to-date information, and search functions were reasons for the use of online newspapers. In addition to the 27 items from U&G Internet motives, these four items were included to provide a total of 31 items for main survey scales.

¹ These questions were: (1) what is the first thing that comes to mind when you think about what you enjoy the most when accessing an online newspaper? (2) what other words describe what you enjoy about interacting with an online newspaper? (3) using single, easy-to-understand terms, what do you use an online newspaper for? (4) what activities are the most important to you when you go to an online newspaper Website? (Questions adapted from Stafford and Stafford's (2001) Web motive study)

4.3 Study One

The first study involved a survey of online newspaper users among business school undergraduate students in six sections of statistics classes during Fall, 2004 at a major U.S. university. The time of data collection was in mid-September, 2004. In the beginning of a class section, students were given a five-minute introduction to the research and then filled out an online or a paper-and-pencil survey questionnaire. These students were provided extra credit as an incentive. A total of 161 participated in the survey. Of these, 147 respondents completed questionnaires.

4.4 Study Two

The second study examined online newspaper usage among business school undergraduate students enrolled in six sections of statistics classes and two other IT classes during Spring, 2005 at a major U.S. university. The data collection procedure of study two was the same as study one. Students filled out an online or a paper-and-pencil survey questionnaire in the beginning of one class section, after a five-minute introduction to research. Data collection started from mid February to early March and a total of 242 usable questionnaires were completed.

We adapted the pre-validated measurement scales from both TAM and U&G theory after changing the wording corresponding to the context of our research. The follow section describes each of the constructs and scales in the survey questionnaire.

4.5 Measurement Scales

Six constructs were of interest to this research: perceived usefulness, perceived ease of use, behavioral intention, behavioral usage, motive constructs, and satisfaction. Perceived usefulness and perceived usefulness were measured using pre-validated scales adapted from Davis (1989). These two constructs were measured with seven-point Likert-type scales having likely/unlikely endpoints and the anchor points extremely, quite, slightly, and neither. Behavioral intention was measured using five scales adapted from prior IT usage literature (Agarwal & Karahanna, 2000; Teo, Wei, & Benbasat, 2003; Venkatesh et al., 2003). Each of the items was a seven-point Likert-type scale with strongly agree/strongly disagree endpoints. Behavioral usage was measured using four items regarding the degree and frequency that respondents currently used online newspapers. Since two theories were integrated, we adapted scales of behavioral usage from both theories. One out of the four item was a validated measurement, adapted from Davis (1989). The rest were adapted from U&G Internet usage study (Papacharissi & Rubin, 2000). The total number of hours of use in a day and yesterday was measured by seven-position categorical scales. A “check the box” scale was presented to allow respondents to self-report their degree of use. Also, the number of years and months that they have been using online newspapers was measured by a seven-position categorical scale.

To construct an information service motives scale, we used 27 items representing five possible prior categories developed by Papacharissi and Rubin (2000). These five motive categories were interpersonal utility, pass [the] time, information seeking, convenience, and entertainment. These five motives were defined by following

statements:

Pass the time: use the Internet when there is nothing to do, to occupy idle time, and to relieve boredom.

Entertainment: use the Internet for amusement and enjoyment.

Information seeking: use the Internet as an information tool to learn about people, places, and events.

Interpersonal utility: use the Internet to fulfill needs of affection, inclusion, expression, social interaction, and surveillance.

Convenience: easy and cheap access to information or others.

Another four items were elicited from the open-ended questions from respondents in our second pilot study. Since Papacharissi and Rubin's (2000) items are mainly motives of the Internet usage rather than that of news medium usage, it was necessary to add four more items reflecting the motives specific to Internet-based information services. The four items were: 1) because it has weather information; 2) because I can get world news; 3) to get up-to-date information; and 4) because it has a search function. Respondents were asked how much their reasons for using an online newspaper were like the above items on a five-point Likert-type scale with exactly/not at all endpoints.

Six items were used to assess satisfaction with online newspaper use. Adapted from Papacharissi and Rubin (2000), the first question asked respondents to indicate: "Overall, how satisfied are you with the job an online newspaper does in providing you with the thing you are seeking" across five response options, ranging from "extremely satisfied"

to “not at all satisfied. Originally used by Kim and Rubin (1997), the other five items ask respondents’ responses to both the contents and to the process of reading online newspapers. Specifically, respondents gave their responses regarding the news topics, the news articles, feeling of wasting time, enjoying reading, and personal satisfaction on online newspapers by rating a seven-point Likert-type scale, ranging from “Strongly agree” to “Strongly disagree”. The following table summarized the literature pertaining to the constructs. The measurement scales are listed in the Appendix B.

Table 3. Factors for Acceptance of Internet-based information Services

Factors	No. of items	Literature corresponds to items
Perceived Usefulness	6	Davis (1989)
Perceived Ease of Use	6	Davis (1989)
Behavioral Intention	5	Davis (1989); Agarwal & Karahanna (2000); Teo et al. (2003); Venkatesh et al. (2003)
Behavioral Usage	4	Davis (1989); Papacharissi & Rubin (2000)
Motives	31	27 items from Papacharissi & Rubin (2000); 4 items from pilot study of this research
Satisfaction	6	Papacharissi & Rubin (2000); Kim & Rubin (1997)

4.6 Data Analysis Plan

The data analysis schema involves statistical analysis including descriptive statistics, principal component analysis (PCA), multiple regression analysis, and structural equation modeling (SEM) analysis. The purpose of each method varies:

Descriptive statistics: They are used to describe the basic features of the data in a study. They provide simple summaries about the sample and the measures. In our research, the demographics of respondents and measures on behavioral usage were analyzed.

Principal component analysis: It is a variable-reduction procedure. It is useful when a large number of variables were obtained and there is some redundancy in those variables. It is possible to reduce the observed variables into a smaller number of

principal components that will account for most of the variance in the observed variable. In our research, there are 31 variables were used to measure motives. It is likely that some of the variables are correlated with one another, because they are measuring the same construct. By performing the analysis, we are able to reduce 31 variables into a small set of artificial variables called principal components. The resulting principal components may then be used in subsequent analysis, the multiple regression analysis.

Multiple regression analysis: The objective of multiple regression analysis is to predict the single dependent variable by a set of independent variables. In our research, we performed many runs of multiple regression analysis to test the relationships between constructs. We also performed a special type of regression analysis, stepwise regression, to identify the most important U&G motives of behavioral usage. When performing stepwise regression analysis, the computer will begin by examining every possible simple linear regression model, and will show you the one with the highest coefficient of predictor.

Structural equation modeling: It is a statistical methodology that takes a hypothesis-testing approach to the multivariate analysis of a structural theory bearing on some phenomenon (Byrne, 1994). In our research, a simultaneous analysis of the entire system of variables (i.e., the integrated model) is performed to determine the extent to which it is consistent with our pooled data.

The data analysis procedure involves several steps. First, we report demographics of respondents and frequencies of online newspaper usage by presenting descriptive statistics. Secondly, we analyze study one data by performing a principal component

analysis to identify the TAM constructs and by conducting multiple regression analysis to test the relationships between these constructs. This data analysis approach is recommended by Gefen, Straub, & Boudreau (2000). Thirdly, we analyze study one data to identify U&G motives by performing principal component analysis. We then test the relationships between motives constructs and behavioral usage and in turn test the relationship between behavioral usage and satisfaction. Fourthly, we test the relationships of the constructs in the integrated model. Fifthly, we will conduct the same analyses which perform in study one data to analyze the data in study two. Finally, we pool the data in studies one and two and then perform structural equation modeling analysis to test TAM, U&G theory, and the integrated model. In our case, both structural equation modeling analysis and multiple regression analysis can be used to test relationships of constructs in the integrated model. We choose to perform both analyses to have more understanding to the data.

In comparison to multiple regression analysis, structural equation modeling analysis has its strengths; however, it also has its weaknesses. For example, SEM analysis takes into account the measurement errors whereas multiple regression analysis treats measurements as error-free. In reality, measurements often involve errors so the results of SEM analysis reflect the real-world situation better than multiple regression analysis. Nevertheless, when researchers are interested in prediction that focuses beyond the variance accounted for (R^2) by the specific regression weights, SEM analysis allows them to articulate their thoughts about relationships of all variables with one another (Maruyama, 1998). Moreover, SEM enables researchers to answer research questions by modeling the relationships among multiple independent and dependent constructs

simultaneously. It therefore characterizes real-world processes better than simple correlation-based models like multiple regression, ANOVA, and MANOVA (Gefen et al., 2000). However, SEM analysis has potential weaknesses. For instance, if a model mis-specifies the relationships among a set of variables, then the analyses may be misleading or even just plain wrong. It is possible that small errors in positioning variables or including paths can create havoc all over a model and result in the solution suggesting wrong inferences (Maruyama, 1998).

In addition to multiple regression analysis, we choose to perform SEM analysis because it can provide us more information which indicates the relationships of all the variables with one another. We hope to get information by performing both multiple regression and SEM analysis to establish the validity of the integrated model. We expect to see that both techniques yield similar results in hypothesis testing. Then, we have enough evidence to argue that our integrated model is supported by data in whichever analytical technique is used.

In the following chapter, we present the results and findings and compare results across studies.

CHAPTER 5

RESEARCH RESULTS AND FINDINGS

5.1 Introduction

We have described the procedure of our data analysis plan involving four statistical methods: descriptive statistics, principal component analysis (PCA), multiple regression, and structural equation modeling (SEM). We analyzed the data collected from studies one and two by performing both principal component analysis and multiple regression analysis. The purpose of performing principal component analysis is to reduce variables into a small set of artificial variables which can be used in subsequent multiple regression analysis. We performed not only multiple regression analyses to TAM and U&G theory but also to the integrated model. We then performed the structural equation modeling (SEM) analysis to the pooled data to test the integrated model. SEM analysis has the capacity to model the relationships among multiple independent and dependent constructs simultaneously. If both multiple regression and SEM analyses yield the similar results of hypothesis testing for the integrated model, we may have strong evidence to support the validity of the model. In the following subsections, we present descriptive statistics of studies one and two and then report the results of the PCA, regression analysis, and SEM analysis.

5.2 Descriptive Statistics

In study one, of the 147 responses, 49.6% were male (coded 1, female coded 0) and ranged in age from 18 to 45. Most of them (70.6%) were in their third year at college. In

study two, the 242 responses included 44.2 % male and ranged in age from 18 to 55. The majority of them (69.4%) were juniors in college. Table 4 shows the demographics of the respondents in both studies.

Table 4. Demographics of Respondents (Studies 1 and 2)

	Study 1		Study 2	
Gender	N	%	N	%
Male	73	49.6	107	44.2
Female	74	50.3	133	55
Missing	0	0	2	0.8
Total	147	100	242	100
Age Range	N	%	N	%
18-20	51	34.7	84	35.0
21-23	63	42.8	105	43.8
24-26	17	10.3	24	10.0
27-35	13	8.8	18	7.5
36-45	3	2.0	5	2.1
46-55	0	0	4	1.7
Missing	0	0	2	0.8
Total	147	100	242	100
Year at College	N	%	N	%
Freshmen	0	0	6	2.5
Sophomore	3	2.0	5	2.1
Junior	103	70.6	168	69.4
Senior	41	27.8	61	25.2
Missing	0	0	2	0.8
Total	147	100	242	100

In study one, the majority of respondents reported that they read newspapers online less than once a week (31.9%). Most respondents reported that the duration of online newspaper usage was less than 3 years. In study two, majority of respondents were not heavy users (read news online daily) of online newspapers. More than fifty-seven percent of respondents used online newspapers less than half an hour a day. The majority of respondents reported that they have been read online newspapers for no more than 3 years. Table 5 presents the frequencies of online newspaper usage by the respondents.

Table 5. Frequencies of Online Newspapers Usage (Studies 1 and 2)

	Study 1		Study 2	
Use Frequency	N	%	N	%
Not Use At All	15	10.2	17	7.0
Less than Once A Week	47	31.9	76	31.4
Once Each Week	29	19.7	55	22.7
Several Times A Week	35	23.8	52	21.5
Once A Day	13	8.8	28	11.6
Several Times A Day	8	5.4	14	5.8
Total	147	100	242	100
Average Use A Day	N	%	N	%
Less than 30 Mins	89	60.5	140	57.9
0.5-1 Hour	44	29.9	69	28.5
1-2 Hours	10	6.8	26	10.7
2-3 Hours	3	2.0	5	2.1
3-4 Hours	1	0.7	2	0.8
Total	147	100	242	100
Duration of Use	N	%	N	%
Less Than 1 Year	43	29.2	62	25.6
1-2 Years	37	25.2	60	24.8
2-3 Years	39	26.5	56	23.1
3-4 Years	12	8.2	36	14.9
4-5 Years	10	6.8	13	5.4
5-6 Years	4	2.7	10	4.1
More Than 6 Years	2	1.4	5	2.1
Total	147	100	242	100

Some subjects reported that they never used online newspapers (15 in study one, 17 in study two). These subjects were excluded from the subsequent analysis, because the sample should have been comprised of only online newspaper users. An additional respondent in study two was deleted from the data set after the outlier detection by influential statistics. A total of 132 respondents were analyzed in study one, whereas 224 respondents were analyzed in study two.

5.3 Study One: Developing the Model

The purpose of study one is to test TAM and U&G theory and ultimately develop the integrated model. We present the results by the sequence of three research questions.

The first research question asks how well behavioral intention and behavioral usage can be predicted by perceived usefulness and perceived ease of use:

Research Question 1: How well does TAM predict the usage of an information service?

5.3.1 Principal Component Analysis: TAM Constructs

A principal component analysis (PCA) is conducted by using SAS system (Version 8.2, SAS Institute Inc., 1999-2001) with varimax (orthogonal) rotation. This resulted in a total of 21 initial components. Four components were the most significant components whose eigenvalues greater than one (Kaiser, 1960), and together accounted for 74.92% of the total variance. The results showed that factor loadings in the same components were all greater than .40 (Stevens, 1986; Hair, Anderson, Tatham, & Black, 1998), except for one item which had cross loading on two items. The factor loadings are presented in Table 6 whereas the corresponding questions are provided in Appendix B.

Table 6. Factor Loadings for TAM Constructs (Study 1)

Factor	Factor 1	Factor 2	Factor 3	Factor 4
(1) Perceived Usefulness				
V38	0.676	0.423	0.217	0.082
V39	0.875	0.201	0.180	0.026
V40	0.805	0.352	0.233	0.103
V41	0.890	0.227	0.153	0.154
V42	0.901	0.098	0.206	0.122
V43	0.864	0.126	0.249	0.159
(2) Perceived Ease of Use				
V32	0.110	0.695	0.230	0.018
V33	0.263	0.849	0.161	0.131
V34	0.196	0.823	0.072	0.097
V35	0.212	0.860	0.141	0.085
V36	0.191	0.882	0.167	0.003
V37	0.177	0.883	0.203	0.069
(3) Behavioral Intention				
V48	0.466	0.282	0.676	0.092
V49	0.381	0.354	0.718	0.060
V50	0.370	0.342	0.743	0.117
V51	0.063	0.003	0.765	0.152
V52	0.335	0.325	0.802	0.068
(4) Behavioral Usage				
V44	0.032	0.167	0.389	0.700
V45	0.133	0.018	0.062	0.758
V46	0.144	0.050	0.016	0.829
V47	0.080	0.094	0.377*	0.337*
Eigenvalue	9.86	2.53	1.89	1.44
Variance Explained	46.95%	12.07%	9.02%	6.87%
Cumulative Variance Explained	46.95%	59.03%	68.05%	74.92%

*Note: this item had cross loading on 2 factors N= 132 No. of items=21

Note that one item, V47, whose loading did not exceed .40. Moreover, the coefficient alpha reliability test (Cronbach $\alpha=0.68$) suggested that reliability estimate will be slightly higher if this item was deleted (Cronbach $\alpha=0.71$). Item V47 (what is the number of years and months you have used the online newspapers) is probably not assessing the same construct that is assessed by V44-V46 (degree of using online newspapers; hours of using the online newspapers on an average day; total hours of using the online newspapers yesterday); therefore, it was deleted from scale reliability assessment (Hatcher, 1994). Table 7 shows that coefficient alpha reliability (standardized) estimates (Cronbach, 1951) all exceed the .70 acceptable value (Nunnally, 1978).

