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User Acceptance of Web-Based Subscription Databases: Extending the Technology Acceptance Model

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USER ACCEPTANCE OF WEB-BASED SUBSCRIPTION DATABASES: EXTENDING THE TECHNOLOGY ACCEPTANCE MODEL

By

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To my mother

Wonkyu Park

with love and deepest appreciation
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# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>List of Tables</td>
<td>vii</td>
</tr>
<tr>
<td>List of Figures</td>
<td>viii</td>
</tr>
<tr>
<td>Abstract</td>
<td>ix</td>
</tr>
<tr>
<td>1. INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>General Context of Research</td>
<td>1</td>
</tr>
<tr>
<td>The Problem</td>
<td>5</td>
</tr>
<tr>
<td>Purpose of the Study</td>
<td>6</td>
</tr>
<tr>
<td>Significance of the Study</td>
<td>7</td>
</tr>
<tr>
<td>Research Questions</td>
<td>8</td>
</tr>
<tr>
<td>Definitions of Terms</td>
<td>9</td>
</tr>
<tr>
<td>Delimitations</td>
<td>9</td>
</tr>
<tr>
<td>2. REVIEW OF THE LITERATURE</td>
<td>10</td>
</tr>
<tr>
<td>Theoretical Framework</td>
<td>10</td>
</tr>
<tr>
<td>TAM Related Empirical Studies</td>
<td>20</td>
</tr>
<tr>
<td>Use of Web-based Subscription Databases</td>
<td>29</td>
</tr>
<tr>
<td>Summary of Chapter</td>
<td>34</td>
</tr>
<tr>
<td>3. RESEARCH PROPOSITION</td>
<td>35</td>
</tr>
<tr>
<td>Beliefs Concerning Usefulness and Ease of Use toward Web-based Subscription Databases</td>
<td>37</td>
</tr>
<tr>
<td>Antecedents of User Beliefs about Usefulness and Ease of use</td>
<td>39</td>
</tr>
<tr>
<td>Social Influences</td>
<td>45</td>
</tr>
<tr>
<td>4. METHODOLOGY</td>
<td>48</td>
</tr>
<tr>
<td>Design of the Study</td>
<td>48</td>
</tr>
<tr>
<td>Data Collection</td>
<td>49</td>
</tr>
<tr>
<td>Measures</td>
<td>51</td>
</tr>
<tr>
<td>Pilot Test</td>
<td>53</td>
</tr>
<tr>
<td>5. DATA ANALYSIS AND RESULTS</td>
<td>57</td>
</tr>
<tr>
<td>Characteristics of the Respondents</td>
<td>57</td>
</tr>
<tr>
<td>Descriptive Statistics</td>
<td>59</td>
</tr>
<tr>
<td>Model Testing</td>
<td>60</td>
</tr>
<tr>
<td>Hypotheses Testing</td>
<td>66</td>
</tr>
</tbody>
</table>
Summary of Data Analysis ................................................................. 74

6. SUMMARY AND CONCLUSIONS ..................................................... 75
   Summary of the Study ....................................................................... 75
   Findings and Discussions ................................................................. 76
   Conclusion ..................................................................................... 81
   Implications for Practice ................................................................. 83
   Recommendations for Future Research ......................................... 84

APPENDICES .......................................................................................... 86
   A CONSTRUCTS AND MEASURES (FINAL INSTRUMENT) .......... 86
   B COVER LETTER ............................................................................. 89
   C QUESTIONNAIRE (FINAL INSTRUMENT) ................................. 91
   D CONSTRUCTS AND MEASURES (PILOT TEST) ....................... 96
   E APPROVAL TO TEST HUMAN SUBJECTS ............................... 99

REFERENCES ....................................................................................... 102

BIOGRAPHICAL SKETCH ..................................................................... 122
LIST OF TABLES

4.1: Descriptive Statistics of Respondents of the Pilot Test........................................ 54
4.2: Reliability of the Measures in the Pilot test....................................................... 55
5.1: Descriptive Statistics of the Respondents......................................................... 58
5.2: Descriptive Statistics of the Constructs .......................................................... 59
5.3: Assessment of the Measurement Model ....................................................... 61
5.4: Loadings and Cross-Loadings for the Measurement Model............................ 63
5.5: Inter-Construct Correlations ......................................................................... 65
5.6: PLS Outer Model Loadings .......................................................................... 67
5.7: Statistical Significance of Coefficients......................................................... 68
LIST OF FIGURES

2.1: Theory of Reasoned Action (TRA) ............................................................ 13
2.2: Technology Acceptance Model (TAM) ....................................................... 15
3.1: Proposed research model ............................................................................. 36
5.1: Structural Model Results ............................................................................. 69
The purpose of this study was to determine the factors affecting user acceptance of Web-based subscription databases. Considering the reported underutilization of Web-based subscription databases and the importance of promoting them, this study aimed to provide a better understanding of the determinants of user acceptance based on a well-established theoretical foundation. This study tested an integrated model of the antecedents and consequents of user beliefs toward intended use by extending TAM, which is one of the most prominent models used to explain the effects of users’ internal beliefs and attitudes on their system usage behavior.

This study employed a cross-sectional field study using a Web survey method. The study targeted undergraduate students who have experience using the databases provided by the University Libraries. A final sample of 121 responses was analyzed. The measurement model and the structural model were tested using Partial Least Squares.

Overall, the research model was found to be effective in explaining user acceptance of Web-based subscription databases. The results of the data analysis showed that perceived usefulness had a stronger effect on user acceptance than ease of use, suggesting that user acceptance of Web-based subscription databases depends primarily on the utility they offer. Job relevance and result demonstrability showed positive effects on usefulness perceptions while output quality did not. The results indicated that user training did not have a significant effect on either usefulness or ease of use, calling for the need to re-examine the effectiveness of user training in the context of Web-based subscription databases. Terminology clarity and accessibility were found to be important determinants for ease of use of the databases. The results also suggested that although subjective norm does not directly affect intended use, it exerts a positive influence on user beliefs about the utility of Web-based subscription databases.
CHAPTER 1

INTRODUCTION

General Context of Research

The emergence of Web-based subscription databases has been changing the way people obtain and use information. With increasing user demands for electronic resources, the availability of Web-based subscription databases has become essential in research and learning.

According to the *Gale Directory of Online, Portable, and Internet Databases* (2004), types of databases are categorized into bibliographic (indexing/abstracting), dictionary, directory, statistical/numeric, full text, image, audio, video, and other types. Yet, recent developments of the hybrid products blur the existing distinctions among these types of databases (Tenopir, 2001). With the growing demand among users for enhanced and integrated information products and services that allow for “one-stop shopping” (Lavin, 2000), the hybrid products that combine a variety of types of databases into a single, subject-related resource center enable users to get needed information on a given topic without having to know which databases to use.

Since the introduction of online database searching in the 1960s, electronic information has been offered via a variety of channels: mediated online searching, end-user online searching, locally-loaded databases, CD-ROM, access through OPAC, and end-user access through the Web (Tenopir & Ennis, 1998a). In the early years, databases were provided via online access. With the increase of the number of CD-ROM databases during the late 1980s and early 1990s, mediated online database searches decreased sharply and online searching was often performed on a limited basis for very specialized databases (Tenopir & Ennis, 1998b). Both online and CD-ROMs have advantages and
disadvantages. Online offers the advantages of frequent updates, but it can be costly due to its time-based charges. CD-ROMs offer a simple interface and cost advantages, but updates are not made as frequently as online (Williams, 1990). In online database searching, searches were mostly performed by intermediaries. Intermediary searching requires interview skills and considerable subject knowledge on the part of the intermediary in addition to searching capabilities. With the proliferation of CD-ROM databases, end-user searching has become common, decreasing mediated online searching by intermediaries. End-user searching eliminates the procedure of explaining an end user’s information needs to an intermediary, which is a major source of failure in information retrieval (Lancaster, 1979).

While online and CD-ROM services are still available, recently most database producers and vendors have focused their services on Web access as the importance of the Web as a medium for information delivery has increased. As vendors loaded their databases onto the Web and made Web access their priority, the Web became the most pervasive form of access to online databases. The Web provides an excellent way to offer information. Since the Web interface is familiar to most users, it makes database selection, searching, and browsing easier than before. Web interfaces of online databases are generally recognized as interactive and intuitive. Xie and Cool (2000) identify the following significant characteristics of Web interfaces of online databases:

- guiding user access to a variety of databases;
- multiple interactive search strategies such as browsing, searching, etc.;
- mapping to thesaurus terms;
- interactive help mechanisms;
- multiple manipulations of output;
- iterative movement by links (p.102).

The proliferation of the Web has also increased the convenience of accessing the databases. Web-based databases enable users to access the information from their desktops, usually via passwords or by IP address ranges.

Some vendors that offered CD-ROM databases have shifted their emphasis to Web-based services. These shifts offer benefits to both the vendors and organizations that subscribe to the databases. Web-based services allow the vendors to offer more features,
update content more frequently, and provide more resources (Tenopir & Barry, 2000). Web-based databases also reduce hardware requirements and workload of system staff managing CD-ROMs. Besides, for full-text databases, Web-based services are considered more desirable to house and maintain than CD-ROMs (Tenopir, 1994).

Electronic information is provided in the form of purely bibliographic databases or bibliographic databases that link to full texts. With the proliferation of full-text electronic information, the number of full-text databases exceeded that of bibliographic databases in the early 1990s (Tenopir, 1993). Studies show that users are becoming more dependent on using full-text databases (Macdonald & Dinkelberger, 2000; Pagell, 1993). According to Brunelle (1999), full-text databases are divided into three basic models: publisher-supplied full-text; third-party or aggregator-supplied full-text; and distributed, “linked” full-text in which a bibliographic database provider links to (usually) publisher-supplied full text (pp.297-298). The publisher-supplied full-text model allows the publishers to add value to the print content such as including auxiliary materials (e.g., spreadsheets of data, motion pictures, etc.), but at the same time it poses difficulties for users to find needed information since the information is spread out over numerous journal sites. On the other hand, the aggregator-supplied full-text model integrates full texts with bibliographic databases, thus providing a seamless interface for users and resolving maintenance problems associated with the publisher model (Brunelle, 1999). However, the instability in obtaining and distributing the information content on the part of the aggregators can be a problem since aggregators do not typically own the data. The distributed, linked full-text model allows the users to avoid the inconvenience of having to visit many different sites for access. However, there are no established standards that make it easy to link bibliographic databases to full texts, nor is there a viable economic model that addresses the issue of vendors’ expense to link to publisher-supplied full texts (Brunelle, 1999).