Table 7. Intercorrelations, and Reliability Estimates for TAM Constructs (Study 1)

Constructs	No. of Items	Means	Std. Dev	Correlation of Constructs			
				(1)	(2)	(3)	(4)
(1) Perceived Ease of Use	6	5.64	1.25	0.93			
(2) Perceived Usefulness	6	5.08	1.52	0.50	0.95		
(3) Behavioral Intention	5	6.13	1.09	0.52	0.62	0.91	
(4) Behavioral Usage	3	2.00	0.67	0.25	0.30	0.40	0.71

Note: N=132 No. of items=20 Standardized Cronbach's α s appear on the diagonal.

Overall, the principal component analysis of the primary research constructs shows clean loadings in the factor structure, as depicted in Table 6. The only problematic item is V47 whose loading is marginal and ambiguous. Dropping this item increases much of the reliability of the remaining three items which measure BU. Six items each load in PU and in PEU whereas five items loads on BI. Collectively, the results confirm Davis' (1989) and other TAM studies (Koufaris, 2002; Gefen et al. 2003) which indicate that these constructs were divergent constructs.

5.3.2 Multiple Regression Analysis: TAM Model

Note that linear regression cannot test all the hypotheses in a single statistical test (Gefen et al., 2000); therefore, a total of three separate regressions were used to test the

four hypotheses. A total of three runs of path analysis were performed to test the causal paths of the model.

Regression#1: Both PU and PEU were found highly correlated with behavioral intention (Davis, 1989). However, the findings on PEU affecting BI are controversial in later studies. PEU was found to be a significant antecedent, rather than a parallel, direct determinant of BI (Davis et al., 1992). Also, its importance of predicting BI was found to vary in tasks or systems (Gefen & Straub, 2000). Given the competing findings, we tested the relationship of PEU, PU, and BI. The first multiple regression model is:

$$BI = \beta_0 + \beta_1 (PU) + \beta_2 (PEU) + \varepsilon$$

Regression analyses (Table 8) indicated that behavioral intention was significantly explained by perceived ease of use ($\beta=0.28$) and perceived usefulness ($\beta=0.48$), $p<.0001$. These two constructs explained 45.29% of variance in behavioral intention.

Table 8. Linear Regression Analysis for Proposed TAM Model (Study 1)

	DV	IV	b	β	
Regression #1	BI	PU	0.34***	0.48	<i>F</i> = 53.39*** <i>df</i> = 2/129 <i>R</i> ² = 0.4529 <i>Adj R</i> ² = 0.4444
		PEU	0.25***	0.28	
Regression #2	PU	PEU	0.61***	0.50	<i>F</i> = 44.10*** <i>df</i> = 1/130 <i>R</i> ² = 0.2533 <i>Adj R</i> ² = 0.2476
Regression #3	BU	BI	0.25***	0.40	<i>F</i> = 25.46*** <i>df</i> = 1/130 <i>R</i> ² = 0.1638 <i>Adj R</i> ² = 0.1573

N=132 * $p<.05$, ** $p<.01$, *** $p<.001$

Regression#2: Various TAM studies found that PEU may affect behavioral usage through the mediating variable, PU (Davis, 1989; Keil, Beranek, & Konsynski 1995; Gefen, 2000). So, we test the relationship between PEU and PU by the following multiple regression model:

$$PU = \beta_0 + \beta_1 (PEU) + \varepsilon$$

The effect of PEU ($\beta=0.50$) on PU is significant at .0001 level. The R^2 is 0.2533, which indicates that 25.33% of variance on PU was explained by PEU. Consistent with Davis (1989), we conclude that PEU has both direct effect and indirect effect to behavioral intention.

Regression#3: BI and BU was found positively correlated with each other in previous TAM studies (Davis, 1989; Venkatesh & Davis, 2000; Venkatesh et al., 2003), results of pooled data across studies and time periods suggested that the basic TAM relationships (i.e., $BI \rightarrow BU$, $PU \rightarrow BI$, $PEU \rightarrow BI$, $PEU \rightarrow PU$) were well-supported (Davis, 1989. Among these relationships, the relationship of BI and BU was positively correlated ($\beta= 0.52^{***}$) (Venkatesh & Davis, 2000). To confirm the causal relationship, the hypothesis corresponds to the multiple regression model was tested:

$$BU = \beta_0 + \beta_1 (BI) + \varepsilon$$

The effect of behavioral intention ($\beta=0.40$) on behavioral usage is significant at .0001 level. Behavioral intention explains 16.38% of variance in behavioral usage. Collectively, the structure relationships of TAM constructs, as depicted in Figure 8, were found to be all significant and positive. Note that the perceived usefulness has stronger impact on behavioral intention than on perceived ease of use.

β = the standardized regression coefficients

Figure 8. TAM Causal Path Findings

In summary, the construct validity of TAM measurements and the relationships of constructs were tested by the following procedures. Firstly, a principal component analysis was conducted and 21 items factor into four factors, in which each factor has clean loadings. Secondly, the results of three regression analyses suggested that TAM constructs predict behavioral usage. Perceived usefulness has stronger impact on behavioral intention than perceived ease of use.

The second research question concerns the U&G theory's motive factors as predictors of behavioral usage and the relationship between satisfaction and behavioral usage. This question asks:

Research Question 2: How well does U&G theory predict the usage of an information service?

5.3.3 Principal Component Analysis: Motives in U&G Theory

Among motive 31 items, seven items measured asked whether chat room functions would be reasons that respondents used online newspapers. Given less than 10% of the respondents reported that they used these functions, these seven items were excluded

from PCA analysis. Preliminary analysis suggested that another six items either did not factor into the constructs that they should or did not meet the criterion of acceptable eigenvalue; therefore, they were excluded from the analysis.

The principal components analysis was conducted with varimax (orthogonal) rotation. This resulted in a total of 18 initial factors. We specified components whose eigenvalues greater than one (Kaiser Criterion) as meaningful components. Five components were identified as the most significant components. Except V22, all the coefficients in these five components were above the acceptable level of .70 except V22 whose loading slightly lower than the acceptable level .70. Table 9 presents these results which shows that these five retained components together accounted for about 78.75% of the total variance. The measures of the five components are included in the Appendix B.

Table 9. Factor loadings of U& G Motivation Items (Study 1)

Factor	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
(1) Information Seeking					
V10	0.830	0.173	0.160	0.014	0.200
V11	0.793	0.012	0.325	0.069	0.180
V12	0.782	0.088	0.208	0.159	0.213
V13	0.864	0.048	0.197	0.073	0.023
(2) Interpersonal Utility					
V1	0.097	0.793	0.129	0.034	0.032
V2	0.236	0.766	0.082	-0.062	-0.221
V3	0.021	0.835	0.214	0.070	0.108
V4	0.081	0.759	-0.086	0.173	0.244
V5	-0.086	0.736	0.057	0.122	0.369
(3) Entertainment					
V18	0.222	0.116	0.748	0.345	0.172
V19	0.209	0.117	0.851	0.232	0.209
V20	0.229	0.114	0.863	0.196	0.160
V22	0.423	0.090	0.698	0.005	0.056
(4) Pass Time					
V7	0.072	0.083	0.196	0.915	0.057
V8	0.068	0.059	0.111	0.929	0.064
V9	0.100	0.107	0.229	0.917	0.038
(5) Convenience					
V16	0.302	0.149	0.273	0.066	0.788
V17	0.297	0.199	0.234	0.080	0.815
Eigenvalue	6.85	2.63	2.36	1.21	1.09
Variance explained	38.07%	14.65%	13.16%	6.77%	6.10%
Cumulative Variance explained	38.07%	52.73%	65.88%	72.66%	78.75%

A component should contain more than two items but the fifth factor was comprised of only two items with high loadings. We tentatively retain this component because of the high loadings. The Cronbach's α of each factor exceeded 0.70 (Table 10), indicating high internal reliability of the items in the same construct. The motivations of using information services are identical to the five Internet motives reported by Papacharissi and Rubin (2000). Recall that four items were elicited from open-ended questions. Among them, only the item "because I can get world news" (V22) loaded in entertainment construct; all else were not factored into a construct. Literally this item was different from other items in the entertainment factor, so it a problematic item. At this point, we temporarily retained this item for further analysis.

Table 10. Reliabilities and Intercorrelations of Motivations (Study 1)

Constructs	No. of Items	Means	Std. Dev	Correlation of Constructs				
				(1)	(2)	(3)	(4)	(5)
(1) Information Seeking	4	4.08	0.93	0.89				
(2) Interpersonal Utility	5	1.80	0.87	0.23	0.85			
(3) Entertainment	4	3.25	1.13	0.57	0.27	0.90		
(4) Pass Time	3	2.88	1.30	0.22	0.19	0.42	0.94	
(5) Convenience	2	2.85	1.29	0.53	0.35	0.52	0.23	0.85

Note: N=132

Standardized Cronbach's α s appear on the diagonal.

5.3.4 Multiple Regression Analysis: U&G Theory

Causal paths were hypothesized with the five factors (represented by the factor scores of their signifying items) as independent variables and behavioral usage as dependent variable. A stepwise regression analysis was performed for the hypothesis testing. Another multiple regression analysis tested the relationship between behavioral usage and satisfaction. Figure 9 shows the variables and relationships between variables.

Figure 9. The U&G theory Tested in this Proposed Research

Stepwise regression enables us to select the most important predictors of behavioral usage. This analysis is useful for researchers whose aim is to obtain a prediction equation (Tabachnick & Fidell, 2000, p.135). Since the main interest of this research is to explore the contribution of motive factors in behavioral usage, conducting stepwise regression will help us to identify the unique contribution of the motive factors to behavioral usage. In this version of statistical regression, decisions about which variables are included and which omitted from the equation are based solely on statistics computed from the particular sample drawn (Tabachnick & Fidell, 2000, p.133). In some cases, variability in the statistics from sample to sample is expected, the application of stepwise regression is controversial (Tabachnick & Fidell, 2000; Pedhazur, 1997). Bear in mind that stepwise regression analysis is based solely on statistics computed from our sample. We will compare the results with the findings in previous studies to solve the problem that the results only apply to our sample.

Regression #1: In step one, entertainment was selected because its correlation with the behavioral usage was the highest among the five motive factors, $R^2=0.3461$, $F(1, 130) = 68.81$, $p<.0001$. In step two, both entertainment and pass [the] time were entered into the regression model, $R^2=0.3579$, $F(2, 129) = 35.95$, $p<.0001$. The SAS system entered three factors, entertainment, pass [the] time, and convenience in the third step, resulting in $R^2=0.3697$, $F(3, 128) = 25.03^{***}$, $p<.0001$. Table 11 displays the regression coefficients suggesting that entertainment ($\beta=0.58$) remained to be the most significant indicator in each step. If pass [the] time, entertainment, and convenience were selected into the regression model, they incremented variance only about 2%. Thus, the addition of pass [the] time, and convenience to the equation did not contribute largely to improve R^2 . Together, entertainment, an intrinsic motive, was the most significant motive that explained behavioral usage.

Table 11. Stepwise Regression Analysis for Motivation Constructs (Study 1)

	Predictor	Behavioral Usage (BU)			
		b	β	F	
Step 1	Entertainment	0.35	0.58	68.81***	F=68.81*** $R^2=0.3461$ df=1/130
Step 2	Entertainment	0.32	0.53	47.44***	F=35.95*** $R^2=0.3579$ df=2/129
	Pass Time	0.06	0.12	2.37 (0.1263)	
Step 3	Entertainment	0.35	0.60	46.52***	F=25.03*** $R^2=0.3697$ df=3/128
	Pass Time	0.06	0.12	2.45 (0.120)	
	Convenience	-0.06	-0.12	2.28 (0.123)	

N= 132 * $p<.05$, ** $p<.01$, *** $p<.001$

Regression #2: To assess the causal path of behavioral usage and satisfaction, a multiple regression was performed. Regression analyses indicate that the effect of behavioral usage on satisfaction was significant ($b=0.48$, $\beta=0.45$, $F(1, 130) = 33.46$,

$p < .0001$). The R^2 and the adjusted R^2 were 0.2047 and 0.198, respectively. That is, 20.47% of variance in satisfaction can be explained by the behavioral usage. Based on the two rounds of multiple regression, the following model for U&G theory can be established.

β = the standardized regression coefficients

Figure 10. U&G Causal Path Findings

In sum, the analysis of questions one and two is encouraging. First, the construct validity of the TAM variables, PU, PEU, BI, and BU was established. The two constructs, PU and PEU in TAM theory predict 45.29% variability of behavior intention. Secondly, five factors extracted from the 18 motive items were identical to those of Internet motives. The multiple regressions on the motive factors and behavioral usage indicate that entertainment motive was the best predictor of behavioral usage; it contributes to the variability of behavioral usage for 34.61% and the significance test of the model is at the .0001 level. In Kaye (1998), entertainment was also found to be the strongest motive of Web use. As a result, we can conclude that entertainment is the most important predictor with given context.

5.3.5 Regression Analysis: The Integrated Model

We attempt to develop an integrated model to explain user acceptance of information services. The third research question asked:

Research Question 3: How well does an integrated TAM and U&G model improve prediction of information service usage?

Regression#1: We found that that entertainment was one of the predictors of behavioral usage. Combining this finding with analysis in TAM, we tested the following regression model in which both behavioral intention and entertainment were predictors of behavioral usage:

$$BU = \beta_0 + \beta_1 (E) + \beta_2 (BI) + \varepsilon$$

Figure 11 shows the relationships of the constructs. The results of the multiple regression, which indicates that both entertainment ($\beta=0.50$) and behavioral intention ($\beta=0.17$) were predictors of behavioral usage, $R^2=0.3718$, $F(2, 129) = 38.18^{***}$, $p < .0001$. Entertainment and behavioral intention explain more than 37% of variance in behavioral usage. Table 12 shows the result of regression analysis.

β = the standardized regression coefficients

Figure 11. Test of Integrated Model

Table 12. Linear Regression Analysis for Integrated Model (Study 1)

	DV	IV	b	β	
Regression #1	BU	BI	0.11*	0.17	F=38.18*** df= 2/129 R ² = 0.3718 Adj R ² = 0.3621 F= 37.33*** df= 3/128 R ² = 0.4666 Adj R ² =0.4541
		Entertainment	0.30***	0.50	
Regression #2	BI	PU	0.30***	0.43	
		PEU	0.22***	0.25	
		Entertainment	0.13	0.13	

N= 132 * $p < .05$, ** $p < .01$, *** $p < .001$

From the results of regression analysis, the final integrated model is shown in Figure 12 and this integrated model confirms the following relationships:

1. Two TAM constructs, perceived ease of use and perceived usefulness, were predictors of behavioral intention;
2. Entertainment and behavioral intention positively predict behavioral usage; and
3. Behavioral usage explains satisfaction.

β = the standardized regression coefficients

Figure 12. The Integrated Model (Study 1)

5.3.6 Post Hoc Test

Regression#2: We next examined the relationship between entertainment and behavioral intention. Note that this relationship was not hypothesized in our integrated model. Rather, the relationship was found in recent IS studies that explored intrinsic motivation, such as perceived enjoyment or perceived playfulness, as a predictor of behavioral intention to the voluntary use of information system or WWW.

Perceived enjoyment and perceived playfulness were similar to entertainment motive because they are related to the fun or pleasure in system use. However, the former were hypothesized as the predictor of behavioral intention in IS studies (Moon & Kim, 2001; van der Heijden, 2004; Lee et al., 2005) whereas the latter was hypothesized as the predictor of behavioral usage in U&G studies. An information system focusing on the fun-aspect of use is known as a hedonic information system (van der Heijden, 2004); online newspapers are this type of information system. Based on IS studies, we hypothesized that entertainment, perceived ease of use, perceived usefulness are all predictors of behavioral intention. The multiple regression model corresponding to the hypothesis is:

$$BI = \beta_0 + \beta_1 (E) + \beta_2 (PEU) + \beta_3 (PU) + \varepsilon$$

The results of Regression analysis show that the overall F test of the regression model was significant ($R=0.4666$, $F(3, 128) = 37.33^{***}$, $p < .0001$). Regression coefficients of perceived ease of use, perceived usefulness were significant at .0001 level; however, the regression coefficient of entertainment ($\beta = 0.13$) was not significant. The

results shown in Figure 13 differ from results in previous IS studies, which found that perceived enjoyment has a direct effect on behavioral intention. The TAM constructs remain to be the most significant indicators of behavioral intention.