One of the recent trends in relation to Web-based databases is the prevalence of government-sponsored databases that provide free access to full texts such as PubMed Central and BioMed Central. There are also databases made available for free on the Web by professional organizations or commercial enterprises. Some of the databases are available both at no cost over the Internet and for a fee through commercial vendors. Whereas the free sites are more easily accessible to users through direct links on the
Internet, the commercial sites available through library home pages usually offer value-added features that are not available at the free sites (Brown, 2003). Grogg et al. (2002) compared the percentages of full-text access for affiliated versus nonaffiliated users in PubSCIENCE. The results indicated that affiliated users had better access than unaffiliated users, confirming that high-quality scholarly information is not always available for free on the Web.

Another trend is the emergence of state-funded Internet-based information services. A number of state agencies now offer state residents free online access to selected online databases via the Internet (Wolfram & Xie, 2000): the BadgerLink service in Wisconsin, the Inspire service in Indiana, the Alabama Virtual Library, and the Kentucky Commonwealth Virtual Library. These services allow residents to access a variety of databases directly from their libraries or homes. Since these services are still in infancy, the need for promoting them has been recognized. Wolfram and Xie (2000), based on their observations of the usage statistics of the state-funded Internet-based database services, point out that users may not be aware of the contents of the databases, and call for further promotion of the database services.

Web-based subscription databases are often compared with Internet search services. Since their development, Internet search services such as Altavista, Yahoo, and Google, have fascinated many Internet users. While many Internet search services have a virtue in that they are free and user friendly, online database services have the advantages of well-tested search capabilities and disciplined, bibliographically controlled access (Chu, 1998). Chu (1998), in a study comparing Internet search services and online database services, speculated that the two services would co-exist for their own features, strengths, and information needs they satisfy respectively, and that neither would replace the other completely even though there might be competition in certain areas (e.g. news). Although there are many factors to consider, his general advice as to which service to choose is that online database services can be used for a concept-based query of a specific discipline, and Internet search services can be used for a fact-based query of a general domain. The quality of information contained in subscription databases over open Internet searches has been underscored by researchers and practitioners. Awakened to users’ inclination toward Internet searches, Tenopir (2001b) calls for the promotion of subscription
databases, citing her interview with Hawkwood that “libraries are competing for the user’s attention and frequently need to remind patrons that subscription databases are the most effective way to conduct research” (p.42).

With the recognition of the need for promotion, explaining user acceptance of Web-based subscription databases has become an important research agenda.

The Problem

Statement of the Problem

What factors affect user acceptance of Web-based subscription databases? How applicable is the Technology Acceptance Model (TAM) in explaining user acceptance in the context of Web-based subscription databases? These questions are the focus of this study.

Significance of the Problem

One of the biggest problems facing librarians and patrons today is ensuring the integrity of information provided and being aware of where to find authoritative information (Crowley, 2000). Despite the high-quality information that Web-based subscription databases offer, prior research has reported underutilization of the databases (Lenares, 1999; Speier, Palmer, Wren, & Hahn, 1999; Tenopir & Read, 2000). Montgomery (1987) found that not all persons who were taught to conduct online bibliographic searches actually conducted self-searches, leading to the speculation that the low usage might be because a potential user thinks it is not cost effective to spend large amounts of time learning how to search. Tenopir and Read (2000b), in their study of database use in academic institutions, found that students underutilized electronic databases in comparison to general Internet resources and chat rooms (as cited in Shim & McClure, 2002). Crowley (2000) asserts that having harnessed technology does not
guarantee use and calls for heavy marketing to help students be aware of the products. Recognizing the lack of awareness, other researchers also underscore the importance of promoting the databases so that potential users will utilize them and get value from them (Keeler, 2002; Townley & Murray, 1999). It has been reported that students tend to think that all information can be found through Internet search engines. Low (2003) points out students’ dependency on open Internet searches despite the fact that quality information is not readily available through open Internet searches. Given these study findings, more emphasis needs to be put on raising awareness of Web-based subscription databases and creating a demand by users.

Along with the new technological developments, it is also crucial to examine factors contributing to positive acceptance of Web-based subscription databases. The present study focuses on understanding undergraduate students’ acceptance of Web-based subscription databases. It uses TAM as a conceptual framework to explain the factors affecting user acceptance. TAM, as one of the most prominent models in user acceptance research, provides a necessary theoretical basis to explain an individual’s motives to use an information system.

**Purpose of the Study**

The purpose of the study is to test factors affecting user acceptance of Web-based subscription databases using a theoretically specified model. This study tests an integrated model of the antecedents and consequents of user beliefs toward database usage. By extending TAM in the context of Web-based subscription databases, this study seeks to examine the effects of user beliefs and subjective norm on user acceptance. The research model in the present study proposes that user acceptance of Web-based subscription databases is affected by user beliefs and subjective norm. User beliefs are proposed to intervene the effects of external factors on intended use. The subjective norm construct is examined to see whether it has a direct effect on use of Web-based subscription databases. This study also seeks to investigate the associations between user beliefs and external factors. The present study identifies the external factors that have
been found consistently to impact user beliefs in prior research and tests the relationships between them. The antecedents of usefulness perceptions included in the proposed research model are subjective norm, job relevance, output quality, result demonstrability, and user training. The antecedents of ease-of-use perceptions include perceived accessibility, terminology, and user training. By examining the antecedents of user beliefs, a better understanding of the factors influencing user acceptance can be accomplished.

To accomplish this purpose, an instrument was devised to measure the constructs in the proposed research model. The instrument was developed based on prior research and by constructing new scales where necessary.

**Significance of the Study**

Many libraries are now spending a substantial portion of their budget subscribing to electronic resources. Thus, an understanding of whether or how Web-based subscription databases are used and what factors affect the intention to use them is critical. User input is important in the evaluation and planning processes of any information system. Given that users’ attitudes and evaluations are in many cases the only meaningful criteria (Ives, Olson, & Baroudi, 1983), improving our understanding of users is critical in order to design more successful systems. A theoretical understanding of user acceptance also offers benefits by helping to better influence the use of the databases in the implementation process.

The present study extends TAM in the context of Web-based subscription databases by incorporating subjective norm and the external factors of user beliefs specified in TAM. TAM has received substantial theoretical and empirical support by numerous studies of user-adoption behavior in information systems research. Although TAM has received extensive support, researchers have called for additional efforts to validate existing research results and extend the model’s theoretical validity and empirical applicability in different technologies, users, and/or organizational contexts (Hartwick & Barki, 1994; Hu, Chau, Sheng, & Tam, 1999). Although TAM has been extensively
tested and supported in many areas, there was no such study that examined the applicability of TAM in the context of Web-based subscription databases. Plus, there has been little research on user acceptance of Web-based subscription databases. A number of other studies focused on online database search behavior and search efficiency (Hsieh-Yee, 1993; Palmquist & Kim, 2000). Applying TAM in the context of Web-based subscription databases can be beneficial in that it allows for the examination of user acceptance based on a well-established theoretical foundation. A better understanding of the determinants of intended use will have managerial implications in that it can provide insight into how practitioners can facilitate use of Web-based subscription databases. Furthermore, the findings of the present study can also provide insights and implications in relation to technology acceptance research in general.

**Research Questions**

1. What relationships exist between ease-of-use and usefulness perceptions and user acceptance of Web-based subscription databases?
2. What relationships exist between usefulness perceptions and the proposed antecedents?
3. What relationships exist between ease-of-use perceptions and the proposed antecedents?
4. What relationships exist between subjective norm and user acceptance of Web-based subscription databases?
**Definition of Terms**

- *Technology acceptance* is defined as an “individual’s psychological state with regard to his or her voluntary use of or intention to use a particular technology” (Hendrick & Brown, 1984).

- *Database* is defined as “a continuously updated computer file of related information, abstracts, or references on a particular subject, arranged for ease and speed of search and retrieval” (Reitz, 2002).

- *Web-based subscription database* is defined as a database that is accessed via the Web and subscribed to by a library or any other institution.

**Delimitations**

- The present study is conducted using a cross-sectional approach. A longitudinal approach can be considered to investigate the changes of user beliefs and their effects on usage behavior in various stages of the implementation.

- Additional factors can be included to enhance our understanding of user acceptance of Web-based subscription databases.
CHAPTER 2
REVIEW OF THE LITERATURE

The literature review is organized into theoretical framework, literature related to TAM, and literature related to the use of Web-based subscription databases. A summary of chapter two will follow.

Theoretical Framework

Innovation diffusion and appropriation has been widely studied. A wide range of studies has been conducted to explain the dimension, speed, or pattern of diffusion. A number of diffusion theories have also been developed in various disciplines including information systems, management, economics, sociology, marketing, and medicine. Diffusion research has been concerned with various issues. Among them, innovation diffusion in information systems has been one of the most frequently studied issues.

User acceptance of information systems has received fairly extensive attention in information systems research. With empirical studies on user acceptance of information systems, theoretical frameworks for user acceptance in the implementation of the systems have been developed to help researchers and practitioners better understand adoption and usage processes. Studies that propose theoretical frameworks and provide empirical findings for the respective theoretical framework have accumulated (Ajzen & Fishbein, 1980; Davis, Bagozzi, & Warshaw, 1989; Mathieson, 1991; Thompson, Higgins, &
Howell, 1991). Among the models, TAM has been recognized as the most robust, parsimonious, and influential.

TAM adapts the Theory of Reasoned Action (TRA) as a theoretical basis for specifying causal linkages between the constructs in the model. Given TRA’s general applicability across a wide variety of domains, applying it to the information systems context is considered appropriate.

**Theory of Reasoned Action**

The Theory of Reasoned Action (TRA) is an intention model developed to explain the determinants of consciously intended behaviors (Ajzen & Fishbein, 1980). Generally speaking, TRA is intended to explain virtually any human behavior. The goal of the theory is “to predict and understand an individual’s behavior” (Ajzen & Fishbein, 1980, p.5). TRA is based on the assumption that “human beings are usually quite rational and make systematic use of the information available to them” (Ajzen & Fishbein, 1980, p.5). Thus, the theory suggests that people consider the implications of their actions before they decide to perform the specific behavior. TRA is based on the notion that a person’s intention to perform a behavior determines his action. Thus, in order to understand human behavior, it is important to identify what determines intentions. TRA postulates that one’s performance of a behavior is determined by his behavioral intention to perform the behavior.