β = the standardized regression coefficients

Figure 13. PEU, PU, and Entertainment as Predictors of BU

We turn next to the analysis of study two, a replication to reproduce the results of study one. Replicability is the major criterion for judging the reliability of the results of empirical research. Even though the regression coefficients of causal paths in the integrated model were all significant in study one, it is necessary to replicate the measurement scales to demonstrate that these scales show good convergent and discriminant properties under our research setting. If the measurement scales are proved to be robust measures in study two, we may assert that these scales are very stable in given research context.

5.4 Study Two: Model Replication

In this study, we analyzed the data by using the same approach as study one.

Principal component analysis was performed to establish the construct validity of constructs whereas multiple regression was conducted to identify the causal relationship of constructs in both TAM and U&G theory. In the subsequent analysis, we tested the causal paths of the integrated model developed from the study one data by using multiple regression.

5.4.1 Principal Component Analysis: TAM Constructs

The construct validity of PU, PEU, BI, and BU was tested by performing a principal component analysis in which the principal axis method was used to extract the components, and this was followed by a varimax (orthogonal) rotation. This resulted in a total of 21 initial components. Four components were identified as the most significant components, whose eigenvalues were greater than one (Kaiser criterion). These four components accounted for 76% of the total variance. Questionnaire items and corresponding factor loadings are presented in Table 13. Factor loadings in the same components were all greater than .40. The four components were labeled corresponding to the four TAM constructs, PEU, PU, BI, and BU. The detailed questions of these constructs are provided in Appendix B.

Table 13. Factor Loadings for TAM Constructs (Study 2)

Factor	Factor 1	Factor 2	Factor 3	Factor 4
(1) Perceived Ease of Use				
V32	0.836	0.198	0.122	0.094
V33	0.868	0.125	0.182	0.102
V34	0.834	0.235	0.111	0.122
V35	0.827	0.262	0.152	0.022
V36	0.830	0.308	0.180	0.038
V37	0.843	0.162	0.223	0.118
(2) Perceived Usefulness				
V38	0.418	0.673	0.202	0.123
V39	0.204	0.868	0.127	0.189
V40	0.296	0.848	0.172	0.147
V41	0.201	0.873	0.193	0.188
V42	0.215	0.835	0.258	0.184
V43	0.189	0.789	0.337	0.153
(3) Behavioral Intention				
V48	0.284	0.275	0.823	0.193
V49	0.289	0.267	0.844	0.143
V50	0.248	0.257	0.869	0.148
V51	-0.003	0.075	0.732	0.063
V52	0.235	0.262	0.832	0.109
(4) Behavioral Usage				
V44	0.120	0.112	0.417	0.620
V45	0.072	0.150	0.081	0.875
V46	0.065	0.166	-0.012	0.852
V47	0.081	0.164	0.156	0.472
Eigenvalue	9.92	2.54	2.05	1.61
Variance Explained	47.27%	12.10%	9.81%	7.68%
Cumulative Variance Explained	47.27%	59.36%	69.17%	76.85%

Table 14 shows that coefficient alpha reliability (standardized) estimates (Cronbach, 1951) all exceed .70, indicating high internal consistency. Reliability estimates were .94, .95, .93, and .78 for PEU, PU, BI, and BU, respectively. Note that when V47 (one item in BU) was included, reliability estimate of BU was relatively lower than other TAM constructs ($\alpha = .74$), because this item had low correlation with other items in BU. We dropped this item and this resulted in an increase of the reliability estimate of BU to .78.

Table 14. Intercorrelations and Reliability Estimates for TAM Constructs (Study 2)

Constructs	No. of Items	Means	Std. Dev	Correlation of Constructs			
				(1)	(2)	(3)	(4)
(1) Perceived Ease of Use	6	5.27	1.29	0.94			
(2) Perceived Usefulness	6	4.87	1.47	0.55	0.95		
(3) Behavioral Intention	5	5.94	1.24	0.46	0.54	0.93	
(4) Behavioral Usage	3	2.10	0.76	0.27	0.41	0.41	0.78

Note: N=224

Standardized Cronbach's α s appear on the diagonal.

5.4.2 Multiple Regression Analysis: TAM

Based on the hypothesized TAM model, four hypotheses were again tested by using three multiple regressions.

Regression#1: The following multiple regression model tested the direct effect PU and PEU to BI:

$$BI = \beta_0 + \beta_1 (PU) + \beta_2 (PEU) + \varepsilon$$

The results of regression analyses (Table 15) indicated that there were direct effects of perceived ease of use and perceived usefulness to behavioral intention. The effects of both perceived ease of use ($\beta=0.23$) and perceived usefulness ($\beta=0.41$) were significant at the .0001 level. The two predictors accounted for 30.62% of variance in behavioral intention. The results of regression analysis were similar to findings in study one in which perceived usefulness has stronger effect than perceived ease of use on behavioral intention.

Regression#2: The corresponding multiple regression model to test the effect of PEU on PU is:

$$PU = \beta_0 + \beta_1 (PEU) + \varepsilon$$

The result suggested that the effect of PEU ($\beta=0.55$) on PU is significant at .0001 level. The results indicated that 30.31% of variance on PU can be explained by PEU.

Regression#3: The following multiple regression models tested the relationship between BI and BU:

$$BU = \beta_0 + \beta_1 (BI) + \varepsilon$$

The effect of behavioral intention ($\beta=0.41$) on behavioral usage is significant at .0001 level. Results indicated that only 17.46% of variance on behavioral usage can be explained by behavioral intention. Table 15 presents the results of analysis.

Table 15. Linear Regression Analysis for Proposed TAM Model (Study 2)

	DV	IV	b	β	
Regression #1	BI	PU	0.34***	0.41	$F = 55.96^{***}$ $df = 2/221$ $R^2 = 0.3362$ $Adj R^2 = 0.3301$
		PEU	0.23***	0.23	
Regression #2	PU	PEU	0.62***	0.55	$F = 96.55^{***}$ $df = 1/222$ $R^2 = 0.3031$ $Adj R^2 = 0.2999$
Regression #3	BU	BI	0.25***	0.41	$F = 46.97^{***}$ $df = 1/222$ $R^2 = 0.1746$ $Adj R^2 = 0.1709$

N=224 * $p < .05$, ** $p < .01$, *** $p < .001$

5.4.3 Principal Component Analysis: Motives in U&G Theory

The principal axis method was used to extract the components, and this was followed by a varimax (orthogonal) rotation. A scree test suggested five meaningful components which were retained for rotation. In interpreting the rotated factor pattern, an item was said to load on a given component if the factor loading was .40 or greater for that component, and was less than 0.4 for the other. Using these criteria, five components were extracted from the analysis. Each component was comprised of at least three items, except the fifth component (convenience) which had only two items with relative high loadings (>.60). We chose to retain this component in subsequent analysis. Question items and corresponding factor loadings are presented in Table 16. The detailed factors and corresponding questions are provided in Appendix B.

Table 16. Factor loadings of U& G Motivation Items (Study 2)

Factor	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
(1) Interpersonal Utility					
V1	0.699	0.018	0.181	0.260	0.055
V2	0.656	-0.107	0.274	0.157	0.152
V3	0.881	0.094	0.089	0.077	0.130
V4	0.846	0.266	-0.022	-0.017	0.066
V5	0.777	0.272	-0.042	-0.057	0.053
(2) Entertainment					
V18	0.112	0.793	0.128	0.320	0.189
V19	0.118	0.813	0.182	0.286	0.085
V20	0.187	0.820	0.144	0.334	0.168
V22	0.142	0.650	0.374	0.034	0.000
(3) Information Seeking					
V10	0.180	0.011	0.737	-0.044	0.115
V11	0.107	0.219	0.739	-0.008	0.130
V12	0.045	0.181	0.813	0.063	0.134
V13	-0.002	0.195	0.814	0.045	0.112
(4) Pass Time					
V7	0.103	0.161	0.001	0.859	-0.038
V8	0.064	0.244	-0.016	0.873	0.058
V9	0.110	0.280	0.039	0.858	0.046
(5) Convenience					
V16	0.197	0.160	0.256	0.054	0.882
V17	0.148	0.142	0.202	0.004	0.913
Eigenvalue	6.10	2.61	2.31	1.22	1.16
Variance explained	33.94%	14.53%	12.86%	6.78%	6.48%
Cumulative Variance explained	33.94%	48.47%	61.33%	68.11%	74.60%

As presented on the diagonal of Table 17, the Standardized Coefficient alpha reliability estimates were higher than the acceptable value .70. Reliability estimates were .85, .88, .82, .89, and .91 for interpersonal utility, entertainment, information seeking, pass [the] time, and convenience, respectively.

Table 17. Intercorrelations and Reliability Estimates for Motivations (Study 2)

Constructs	No. of Items	Means	Std. Dev	Correlation of Constructs				
				(1)	(2)	(3)	(4)	
(1) Interpersonal Utility	5	1.85	0.87	0.85				
(2) Entertainment	4	3.22	1.05	0.35	0.88			
(3) Information Seeking	4	3.95	0.87	0.26	0.41	0.82		
(4) Pass Time	3	2.82	1.17	0.22	0.49	0.09	0.89	
(5) Convenience	2	2.83	1.34	0.33	0.35	0.41	0.11	0.91

Note: N=224

Standardized Cronbach's α s appear on the diagonal.

5.4.4 Multiple Regression Analysis: U&G Theory

To replicate study one, a stepwise regression was carried out to select the best set of predictors of the behavioral usage. Sequentially, a multiple regression analysis was performed to test the relationship between behavioral usage and satisfaction.

Regression #1: The SAS system performed four steps of model selection. In step one, entertainment was selected because of this correlation with the behavioral usage was the highest among the five motive factors, $R^2=0.2601$, $F(1, 222) = 78.02$, $p<.0001$. In step two, both interpersonal utility and entertainment were entered into the regression model, $R^2 = 0.2926$, $F(2, 221) = 45.71$, $p<.0001$. The SAS system entered three factors, information seeking, interpersonal utility, and entertainment in the third step, resulting in $R^2=0.3059$, $F(3, 220) = 32.31^{***}$, $p<.0001$. Pass [the] time, was added in the step four regression, the four variables resulted in $R^2 = 0.3139$, $F(4, 219) = 25.04^{***}$, $p<.0001$. The standardized regression coefficients suggested that entertainment ($\beta=0.50$) remained the most significant indicator. If interpersonal utility, pass [the] time, and information seeking were selected into the regression model, they explained incremental variance of about 5%, which did not contribute significant improvement of R^2 . Table 18 shows the results of the stepwise selection.

Table 18. Stepwise Regression Analysis for Motivation Constructs (Study 2)

	Predictor	Behavioral Usage (BU)			
		b	β	F	
Step 1	Entertainment	0.37***	0.50	78.02***	F=78.02*** R ² =0.2601 df=1/222
Step 2	Interpersonal Utility	0.17***	0.19	10.18**	F=45.71*** R ² =0.2926 df=2/221
	Entertainment	0.32***	0.44	53.26 ***	
Step 3	Information seeking	0.11	0.12	4.19*	F=32.31*** R ² =0.3059 df=3/220
Step 4	Interpersonal Utility	0.15	0.17	8.45***	F= 25.04*** R ² =0.3139 df=4/219
	Entertainment	0.28	0.39	37.70**	
	Information Seeking	0.09	0.11	3.16	
	Pass Time	-0.06	-0.10	2.55	

N=224 * $p<.05$, ** $p<.01$, *** $p<.001$

Regression #2: Regression analyses indicate that the effect of behavioral usage on satisfaction were significant ($b=0.65$, $\beta=0.53$, $F(1, 222) = 88.47$, $p<.0001$). The R^2 and adjusted R^2 were 0.285 and 0.281, respectively. A total 28.50% of variance in satisfaction can be explained by the behavioral usage.

Given the constructs and causal relationships were replicated in study two, we turn next to identify the causal relationships in the integrated model. We expect to see that the integrated model depicts the same structural relationship as the model in study one.

5.4.5 Regression Analysis: The Integrated Model

After several runs of regression analysis, we carried out one more multiple regression analysis to explore the relationships of behavioral intention, entertainment, and behavioral usage. The corresponding multiple regression model is:

$$BU = \beta_0 + \beta_1 (E) + \beta_2 (BI) + \varepsilon$$

Table 19 displays the result of the multiple regression analysis, which indicates that entertainment ($\beta=0.40$) has great impact on behavioral usage than behavioral intention ($\beta=0.24$). Regression coefficients of both constructs were significant at .0001. The regression analysis resulted in $R^2=0.3079$, $F(2, 221) = 49.16^{***}$, $p<.0001$.

Table 19. Linear Regression Analysis for Integrated Model

	DV	IV	b	β	
Regression #1	BU	BI	0.14***	0.24	F=49.16*** df= 2/221 R ² = 0.3079 Adj R ² = 0.3016
		Entertainment	0.29***	0.40	

N=224 * $p<.05$, ** $p<.01$, *** $p<.001$

An integrated model was tested and the results confirmed those of study one. The integrated model is depicted by following diagram:

β = the standardized regression coefficients

Figure 14. The Integrated Model (Study 2)

In sum, the results of studies one and two suggested that construct validity of TAM measurement and the relationships of constructs can be re-established by performing principal component analysis and three regression analyses. Secondly, TAM's causal paths are replicated in studies one and two, although there is a shrinkage in R^2 of PU and PEU as predictors of BI in study two (PU, $PEU \rightarrow BI$, $R^2 = .4529$, study 1, $R^2 = .3362$, study 2; $PEU \rightarrow PU$, $R^2 = .2533$, study 1; $R^2 = .3031$, study 2; $BI \rightarrow BU$, $R^2 = .1638$, study 1, $R^2 = .1746$, study 2). Principal component analysis extracts five motivations from the 21 motive items. The motive factor, entertainment, is the most important predictor of behavioral usage whose variability is accounted for by entertainment up to 26%-34% and the significant test of the regression coefficient is significant at .0001 level. Finally, the

causal paths in the integrated model were supported by the data in both studies. We can conclude that adding motive and satisfaction constructs to original TAM is plausible, and the idea of merging TAM and U&G theory is supported by the data collected.

5.5 Structural Equation Modeling of Pooled Data

We have mentioned that we will get as much as information as possible from our data by performing both multiple regression and SEM analyses. The multiple regression analyses have shown the causal-effect relationships in the integrated model. We now perform a SEM analysis by using SAS System's CALIS procedure (Version 8.2, SAS Institute Inc., 1999-2001).

The present analysis followed a two-step procedure based in part on an approach recommended by Anderson and Gerbing (1988). In the first step, confirmatory factor analysis was used to develop a measurement model that demonstrated an acceptable fit to the data. A measurement model describes the nature of the relationships between (a) a number of latent variables, or factors, and (b) the manifest indicator variables that measure those latent variables. In the second step, the measurement model was modified to represent the theoretical (causal) model of interest. The theoretical model was then tested and revised until a theoretically meaningful and statistically acceptable model was found.

5.5.1 Proof of Concept: Using SEM to Test TAM and U&G Theory

Prior to testing the integrated model, we conducted SEM analysis for TAM and U&G theory, respectively. We developed measurement model for each theory and a structural model of each theory was sequentially tested.

The Measurement Model of TAM Constructs. We performed a confirmatory factor analysis and the results indicated that the model adequately described the sample data. Goodness of fit indices for the measurement model are presented in Table 20. This table shows that the measurement model displayed values greater than .90 on the non-normed-fit index (NNFI) and the comparative fit index (CFI), indicative of an acceptable fit (Bentler & Bonett, 1980; Bentler, 1989). Therefore, this model was accepted as TAM's measurement model. A number of tests were conducted to assess the reliability and validity of the model. The findings supported the reliability and validity of the constructs and their indicators.

Table 20. Fit Indices of TAM constructs

Model	χ^2	$\chi^2 df$	GFI	CFI	NFI	NNFI	PNFI
TAM							
Measurement Model	408.2211	178	0.9041	0.9667	0.9428	0.9608	0.7991
Structural Model	414.7743	180	0.9028	0.9661	0.9418	0.9604	0.8073
U&G Theory							
Measurement Model	262.0942	74	0.9005	0.9176	0.8896	0.8987	0.7234
Structural Model	226.1031	74	0.9156	0.9334	0.9047	0.9181	0.7357

Note: N=356

The Structural Model of TAM Constructs. The structural model hypothesized the causal relationships between the TAM constructs. Goodness of fit indices for the model appear in Table 20. Values on the NNFI and CFI were acceptable for this structural model (in excess of .90). Standardized path coefficients for the model were all significant and in the predicted direction. R^2 values showed that perceived ease of use accounted for 30.62% of the variance in perceived usefulness; while perceived ease of use and perceived usefulness collectively accounted for 41.66% of the variance in behavioral intention. Furthermore, behavioral intention explained 30.71% of variance in behavioral usage (Figure 15).

Figure 15. Standardized Path Coefficients of TAM

The Measurement Model of U&G Constructs. The results of confirmatory analysis indicated that the model adequately depicted the sample data. The goodness of fit indices for the measurement model displayed values greater than .90 (see Table 20). We therefore accept this measurement model and then conducted a number of tests to assess the reliability and validity of the model. The findings support the reliability and validity of the constructs and their indicators.

The Structural Model of U&G Constructs. Goodness of fit indices for the structural model were acceptable. Values on the NNFI and CFI were in excess of .90 (see Table 20). Standardized path coefficients for the model were all significant and in the predicted direction. R^2 values showed that entertainment accounted for 51.27% of the variance in behavioral usage; while behavioral usage in turn accounted for 51.52% of the variance in behavioral intention (see Figure 16).

Figure 16. Standardized Path Coefficients of U&G Model

Overall, we conclude that TAM constructs were valid and the standardized coefficients were all significant as predicted. The constructs in the simplified U&G model were valid and the causal paths were all significant. In the following subsection, we developed a measurement model for our integrated model. Sequentially, we evaluate the structural portion of the integrated model.

5.5.2 Overview of the Analysis of the Integrated Model

Given a good fit between the pooled data and both theories, we further analyzed the integrated model. The pooled data were analyzed using SAS System's CALIS procedure and the models tested were covariance structure models with multiple indicators for all latent constructs. Standard deviations, means, and intercorrelations for the study's 31 manifest variables are presented in Table 21.

Note that in this measurement model, three negatively worded items (V51, V54, and V56) were excluded. There three items were items in behavioral intention (V51: I am not likely to use an online newspaper in the future) and satisfaction (V54: Reading online newspaper is a waste of time and V56: I am not satisfied with the topics in my favorite online newspaper). These items might not effectively measure their corresponding construct, because each of them had a relative low correlation with other items in the

same construct. It is likely that the respondents did not read over the word “not” and answer on that basis (Babbie, 2001). So, the responses for these negatively worded items were invalid. Also, preliminary analysis confirmed that if these variables were kept in the resulting measurement model, the model would not fit well the data. As a result, they were excluded from the analysis.

Excluding these items also allows the measurement model to contain 28 items which is the adequate number of item recommended by Hatcher (1994) and Bentler and Chou (1987). Hatcher (1994) notes that a maximum of 20-30 indicators variables will be effectively studied in performing path analysis with manifest variables. Bentler and Chou (1987) caution that it is easy to become too grandiose when developing structural models, and they advised that researchers should work only with relatively small data sets of perhaps 20 indicator variables or less. Given the moderate large sample size ($N=356$) of this study, estimating the measurement model with under 30 variables should be appropriate.

Table 21. The Correlation Matrix for the 31 Manifest Variables

	Mean	Std.	V18	V19	V20	V22	V32	V33	V34	V35	V36	V37	V38	V39	V40	V41
V18	3.12	1.20	1.00													
V19	3.15	1.27	0.74	1.00												
V20	3.01	1.24	0.81	0.86	1.00											
V22	3.65	1.25	0.51	0.57	0.56	1.00										
V32	5.58	1.44	0.24	0.26	0.23	0.27	1.00									
V33	5.50	1.41	0.21	0.27	0.25	0.26	0.73	1.00								
V34	5.13	1.53	0.23	0.30	0.29	0.28	0.63	0.77	1.00							
V35	5.21	1.50	0.24	0.28	0.29	0.28	0.65	0.77	0.75	1.00						
V36	5.44	1.47	0.18	0.24	0.22	0.28	0.74	0.74	0.72	0.79	1.00					
V37	5.56	1.40	0.25	0.33	0.31	0.33	0.68	0.78	0.74	0.77	0.83	1.00				
V38	5.31	1.60	0.23	0.28	0.27	0.37	0.46	0.53	0.54	0.51	0.57	0.53	1.00			
V39	4.82	1.66	0.26	0.31	0.33	0.39	0.35	0.37	0.39	0.42	0.42	0.38	0.70	1.00		
V40	4.78	1.69	0.29	0.32	0.33	0.39	0.42	0.49	0.49	0.52	0.51	0.47	0.70	0.83	1.00	
V41	4.69	1.66	0.31	0.30	0.33	0.41	0.36	0.39	0.41	0.43	0.46	0.41	0.66	0.86	0.88	1.00
V42	4.92	1.71	0.29	0.28	0.30	0.38	0.36	0.38	0.37	0.39	0.43	0.36	0.68	0.79	0.79	0.83
V43	5.16	1.65	0.30	0.27	0.30	0.37	0.35	0.37	0.36	0.38	0.43	0.36	0.68	0.73	0.74	0.79
V44	3.28	1.20	0.47	0.51	0.50	0.43	0.23	0.27	0.24	0.19	0.19	0.31	0.28	0.26	0.28	0.30
V45	1.60	0.81	0.33	0.33	0.33	0.28	0.12	0.17	0.18	0.13	0.13	0.15	0.23	0.27	0.26	0.28
V46	1.32	0.66	0.32	0.29	0.31	0.24	0.13	0.15	0.16	0.10	0.10	0.15	0.22	0.24	0.25	0.29
V47	2.73	1.46	0.13	0.16	0.14	0.12	0.15	0.15	0.12	0.23	0.19	0.17	0.17	0.23	0.22	0.24
V48	5.97	1.31	0.30	0.40	0.37	0.43	0.42	0.46	0.40	0.44	0.46	0.48	0.52	0.48	0.54	0.52
V49	5.96	1.36	0.33	0.38	0.39	0.44	0.42	0.46	0.44	0.45	0.47	0.51	0.51	0.47	0.51	0.49
V50	5.98	1.34	0.33	0.38	0.36	0.40	0.39	0.46	0.41	0.43	0.46	0.48	0.51	0.44	0.52	0.50
V51	6.12	1.45	0.19	0.23	0.23	0.16	0.12	0.20	0.14	0.17	0.18	0.17	0.23	0.21	0.23	0.23
V52	6.03	1.32	0.30	0.33	0.34	0.38	0.41	0.43	0.36	0.42	0.47	0.47	0.47	0.44	0.51	0.49
V53	3.74	0.82	0.25	0.25	0.26	0.24	0.45	0.50	0.43	0.46	0.48	0.49	0.40	0.35	0.39	0.35
V54	4.30	0.88	0.23	0.20	0.21	0.22	0.19	0.20	0.20	0.20	0.23	0.24	0.24	0.19	0.20	0.25
V55	3.52	0.99	0.34	0.33	0.36	0.34	0.15	0.19	0.20	0.14	0.16	0.21	0.25	0.35	0.35	0.40
V56	3.79	0.90	0.11	0.09	0.10	0.13	0.08	0.11	0.10	0.11	0.04	0.08	0.09	0.12	0.09	0.10
V57	3.59	0.96	0.46	0.49	0.49	0.36	0.32	0.36	0.34	0.31	0.28	0.34	0.31	0.31	0.37	0.35
V58	3.37	1.04	0.47	0.46	0.49	0.39	0.29	0.29	0.31	0.29	0.23	0.32	0.29	0.36	0.38	0.35

	V42	V43	V44	V45	V46	V47	V48	V49	V50	V51	V52	V53	V54	V55	V56	V57	V58
V42	1.00																
V43	0.88	1.00															
V44	0.30	0.32	1.00														
V45	0.27	0.26	0.47	1.00													
V46	0.27	0.26	0.45	0.62	1.00												
V47	0.28	0.25	0.27	0.29	0.26	1.00											
V48	0.55	0.59	0.46	0.24	0.22	0.31	1.00										
V49	0.53	0.56	0.44	0.23	0.17	0.29	0.89	1.00									
V50	0.50	0.55	0.46	0.26	0.18	0.24	0.83	0.88	1.00								
V51	0.26	0.30	0.33	0.16	0.09	0.20	0.48	0.50	0.57	1.00							
V52	0.49	0.52	0.39	0.22	0.17	0.23	0.82	0.81	0.87	0.57	1.00						
V53	0.34	0.36	0.31	0.20	0.15	0.11	0.48	0.48	0.52	0.25	0.44	1.00					
V54	0.24	0.28	0.31	0.13	0.07	0.10	0.36	0.41	0.42	0.56	0.42	0.34	1.00				
V55	0.34	0.32	0.31	0.33	0.29	0.10	0.34	0.36	0.34	0.20	0.31	0.23	0.18	1.00			
V56	0.12	0.13	0.21	0.15	0.11	0.12	0.14	0.20	0.18	0.27	0.15	0.26	0.42	0.04	1.00		
V57	0.30	0.33	0.49	0.25	0.21	0.19	0.44	0.47	0.46	0.28	0.39	0.47	0.28	0.53	0.25	1.00	
V58	0.34	0.32	0.43	0.31	0.28	0.23	0.41	0.41	0.35	0.14	0.31	0.33	0.18	0.50	0.19	0.74	1.00

5.5.3 The Measurement Model of the Integrated Model

The integrated model consists of six latent variables: perceived usefulness, perceived ease of use, entertainment, behavioral intention, behavioral usage, and satisfaction. Each of the six latent variables was measured by at least three manifest indicator variables. The latent variables and their corresponding items are presented in Figure 17.

5.5.3.1 The Initial Measurement Model

We follow Bentler's (1989) convention of identifying latent variables with the letter "F" (for Factor), and labeling manifest variables with the letter "V" (for Variable). Figure 17 uses these conventions in identifying the six latent constructs and the indicators that measure these constructs. The figure shows that the perceived ease of use construct (F1) is measured by manifest variables V32 through V 37, the perceived usefulness construct (F2) is measured by manifest variables V38 through V43, entertainment construct (F3) is measured by variables V18, V19, V20 and V22, and so forth. The measurement model assessed in the first stage of this analysis was not identical to the model in Figure 17, because the model in that figure posits certain unidirectional causal relationships between latent variables. Instead, in a measurement model, a covariance is estimated to connect each latent variable with every other latent variable. The measurement model is equivalent to a confirmatory factor analysis model in which each latent construct is allowed to covary with every other latent construct.

Figure 17. The Theoretical Model

The measurement model was estimated by using the maximum likelihood method. The results show that the chi-square values for the model was statistically significant, $\chi^2 (335, N=356) = 1040.48, p < .0001$. Hatcher (1994) notes that if the model provides a good fit, the χ^2 value will be relatively small and the corresponding p value will be relatively large (above .05 and preferably closer to 1.00). However, with a large sample and real-world data, even if the model provides a good fit, the χ^2 value will often be significant (James, Mulaik, & Brett, 1982). So, we assessed the model by its relative small χ^2 value than the initial model, rather than seek a model with a non-significant χ^2 .

Table 22 shows the fit indices of the initial measurement model. The results indicated that there was a problem in the model's fit. Typically, Goodness of Fit Index (GFI), the non-normed fit index (NNFI) and the comparative fit index (CFI), are examined when identifying the fit of the model. In the present model, only the CFI exceeded the acceptable .90 level.

The rank order of 10 largest asymptotically standardized residuals showed that there were large residuals for V53 (item in satisfaction) and other four indicators, V33, V35, V36, and V37. Lagrange multiplier (LM) tests also showed that V53 was apparently causally affected by F1 and F4. That is, V53 is a complex variable, which is affected by multiple constructs. Rather than reassign V53, this variable was dropped from the analysis entirely based on the suggestion of Hatcher (1994). In each run of modification, Wald test results did not show in the SAS output, we therefore concluded that no path in the measurement model should be deleted.

Item V53, a satisfaction item from Papacharissi and Rubin's (2000) study, proved to have relatively little explaining value to satisfaction construct. The

standardized coefficient of item V53 is .50 and significant at .005 level. After deletion of this item, the rest of items, all those adapted from Kim and Rubin (1997), were still doing a good job in measuring satisfaction.

Table 22 summarizes the fit indices improved over six runs of revision. In each run, one variable was identified as a complex variable which was apparently a multidimensional variable. Such a variable was eliminated from the measurement model and the measurement model was re-estimated.

Table 22. Fit Indices of the Revised Measurement Models

<i>Model</i>	χ^2	χ^2 df	χ^2 /df	<i>GFI</i>	<i>CFI</i>	<i>NFI</i>	<i>NNFI</i>	<i>PNFI</i>	<i>Item Drop</i>
Initial	1040.4864	335	3.10	0.8263	0.9200	0.8868	0.9097	0.7860	
Rev1	916.2603	309	2.96	0.8378	0.9296	0.8980	0.9201	0.7905	V53
Rev2	816.5446	284	2.87	0.8475	0.9356	0.9050	0.9263	0.7909	V53, V38
Rev3	724.9195	260	2.78	0.8564	0.9393	0.9089	0.9299	0.7877	V53, V38, V48
Rev4	555.6037	237	2.34	0.8827	0.9550	0.9245	0.9476	0.7939	V53, V38, V48, V43
Rev5	470.7613	215	2.18	0.8976	0.9629	0.9341	0.9563	0.7938	V53, V38, V48, V43, V46
Rev6	414.4502	194	2.13	0.9046	0.9671	0.9402	0.9608	0.7896	V53, V38, V48, V43, V46, V22

The First Revision. Evaluation of the model focused mainly on goodness of fit indices. Some of values ($GFI=.83$; $NFI=.89$), as shown in Table 22, are below the usual acceptable level .90. Thus it is apparent that some modification in specification is needed in order to determine a model that better represents the sample data. Clues to these modifications were derived from LM statistics and Wald test statistics. Wald test statistics did not appear in the SAS output and this indicated that no path should be dropped from the model. In reviewing the LM statistics for the re-estimated model, we found that adding the path from F1 (perceived ease of use) to V38 would improve the goodness of fit. The modification would probably

not be a satisfactory solution because V38 is doing a good job of measuring F2 (perceived usefulness). The standardized coefficient for the path from F2 to V38 was fairly large at .89 and was statistically significant.

The rank order of the 10 largest asymptotically standardized residuals shows that there was a large residual for V38 (item measures perceived usefulness in TAM) and V36 (item measures perceived ease of use in TAM), and another large residual for V38 and V34. Both large residuals involved the manifest variable V38.

It is likely that V38 was a multidimensional indicator variable, or it was assigned to the wrong factor. Given the item is a pre-validated item and its high factor loading ($0.89, p < .001$), V38 should not be assigned to the wrong factor. The high asymptotically standardized residuals showed that V38 might be multi-factorial. In this situation, the best alternative was to drop V38 entirely. This should not create any identification problems for F2, because this factor would still be measured by more than three indicators even after V38 is deleted.

The deletion of V38 (using online newspapers enable me to accomplish task more quickly) suggested using online newspapers would not help our subjects to perform their college task quicker. More important measures are the remaining items (see Appendix B) in perceived usefulness. We deleted V38 from analysis and re-estimated the resulting measurement model.