In TRA, it is assumed that most behaviors of social relevance are under volitional control and are thus predictable from intentions. In TRA, intention is considered to be the immediate determinant of behavior. It is posited that when an appropriate measure of intention is provided, intention will serve as the most accurate prediction of behavior. However, the extent to which intention permits accurate prediction of behavior depends on two factors: First, the measure of intention should correspond to the measure of behavior in action, target, context, and time. It is essential to obtain an appropriate measure of intention in order to ensure high correspondence between intention and
behavior. Second, since intentions can change over time, it is essential to measure the intention as closely as possible to the behavior in order to maximize behavioral prediction (Ajzen & Fishbein, 1980).

TRA postulates that behavioral intention (BI) is jointly determined by an individual’s attitude (A) toward the behavior and subjective norm (SN). (Figure 2.1). According to TRA, a person’s behavioral intention is determined by his attitude toward performing the behavior and by his subjective norm. Attitude refers to “his favorable or unfavorable evaluation of his performing the behavior” (Ajzen & Fishbein, 1980, p.60), and subjective norm refers to “his perception that most people who are important to him think he should or should not perform the behavior” (Ajzen & Fishbein, 1980, p.60). It can be said that a person is likely to perform those behaviors that he favorably evaluates and that he perceives important referents think he should perform. The relative weights of the two components, attitude and subject norm, in determining intentions vary depending on a given behavior and individual.

The theory also seeks to explain why people hold certain attitudes and subjective norms. In TRA, attitudes are postulated to be a function of behavioral beliefs. Behavioral beliefs refer to “the person’s beliefs that the behavior leads to certain outcomes” (Ajzen & Fishbein, 1980, p.8). A person who believes that performing a given behavior will result in positive consequences is likely to hold a favorable attitude toward performing the behavior, while a person who believes that performing the behavior will yield negative consequences is likely to hold an unfavorable attitude. Similarly, subjective norms are postulated to be a function of normative beliefs. Normative beliefs refer to “the person’s beliefs that specific individuals or groups think he should or should not perform the behavior” (Ajzen & Fishbein, 1980, p.7). A person who believes that important referents think he should perform the behavior will have a subjective norm to perform the behavior. In summary, the theory suggests that it is possible to explain and predict an individual’s behavior by measuring his attitude toward the behavior, his subjective norm, and relative weights of these attitudinal and normative factors.

Ajzen and Fishbein (1980) hold the view that external variables may influence a person’s beliefs and the relative weights of his attitudinal or normative beliefs. These variables can be personal characteristics such as authoritarianism, introversion-
extroversion, and a need for achievement; demographic variables including gender, age, social class, and race; and such factors as social role, status, socialization, intelligence, and kinship patterns (Ajzen & Fishbein, 1980). However, these external variables do not constitute an integral part of TRA because different external variables need to be invoked to explain a different behavior. Ajzen and Fishbein assert that external variables are not expected to have consistent effects in different contexts, and that there is no necessary relation between any external variable and a given behavior. Thus, TRA seeks to account for the relations between any external variable and any behavioral phenomenon that can be controlled by a person’s volition.

Since the introduction of the theory, TRA has been widely studied in various subject areas (Ajzen & Fishbein, 1980; Bagozzi, 1981; Davis, 1985; Fishbein & Ajzen, 1975).

![Diagram of Theory of Reasoned Action (TRA)](image-url)

Figure 2.1 Theory of Reasoned Action (TRA) (Ajzen & Fishbein, 1980)
Although there have been a number of studies conducted in the areas of system acceptance, research on the effect of users’ internal beliefs and attitudes on system acceptance has produced mixed and inconclusive findings. Recognizing that the lack of consistent findings in the usage behavior studies could be attributed to different measures employed in the studies and inadequate theoretical and psychometric justification, Davis (1986) developed and validated the measures of key theoretical constructs: perceived usefulness and perceived ease of use. Davis (1985) introduced the technology acceptance model (TAM), which specifically aims to model user acceptance of information systems. TAM explains user acceptance of an information system based on user perceptions. The goal of TAM is “to provide an explanation of the determinants of computer acceptance that is general, capable of explaining user behavior across a broad range of end-user computing technologies and user populations, while at the same time being both parsimonious and theoretically justified” (Davis et al., 1989, p.985).

TAM employs the causal linkages between two key beliefs specified in TRA and users’ attitudes, intentions and actual system adoption behavior (Figure 2.2). TAM posits that two theoretical constructs, perceived usefulness and perceived ease of use are fundamental determinants of user acceptance of an information system. 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” (Davis et al., 1989, p.320). Perceived ease of use (PEOU) refers to “the degree to which a person believes that using a particular system would be free of effort” (Davis et al., 1989, p.320). The theoretical importance of PU and PEOU is based on an extensive analysis from various perspectives, including: expectancy theory; self-efficacy theory; behavioral decision theory; diffusion of innovations; marketing; and human-computer interaction (Davis, 1986).

TAM theorizes that system use is determined by behavioral intention (BI), and BI is jointly determined by the individual’s attitude (A) toward using the system and perceived usefulness (PU). The A-BI relationship represented in TAM suggests that “all else being equal, people form intentions to perform behaviors toward which they have positive affect” (Davis et al., 1989, p.986). The PU-BI relationship represented in TAM implies
Figure 2.2 Technology Acceptance Model (TAM) (Davis, 1989)
that “within organizational settings, people form intentions toward behaviors they believe will increase their job performance, over and above whatever positive or negative feelings may be evoked toward the behavior per se” (Davis et al, 1989, p.986). The PU-BI relationship is hypothesized that PU has a direct effect on behavioral intentions when affect is not fully formed; thus one’s attitude could not reflect the impact of performance considerations on BI. While PU is theorized to have a direct effect on BI, PEOU is posited to have both a direct effect and an indirect effect on BI through PU.

TAM also postulates that A is jointly determined by PU and PEOU. Based on previous research (Rosenberg, 1956; Vroom, 1964), PU is postulated to have an influence on A in that positively valued outcomes are likely to increase one’s affect toward the behavior. PEOU in TAM influences A via two basic mechanisms: self-efficacy and instrumentality. Improvements in PEOU are likely to increase the user’s self-efficacy (Bandura, 1982) and performance, in turn increasing his affect toward the behavior.

Beliefs are considered important in system adoption because of their influence on usage behavior. Their importance is further underscored in that they are amenable to strategic managerial manipulation through interventions such as system design and training (Davis, 1993; Venkatesh, 1999). TAM posits that PU is determined by PEOU and external variables. PEOU is postulated to have a direct effect on PU. It suggests that other things being equal, a system perceived to be easier to use is likely to be perceived as more useful. External factors are also postulated to influence usefulness beliefs. External factors may include system features, training, documentation, and user support consultants (Davis et al., 1989). TAM also posits that PEOU is determined by external factors. In order to identify the impact of external factors on internal beliefs, attitudes, and behavioral intentions, TAM uses TRA to specify the theoretical relationships among the variables and incorporates the cognitive and affective variables of user acceptance from prior research. External factors provide “the bridge between the internal beliefs, attitudes and intentions represented in TAM and the various individual differences, situational constraints and managerially controllable interventions impinging on behavior” (Davis et al., 1989, p.988). In a system implementation, by manipulating these external variables, system developers can influence users’ beliefs of the system and
subsequently their behavioral intentions and system use (Hong, Thong, Wong, & Tam, 2002).

Subjective norm (SN) represented in TRA is not included in TAM as a determinant of BI because of its uncertain theoretical and psychometric status. Davis et al. (1989) note that it is difficult to disentangle direct effects of SN on BI from indirect effects via A. Based on Kelman’s (1958) three different processes of social influence, Davis et al. suggest that SN may have an indirect effect on BI via A, through internalization and identification processes, or have a direct effect through compliance process.

As with the similarities in their theoretical aspects, TAM and TRA have some differences. Salient beliefs in TRA are idiosyncratic, calling for a new specification for each context. In contrast, TAM includes two *a priori* belief constructs, PU and PEOU, as general determinants of user acceptance. Besides, while all beliefs in TRA are summed to a single construct, PU and PEOU in TAM are represented separately, enabling the researcher to identify the relative influence of each belief on A (Davis et al., 1989).

**Kelman’s Social Influence Processes**

TAM does not include subjective norm as a determinant of behavioral intention in the adoption and utilization of information systems. The exclusion of subjective norm is due to its uncertain theoretical and psychometric status suggested based on Davis et al.’s (1989) observation that it is difficult to distinguish direct effects of subjective norm on behavioral intention from indirect effects via attitude.

Kelman’s (1958) social influence processes can provide a theoretical framework for understanding the role of social influences in TAM. In an attempt to investigate the nature and depth of attitude change, Kelman constructs his research on a broader theoretical framework that concerns the analysis of different processes of attitude change resulting from social influence. The theoretical analysis is based on the observation that changes in attitudes and actions exerted by social influence may occur at different levels. These differences in the nature or level of changes correspond to differences in the process whereby the individual accepts influence. When an individual adopts an induced
behavior, the processes that underlie his behavior may be different, even though the resulting outward behavior appears the same.

Kelman (1958) distinguishes three different processes of influence: compliance, identification, and internalization. These processes represent three qualitatively different ways that individuals accept influence. Compliance occurs when an individual accepts influence to obtain a favorable reaction from another person or group. When conformity takes the form of compliance, the individual adopts the induced behavior to gain specific rewards or approval and avoid specific punishments or disapproval. In this case, satisfaction brought by compliance is due to the social effect of accepting influence. Identification occurs when an individual accepts influence to establish and maintain a satisfying relationship to another person or a group. The individual may want to be a part of a group, respecting its values without adopting them as his own (O’Reilly & Chatman, 1986). When conformity takes the form of identification, the individual adopts the induced behavior because it is associated with the desired relationship. Satisfaction brought by identification is due to the act of conforming as such. Internalization occurs “when an individual accepts influence because the content of the induced behavior – the ideas and actions of which it is composed – is intrinsically rewarding” (Kelman, 1958, p.53). When conformity takes the form of internalization, the individual adopts the induced behavior because it is congruent with his own value system. Behaviors adopted in the form of internalization are integrated with his existing values. Satisfaction brought by internalization is due to the content of the new behavior.