The Second Revision. Because most of the fit indices were at .90 acceptable level, we mainly examined the GFI. The GFI value of .84, as shown in Table 22, was still below .90. Thus some modifications in specification were needed in order to determine a model that better represents the sample data. Again, we reviewed the Wald test statistics and found no specific path should be dropped from the model. In

reviewing the LM statistics for the re-estimated model, we can see that adding the path from F3 (entertainment) to V44 (Please indicate your degree of using online newspaper), from F4 (behavioral intention) to V44, and from F6 (satisfaction) to V44 would improve the goodness of fit. However, adding these two paths would probably not be satisfactory solutions because V44 is doing a good job in measuring behavioral usage (F5). The standardized coefficient for the path from F5 to V44 was fairly large at .70, and was statistically significant at .001 level.

The rank order of the 10 largest asymptotically standardized residuals shows that there is a large residual for V50 and V48, a large residual for V49 and V48, and another large residual for V48 and V44. All large residuals involve the manifest variable V48. Additionally, another three large residuals listed in the rank order table were all involve manifest variable V44.

Apparently, V44 was a multi-factorial indicator which should be considered to drop entirely from the analysis; however, this was an undesirable solution. This indicator was the major behavioral usage item in TAM, so it was preferable to retain when developing a measurement model. We therefore considered dropping V48 because large residuals occurred with this variable. Deleting V48 would not create any identification problems for F4, because this factor would still be measured by three indicators.

The large residual for V48 and V49 and another large residual for V48 and V50 indicated that the model underpredicts the relationships of these variables. Since these items were literally similar to each other and this was the reason why the large residuals appeared (see Appendix B). The deletion of V48 (I plan to use online newspapers in the future) from behavioral intention (F4) would not greatly impact

behavioral intention, because other similar items (V49, V50) were retained in the model. Based on a combination of both the statistical information provided in the SAS output and our knowledge, the measurement model was modified by deleting V48 and then the re-specified model was estimated.

The Third Revision. In this revised model, the GFI of .85 indicated that there was substantial degree of misfit in the model. Again, we reviewed the Wald test statistics and found no specific path should be dropped from the model whereas LM statistics indicated that adding the path from F4 (behavioral intention) to V43 (I found online newspapers useful at college) would improve the goodness of fit.

Of substantial interest in the SAS output was the table of asymptotically standardized residuals. The rank order of the 10 largest asymptotically standardized residuals showed that there was a large residual for V43 and V42. Consistent with the previous re-specified model, another three large residuals listed in the rank order table all involve manifest variable V44.

As stated earlier, it is preferable to retain V44 when developing a measurement model. We therefore considered dropping V43 because of large residuals involved this variable. Dropping this variable would not create any identification problems for F2 (perceived usefulness), since this factor would still be measured by more than three indicators whose meaning were literally similar to V43. After deleting this variable, the model was re-estimated.

The Fourth Revision. The GFI value of .88 was the evidence of a better fitting model, but the value was still not at acceptable level. Even though goodness-of-fit results for this re-specified model demonstrated an improvement in the overall fit, given the GFI was not at acceptable level, the model needed to be re-specified.

LM statistics indicated that adding the path from F4 to V46 and F6 to V46 would improve the goodness of fit. These two cross loadings of V46 on both F4 and F6 indicated that V46 is multi-factorial variable. Also, the rank order of the 10 largest asymptotically standardized residuals showed that there was a large residual for V46 and V45. Item V46 (What is the total number of hours that you used the online newspapers yesterday?) is conceptually similarly to item V45 (How many hours that you use the online newspapers on an average day?). We therefore consider dropping V46 because a large residual involved this variable. Dropping this variable would not create any identification problems for behavioral usage (F5), since this construct will still be measured by more than three indicators. After dropping V46, the re-specified model was estimated.

The Fifth Revision. The GFI value of .89 indicated an inadequate fit, though the value was very close to .90. Modification of this model would result in a statistically significant better fitting model. LM statistics indicated that there were four two cross loadings of V22 (I use an online newspaper because I can get world news) on F1 (perceived ease of use), F2 (perceived usefulness), F4 (behavioral intention), and F5 (behavioral usage). Adding these paths was not theoretically and substantially meaningful. Also, V22 was not adapted from theory; rather, this item was elicited from the pilot study. Its meaning conceptually differed from other items in entertainment construct (F3). Nevertheless, there was a large residual for V22 and other items, V49, V36, V40, V42, V39, V50, and V37, respectively. Based on a junction of information, we dropped V22 from the measurement model to improve the overall fit. Again, the modification would not create any identification problems for entertainment (F3), since this construct was still measured by more than three indicators.

The Sixth Revision. In comparison with the initially hypothesized model, there was an enormous drop in the overall χ^2 value (414.45, $df=194$) for the sixth revised model. Needless to say, the decrease in χ^2 from each run of revision represented a significant improvement in goodness of fit. In support of the improvement in the model fit was the goodness of fit indices above .90 acceptable levels. In addition, the fact that all the coefficients were statistically significant and reflected substantially high correlations provides strong argument in favor of retaining all the parameters in the model. Given these findings, no further deletions were therefore specified.

In the following subsection, a number of tests were conducted to assess the reliability and validity of the final revised model. The findings supported the reliability and validity of the constructs and their indicators.

5.5.3.2 The Final Measurement Model

In reviewing the revised measurement model, we found that the overall χ^2 value (414.45, $df=194$) for this model was much smaller than the initial model; however, the p value associated with the χ^2 is relative small ($p<.0001$). As stated earlier, relative large p value with a large sample and real-world data is often difficult to get even if the model provides a good fit. Byrne (1994) also notes that this statistic is sensitive to sample size, so using the χ^2 index provides little guidance in determining the extent to which the model does not fit. It is more beneficial to rely on fit as represented by the goodness of fit indices.

Goodness of fit indices for the re-specified measurement model are presented in Table 22. This table shows that the revised measurement model displayed value greater than .90 on the GFI, the NNFI and the CFI, indicative of an acceptable fit (Bentler & Bonett, 1980; Bentler, 1989). Therefore, the revised model was tentatively accepted as the study's "final" measurement model, and a number of tests

were conducted to assess its reliability and validity.

Standardized factor loadings for the indicator variables are presented in Table 23. The SAS System's CALIS procedure provided approximate standard errors for these standardized factor loadings. Note that there were no near-zero standard error. The t score obtained for the coefficients in Table 23 ranged from 6.19 through 24.54, indicating that all factor loadings were highly significant ($p < .0001$).

After reviewing the residual matrix and asymptotically standardized residual matrix, we found there were few large residuals (3.04 to 4.77, absolute values) and the distribution of the residuals was near symmetrical. In SAS System's CALIS procedure (Version 8.2), asymptotically standardized residual matrix was a default output, not normalized residuals. The absolute value of normalized residuals should be less than 2 in order to indicate the good fit to the data (Hatcher, 1994). Since SAS V9 online documentation (2002-2005) noted that normalized residuals cannot be larger than the asymptotically standardized residuals based on their mathematical solution, larger asymptotically standardized residuals (greater than 2) should be the were possible to appear in the output. Combined, from both statistical and theoretical perspective we accept the final measurement model and we reported the reliability and validity of the constructs in the model in the following subsections.

5.5.3.3 Construct Reliability

Construct reliability (composite reliability) is a measure of internal consistency comparable to coefficient alpha (Fornell & Larcker, 1981). Internal consistency is generally indicated by coefficient alpha figures above .70 (Hatcher, 1994). The formula for the construct reliability index (adapted from Fornell and Larcker, [1981]) is given as:

$$\text{Composite reliability} = \frac{(\sum \text{Standardized loadings})^2}{(\sum \text{Standardized loadings})^2 + \sum \text{Error variance}}$$

The construct reliability for each construct shows in Table 23. Five constructs demonstrated acceptable levels of reliability, with coefficients in excess of .70. Behavioral usage had lower construct reliability (0.62), but the number was close to .70. Item V47 was the problematic item which caused low construct reliability. Given the rule of retaining three items for each construct in measurement model, this item was retained.

Table 23. Properties of Revised Measurement Model

Latent Factor & Manifest Variable	Standardized Loading	t Value ^a	Composite Reliability (R ²)	Variance Extracted Estimate
Perceived Ease of Use (F1)			0.9447 ^b	0.7406
V32	0.7834	17.4355	0.6137	
V33	0.8746	20.6898	0.7649	
V34	0.8382	19.3208	0.7026	
V35	0.8729	20.6243	0.7620	
V36	0.8967	21.5706	0.8041	
V37	0.8924	21.3957	0.7964	
Perceived Usefulness (F2)			0.9513 ^b	0.8302
V39	0.9026	21.8775	0.8147	
V40	0.9216	22.6776	0.8493	
V41	0.9535	24.0995	0.9092	
V42	0.8647	20.3689	0.7477	
Entertainment (F3)			0.9273 ^b	0.8100
V18	0.8405	19.3288	0.7064	
V19	0.8966	21.3958	0.8039	
V20	0.9590	23.9755	0.9197	
Behavioral intention (F4)			0.9476 ^b	0.8579
V49	0.9130	22.2569	0.8336	
V50	0.9652	24.5431	0.9316	
V52	0.8992	21.6952	0.8086	
Behavioral Usage (F5)			0.6262 ^b	0.3832
V44	0.8365	15.1867	0.6997	
V45	0.5684	10.3462	0.3231	
V47	0.3559	6.1938	0.1267	
Satisfaction (F6)			0.8244 ^b	0.6155
V55	0.6116	12.052	0.3741	
V57	0.8813	19.543	0.7767	
V58	0.8342	18.098	0.6959	

Notes: ^a All t-tests were significant at $p < .0001$. ^b Denotes composite reliability

5.5.3.4 Convergent Validity

Convergent validity is demonstrated when measuring the same construct by using different instruments, and the scores from these different instruments are strongly correlated (Hatcher, 1994). We assessed convergent validity by reviewing the t tests for the factor loadings. Statistically significant t tests of the indicators in the same constructs were considered as the evidence to support the convergent validity of the indicators (Anderson & Gerbing, 1988). Table 23 shows that t values were all above 1.96, the critical t value significant at .05 level, so we concluded that all indicators were effectively measuring the same construct.

The variance extracted estimate is a measure of the amount of variance captured by a construct, relative to the variance due to random measurement error (Fornell & Larcker, 1981). The formula is given as:

$$\text{Variance extracted} = \frac{\sum (\text{Standardized loadings})^2}{\sum (\text{Standardized loadings})^2 + \sum \text{Error variance}}$$

The final column of Table 23 provides the variance extracted estimate for each scale. Five constructs demonstrated variance extracted estimates in excess of .50, the level recommended by Fornell and Larcker (1981). The variance extracted estimate for perceived ease of use, for example, was .74, meaning that 74% of the variance is captured by the construct, and only 26% was due to measurement error. Only behavioral usage had lower variance extracted estimate (.38). This calls into question of the validity of the latent construct as well as its indicators. Notice that V47 was the problematic item which led the low variance extracted estimate, we should consider dropping this item. Again, given the rule that each construct should have no less than three indicators, we temporarily retained this item.

5.5.3.5 Discriminant Validity

Discriminant validity is demonstrated when measuring the same construct by using different instruments, and the scores from these different instruments are weakly correlated with each other. We found evidence through use of the three procedures: the chi-square difference test and the variance extracted test (Hatcher, 1994).

The chi-square difference test provides evidence of the discriminant validity of two constructs. The correlations among constructs were all moderate (see Table 24). Behavioral usage (F5) and satisfaction (F6) had highest correlation (0.63). This is good in the case that the integrated model predicted behavioral usage had positive causal effect on satisfaction, and the high correlation was consistent with the prediction. However, the correlation was so high that we might question whether these two constructs were different constructs at all.

Table 24. Correlations Among Constructs

Factor 1	Factor 2	Parameter	Estimate	Standard Error	t Value
F1	F2	CF1F2	0.528	0.040	12.93
F1	F3	CF1F3	0.328	0.050	6.53
F2	F3	CF2F3	0.368	0.048	7.59
F1	F4	CF1F4	0.547	0.039	13.77
F2	F4	CF2F4	0.567	0.038	14.78
F3	F4	CF3F4	0.411	0.046	8.81
F1	F5	CF1F5	0.336	0.057	5.81
F2	F5	CF2F5	0.412	0.055	7.49
F3	F5	CF3F5	0.627	0.046	13.62
F4	F5	CF3F5	0.552	0.049	11.21
F1	F6	CF1F6	0.404	0.050	8.07
F2	F6	CF2F6	0.459	0.047	9.72
F3	F6	CF3F6	0.605	0.039	15.28
F4	F6	CF4F6	0.513	0.044	11.53
F5	F6	CF5F6	0.637	0.048	13.08

To assess the discriminant validity of F5 and F6, we performed a PROC CALIS analysis by modifying the program of the final revised measurement model. We set the constraint on the correlation of F5 and F6 to 1 and all other correlations remained to be free to be estimated. This model created as a result of this modification was referred to be the unidimensional model, and the model in which

the correlation between F5 and F6 is a free parameter to be estimated was referred to as the standard measurement model.

The unidimensional model displayed a model chi-square of 480.41 with 195 *df*. The summary table (Table 22) shows that the chi-square for the standard measurement model was 414.45 with 194 *df*. The difference in chi-square between the two models was 65.96 (480.41-414.45). There is 1 (195-194) *df* associated with this chi-square difference test. The difference between the two models was significant at .001 level. That is, the standard measurement model in which F5 and F6 were viewed as distinct but correlated constructs provides a fit that was significant better than the fit provided by the unidimensional model. Thus, the chi-square difference test supported the discriminate validity of F5 and F6.

The variance extracted test reviews that variance extracted estimates for the two factors of interest and compare these estimates to the square of the correlation between the two factors. Table 24 shows that the correlation between F5 and F6 was .63. In Table 23, variance extracted estimates from F5 and F6 were .38 and .61 respectively. The square of the interfactor correlation was .39, which was slightly higher than variance extracted estimates from F5 but much lower than variance extracted estimates from F6. Given the V47 was a problematic item, we temporarily did not conclude this test failed to support the discriminant validity of the two factors.

Combined, these findings generally support the reliability and validity of the constructs and their indicators. The revised measurement model was therefore retained as the study's final measurement model. Figure 18 presents the final measurement model and the factor loadings of each manifest variable.

Figure 18. The Final Measurement Model

5.5.4 Structural Model for the Integrated Model

5.5.4.1 *The Initial Theoretical Model*

The theoretical model tested in the present study was identical to the one presented in Figure 17, with the exception that a total of six variables were dropped from the model based on the analysis of the measurement model. The analysis of this structural model might be described as a path analysis with latent variables.

Goodness of fit indices for the model appears in Table 25, in the row headed “initial model.” Values on the NNFI and CFI were acceptable for this model (in excess of .90) but the GFI was not at acceptable level (.89). Moreover, a review of the model’s residuals revealed that the distribution of asymptotically standardized residuals was not perfectly symmetrical, and the residuals were relatively large (in excess of 2.0).

Figure 19 shows path coefficient for all the estimations. All the causal paths linking latent constructs proved to be significant at .0001 level. The absolute value of the t values for each factor loading and path coefficient exceed 1.96 (critical t value), and the standardized factor loadings were nontrivial in size (absolute values exceed .05).

Testing the nomological validity of the theoretical model, a chi-square difference test was performed to compare the theoretical model to the measurement model. A finding of no significant difference indicates that the theoretical model is successful in accounting for the observed relationship between the constructs (Anderson & Gerbing, 1988). Therefore, the chi-square for the measurement model was subtracted from the chi-square for the theoretical model with the resulting value of 64.82 (414.45-479.27). Subtracting the degree of freedom of the two models, the degree of freedom of the test is 8 (202-194).

The critical value of 8 *df* is 26.125 ($p < .001$), so this chi-square difference test was significant. This finding indicates that the theoretical model was unsuccessful in accounting for the relationships between the constructs.

Together, the GFI did not reach to an acceptable level .90 and the chi-square difference test was significant; therefore, a specification search was conducted to arrive at a better-fitting model.