Kelman (1958) identifies three determinants of influence as following:

*The probability of accepting influence is a combined function of (a) the relative importance of the anticipated effect, (b) the relative power of the influencing agent, and (c) the prepotency of the induced response (p.53).*

Each of the three processes (compliance, identification, and internalization) is characterized by a distinctive set of antecedent conditions. For each of the three processes, these determinants take a qualitatively variant form; thus they can be differentiated in terms of the nature of the anticipated effect, the source of the influencing agent’s power, and the manner in which the induced response has become
Kelman (1958) encouraged the application of this theoretical framework to the analysis of the effects of social influence on attitudes or actions. Malhotra and Galletta (1999) applied Kelman’s theoretical framework in the context of information system use. They suggest that the social influence processes determine an individual’s commitment to the use of an information system. Individuals who use the system because they think it is congruent with their values can be recognized as the users who adopted the system use through the internalization process. In contrast, individuals who use the system to obtain rewards and avoid punishments can be recognized as the users who adopted the system use through the compliance process. This conception is worth noting in that it views system use as a continuum in contrast to the traditional conception of system use in terms of prepotent.
of use and non-use (Malhotra & Galletta, 1999). They define the range in this continuum from avoidance to use (nonuse) to meager and unenthusiastic use (compliant use) to skilled, enthusiastic and consistent use (committed use) depending on the user’s commitment to the use of the information system.

**TAM Related Empirical Studies**

**Replication Studies and the Integration of Models**

TAM is one of the most widely used models in information systems adoption research. TAM has been applied to a wide range of applications and user profiles in the past decades. Researchers have replicated Davis’ (1989) study and supported its validity and reliability in explaining and predicting user acceptance of various information systems. Adams, Nelson, and Todd (1992) replicated Davis’ study to evaluate the psychometric properties of the PU and PEOU scales and examine the relationships between the two variables and usage. The study confirmed that the psychometric properties of the two scales developed by Davis were robust across studies and user groups. However, the examination of the relationships between PU, PEOU, and usage yielded somewhat mixed results. Adams et al. explained that the observed differences in the relative importance of PU and PEOU might be attributed to the differences in the user’s level of experience or the different natures of the software packages. Later, Segars and Grover (1993) performed a confirmatory factor analysis to examine the possible measurement problems in Adams et al.’s study using the Adams et al. data. Pointing out that the two-factor model consisting of PU and PEOU was not adequate in explaining the observed correlations in the data, they derived a three-factor model consisting of ease of use, usefulness, and effectiveness. However, raising concerns regarding the exploratory procedure used by Segars and Grover, Chin and Todd (1995) reexamined whether the usefulness construct developed by Davis was multidimensional or unidimensional. Using their own data set and the original Adams et al. data, they performed traditional sample-
based tests of model fit, distribution-free resampling procedures, and cross validations, and they concluded that the separation of the usefulness construct into two dimensions (usefulness and effectiveness) had no empirical support or substantive rationale, supporting the Davis’s two-factor model. Subramanian (1994) also replicated the construct measurement of PU and PEOU with a new data set collected from a survey targeting users of two different systems. This replication study suggested that the two-factor model provided a better fit than the three-factor model. The study also found consistent results with earlier studies that PU was a determinant of predicted future usage, but PEOU did not show a significant influence on usage.

Hendrickson, Massey, and Cronan (1993) examined the test-retest reliability of the PU and PEOU to determine the consistency and reliability of the instrument developed by Davis (1989). The results confirmed that the instrument showed a high degree of test-retest reliability. Szajna (1994) examined the predictive validity of the PU and PEOU instrument developed by Davis. In order to address problems associated with self-reported measures such as common method variance, she used the subject’s actual choice of a software package as a measure of behavioral intention. The results suggested that the instrument developed by Davis exhibited the predictive validity for intentions to use, self-reported usage, self-predicted usage, attitudes toward use, and choice. Szajna (1996) also conducted a confirmatory test of the revised TAM using the data collected from a longitudinal study. The results supported that TAM adequately predicted and explained behavioral intention. In this study, user acceptance was measured as both self-reported and actual usage. The test of the post-implementation version of the model revealed that the effect of intentions was stronger on self-reported usage than on actual usage, suggesting relatively weak support for the convergent validity of self-reported usage with actual usage. Meanwhile, Doll, Hendrickson, and Deng (1998) pointed out that TAM-related empirical studies had produced conflicting and equivocal results despite TAM’s wide influence on studies of the determinants of system usage. Thus, Doll et al. assessed the measurement equivalence of Davis’s PU and PEOU instruments across type of application, level of experience, and gender. The results confirmed that all items

\[1\] Common method variance: the contamination of a potential relationship by the subjects’ desire for consistency or social desirability (Podsakoff and Organ, 1986).
of PU and PEOU scales had good validity and reliability, and the instruments had the robustness across most, but not all, subgroups.

In addition to these replication studies, researchers have recognized the importance of re-examining and comparing existing theoretical models of user acceptance. Taylor and Todd (1995b) identified two lines of theoretical perspectives that provided an understanding of the determinants of system usage (intention-based models and models from social psychology) and compared three models from the two lines (TAM, TPB, and decomposed TPB that incorporated additional factors that were not present in TAM) in terms of overall model fit, explanatory power and significance of paths. The results indicated that all three models had a good fit and roughly equivalent explanatory power, with each model having its own strengths. The authors concluded that while TAM could be preferably used when the research goal was the prediction of system usage, the decomposed TPB model provided a more complete understanding of the determinants of system usage by incorporating subjective norm and perceived behavioral control constructs. Chau and Hu (2001) replicated previous comparison studies of technology acceptance theories and models by Mathieson (1991) and Taylor and Todd (1995b) in the context of physicians’ acceptance of telemedicine. They compared TAM, TPB, and a decomposed TPB to investigate the extent to which the models could explain user acceptance. Relatively poor reliabilities and R-square shown in the study suggested that the prevalent theoretical models such as TAM and TPB might have limited explanatory utility in a healthcare professional context, calling for the inclusion of additional factors.

By integrating existing models and theories, researchers attempted to derive a stronger model that provided more explanatory power than a model standing alone (Chau, 1996b; Dishaw & Strong, 1999; Thompson et al., 1991). Integrating constructs from existing models and theories enabled the researchers to better explain factors that influenced user acceptance. Thompson et al. (1991) adapted TRA (Fishbein & Azjen, 1975) and a competing theory of behavior proposed by Triandis (1980) as the theoretical grounding to investigate factors that influenced PC use of knowledge workers. They found that among the proposed relationships, social norms and three components of expected consequences (complexity of use, fit between the job and PC capabilities and long-term consequences) had significant effects on use. In this study, job fit was a
stronger predictor of PC utilization than complexity, consistent with Davis et al.’s (1989) findings that had demonstrated a stronger effect of PU on usage than PEOU. Dishaw and Strong (1999) integrated TAM with the task-technology fit model (TTF) to provide a more complete model. Extending TAM with TTF constructs provided more explanatory power than did either TAM or TTF alone. The study findings indicated that system utilization was influenced by both individual’s attitudes toward the system (construct specified in TAM) and the matching of system functionality to task requirements (construct specified in TTF). In another study to examine determinants of CASE acceptance by systems developers, Chau (1996b) tested a research model that integrated TAM and the personal computer utilization model developed by Thompson et al. (1991). Inconsistent with previous studies, PEOU was found to exert a stronger influence on user acceptance than PU. He speculated that the results might be attributed to the subjects’ limited experience with CASE.

**User Beliefs and Social Influences**

In order to better understand factors affecting system usage, the need to examine the theoretical determinants of user beliefs (PEOU and PU) has been recognized. Venkatesh and Davis (1996) underscored the importance of understanding the determinants of PU and PEOU for TAM to meaningfully explain user acceptance beyond the influences of ease-of-use and usefulness perceptions on system usage. A number of studies extended TAM by incorporating external variables, hypothesizing that beliefs mediate the external variables and user acceptance. Pointing out that previous research on TAM has focused on PU and PEOU as the determining factors of system usage rather than exploring specific determinants that shape the individuals’ beliefs and behaviors, Igbaria and Iivari (1995) extended TAM by incorporating self-efficacy and its determinants (experience and organizational support) as external variables. Later, Igbaria, Guimaraes, and Davis (1995) examined the impact of the external factors on TAM by incorporating individual, organizational, and system characteristics as determinants of PU, PEOU, and usage. The results provided support for TAM and confirmed the effects of the external factors on PU and PEOU. Venkatesh and Davis tested a model that incorporated computer self-efficacy
and objective usability as the determinants of PEOU. They conducted three experiments using six different systems. The results indicated that computer self-efficacy had a significant effect on PEOU both before and after direct experience with a system, and objective usability had a significant effect on PEOU only after direct experience. Igbaria, Zinatelli, Cragg, and Cavaye (1997) extended TAM by adding intra-organizational factors (internal computing support, internal computer training, and management support) and extra-organizational factors (external computing support and external computing training) in a small firm context. Both PU and PEOU had a strong effect on system usage. However, inconsistent with previous studies, PEOU was found to have a greater effect on usage and relatively little support was found for the influence of both internal support and internal training. The authors speculated that these inconsistent results might be associated with distinct characteristics of small firms.

Researchers have incorporated various constructs into TAM to develop a more comprehensive model that explains user acceptance. Jackson, Chow, and Leitch (1997) extended TAM by adding user involvement constructs. The extended model, which includes situational involvement, intrinsic involvement, argument for change, prior usage, and attitude constructs, exhibited better descriptive ability than the original TAM. Lucas and Spitler (1999) extended TAM by incorporating perceptions of system quality, subjective norms, and user performance. The results of the study indicated that organizational variables such as social norms and one’s job requirements were found to be more important predictors of use than the core perception variables specified in TAM (PEOU and PU). The authors speculated that the results might be associated with the mandatory nature of the use of the system under investigation. Venkatesh (1999) utilized TAM as a theoretical perspective to explore the role of intrinsic motivation in the context of end-user training. The results indicated that the users in a game-based training program designed to enhance intrinsic motivation showed higher potential acceptance of a system than those in a traditional training program. Meanwhile, Chau (1996a) identified two distinct types of PU (near-term usefulness and long-term usefulness) and tested them in the TAM context. Analyses of data suggested that perceived near-term usefulness had the most significant influence on the behavioral intention to use, and perceived long-term usefulness had lesser, but significant influence on intention.
The role of individual differences has also been examined in the TAM context. Agarwal and Prasad (1999) extended TAM by incorporating individual differences (role with regard to technology, tenure in workforce, level of education, prior experiences, and participation in training) as external variables. The study results provided support for TAM and demonstrated the significant relationships between several individual difference variables and belief variables.