Table 25. Fit Indices of the Revised Structural Models

<i>Model</i>	χ^2	χ^2 df	χ^2 /df	<i>GFI</i>	<i>CFI</i>	<i>NFI</i>	<i>NNFI</i>	<i>PNFI</i>	<i>Item Drop</i>
Initial	479.273	202	2.37	0.893	0.958	0.930	0.952	0.814	
Rev1	437.108	182	2.40	0.897	0.961	0.935	0.955	0.810	V55
Rev2	389.364	163	2.38	0.903	0.965	0.941	0.959	0.807	V55, V47

Figure 19. The Structural Model

5.5.4.2 Revised Model 1

We began the search by attempting to identify parameters that could be dropped from the model so that the model's fit could be significantly improved. The approach was not successful because the SAS System's CALIS procedure did not report the Wald test results, which could be useful for dropping the paths.

The LM test (Bentler & Chou, 1987) suggested that adding the path from F6 to F5 and F5 to F2 would increase the model's fit. However, adding path from one construct to another was not preferred in our case, because we attempted to search for a model which is theory driven rather than data driven. Adding path from F6 to F5 or F5 to F2 may lead the model to be a nonrecursive path model, causation might flow in more than one direction. Such a reciprocal causation was not of interest.

The rank order of the 10 largest asymptotically standardized residuals shows that there was a large residual for V55 and V41, and another large residual for V55 and V55. Notice that both large residuals involved V55, which was predicted to load on satisfaction (F6). The high residuals indicated that the model underpredicted the strength of the relationship between those two variables. The LM test also suggested that the path adding from V55 to F2 would increase the fit of the model. This suggested that V55 is influenced by F2 (which affects V41). Likely, V55 was a complex variable that was affected by both F2 and F6. It is often desirable when performing path analysis with latent variables to use only factorially simple indicators: indicators that measure only one factor. As a result, the most effective way of improving the model was to drop it from the analysis entirely.

Item V55 (I would like to read more articles in my favorite online newspaper) literally differed from items in F2 (entertainment). Its meaning is also slightly different

from the rest of items in F6 (satisfaction). In this case, we can conclude that it is not an item effectively measure satisfaction. So, dropping V55 would be an appropriate solution.

We dropped V55 from the analysis, and the resulting model, revised model 1 was then estimated. Fit indices for this model appear in Table 25. The overall goodness of fit indices for the model was slightly increased, with values on the NNFI and CFI in excess of .90. The GFI was improved from 0.8936 to 0.8979; however, the value did not exceed the acceptable .90 level.

These findings show that the revised model 1 was superior to the initial theoretical model. Given the fact that the GFI did not exceed .90, a search for a better-fitting model was conducted.

5.5.4.3 Revised Model 2

Wald tests conducted in the course of analyzing revised model 1 did not reveal any additional causal path between latent constructs that could be deleted without affecting the model's fit. We therefore reviewed results of LM tests (Bentler, 1989) to identify new causal paths that should be added to the model. LM test estimated that model chi-square for revised model could reduced by 23.95 ($p < .0001$), if a causal path were added that went from F1 to V40. Adding this path would be against the theoretical assumption. Adding path from F1 to V40 indicated that V40 would no longer to be a factorial simple indicator, because V40 was assigned to measure F2. Again, given the constraint that a revised model should be close to the initial theoretical model in which the factors are divergent to each other, no path from V40 was added to F2.

We reviewed the residuals matrix and found that the distribution of the asymptotically standardized residuals was not perfectly symmetrical. The rank of top 10 residuals shows that the entry of V47 and V47 has high asymptotically standardized residuals. Dropping V47 should be an appropriate solution because this variable did not do very a good job in predicting same latent variable (F5). Recall that V47 performed relatively weak in measuring behavioral usage when developing the measurement model, it should be an appropriate solution to drop this indicator. After dropping V47 (What is the number of years and months you have used the online newspapers?), there are two items in behavioral usage constructs. We can conclude that the duration or experience of using online newspapers did not measure behavioral usage appropriately. In contrast, *t* values in V44 (Please indicate your degree of using online newspapers) and V45 (How many hours that you use online newspaper on an average day?) showed that both items did a good job of measuring behavioral usage.

Fit indices for revised model 2 are presented in Table 25. The fit indices (i.e., the NNFI and CFI) were not only above .90 but were also higher than those displayed by revised model 1 and the initial theoretical model. The GFI exceeded .90 also indicated that the revised model 2 was a better-fitting model. Figure 20 displays standardized path coefficients for revised model 2.

The rank of top 10 residuals also shows that there was large residual for V49 and V20, and another large residual for V49 and V19. Notice that both large residuals involved V49, dropping this item would obtain the slightly lower GFI (.90) and higher chi-square (391.49). In comparison with dropping V47, retaining V49 would be a better solution because this modification provided a better fit to the data.

All coefficients were significant at .0001 level and in the predicted direction. R^2 values showed that perceived ease of use (F1) accounted for 28% of the variance in perceived usefulness (F2). Perceived ease of use and perceived usefulness accounted for 41% of the variance in behavioral intention (F4). Entertainment and behavioral intention accounted for 65% of the variance in behavioral usage. Behavioral usage explained 55% of the variance in satisfaction. Almost all the 20 indicators explained more than 60% of the corresponding constructs, except V45 whose R^2 was only .23 (Table 26).

Table 26. The R^2 of Constructs and Manifest Variables for the Revised Model 2

Constructs and Manifest Variables	R^2
Perceived Usefulness (F2)	0.28
Behavioral Intention (F4)	0.41
Behavioral Usage (F5)	0.65
Satisfaction (F6)	0.55
V18	0.70
V19	0.80
V20	0.92
V32	0.61
V33	0.76
V34	0.70
V35	0.76
V36	0.80
V37	0.79
V39	0.81
V40	0.84
V41	0.90
V42	0.74
V44	0.52
V45	0.23
V49	0.83
V50	0.93
V52	0.80
V57	0.79
V58	0.67

The distribution of asymptotically standardized residuals for revised model 2 was asymmetrical, and the residuals were relatively large (in excess of 2.0). The distribution was symmetrical and centered on zero was desired. So, the large residuals indicated that misspecification of the model. However, it was too early to judge the misspecification by looking at only the residuals. In our model, most of indicators were doing a good job in measuring the corresponding constructs and the path coefficients were all highly

significant. Additionally, goodness of fit indices all exceeded the acceptable level. The revised model 2 was considered as an adequate fit model. Given the residuals were the only values which indicated poor fit of model, the revised model 2 was regarded as an adequate fit model.

Table 27 presents indices that reflect the parsimony of the models. The parsimony ratio (PR) (James et al., 1982) indicates the parsimony of the overall model, with higher values reflecting greater parsimony. The parsimonious normed-fit index (PNFI, James et al., 1982) was obtained by SAS System's CALIS procedure, resulting in a single index that reflects both the fit and the parsimony of the overall model. Researchers note that it is possible to have acceptable models with parsimonious normed-fit indices in the .50s (Mulaik, James, Van Alstine, Bennett, Lind, & Stilwell, 1989).

Table 27. Goodness of Fit and Parsimony Indices for the Integrated Model

Model	Combined Model					Structural Model				
	χ^2	$\chi^2 df$	NFI	NNFI	CFI	PR	PNFI	RNFI	RPR	RPFI
Uncorrelated Model	1107.423	209	0.840	0.851	0.865		0.760	0.000	1.000	0.000
Measurement Model	414.450	194	0.940	0.960	0.967	0.706	0.789	1.000	0.000	0.000
Theoretical Model	479.273	202	0.930	0.952	0.958	0.905	0.814	0.917	0.53	0.489
Revised Model 1	437.108	182	0.935	0.955	0.961	0.874	0.810	0.918	0.53	0.489
Revised Model 2	389.364	163	0.941	0.959	0.965	0.788	0.807	0.921	0.53	0.488

These indices show that revised model 2 displayed a parsimony ratio (PR) of 0.788, which was somewhat lower than that of revised model 1, which displayed a PR of .874. Parsimonious normed-fit index of revised model 2 was .807, while the PNFI for revised model 1 was 0.810. Both indices indicated that revised model 1 was actually a more parsimonious model. However, this was more than offset by the superior fit achieved by revised model 2, whose GFI, NFI, NNFI, and CFI were all higher than revised model 1.

Table 27 also provides indices that represent the fit and parsimony in just the structural portion of a model; that is, the part of a model that describes just the relations between the latent variables (the F variables). For example, the relative normed-fit index, or RNFI (Mulaik et al., 1989) revealed the fit achieved in just the structural portion of the model, independent of the fit of the measurement model. In the same way, the relative parsimony ratio (RPR) revealed that parsimony of the structural portion of the model, regardless of the parsimony of the measurement model. Finally, the relative parsimonious fit index (RPFI) was obtained by multiplying the RNFI by the RPR. The RPFI indicates how well the model explains all possible relations among the F variables, from outside the data (Mulaik et al., 1989).

The RNFI indices in Table 27 show that revised model 2 demonstrated a fit to the data that was superior to that of revised model 1, due to the deletion of V47. On the other hand, the deletion of V47 did hurt the parsimony of revised model 2, as revised model 2 displayed values on both the RPR and RPFI that were almost the same as those exhibited by revised model 1.

We accepted the revision model 2 as the final structural equation model. First, the coefficients of causal paths postulated by TAM and U&G theory were proved to be significant; adding more paths to the model would contribute only trivially to its structure. Byrne (1994) cautions that researchers should incorporate a sufficient number of parameters to yield an adequate model which presents the data rather than incorporate too many parameters to attain the statistically best fitting model. In fact, the more parameters there are in the model, the more difficult it is for future research to replicate its structure. Secondly, the statistical criteria based on information pooled from various indices of fit

generally exceeded the acceptable levels. Given the adequate assessment of these statistical criteria, we would argue for no further modification to the model. Finally, the parsimony of the model was of our concern. Incorporating of additional parameters into the model would lead to a trivial improvement of fit, while eroding the parsimony of the model.

In sum, of five causal paths specified in the hypothesized model (see Figure 16), all were found to be statistically significant for our subjects. These paths reflected the impact of (a) perceived ease of use on perceived usefulness, (b) perceived ease of use and perceived usefulness on behavioral intention, (c) entertainment and behavioral intention on behavioral usage, and (d) behavioral usage on satisfaction. All the paths specified a priori were proved to be essential components of the causal structure; they were therefore all retained to the model. Revised model 2 was this study's final model, and is displayed in Figure 20. Standardized path coefficients appear on the causal paths.

Figure 20. The Final Model

5.6. Summary

Merging both TAM and U&G constructs, the integrated model was found to be a model of technology acceptance in which both intrinsic and extrinsic reasons of IT use were included. The intrinsic motive was entertainment whereas extrinsic motive was perceived ease of use, whose antecedent was perceived usefulness. Taking a motivational perspective, the results of data analysis suggested that examining the intrinsic and extrinsic motive was a successful strategy.

Both multiple regression analysis and structural equation modeling analysis yielded the similar results for the integrated model. All the causal paths in the integrated model were found to be significant. That is, the pattern of the data fit the integrated model. Recall we discussed that structural equation modeling is better than multiple regression analysis because it takes into account of measurement errors, allows us to identify the best items that reflect the constructs of interests, and to identify the relationships of constructs simultaneously. Its capacity is demonstrated by providing a parsimonious integrated model of user acceptance of IT.

Table 28 summarizes the findings in both multiple regression analysis and structural equation modeling analysis. In the pooled data, the variance explained by the dependent variables is generally larger than that of studies one and two. Due to the attenuation effect, correlation between two variables in the path analysis with latent variables will be larger than that of the path analysis with manifest variables. Since in studies one and two, we added up the items in the same construct and then performed a multiple regression analysis, the correlation between dependent variable and dependent variable is lower than the correlation in structural equation modeling. The variance explained by independent

variable is the square of correlation. Thus, in structural equation modeling, the overall R^2 of dependent variables is often higher than in multiple regression analysis.

Structural equation modeling enables us to identify the problematic items so we found the items that best reflect the constructs. This is also a reason that R^2 in the structural equation modeling analysis is higher than that of multiple regression. Nevertheless, deleting items which do not do a good job in measuring corresponding constructs allows us to identify a better model which fits the data. The measurement errors were minimized by performing structural equation modeling.

Table 28. Summary of Results in Study 1, Study 2, and Pooled Data

	Multiple Regression		SEM
	Study 1 (N=132)	Study 2 (N=224)	Pooled Data (N=356)
(a) Dependent Variable: Perceived Usefulness			
R^2	0.253	0.303	0.283
Adjusted R^2	0.247	0.299	
Perceived Ease of use (β)	0.50***	0.55***	0.53**
(b) Dependent Variable: Behavioral Intention			
R^2	0.452	0.336	0.410
Adjusted R^2	0.444	0.330	
Perceived Usefulness (β)	0.28***	0.41***	0.38*
Perceived Ease of use (β)	0.48***	0.23***	0.34*
(c) Dependent Variable: Behavioral Usage			
R^2	0.371	0.307	0.650
Adjusted R^2	0.362	0.301	
Behavioral Intention (β)	0.17*	0.24***	0.41*
Entertainment (β)	0.50***	0.40***	0.61**
(d) Dependent Variable: Satisfaction			
R^2	0.204	0.285	0.555
Adjusted R^2	0.198	0.281	
Behavioral Usage (β)	0.45***	0.53***	0.74**

Note that the results present in Table 28 summarized the regression coefficients and variances for constructs whose mal-functioned items were excluded so some of the constructs in studies one and two and pooled data were not measured by the same items. So, caution should be exercised when comparing the results in Table 28.

In sum, we successfully merged TAM and U&G theory into an integrated model in which intrinsic and extrinsic motives were taken into account. The analyses of both multiple regression and structural equation modeling yielded the similar results which support the integrated model. Although we found a consistent pattern of the data in study one, study two, and the pooled data, caution should be exercised when comparing the regression coefficients and variance explained. Given some items were not included in data sets of studies one and two and the pooled data to optimize the constructs, the results should be compared with care.

CHAPTER 6

DISCUSSION

6.1 Major Findings

The purpose of this research was to develop a theoretical model which explains technology acceptance of Internet-based information services. We asked three research questions which concern TAM, U&G theory, and the integrated model, respectively. The integrated model is considered as a theory of technology acceptance which improves TAM.

The first research question asks to what extent TAM predicts the use of information services. Consistent with previous TAM studies, the findings of both studies suggest that TAM substantially explains behavioral usage. In study one, perceived ease of use and perceived usefulness together account for more than 45% of variance in behavioral intention. In study two, the variance of behavioral intention explained by the two constructs still explain substantial amount of variance, although the R^2 shrank to 33%. Behavioral intention alone explains 16% and 17% of variance in behavioral usage in studies one and two, respectively. We therefore conclude that our subjects use online newspapers for their capacity of an ease to use system and for their usefulness to achieve their goal-directed behavior. Nevertheless, the psychometric properties of the two measures, perceived ease of use and perceived usefulness, appear to have been robust across studies based on the results of principal component analysis.

The second research question asks to what extent U&G theory predicts the use of information services. The findings indicate that the U&G model provides adequate explanatory power of behavioral usage. Stepwise regression analysis suggests that entertainment is the most crucial motive; it explains 34% of variance in behavioral usage. Similarly, behavioral usage explains a substantial proportion of the variance in satisfaction; it accounted for 20%-28% of variance in satisfaction.

When analyzing U&G motive items, principal component analyses of studies one and two yields the same results of five factors: information seeking, interpersonal utility, entertainment, pass [the] time, and convenience. Related items for each of the factors all load nicely. The first factor, information seeking, is one of the motives for using online newspapers. Variables loading on this factor include a new way of doing research, ease of access, free information, and to look for information. This suggests that motivation underlying this dimension relates to using online newspapers to get information updates freely and easily. Second factor, interpersonal utility, represents items of interpersonal communication. To help others, to participate in discussions, and to express opinion and input to editors freely, were variables in this dimension. This indicates that users view online newspapers as a forum in which their own thoughts can be expressed through the information services. The third factor, entertainment, indicates that our subjects might obtain gratification from interacting with online newspapers simply by taking advantage of the enjoyment and entertainment offered on the Web. Forth factor, pass [the] time, is a factor with variables such as passing boring time, having nothing to do, and occupying time. It appears that some subjects are motivated to use the online newspapers for relieving boredom. Finally, the fifth factor represents a theme of using online newspapers

as a convenient means of seeking information and entertainment. Variables in this dimension include ease of e-mailing articles and capacity for e-mailing others. We can conclude that information services which support asynchronous communication by sending e-mails attract our subjects to use these services.