Several researchers have incorporated the effect of gender or experience in the context of TAM (Gefen & Straub, 1997; Taylor & Todd, 1995b). Gefen and Straub (1997) examined gender differences in terms of perceptions and use of email. Gender differences were observed in their perceptions but not in actual use. Venkatesh and Morris (2000) extended TAM to include subjective norm and gender, recognizing that the role of social influence on an individual’s usage behavior is different depending on gender. The study revealed that for men, PU had a strong influence on usage decisions. In contrast, women’s usage decisions were more strongly affected by their perceptions of ease of use and subjective norm. However, the influence of subjective norm diminished with increasing experience.

Taylor and Todd (1995a) tested an augmented version of TAM that included social influences and behavioral control to examine whether there were any differences in the determinants of system usage between experienced and inexperienced user groups. Overall, the results of the study suggested that the augmented TAM can be used to predict and explain usage for both experienced and inexperienced users. However, the authors also identified some significant differences in the relative effect of the determinants of usage depending on experience. Karahanna, Straub, and Chervany (1999) empirically examined differences across pre-adopter and post-adopter beliefs and attitudes and their influence on usage behaviors to investigate if the factors affecting system usage change over time. The study findings indicated that there were differences in the determinants of subjective norm, attitude, and behavioral intention between pre-adopters (potential adopters) and post-adopters (users). Subjective norm was the most important determinant of behavioral intention to pre-adopters whereas post-adopters’ behavioral intention is mostly determined by attitude.
Motivated by the need to account for the social influence that is omitted in TAM, researchers have often incorporated the social influence construct into TAM. Davis et al. (1989) suggested that the role of social influences in applications of TAM be further examined to better understand user acceptance. Lucas and Spitler (1999) found that social norms are more important in user acceptance of an information system than user perceptions. Taylor and Todd (1995a) also found that subjective norm has a direct effect on behavioral intention. Malhotra and Galletta (1999) extended TAM by incorporating Kelman’s processes of social influence to examine how social influences affect individuals’ attitudes. Analyses of the data obtained from the field study suggested that social influence was an important factor affecting user acceptance and usage behavior. Among the processes of social influence, internalization of the induced behavior was found to have a stronger effect on attitudes toward system use. Venkatesh and Davis (2000) examined the impact of three interrelated social forces (subjective norm, voluntariness, and image) on the user’s adoption or rejection of an information system. They found that subjective norm had a significant direct effect on usage intention over and above PU and PEOU when system use was perceived to be mandatory, but not when system use was perceived to be voluntary.

**Extending TAM in the Context of the Internet**

With the phenomenal growth of the Internet, user acceptance of various Internet technologies has been widely studied. Researchers extended TAM in the WWW context to examine Web user behavior (Agarwal & Karahanna, 2000; Gefen & Straub, 2000; Lederer, Maupin, Sena, & Zhuang, 2000; Moon & Kim, 2001). Lederer et al. (2000) tested TAM for work-related tasks with WWW and identified antecedents to PU and PEOU. The results provided support for TAM, confirming that use of a Web site depends on the usefulness and ease of use of the site. The factors with highest predictive power for PU and PEOU were ease of understanding and information quality respectively.

In the WWW context, one of the factors that has been often studied in TAM related work is the effect of the intrinsic and extrinsic motivation factors on user acceptance. *Extrinsic motivation* refers to “the performance of an activity to help achieve valued
outcomes that are distinct from the activity itself, such as improving job performance” (Deci, 1975, as cited in Moon & Kim, 2001, p.218), and Intrinsic motivation refers to “the performance of an activity for no apparent reason other than the process of performing it” (Deci, 1975, as cited in Moon & Kim, 2001, p.218). Intrinsic motivation factors include constructs such as perceived enjoyment or perceived fun. Recognizing that most of the work on TAM has been conducted from an extrinsic motivation perspective, Moon and Kim (2001) added perceived playfulness to TAM as an intrinsic motivation factor. The study findings showed that although all three user beliefs (ease of use, usefulness, and playfulness) had a significant effect on the use of WWW, perceived playfulness had a more significant effect than usefulness, implying that intrinsic motivational factors have stronger effects on system usage than extrinsic motivational factors in the WWW context. Teo, Lim, and Lai (1999) examined the impact of intrinsic (perceived enjoyment) and extrinsic (perceived usefulness) factors on the use of the Internet. Contrary to Moon and Kim’s findings, the test of their proposed research model indicated that perceived usefulness had a much stronger effect on Internet usage than perceived enjoyment, suggesting that extrinsic motivation has a stronger influence than intrinsic motivation. These conflicting results might have resulted from different characteristics of the user groups. A contingency underlying the mixed findings can be identified by further investigating possible moderating effects. Agarwal and Karahanna (2000) incorporated a conceptual construct labeled cognitive absorption, an intrinsic motivation related construct, into TAM in the WWW context. Defined as a “state of deep involvement with software” (p.665), cognitive absorption was theorized to have the five dimensions: temporal dissociation, focused immersion, heightened enjoyment, control, and curiosity. They proposed a theoretical model, wherein cognitive absorption was postulated to be an antecedent of user beliefs, and the individual traits such as playfulness and personal innovativeness were proposed as determinants of cognitive absorption. The results showed a direct effect of cognitive absorption on user beliefs and behavioral intention to use, implying that intrinsic motivation factors are important predictors of the intention to use the WWW.

TAM has also been extended to the context of e-commerce (Gefen, Karahanna, & Straub, 2003; Gefen & Straub, 2000; Lee, Park, & Ahn, 2001). Lee et al. (2001) proposed
the e-Commerce Adoption Model (e-CAM) to explain the factors affecting a consumer’s online purchasing behavior based on TAM and the theories of perceived risk. The model included perceived risk with products/services (PRP), and perceived risk in the context of online transaction (PRT) as contextual constructs that influence the consumer’s adoption of e-commerce in addition to the core perception variables in TAM (PU and PEOU). The results indicated that PU, PRT, and PRP had significant direct effects on e-commerce adoption, and PEOU had only indirect effect through PU. Gefen et al. (2003) examined factors influencing consumer decisions to return to an e-vendor by integrating TAM constructs and trust in the e-vendor. They believed that trust is an important issue in e-commerce. Analyses of data from experienced repeat online shoppers showed that both trust and TAM belief constructs (PU and PEOU) had influences on the consumers’ intentions to transact with the e-vendor from whom they purchased. Among the four trust-building antecedents proposed in the study, institution-based structural assurances and situational normality were found to have strong effects on trust. Gefen and Straub (2000) examined the effects of PEOU on user acceptance in the context of e-commerce, recognizing that TAM related studies have yielded mixed results concerning the effects of PEOU on system use. They postulated that PEOU directly influenced user acceptance when the nature of the task is intrinsic. The results showed that PEOU influenced usage when the task was purchasing (extrinsic), but PEOU did not affect usage when the task was inquiring about products (intrinsic), suggesting that PEOU exerts varying effects, depending on whether the type of use is intrinsic or extrinsic.

Studies that extended TAM to various Internet technologies have been conducted. Wöber and Gretzel (2000) used TAM to identify key factors influencing tourism managers’ adoption of an Internet-based marketing decision support systems (MDSS). MDSS allows employees in tourism organizations to retrieve marketing research data for their various business information needs. Wöber and Gretzel proposed a research model that was adopted from Hendrickson and Collins’s (1996) modified TAM and further incorporated experience, task, and attitude constructs. Analyses of the data showed that the total effect of PEOU was greater than that of PU on usage, implying that user friendliness and usability of the system seemed to be highly regarded among tourism managers. The complexity and timeliness of tasks were also found to have a strong
influence on PU. Dasgupta, Granger, and McGarry (2002) extended TAM to an e-collaboration technology. User acceptance of a courseware management tool was examined and system usage was compared to student performance in the course. The study findings provided general support for TAM. Lu, Yu, Liu, and Yao (2003) proposed a revised TAM that depicted the factors affecting user acceptance of Wireless Internet via Mobile Devices (WIMD). The proposed model included external factors such as individual differences, facilitating conditions, social influences to provide more complete understanding of WIMD acceptance, calling for empirical studies to test the proposed relationships.

Collectively, empirical studies utilizing TAM suggest that the measurement scales for TAM show relatively high reliability and validity and that TAM has adequate explanatory power in explaining user acceptance of information systems in various contexts.

**Use of Web-based Subscription Databases**

The prevalence of electronic resources has changed the various aspects of distributing and searching for information. With these changes, research on end users’ usage patterns has become essential to evaluate and improve user services.

Studies provide empirical evidence of the proliferation of Web-based subscription databases. In a study that conducted a direct observation of library home pages and the parent institutions’ home pages, 76.2% of the surveyed institutions provided links to commercial online databases, and 90.1% of the institutions offering home pages provided access to commercial online databases (Bao, 2000). The results also showed that 57.8% provided off-campus access to some of the databases. The method of the provision of remote access included setting-up a proxy server, providing instructions on how to configure the browser on the user’s computer, or providing instructions on how to receive database identifications and passwords.
The empirical literature has discussed the features of Web-based databases. Xie and Cool (2000), in a study to explore the nature of searcher preferences for Web versus non-Web interfaces to online databases, found that some functions of Web interfaces were preferred to non-Web interfaces, but at the same time, not all of them were preferred. Regarding database selection, there was no obvious difference in user perceptions between Web-based and Window-based online systems. Web-based interfaces were rated higher in user access, search strategy formulation, help mechanisms, and display. Brown (2003) compared the features of four versions of the ERIC database and discussed the relative strengths and weaknesses to find the most cost-effective ways of providing the database to users.

Several studies have identified factors that affect the use of databases. Tenopir (1999a) conducted a survey targeted to academic librarians, asking them to speculate as to what influences their library users when choosing an online database to search. The respondents rated content factors such as usefulness and quality of content as the most important. Convenience factors such as availability of remote login and the number of workstations in the library were also rated as having a great influence. As to where the users get referrals to select appropriate databases, the survey results indicated that peer (friends) recommendations were considered to be the most important. Another factor influencing database selection was ease of use including intuitive commands, Windows or Web versions, a simple interface, natural-language searching, easy printing, and ease of navigation (Tenopir, 1999a). The availability of full text was also rated as an important factor, especially for undergraduates. Another survey targeting public librarians reported that useful content, easy-to-use interface, and full-text were essential factors (Tenopir, 1999b). Tenopir (1996b) speculated that recommendations, instruction classes, and placement on a database menu all would influence how much a database was used. Townley and Murray (1999) identified factors influencing the use of electronic information based on Meyer’s (1993) user-based model for selection of electronic information. Analyses of data suggested that usage rates were positively related to length of use, availability of library instruction, and limited access to alternative resources. Technology conveying electronic resources was preferred in the order of: locally mounted, Internet-based, and CD-ROM. The authors speculated that locally mounted
databases were preferred because of their common interfaces, links to holdings, and other technological features that enhance access. In this study, full-text availability was not found to have a statistically significant relationship with database use, leading the authors to speculate that full-text access would become a significant factor as existing technical limitations improve.