Finally, we intend to answer the third question: to what extent the integrated model explains the use of information services. Of six factors in the integrated model, the causal relationships are all positive in both studies. By performing the structural equation modeling, two items in perceived usefulness (i.e., accomplishing task more quickly; usefulness) were excluded but all the items in perceived ease of use were retained. Since structural equation modeling takes into account both structural relationship and error terms, it provides detailed analysis than regression analysis. Applying Davis' (1989) scales, we found the items in perceived usefulness can be refined in our research context. From the results, we conclude that Davis' scales are still very useful; however, some refinement of the scales is necessary with given application and context.

The items of behavioral usage are finalized into two items: the degree of use and the frequency of average use. The former is the item used in Davis' study, while the latter is adapted from the U&G study by Papacharissi and Rubin (2000). In contrast, two items, frequency of use yesterday and duration of use, are deleted from analysis to achieve a better-fitting model. Although measuring the average use and yesterday's use is a common practice in media studies because the incident event may lead users to increase media exposure, our results indicate that this approach may not be appropriate. The error terms of these two items yield high covariance so that deleting the item of measuring yesterday's use gives us a better-fitting model. Similarly, duration of use is not an

appropriate item in our research context. As the results, the final integrated model retains the two items which most effectively reflect to the measures of behavioral usage.

6.2 Summary of Findings

An integrated model which has components of both TAM and U&G theory resulted from two studies. The first study provided the empirical supports to the integrated model, whereas the second study confirmed the results and demonstrated the robustness of measures in the integrated model. In the integrated model, key determinants of behavioral usage of a type of an information service, online newspapers, were identified. Here we summarize the key findings from the data analysis:

- Six factors comprise the integrated model: perceived ease of use, perceived usefulness, entertainment, behavioral intention, behavioral usage, and satisfaction.
- The causality chain of $PEU \rightarrow PU \rightarrow BI$ is confirmed.
- There is a direct effect of perceived ease of use to behavioral intention.
- Among the five U&G motives (i.e., information seeking, interpersonal utility, entertainment, pass [the] time, and convenience) extracted from principal component analysis, the strongest predictor of behavioral usage is entertainment.
- In the integrated model, the effect of entertainment on behavioral usage is stronger than that of behavioral intention on behavioral usage.
- Behavioral usage has a significant impact on satisfaction.

6.3 Discussion of Findings

In comparison to the findings of previous TAM studies in utilitarian system contexts, we find that entertainment motive plays a more significant role than TAM's constructs in an online newspaper context. Regression analysis of the integration model suggests that behavioral intention and entertainment together account for more than 30% of variance in behavioral usage. Interestingly, the standardized regression coefficients in both studies suggested that entertainment, in fact, has greater impact on behavioral usage than that of behavioral intention.

We contend that technology acceptance of Internet-based information services is driven by both intrinsic and extrinsic reasons. Entertainment motive, which involves the affective aspect of human behavior, is the intrinsic reason that predicts substantial variance of behavioral usage. On the other hand, perceived usefulness is the extrinsic reason of Web use that impacts behavioral usage through behavioral intention. Consistent with previous IS studies, we found that affective measures were related to the adoption of Internet-based information service. Other than findings in intrinsic and extrinsic motives, satisfaction was another important element in this research.

Satisfaction with Internet-based information service increased along with the level of use. We found that the more our subjects use information services, the more they feel satisfied with them. Including satisfaction into the integrated model broadens the perspective of technology acceptance by taking into account the evaluation of use. These specific findings form the integrative perspective that ties concepts from the user satisfaction and technology acceptance literature into a single research model.

Overall, the integrated model successfully depicts the pattern of the data. The outcomes yield contributions to practitioners and researchers. We turn next to discuss these contributions and their implications.

6.4 Contributions

In practice, our findings provide practitioners important information to examine their marketing strategy, the content, and the implementation of Internet-based information services. Specifically, practitioners should consider not only functional features to make the systems easy to use and useful, but also features provide users with the feeling of entertainment. Based on our results, a marketing strategy which emphasizes the usefulness or ease of use is important but probably will not be very attractive. Giving the feeling of entertainment should be emphasized when there is a trade-off between usefulness and entertainment.

Theoretically, the integrated model extends the context of technology acceptance to a non-organizational context. As discussed earlier, TAM elaborations (TAM2, UTAUT) would not be useful to study the use of IT in a customer context. The use of a hedonic system will be best predicted by our integrated model which considers the customer context. As the use of Web prevails, the integrated model should offer a more plausible explanation of users' technology acceptance than models which were developed for IT use in an organizational context. On other hand, U&G researchers should benefit from the research findings as much as IS researchers.

The integrated model provides U&G researchers who intend to examine media adoption with more insights from the point of view of IS. For instance, U&G researchers

pay more attention to eliciting motives of media use rather than building causal model to explain the phenomena. This approach impedes the theory-building of U&G theory. In contrast, IS researchers are interesting in finding the causality among factors. Rather than just examining what are the important predictors of behavioral usage by merging TAM and U&G theory, we take a step further to develop a causal model which can explain behavioral usage. U&G researchers may benefit from our approach of merging two theories and then adapt the theory building approach to study technology acceptance.

Nevertheless, our attempt to merge TAM and U&G theory may in turn provide IS researchers an opportunity to examine technology acceptance in a broader perspective. Traditionally, information systems were viewed as a tool to increase job performance. Today, Internet-based information systems provide fulfillment of pleasure and relaxation. Therefore, business of use IT not only increases the job performance of employees but also is a strategic tool to get customers. Studying IT use in a customer context benefits today's businesses. We took a cross-disciplinary perspective in which IT applications are not only seen as tools for accomplishing tasks at work, but also platforms to enable users have fun and entertainment. The integrated model proposed and tested above represents a significant contribution toward establishing a technology acceptance model of the user.

6.5 Limitations

Our findings provide meaningful implications; however, this study has several limitations. First, our subject samples consisted of university students. Given the responses were obtained only from this user group, caution must be taken when generalizing our findings to Internet-based services users in general. In fact, it will be appropriate to re-test the integrated model in different user groups.

Secondly, the use of self-report scales to measure variables may involve measurement bias. For example, the self reported use is not a precise measure; it should serve only as a relative indicator of use. Given the limited resources, we were not able to measure the actual use. In order to pursue further investigation, it will be appropriate to develop a more direct and objective measure for the use of Internet-based information services.

Thirdly, this study was conducted with a snapshot research approach. Such approach neglected the reciprocal relationships among variables. For instance, our findings suggested that behavioral usage has positive relationship with satisfaction. Logically, user satisfaction may in turn lead to increasing use. Thus, there should be a loop between behavioral usage and satisfaction. To study the reciprocal relationship between these two variables, a longitudinal approach should be considered.

Finally, this study explained adoption pattern based on measure of behavioral intention and entertainment. Based on theory (Davis, 1989), we assumed that there was a causal effect of behavioral intention to behavioral usage. However, the extent to which behavioral intention can be used to predict behavioral usage in a rapidly changing technology environment is unknown. We therefore suggested that the results of our study should be treated with caution.

6.6 Recommendations

Future research may take a multi-dimensional approach to study the motivations of information services. As diverse functions available on the Web applications, users may fulfill physiological and psychological needs such as self-actualization, curiosity,

aesthetic needs, and expressive needs which are inherent in every individual and central to human experience (Ruggiero, 2000). In such cases, the dichotomy of intrinsic and extrinsic motivations may not be appropriate; therefore, a multi-dimensional motivation scale will be more useful and should be developed.

Secondly, we encourage future research to develop motive items without using the items generating from traditional mass media. Given the limited resources, we used open-ended questions (Stafford & Stafford, 2001) and adapted validated Internet motive scales (Papacharissi & Rubin, 2000) whose relationships with behavioral usage were proved. These Internet motives were developed from TV viewing motive under the assumption that watching TV is similar to reading from computer screen. However, it was our concerns that to what extent those TV-like motives similar to surfing on the net. In comparison with TV viewing, Web surfing should involve more sensory-motor behaviors (e.g., mouse clicking) and cognitive activities. So, future research may elicit motive items by using open-ended questions and then extracted motives for subsequent analysis.

Thirdly, although we found that the level of satisfaction increases as the level of use increases, the satisfaction of light users and heavy users were not compared in our study. The light users and heavy users may have different level of satisfaction to the systems. For example, hedonic information systems encourage prolonged use which may involve more complicated user evaluations of systems. In such a case, the relationship between behavioral usage and satisfaction may not be linear. Future research may explore the satisfaction of heavy users who use the information services longer time and more frequently.

Finally, future research may examine what system qualities, such as navigation, and hypertextuality are related to entertainment, perceived ease of use, and perceived usefulness. Then, these system qualities may be translated to the system analysis design to fulfill the needs of adopters.

APPENDIX A

Filter Questions

In this study, a news site refers to a World Wide Web page whose primary offering is news content. This, of course, **excludes** the major portal sites (e.g., Yahoo!, MSN, AOL), which often post a handful of headlines and appear to be relatively popular resources of news.

Which of the following activities you have ever done when you go online to access the Internet or the World Wide Web? (Circle all that apply)

1. Reading online news	6. Schoolwork
2. E-mail	7. Shopping
3. Chatting	8. Job search
4. Games	9. Browsing
5. Downloading music	10. Other _____ (Please Specify)

Which of the following **online newspaper** Websites you have been visit? (Circle that you have visited)

1. The New York Times	7. Miami Herald Online
2. USA Today	8. Dallas Morning News
3. Washington Post	9. Chicago Tribune
4. The Los Angeles Times	10. San Jose Mercury News
5. Boston Globe	11. Honolulu Advertiser
6. San Francisco Chronicle	12. Honolulu Star-Bulletin
	13. Other _____ (Please Specify)

Which types of **news** you often read online? (Circle top 3)

1. Sports	8. Politics
2. Business and Money	9. Weather
3. Arts and Entertainment	10. Health
4. Features	11. Opinion and editorial
5. U.S. national	12. State and local
6. Technology and Science	13. Other news
7. World	

APPENDIX B

Motivation Scales

	<i>"I use an online newspaper..."</i>
	Interpersonal Utility
V1	To help others
V2	To participate in discussions
V3	To show others encouragement
V4	To express myself freely (to online newspaper editors)
V5	To give my input (to editorial process or online poll)
V6	To get more points of view
V25	To belong to a group (if there is a news chat group)
V26	Because I enjoy answering questions (if there is a news chat group)
V27	To tell others what to do (if there is a chat room)
V28	Because I wonder what other people said (if there is a chat room)
V29	To meet new people (if there is a chat room)
V30	Because I want someone to do something for me (if there is a chat room)
	Pass Time
V7	Because it passes time when I am bored
V8	When I have nothing better to do
V9	To occupy my time
	Information Seeking
V10	Because it is a new way to do research
V11	Because it is easier
V12	To get information for free
V13	To look for information
V14	To see what is out there
	Convenience
V31	To communicate with friends, family (if there is a chat room)
V15	Because it is cheaper
V16	Because it is easier to e-mail an article than tell people
V17	Because people don't have to be there to receive an e-mailed article
	Entertainment
V18	Because it is entertaining
V19	Because I just like to use it
V20	Because it is enjoyable
	Other Motive Items
V21	Because it has weather information
V22	Because I can get world news
V23	To get up-to-date information
V24	Because it has a search function

Measurement Scales in the Integrated Model

	Entertainment
V18	Because it is entertaining
V19	Because I just like to use it
V20	Because it is enjoyable
V22	Because I can get world news
	Behavioral Usage
V44	Please indicate your degree of using online newspapers?
V45	How many hours that you use the online newspapers on <u>an average day</u> ?
V46	What is the total number of hours that you used the online newspapers <u>yesterday</u> ?
V47	What is the number of years and months you have used the online newspapers?
	Behavioral intention
V48	I plan to use an online newspaper in the future.
V49	I intend to continue using an online newspaper in the future.
V50	I expect my use of an online newspaper to continue in the future.
V51	I am not likely to use an online newspaper in the future.
V52	I predict I would use an online newspaper in the future.
	Satisfaction
V53	Overall, how satisfied are you with the job the online newspapers do in providing you with the things you are seeking?
V54	Reading an online newspaper is a waste of time.
V55	I would like to read more articles in my favorite online newspaper.
V56	I am not satisfied with the topics in my favorite online newspaper
V57	I enjoy my favorite online newspaper.
V58	Reading my favorite online newspaper is personally satisfying.
	Perceived Ease of Use
V32	Learning to read online newspapers is easy for me.
V33	I find it easy to navigate online newspapers.
V34	I find online newspapers to be flexible to interact with.
V35	My interaction with online newspapers is clear and understandable.
V36	It is easy for me to become skillful at using online newspapers.
V37	I find online newspapers easy to use.
	Perceived Usefulness
V38	Using online newspapers at college enable me to accomplish tasks more quickly.
V39	Using online newspapers improve my college performance.
V40	Using online newspaper increase my productivity.
V41	Using online newspapers enhance my effectiveness at college.
V42	Using online newspaper make it easier to do my work at college.
V43	I find online newspapers useful at college.

REFERENCE

- Adams, D. A., Nelson, R. R., & Todd, P. A. (1992). Perceived Usefulness, Ease of Use, and Usage of Information Technology: A Replication. *MIS Quarterly*, 16(2), 227-247.
- Agarwal, R., & Karahanna, E. (2000). Time Flies When You're Having Fun: Cognitive Absorption and Beliefs about Information Technology Usage. *MIS Quarterly*, 24(4), 665-694.
- Agarwal, R., & Pradsad, J. (1997). The Role of Innovation Characteristics and Perceived Voluntariness in the Acceptance of Information Technologies. *Decision Sciences*, 28(3), 557-582.
- Ajzen, I., & Fishbein, M. (1980). *Understanding Attitudes and Predicting Social Behavior*. Englewood Cliffs, NJ: Prentice-Hall.
- Anderson, J. C., & Gerbing, D. W. (1988). Structural Equation Modeling in Practice: A Review and Recommended Two-Step Approach. *Psychological Bulletin*, 103, 411-423.
- Atkinson, M., & Kydd, C. (1997). Individual Characteristics Associated with World Wide Web Use: An Empirical Study of Playfulness and Motivation. *ACM SIGMIS Database*, 28(2), 53 - 62.
- Babbie, E. (2001). *The Practice of Social Research* (9th ed.). Belmont, CA: Wadsworth/Thomson Learning.
- Baroudi, J. J., Olson, M. H., & Ives, B. (1986). An Empirical Study of the Impact of User Involvement on System Usage and Information Satisfaction. *Communications of the ACM*, 29(3), 232 -238.
- Bentler, P. M. (1989). *EQS Structural Equations Program Manual*. Los Angeles: BMDP Statistical Software.
- Bentler, P. M., & Bonett, D. G. (1980). Significant Tests and Goodness-of-fit in the Analysis of Covariance Structure. *Psychological Bulletin*, 88, 588-606.
- Bentler, P. M., & Chou, C. P. (1987). Practical Issues in Structural Modeling. *Sociological Methods & Research*, 16, 78-117.
- Berelson, B. (1949). What Missing the Newspaper Means. In P. Lazarsfeld & F. Stanton (Eds.), *Communication Research 1948-49* (pp. 111-129). New York, NY: Harper & Row.

- Burgoon, J. K., & Burgoon, M. (1980). Predictor of Newspaper Readership. *Journalism Quarterly*, 57(4), 589-596.
- Byrne, B. (1994). *Structural Equation Modeling with EQS and EQS/Windows: Basic Concepts, Applications, and Programming*. Thousand Oaks, CA: Sage.
- Cameron, G. T., Curtin, P. A., Hollander, B. A., Nowak, G. J., & Shamp, S. A. (1996). Electronic Newspapers: Toward a Research Agenda. *Journal of Mediated Communication*, 11(1), 3-53.
- Charney, T., & Greenberg, B. S. (2002). Uses and Gratifications of the Internet. In C. A. Lin & D. Atkin (Eds.), *Communication Technology & Society: Audience Adoption and Uses* (pp. 379-407). Cresskill, NJ: Hampton.
- Chismar, W. G., & Patton, S. W. (2003). *Does the Extended Technology Acceptance Model Apply to Physicians?* Paper presented at the 36th Hawaii International Conference on System Sciences (HICSS).
- Chung, J., & Tan, F. B. (2004). Antecedent of Perceived Playfulness: An Exploratory Study on User Acceptance of General Information-Searching Websites. *Information & Management*, 41, 869-881.
- Coats, R. (2002). *Power Users: A Profile of Online Newspaper Consumers*. Vienna, VA: Newspaper Association of America.
- Cronbach, L. J. (1951). Coefficient Alpha and the Internal Structure of Tests. *Psychometrika*, 16, 297-334.
- Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*, 13(3), 319-340.
- Davis, F. D. (1993). User Acceptance of Information Technology: System Characteristics, User Perceptions and Behavioral Impacts. *International Journal of Man-Machine Studies*, 38(3), 475-487.
- Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1992). Extrinsic and Intrinsic Motivation to Use Computers in the Workplace. *Journal of Applied Social Psychology*, 22(14), 1111-1132.
- December, J. (1996). Units of Analysis for Internet Communication. *Journal of Communication*, 46(1), 14-37.
- Deci, E. L., & Ryan, R. M. (1985). *Intrinsic Motivation and Self-determination in Human Behavior*. New York, NY: Plenum Press.
- DeLone, W. H., & McLean, E. R. (1992). Information Systems Success: The Quest for the Dependent Variable. *Information Systems Research*, 3(1), 60-95.
- Dobos, J. (1992). Gratification Models and Choice of Communication Channels in Organizations. *Communication Research*, 19(1), 29-51.

- Editor & Publisher Interactive. (1997). *Online Newspaper Database*. Retrieved October 3, 1997, from <http://www.mediainfo.com/ephone/npaper/nphtm/online.htm>
- Farhoomand, A., & Lovelock, P. (2001). *Global E-Commerce*. Singapore: Prentice Hall.
- Ferguson, D. A., & Perse, E. M. (2000). The World Wide Web as a Functional Alternative to Television. *Journal of Broadcasting & Electronic Media*, 44(2), 155-174.
- Fishbein, M. (1963). An Investigation of the Relationships between Beliefs about an Object and the Attitude toward that Object. *Human Relations*, 16(233-240).
- Fishbein, M., & Ajzen, I. (1975). *Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research*. Reading, MA: Addison-Wesley.
- Fornell, C., & Larcker, D. F. (1981). Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. *Journal Marketing Research*, 18, 39-50.
- Gefen, D., Karahanna, E., & Straub, D. W. (2003). Trust and TAM in online shopping: An integrated model. *MIS Quarterly*, 27(1), 51-90.
- Gefen, D., Straub, D., & Boudreau, M. (2000). Structural Equation Modeling Techniques and Regression: Guidelines for Research Practice. *Communications of AIS*, 7(7), 1-78.
- Hair, J. F., Jr., Anderson, R. E., Tatham, R. L., & Black, W. C. (1998). *Multivariate Data Analysis with Readings* (5th ed.). Englewood Cliffs, NJ: Prentice Hall.
- Hart, M., & Porter, G. (2004). The Impact of Cognitive and Other Factors on the Perceived Usefulness of OLAP. *Journal of Computer Information Systems*, 45(1), 47-56.
- Hatcher, L. (1994). *A Step-by-step Approach for Using the SAS System for Factor Analysis and Structural Equation Modeling*. Cary, NC: SAS Institute Inc.
- Hecht, M. L. (1984). Satisfying Communication and Relationship Labels: Intimacy and Length of Relationship as Perceptual Frames of Naturalistic Conversations. *Western Journal of Speech Communication*, 48, 201-216.
- Hecht, M. L. (1987). Toward a Conceptualization of Communication Satisfaction. *Quarterly Journal of Speech*, 64, 47-62.
- Herzog, H. (1944). What Do We Really Know About Day-Time Serial Listeners? In P. F. Lazarsfeld & F. N. Stanton (Eds.), *Radio Research 1942-1943*. New York, NY: Duell, Sloan and Pearce.
- Hong, W. Y., Thong, J. Y. L., Wong, W. M., & Tam, K. Y. (2001). Determinants of user acceptance of digital libraries: An empirical examination of individual differences and system characteristics. *Journal of Management Information Systems*, 18(3),

97-124.

- Hudson, H. E. (1997). *Global Connections: International Telecommunications Infrastructure and Policy*. New York: John Wiley & Sons.
- Igbaria, M., Parasuraman, S., & Baroudi, J. J. (1996). A Motivational Model of Microcomputer Usage. *Journal of Management Information Systems*, 13(1), 127-144.
- Igbaria, M., Zinatelli, N., Cragg, P., & Cavaye, A. L. M. (1997). Personal Computing Acceptance Factors in Small Firms: A Structural Equation Model. *MIS Quarterly*, 21(3), 279-305.
- James, L. R., Mulaik, S. A., & Brett, L. M. (1982). *Causal Analysis: Assumptions, Models, and Data*. Beverly Hills, CA: Sage.
- Kaiser, H. F. (1960). The Application of Electronic Computer to Factor Analysis. *Educational and Psychological Measurement*, 20, 141-151.
- Kamhawi, R., & Weaver, D. (2003). Mass Communication Research Trends from 1980 to 1999. *Journalism & Mass Communication Quarterly*, 80(1), 7-27.
- Katz, E., Blumler, J., & Gurevitch, M. (1974). Utilization of Mass Communication by the Individual. In E. Katz & J. Blumler (Eds.), *The Uses of Mass Communication*. Beverly Hills: Sage.
- Kaye, B. K. (1998). Uses and Gratifications of the World Wide Web: From Couch Potato to Web Potato. *The New Jersey Journal of Communication*, 6(1), 21-40.
- Keil, M., Beranek, P. M., & Konsynski, B. R. (1995). Usefulness and Ease of Use: Field Study Evidence Regarding Task Considerations. *Decision Support Systems*, 13(1), 75-91.
- Kim, J., & Rubin, A. (1997). The Variable Influence of Audience Activity on Media Effects. *Communication Research*, 24(2), 107-135.
- Koufaris, M. (2002). Applying the Technology Acceptance Model and Flow Theory to Online Consumer Behavior. *Information Systems Research*, 13(2), 205-223.
- LaRose, R., & Atkin, D. (1988). Satisfaction, Demographic, and Media Environment Predictors of Cable Subscription. *Journal of Broadcasting & Electronic Media*, 32, 403-414.
- LaRose, R., Mastro, D., & Eastin, M. S. (2001). Understanding Internet Usage: A Social Cognitive Approach to Uses and Gratification. *Social Science Computer Review*, 19(4), 395-413.
- Lazarsfeld, P. F., & Stanton, F. N. (1942). *Radio Research 1942-1943*. New York, NY: Duell, Sloan and Pearce.

- Lee, M. K. O., Cheung, C. M. K., & Chen, Z. (2005). Acceptance of Internet-based Learning Medium: The Role of Extrinsic and Extrinsic Motivation. *Information & Management, Article in Press*.
- Lee, Y., Kozar, K. A., & Larsen, K. R. T. (2003). The Technology Acceptance Model: Past, Present and Future. *Communications of the AIS, 12*, 752-780.
- Legris, P., Ingham, J., & Collette, P. (2003). Why Do People Use Information Technology? A Critical Review of the Technology Acceptance Model. *Information & Management, 40*(3), 191-204.
- Lin, C. (1999). Online-Service Adoption Likelihood. *Journal of Advertising Research, 39*, 79-89.
- Lucas, H. C. J., & Spitler, V. K. (1999). Technology Use and Performance: A Field Study of Broker Workstations. *Decision Sciences, 30*, 291-311.
- MacQuail, D. (1987). *Mass Communication Theory: An Introduction* (2nd ed.). Beverly Hills, CA: Sage.
- Margolis, M., & Resnick, D. (2000). *Politics as Usual: The Cyberspace Revolution*. Thousand Oaks: CA: Sage.
- Markus, M. L. (1987). Toward a "Critical Mass" Theory of Interactive Media: Universal Access. *Communication Research, 14*(5), 491-511.
- Maruyama, G. M. (1998). *Basics of Structural Equation Modeling*. Thousand Oaks: Sage.
- Maslow, A. H. (1954). *Motivation and Personality*. New York, NY: Harper.
- Mathieson, K. (1991). Predicting User Intentions: Comparing the Technology Acceptance Model with the Theory of Planned Behavior. *Information Systems Research, 2*(3), 173-191.
- Moon, J. W., & Kim, Y. G. (2001). Extending the TAM for a World-Wide-Web Context. *Information & Management, 38*, 217-230.
- Morris, M., & Ogan, C. (1996). The Internet as Mass Medium. *Journal of Computer-Mediated Communication, 1*(4).
- Mulaik, S. A., James, L. R., Van Alstine, J., Bennett, N., Lind, S., & Stilwell, C. D. (1989). Evaluation of Goodness-of-fit Indices for Structural Equation Models. *Psychological Bulletin, 105*, 430-445.
- Neuberger, C., Tonnemacher, J., Biebl, M., & Duck, A. (1998). Online--The Future of Newspapers? Germany's Dailies on the World Wide Web. *Journal of Computer-Mediated Communication, 4*(1).
- Newton, H. (2004). *Newton's Telecom Dictionary: Covering Telecommunications, Networking, Information Technology, Computing and the Internet* (20th ed.). Manhasset, NY: CMP Books.

- Nielson/Netratings. (2005). *Global Internet Index: Average Usage (Single Month)*. Retrieved April 9, 2005, from http://www.nielsen-netratings.com/news.jsp?section=dat_gi
- Nunnally, J. (1978). *Psychometric Theory*. New York: McGraw-Hill.
- Palmgreen, P., & Rayburn, J. D. (1985). A Comparison of Gratification Models of Media Satisfaction. *Communication Monographs*, 52, 334-346.
- Palmgreen, P., Wenner, L. A., & Rayburn, J. D. (1981). Gratification Discrepancies and News Program Choice. *Communication Research*, 8, 451-478.
- Palmgreen, P., Wenner, L. A., & Rosengren, K. E. (1985). Uses and Gratification Research: The Past Ten Years. In K. E. Rosengren, L. A. Wenner & P. Palmgreen (Eds.), *Media Gratifications Research*. Beverly Hills: CA: Sage.
- Papacharissi, Z., & Rubin, A. M. (2000). Predictors of Internet Use. *Journal of Broadcasting & Electronic Media*, 44(2), 175-196.
- Pedhazur, E. J. (1997). *Multiple Regression in Behavioral Research* (3rd ed.). Orlando, FL: Harcourt Brace.
- Perse, E. M., & Ferguson, D. A. (1993). The Impact of the Newer Television Technologies on Television Satisfaction. *Journalism Quarterly*, 70(4), 843-853.
- Rayburn, J. D., Palmgreen, P., & Acker, T. (1984). Media Gratifications and Choosing a Morning News Program. *Journalism Quarterly*, 61, 149-156.
- Rogers, E. M. (1983). *Diffusion of Innovations* (3rd ed.). New York, NY: The Free Press.
- Rogers, E. M. (1986). *Communication Technology: The New Media in Society*. New York: The Free Press.
- Rogers, E. M. (2002). The Information Society in the New Millennium: Captain's Log, 2001. In C. Lin & D. Atkin (Eds.), *Communication Technology and Society: Audience Adoption and Uses*. Cresskill: NY: Hampton Press.
- Rosengren, K. E. (1974). Uses and Gratifications: A Paradigm Outlined. In E. Katz & J. Blumler (Eds.), *The Uses of Mass Communication*. Beverly Hills, CA: Sage.
- Rubin, A. M. (1983). Television Uses and Gratifications: The Interactions of Viewing Patterns and Motivations. *Journal of Broadcasting*, 27(1), 37-51.
- Ruggiero, T. E. (2000). Uses and gratifications theory in the 21st century. *Mass Communication & Society*, 3(1), 3-37.
- Russell, S. (1995, Feb 27). Videotext, the Sequel. *Mediaweek*, 5, 14.
- Sambamurthy, V., & Chin, W. (1994). The Effects of Group Attitudes toward GDSS Designs on the Decision-making Performance of Computer-supported Groups. *Decision Sciences*, 25(2), 215-242.

- SAS Institute Inc. (2002-2005). *SAS V9 Online Documentation*, May 10, 2005, from <http://support.sas.com/onlinedoc/913/docMainpage.jsp>
- Shang, R., Chen, Y., & Shen, L. (2005). Extrinsic Versus Intrinsic Motivations for Consumers to Shop On-line. *Information & Management*, 42(3), 401-413.
- Stafford, T., & Stafford, M. (2001). Identifying Motivations for the Use of Commercial Web Sites. *Information Resources Management Journal*, 14(1), 22-30.
- Stafford, T. F., Stafford, M. R., & Schkade, L. L. (2004). Determining Uses and Gratifications for the Internet. *Decision Sciences*, 35(2), 259-288.
- Stevens, J. (1986). *Applied Multivariate Statistics for the Social Sciences*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Subramanian, G. H. (1994). A Replication of Perceived Usefulness and Perceived Ease of Use Measurement. *Decision Sciences*, 25(5/6), 863-874.
- Szajna, B. (1996). Empirical Evaluation of the Revised Technology Acceptance Model. *Management Science*, 42((1)), 85-92.
- Tabachnick, B. G., & Fidell, L. S. (2000). *Using Multivariate Statistics* (4th ed.). Boston, MA: Allyn and Bacon.
- Taylor, S., & Todd, P. A. (1995). Assessing IT Usage: The Role of Prior Experience. *MIS Quarterly*, 19(4), 561-570.
- Teo, H. H., Wei, K. K., & Benbasat, I. (2003). Predicting Intention to Adopt Interorganizational Linkages: An Institutional Perspective. *MIS Quarterly*, 27(1), 19-49.
- Teo, T. S. H., Lim, V. K. G., & Lai, R. Y. C. (1999). Intrinsic and Extrinsic Motivation in Internet Usage. *Omega-International Journal of Management Science*, 27(1), 25-37.
- Tewksbury, D. (2003). What Do Americans Really Want to Know? Tracking the Behavior of News Readers on the Internet. *Journal of Communication*, 53, 694-710.
- The Pew Research Center. (2000). *Internet Sapping Broadcast News Audience*. Retrieved May 15, 2005, from <http://people-press.org/reports/display.php3?ReportID=36>
- The UCLA Internet Report. (2003). *Surveying the Digital Future*. Los Angeles, CA: UCLA Center for Communication Policy.
- van der Heijden, H. (2004). User Acceptance of Hedonic Information Systems. *MIS Quarterly*, 28(4), 695-704.
- Venkatesh, V. (1999). Creation of Favorable User Perceptions: Exploring the Role of Intrinsic Motivation. *MIS Quarterly*, 23(2), 239-260.
- Venkatesh, V. (2000). Determinants of Perceived Ease of Use: Integrating Control, Intrinsic Motivation, and Emotion into the Technology Acceptance Model. *Information Systems Research*, 11(4), 342-365.

- Venkatesh, V., & Brown, S. A. (2001). A Longitudinal Investigation of Personal Computers in Homes: Adoption Determinants and Emerging Challenges. *MIS Quarterly*, 25(1), 71-102.
- Venkatesh, V., & Davis, F. D. (2000). A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. *Management Science*, 46, 186-204.
- Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User Acceptance of Information Technology: Toward a Unified View. *MIS Quarterly*, 27(3), 425-478.
- Venkatesh, V., Speier, C., & Morris, M. G. (2002). User Acceptance Enablers in Individual Decision Making about Technology: Toward an Integrated Model. *Decision Sciences*, 33(2), 297-316.
- Zviran, M., & Erlich, Z. (2003). Measuring IS User Satisfaction: Review and Implications. *Communications of the AIS*, 12, 81-103.