There has been empirical support to ease of use as a deciding factor, especially when a database is available through more than one vendor (Marble, 1990). Marshall (1987) identified three groups of the difficulties experienced by database users in conducting searches: intellectual, technical, and system. The intellectual difficulties, which the users felt were the most difficult, included searching for information on complex topics and broadening or narrowing a search. The technical difficulties included keyboarding, using hardware and software, and remembering how to do a search. The system difficulties were related to database selection and learning systems commands and procedures. Terrant, Garson, Cohen, and Meyers (1982) reported that inexperienced users tend to find searching with natural language terms is easier than using controlled descriptors.

Increased accessibility may also facilitate database use. People are likely to use easily accessible information even though it is not the most appropriate information. Studies note the positive relationship between easier access and use (Bishop, 1998; Kresge, 2000). Budd and Connaway (1997), in their research on the habits or attitudes of university faculty towards the use of networked information, found that accessibility is a critical factor in use of networked information by faculty. Abels, Liebscher, and Denman (1996), in a study exploring the factors influencing adoption and use of electronic networks and services, found that physical access was the most significant determinant of adoption of network use.

The analysis and interpretation of usage statistics of Web-based subscription databases has emerged as an important task among librarians. Database usage statistics are essential in demonstrating the cost-effectiveness of databases and making the decisions on database subscriptions. Reliable and accurate statistics of database usage are critical in that they can be used to justify library expenditures and help librarians make decisions for future subscriptions. Recent studies discuss the need for standardized usage statistics of commercial databases (Shim & McClure, 2002). According to Dunlap and
Stierman (2001), the variations in the methods of measuring and reporting usage depending on vendors inhibit direct comparisons among the data from different vendors, and a variety of consortial arrangements and different aggregators further make collecting comprehensive usage data even more difficult. As inconsistencies in database usage statistics provided by vendors make the comparison of the usage data difficult, the need for standards for how database usage statistics should be collected has emerged. The International Coalition of Library Consortia (ICOLC) initiated “Guidelines for Statistical Measures of Usage of Web-based Indexed, Abstracted, and Full Text Resources.”

Studies examining local usage patterns of databases have also been conducted. To obtain a better understanding of information seeking patterns with end-user Internet-based information services, Wolfram and Xie (2000) analyzed database usage statistics of statewide free online access to selected online databases available through the Internet. Usage data showed that a variety of databases and titles were being accessed, with academic or current information sources being most popular. The primary users of the statewide Internet-based databases were found to be affiliated with educational institutions. Hsieh-Yee (1996) examined the information resources utilized by juniors at two universities. Whereas 44% of the students were aware of online databases and over half of them knew about CD-ROM databases, 19% and 28% of the students reported that they used online Internet databases and CD-ROM databases respectively. No statistically significant difference was found between the number of students who reported they had received instruction on electronic resources and the number of electronic resources actually used, implying no relationship between receiving user instruction and actual usage. The reasons for non-use of electronic resources were divided into two general categories: access problems and relevancy of material. On the other hand, ease of use, currency and relevancy of material were mentioned the most frequently as the reasons for using electronic resources.

Meanwhile, significant increases in usage of electronic resources have been reported in many studies (Bauer, 2001; Dunlap & Stierman, 2001). Bauer (2001), based on the local usage statistics, reported a dramatic increase in the use of electronic resources and decline of print resources. Tenopir (2001b) reported that full-text databases were found to be the most popular among the databases offered. Dunlap and Stierman (2001), based on
usage data at their libraries, reported a rapid increase in full-text database retrieval each year since the databases had become available. However, after several years of rapid growth, the data indicated that the usage had begun to level off or slightly decline in certain “established” databases in the collection. They found that usage increased in some databases and it leveled off or declined in others despite the fact that the overall number of databases increased.

Studies have also been conducted to assess levels of awareness and use of electronic journals (Rogers, 2001; Stewart, 1996; Woodward, Rowland, & McKnight, 1997). Stewart (1996) reported that improvements in accessibility, comfort of use, browsing ability, portability, and availability of backfiles were reported to be important in user acceptance of electronic journals. However, empirical results from studies on the use of electronic journals are not uniformly decisive. Rusch-Feja and Siebeky (1999), based on vendor usage statistics, reported significantly high acceptance of electronic journals among researchers and an unwillingness to return to print versions only. In contrast, in a survey on the awareness of electronic journals targeted to users in ARL institutions, over 40% reported that they rarely used electronic journals and another third of them reported they never used them (Speier et al., 1999). In Crowley’s (2000) study targeting users of an academic library, 72% of the participants had no experience with full-text journal projects and commercial packages. Lenares (1999), in a survey on faculty use of electronic journals, found that over half of the faculty was not aware of respected electronic journals in their field. In relation to patterns in growth and decline of electronic journal usage, Bishop (1998) found that the use of electronic journals was very low in their first year of implementation, and argued that use patterns take a long time to become established.

Database training and user assistance have been emphasized by many researchers and practitioners. Marshall and Allan (1990) pointed out that the poor search outcomes that resulted from lack of training were a major factor contributing to the low use of online systems. Adams and Bonk (1995) found that lack of information on the databases was the biggest obstacle to faculty use of electronic information technology, calling for the continuous provision of information on specific databases and a variety of training options. Townley and Murray (1999) found that database use was higher at institutions.
that provided user instruction. Some emphasized the increased need of user instruction as the types of electronic information increase. Recognizing that users are not fully utilizing all available search options and are unaware of controlled vocabulary terms, Mercado (1999) asserts that users need help with database selection, search strategies, selecting appropriate terminology, and evaluation of search results, in addition to computer skills. In a study to compare the search results of the ERIC database on CD-ROM performed by end-users and skilled librarian searchers, Lancaster, Elzy, and Zeter (1994) found that end users achieved the worst recall but the best precision, obtaining only about a third of the important items. DeMinco (2002) investigated students’ perceived needs for assistance in affective, cognitive, and sensorimotor domains when they use ERIC-on-CDROM. The results indicated that most (94%) students reported they needed human assistance when they used the database even though many of them (66%) were not first-time users, emphasizing the importance of both informal one-on-one instruction and formal classes. The study also indicated that short-term use of a database did not enable the students to have the skills or confidence to search similar databases. However, there are also research findings that report users with formal training experience more difficulties than is commonly realized (DiMartino & Zoé, 1996). Marshall (1989), in a study of the impact of training on end users, found there was no correlation between user training and user search performance.

**Summary of Chapter**

This chapter described the theory of reasoned action, the technology acceptance model, and Kelman’s social influence processes. TAM-related empirical studies were reviewed, including replication studies, studies that examined the effects of user beliefs and social influences on user acceptance, and studies that extended TAM in the context of the Internet. The literature related to use of Web-based subscription databases were also reviewed.
CHAPTER 3

RESEARCH PROPOSITION

The proposed research model, illustrated in Figure 3.1, extends TAM in the context of Web-based subscription databases based on prior research on user acceptance. The model posits that intended use of Web-based subscription databases is jointly determined by perceived ease of use, perceived usefulness, and subjective norm. Subjective norm is proposed to have a direct effect on intended use and perceived usefulness. The model also posits that the two belief variables, perceived ease of use and perceived usefulness, mediate the effects of the antecedents of beliefs on intended use of Web-based subscription databases. Drawing upon Davis et al.’s (1989) suggestion to include external variables in the model to examine the effects of various individual differences, situational constraints, and managerially controllable interventions on use, the model incorporates the antecedents of user beliefs based on previous studies that have extended TAM.

Attitude, which is included in the original TAM as a mediating construct between beliefs and intentions, was later excluded based on Davis et al.’s (1989) observation that attitude does not generally intervene between beliefs and intentions. Several recent studies utilizing TAM also excluded attitude from the model based on the empirical evidence that it did not fully mediate the effects of beliefs on behavioral intention (Agarwal & Karahanna, 2000; Igbaria et al., 1997; Igbaria, Guimaraes, & Davis, 1995; Gefen et al., 2003; Hong et al., 2002; Szajna, 1996; Venkatesh & Davis, 1996; Venkatesh & Morris, 2000). Consistent with the prior research, attitude is excluded from the proposed research model.

In the proposed research model, intended use is applied as an indicator of user acceptance. Examining behavioral intention as an indicator of user acceptance is consistent with previous studies using TAM (Agarwal & Karahanna, 2000; Agarwal &
Prasad, 1999; Chau, 1996; Gefen et al., 2003; Gefen & Straub, 2000; Hong et al., 2002; Hu et al., 1999; Jackson et al., 1997; Melone, 1990). In accordance with these studies, the effects of user beliefs on behavioral intention are examined in the present study.

Figure 3.1 Proposed Research Model
Beliefs Concerning Usefulness and Ease of Use toward Web-based Subscription Databases

System usage is one of the critical dependent variables in IS research. Individuals’ beliefs about or perceptions of information systems have a significant influence on usage behavior (Agarwal & Karahanna, 2000). Beliefs are also important in that they are amenable to managerial manipulation through interventions such as system design and training (Agarwal & Karahanna, 2000; Davis, 1993; Venkatesh, 1999). According to TAM, user acceptance of a system is influenced by user beliefs about the usefulness and ease of use of the system. Davis (1986) suggested that intentions to use a system are predicted by user beliefs identified in TAM, perceived usefulness and ease of use. The influence of user beliefs on behavioral intention to use the system has been empirically supported in many studies (Agarwal & Karahanna, 2000; Gefen et al., 2003; Hong et al., 2002; Jackson et al., 1997;).

Prior research has shown that perceived usefulness (PU) is a major determinant of user acceptance or it has a positive effect on system use (Adams et al., 1992; Agarwal & Karahanna, 2000; Davis et al., 1989; Gefen et al., 2003; Straub, Limayem, & Karahanna-Evaristo, 1995). PU is a “measure of the individual’s subjective assessment of the utility offered by the new IT in a specific task-related context” (Gefen et al., 2003). According to the motivation theory, the influence of PU on system use can be explained in that an individual is inclined to accept a new information system when he perceives it to be instrumental for achieving valued outcomes (Igbaria & Iivari, 1995). PU is often found to have a stronger relationship with system use compared to ease of use. This prominence of PU suggests that users tend to accept a system primarily because of the functions it performs, implying that ease of use cannot compensate for a system that does not provide needed functionality (Davis, 1986). In accordance with TAM, it is hypothesized that perceived usefulness will have a positive direct effect on intended use of Web-based subscription databases.
Hypothesis 1: Perceived usefulness will have a positive direct effect on intended use of Web-based subscription databases.

User beliefs about ease of use are another important determinant of user acceptance. Perceived ease of use (PEOU) is an “indicator of the cognitive effort needed to learn and to utilize the new IT” (Gefen et al., 2003). According to self-efficacy theory, “the easier a system is to interact with, the greater should be the user’s sense of efficacy” (Davis et al., 1989, p.987). Prior research that examined the effect of PEOU on user acceptance has yielded mixed results. Some studies reported a significant effect of PEOU on system use (Chau, 1996b; Hendrickson & Collins, 1996; Igbaria et al., 1997; Wöber & Gretzel, 2000). Yet, some studies found that PEOU has only an indirect effect on system usage through PU (Davis, 1989; Karahanna & Straub, 1999; Mathieson, 1991).

Davis et al. (1989) also suggest the role of PEOU as a causal antecedent to PU. This association implies that system usability affects the functionality of a system (Goodwin, 1987). Previous studies found that PEOU has a significant effect on PU (Adams et al., 1992; Davis et al., 1989; Gefen & Straub, 2000; Igbaria et al., 1997; Karahanna & Straub, 1999; Lee et al., 2001). According to TAM, the direct effect of PEOU on PU is explained in that increased PEOU can contribute to improved performance by saving effort needed to do the same work. Consistent with TAM, it is hypothesized that PEOU has an influence on intended use of Web-based subscription databases both directly and indirectly through its effect on PU.

Hypothesis 2: Perceived ease of use will have a positive direct effect on intended use of Web-based subscription databases.

Hypothesis 3: Perceived ease of use will have a positive direct effect on perceived usefulness of Web-based subscription databases.
Antecedents of User Beliefs about Usefulness and Ease of Use

TAM suggests that user beliefs mediate the effects of external variables on user acceptance of a system. That is, the external variables are expected to influence intended use indirectly through PU and PEOU. Researchers have recognized the need to incorporate external variables to TAM for improvement of its specificity and explanatory utility (Agarwal & Prasad, 1998; Mathieson, 1991). Davis (1989) also asserted that future research is needed to examine how external variables affect usefulness, ease of use, and user acceptance. The proposed research model incorporates the antecedents of PU and PEOU identified from prior TAM related empirical research.

Job Relevance

The present study identifies the antecedents of PU based on cognitive instrumental determinants discussed in the extended technology acceptance model (TAM2) and empirical evidence from previous research. Venkatesh and Davis (2000) proposed TAM2 that explains usefulness perceptions and usage intentions in terms of social influences and cognitive instrumental processes. Drawing upon work motivation theory (Vroom, 1964), activation theory (Fishbein & Ajzen, 1975), and behavioral decision theory (Beach & Mitchell, 1978), TAM2 theorizes that cognitive instrumental processes affect usefulness perceptions and usage intentions. The underlying view of the theoretical reasoning is that the impetus for engaging in specific behaviors is affected by a mental representation that links higher-level goals to specific behaviors that are instrumental for achieving the goals (Venkatesh & Davis, 2000). In this context, TAM2 suggests that usefulness perceptions are formed based on cognitive comparisons of one’s work goals and the consequences of using a system.

According to TAM2, job relevance is a cognitive instrumental determinant of PU. Job relevance is defined as “an individual’s perception regarding the degree to which the target system is applicable to his or her job” (Venkatesh & Davis, 2000, p.191). It is similar to the task-technology fit construct, which refers to the match between the capabilities of technology and task requirements (Goodhue & Thompson, 1995). The
task-technology fit model suggests that an information system will be used if the available functionality of the system supports the tasks of the user (Goodhue, 1995). Venkatesh and Davis (2000) found that job relevance as a cognitive judgment had a direct effect on usefulness perceptions. Based on TAM2, it is hypothesized that job relevance will have a positive direct effect on perceived usefulness of Web-based subscription databases.

Hypothesis 4: Job relevance will have a positive direct effect on perceived usefulness of Web-based subscription databases.

Output Quality

According to TAM 2, perceptions of output quality, which refers to an individual’s belief regarding how well the system performs the tasks, are theorized as a cognitive instrumental determinant of PU (Venkatesh & Davis, 2000). Output quality can be judged by evaluating the intermediate or end products of using a system (Davis et al., 1992). Prior research has shown that the output quality has a significant effect on perceived usefulness (Davis et al., 1992). Several studies also examined perceptions of output quality as a potential determinant of information use. (O’Reilly, 1982; Zmud, 1978). Venkatesh and Davis (2000) suggest that when a set of multiple relevant systems is available, one is likely to choose a system that delivers the highest output quality. All else being equal, increased output quality is likely to improve an individual’s job performance, thus influencing his perception of usefulness. Although TAM2 does not imply a direct effect of output quality on PU, the relationship between output quality and PU are examined in the present study, considering possible influence of the quality of output produced by the databases. In the present study, it is hypothesized that output quality will have a positive direct effect on perceived usefulness.

Hypothesis 5: Output quality will have a positive direct effect on perceived usefulness of Web-based subscription databases.
Result Demonstrability

TAM2 posits that result demonstrability is a cognitive instrumental determinant of usefulness perceptions. Result Demonstrability is defined as the “tangibility of the results of using the innovation” (Moore & Benbasat, 1991, p.203). People are likely to form favorable perceptions of the usefulness of a system if subsequent results of using the system are readily discerned to be positive. In contrast, if a system’s result demonstrability is obscure, users are less likely to understand how useful the system is (Venkatesh & Davis, 2000). Previous research has shown that result demonstrability has a significant effect on user acceptance, and it is also instrumental in promoting sustained usage (Agarwal & Prasad, 1997; Venkatesh & Davis, 2000). Based on TAM2, it is hypothesized that result demonstrability will have a positive direct effect on perceived usefulness of Web-based subscription databases.

Hypothesis 6: Result demonstrability will have a positive direct effect on perceived usefulness of Web-based subscription databases.

User Training

User training has been found to play a crucial role in forming user beliefs about an information system. Previous studies have shown that user training influences users’ perceptions toward a system and subsequently their use of the system (Igbaria, 1990; Igbaria, Guimaraes, & Davis, 1995; Nelson & Cheney, 1987; Gist, 1987).

Davis et al. (1989) suggest that training may influence ease of use as an external factor in TAM. Empirical support for the relationship between user training and ease of use perceptions can be found in many studies (Thompson et al., 1991; Igbaria et al., 1997; Igbaria, Guimaraes, & Davis, 1995). According to Compeau and Higgins (1991), user training can influence one’s computer self-efficacy, and subsequently affect system use. Agarwal and Prasad (1999) suggest that user training helps to reduce uncertainty by providing information about the features of the system.
Similarly, studies found that training has a positive impact on usefulness perceptions and user acceptance (Agarwal & Prasad, 1999; Igbaria et al., 1997; Igbaria, Guimaraes, & Davis, 1995; Raymond, 1988). User training may facilitate an individual’s awareness of a system’s functions and contents, and thereby affect the individual’s perceptions of usefulness of the system. Agarwal and Prasad (1999) reported that participation in training had a direct effect on usefulness perceptions, suggesting that training might be instrumental in facilitating individuals’ recognition of system capabilities. In contrast, Karahanna and Straub (1999) found that the availability of training and support had no significant effect on either perceived ease of use or perceived usefulness. They explained that this nonsignificant result might be attributed to the operational definition of the construct in that the items measuring the construct were phrased with respect to information technology in general and did not refer to the system under investigation specifically.

Collectively, it is expected that training affects user acceptance of Web-based subscription databases indirectly through its influence on perceptions of ease of use and usefulness. Consistent with the previous studies supporting these relationships, it is hypothesized that user training will have a positive direct effect on both perceived ease of use and perceived usefulness of Web-based subscription databases.

Hypothesis 7: User training will have a positive direct effect on perceived usefulness of Web-based subscription databases.

Hypothesis 8: User training will have a positive direct effect on perceived ease of use of Web-based subscription databases.

Accessibility

User perceptions of information system accessibility have been found to be associated with information use (Culnan, 1984). According to Culnan (1985), accessibility is a multidimensional concept encompassing physical access to the source, the interface to the source, and the ability to physically retrieve potentially relevant
information. In a study to investigate the dimensionality of accessibility, Culnan (1984) found that physical access to the information is independent of the perceived accessibility of an information system, and system use appears to be more related to user perceptions of accessibility. Provision of physical access is essential to facilitate acceptance and use of information systems. However, this provision is not sufficient to guarantee use of the system. In a study to examine the effects of source accessibility on information gathering behavior, Culnan (1983) found that online database systems were recognized as being less accessible than other sources utilized to obtain the same external information.

Prior research has shown the influence of perceived accessibility on the selection of an information source (Gerstberger & Allen, 1968; O’Reilly, 1982; Culnan, 1983; Rosenberg, 1967) and the effect of perceived inaccessibility on user rejection of an information system (Kerr & Hiltz, 1982). When multiple sources are available, the expected level of effort required to use a specific source will have an influence on a user’s choice of information source (Culnan, 1985). Some studies reported that for potential adopters of information, perceived accessibility to information has a stronger effect on information use than the perceived quality of the information (Gerstberger & Allen, 1968; Hardy, 1982; O’Reilly, 1982). This stronger effect may be attributed to the uncertainty of the value of retrieved information both before and after retrieval (Rice & Shook, 1988). On the contrary, Davis et al. (1989) found no significant effect of perceived accessibility on behavioral intentions or behavior. They speculated that the results might be caused by psychometric weaknesses of their measure of accessibility or the fact that the system under investigation was uniformly accessible to the respondents. They further argued that accessibility might have a significant influence when system accessibility is variant to all users.

Previous research has also reported a significant positive effect of perceived accessibility on ease of use (Karahanna & Straub, 1999). Based on the earlier studies, it is hypothesized that perceived accessibility will have a positive direct effect on ease of use perceptions of Web-based subscription databases.

Hypothesis 9: Perceived accessibility will have a positive direct effect on ease of use perceptions of Web-based subscription databases.
Terminology Clarity

Successful navigation of an information system and accurate searching of the resources depend on the clarity of terminology used in the system. In remote access to Web-based subscription databases, the absence of immediate assistance from public service staff may aggravate difficulties that the users experience with ambiguous terminology. Spivey (2000) identifies several categories of unclear vocabulary used in the library interfaces: (1) short descriptions and nouns for resources and services; (2) acronyms; (3) vendor’s labels and marketing descriptions; and (4) embedded explanations. It is recognized that vocabularies in a library interface consisting of professional, technical, and official terminology often differ from users’ vocabularies which express their information needs (Talja et al., 1998). Some researchers contend that jargon such as personal author, corporate name, added author, and conference name should be eliminated on a search form (Ortiz-Repiso & Moscoso, 1999).

Studies have reported a significant relationship between terminology clarity in an information system and user acceptance (Hill et al., 1997; Spivey, 2000). In a study of users of the Alexandria Digital Library, clarity of terminology used in the interface was found to have a statistically significant influence on users’ approval of the system (Hill et al., 1997). Hong et al. (2002) also found that terminology clarity had a significant effect on user perceptions of ease of use of the digital library. Consistent with the findings obtained from Hong et al.’s study, it is hypothesized that clarity of terminology used in Web-based subscription databases will have a positive direct effect on perceived ease of use of the systems.

Hypothesis 10: Terminology clarity will have a positive direct effect on perceived ease of use of Web-based subscription databases.
Social Influences

Prior research has shown that social norm has an influence on one’s behavior (Pavri, 1988; Thompson et al., 1991; Triandis, 1971). Although TAM does not account for social influences, Davis et al. (1989) acknowledged the need to further investigate the conditions and mechanisms that govern the impact of social influences on system use. In the literature related to TAM, social influences have been accounted for via subjective norm. Subjective norm is defined as a “person’s perception that most people who are important to him think he should or should not perform the behavior in question” (Fishbein & Ajzen, 1975, p.302). In TRA, subjective norm is a key determinant of behavioral intention. A direct effect of subjective norm on intention is based on the rationale that people may choose to perform a behavior that important referents think they should even if they are not themselves favorable toward the behavior (Fishbein & Ajzen, 1975). However, subjective norm was not included in the original TAM based on the research findings by Davis et al. that failed to demonstrate a significant effect of subjective norm on system use. They attributed this nonsignificant effect to the weak psychometric properties of the measurement scale or the characteristics of the system investigated in the study.

Several studies incorporated social influences to TAM (Lucas & Spitler, 1999; Malhotra & Galletta, 1999; Mathieson, 1991; Taylor & Todd, 1995; Venkatesh & Morris, 2000). Expecting that social norms are more likely to influence users in a field rather than a laboratory, Thompson et al. (1991) conducted a field study targeting knowledge workers and found a significant effect of social norms on PC use. Lucas and Spitler (1999) found that social norm is a more important factor in predicting system use than one’s perceptions of ease of use and usefulness. In a study that compares the effect of social influence on behavioral intention in experienced and inexperienced user groups, Taylor and Todd (1995b) found that the relative influence of subjective norm on behavioral intention was not significantly different between the two groups. Venkatesh and Davis (2000) argue that subjective norm taking place through the process of compliance has a direct effect on usage behavior. The effect operates when an individual perceives that an important referent thinks he should perform a specific behavior, and the
referent has the power to reward or punish (French & Raven, 1959; Kelman, 1958). Building on the earlier studies, it is hypothesized that subjective norm will have a positive direct effect on intended use of Web-based subscription databases.

Hypothesis 11: Subjective norm will have a positive direct effect on intended use of Web-based subscription databases.

The effect of social influence on user perceptions of usefulness has also been examined in several studies (Karahanna & Straub, 1999; Lu et al., 2003; Venkatesh & Davis, 2000). Karahanna and Straub (1999) found the strong relationship between social influence and usefulness perceptions, and at the same time, the lack of direct relationship between social influence and system use. They suggest that social influence affects usage indirectly via the process of internalization by reinforcing one’s belief in the usefulness of the system. They further speculated that at the initial stage, the influences of both compliance and internalization might occur, but the influence of compliance becomes nonsignificant as it becomes integrated into one’s own cognitive belief system. Lu et al. (2003) also suggest that social influence has an effect on both perceived near-term and long-term usefulness.

Venkatesh and Davis (2000) argue that when conformity takes a form of internalization, subjective norm can influence usage behavior indirectly through perceived usefulness as opposed to a direct compliance effect on usage behavior. Internalization occurs when the induced behavior is in accord with one’s value system. In the information systems context, through the internalization process, an individual may incorporate the referent’s belief that a particular system might be useful into his own belief structure by believing it is useful and subsequently shape an intention to use the system. Building on the prior research, it is hypothesized that subjective norm will have a positive direct effect on perceived usefulness of Web-based subscription databases.

Hypothesis 12: Subjective norm will have a positive direct effect on perceived usefulness of Web-based subscription databases.
Based on the above discussions, the research model proposes a framework for understanding factors that affect user acceptance of Web-based subscription databases.
CHAPTER 4

METHODOLOGY

This chapter describes the research design and the method used to empirically test the relationships implied by the research model and the research hypotheses. The first section includes a description of the empirical design. It also describes the research method used for the study. In the second section, the explanations of the data collection procedure are provided. The third section provides the descriptions of measures for the constructs, which detail the measurement items and scales. In the fourth section, the results of pilot test are reported.

Design of the Study

This study focuses on testing an integrated model that identifies factors affecting user acceptance of Web-based subscription databases. A cross-sectional field study using a Web survey method is conducted to collect the data. The Web survey method is used because the Internet is the most suitable medium when the target subjects of the study are Internet users (Tan & Teo, 2000). Since this study is targeted to users of Web-based subscription databases, the Web survey method is considered appropriate.

To ensure convergent and discriminant validity of the scales, most of the research constructs were measured using existing validated scales. New scales were developed drawing upon prior work where necessary.
Data Collection

The Study Context and Subjects

This study was conducted at Florida State University in Summer 2004. As a comprehensive, graduate-research university with a liberal arts base, the university offers undergraduate, graduate, advanced graduate and professional programs of study. The enrollment for the Fall 2004 totaled 38,886 students. Of this total, 30,015 (77.2 percent) were undergraduate students, 7,456 (19.2 percent) were graduate students, and 1,415 (3.6 percent) were unclassified students (Florida State University, 2004). In the present study, the potential effect of organizational-level variance due to institutional constraints and infrastructure disparity on user acceptance was controlled by collecting the data from individuals in a single institution (Brown, 1981).

The subjects for the present study were undergraduate students who have experience using Web-based subscription databases. Since this study targeted undergraduate students who have used Web-based subscription databases, only the responses from those who have experience with the databases were analyzed. The respondents consisted of 121 undergraduate students registered in courses in education, psychology, and information studies. The choice of the students registered in classes in the three areas was based on the likelihood of their involvement with Web-based subscription databases. The unit of analysis in the study is the individual user.

The Web-based subscription databases provided by the University Libraries are available at a number of locations on campus, where the Internet is accessible. Access to some of the databases from off-campus requires a Proxy setup. Online database workshops are offered to all members of the university by the Libraries. The workshops incorporate strategies for using the databases and searching skills. Specifically, they cover essentials about selection of best databases/terminology, use of Boolean/proximity/truncation operators, and effects of “keyword” vs. “subject” searching, etc (Florida State University Libraries, 2003).
In the present study, user acceptance of the following three databases was examined as subject-specific databases. The Education Resources Information Center (ERIC) is a Web-based bibliographic and full-text database of education-related resources, sponsored by the U. S. Department of Education (Education Resources Information Center, 2004). The Libraries provide access to ERIC through FirstSearch and Cambridge Scientific Abstracts (CSA). Starting from 2004, the U. S. Department of Education version of the ERIC database, which is available to the public, is also offered via the Libraries website. PsycINFO is an abstract database of psychological literature (American Psychological Association, 2004). Although PsycINFO does not deliver full text, the University Libraries provide access to full text through SFX, which is a database management tool that provides links from bibliographic databases to full text when it’s available. The University Libraries provide access to PsycINFO through CSA. Library Literature & Information Science Full Text provides citations and full-text articles in the library and information science field. The Libraries provide access to the database through WilsonWeb.

Data Collection Procedure

The data for the present study were gathered using a Web survey. The purpose of the study and confidentiality of the data gathered were explained in the cover letter on the first screen. The participants were instructed that the study was conducted to explore their perceptions and use of Web-based subscription databases and the participation was voluntary. They were also alerted that they could withdraw from the study at any time and that they must be at least 18 years old to participate. The contact information of the Human Subjects Committee was given for inquiries regarding their rights as participants in the study. The respondents were provided the telephone number and e-mail address for contacting the researcher to make inquiries or to obtain the results of the study.

The Web survey consisted of two major parts. The first part included questions related to demographics of the respondents. In the second part, question items for the constructs in the research model were mixed together to minimize potential biases due to response consistency (Davis & Venkatesh, 1995). In the introduction of the
questionnaire, the respondents were asked if they had used any of the Web-based subscription databases provided by the University Libraries. To assist the respondents in understanding what the databases are, the link to the Web page that can lead users to the databases was provided. It allowed the respondents to visit the Web page that listed the databases provided via the University Libraries website. Those who had experience using the databases were asked if they had previously used a subject-specific database in their respective area: ERIC for the students registered in the education classes, PsycINFO for the students registered in the psychology classes, Library Literature & Information Science Full Text for the students registered in the information studies classes. Only those who reported that they had used the specified database were asked to answer the question items measuring the constructs in the research model.

The questionnaire was posted on a commercial web survey host site. The data collection period lasted about eight weeks. The researcher initially contacted the instructors who were teaching courses in education, psychology, and information studies during Summer 2004 and asked them to encourage the students’ participation. The respondents in some of the classes were rewarded extra credit for their participation in the present study. For the respondents who were not rewarded extra credit, a 100 dollar gift certificate to an electronic store was publicized as an incentive. The respondents were asked to submit their name and address at the end of the survey if they were willing to enter the random drawing for the gift certificate. 43 respondents entered the drawing. The winner of the gift certificate was announced and was rewarded the gift certificate.

Measures

The instrument included the items measuring demographic characteristics of respondents and the research constructs implied in the model. Demographic variables which were measured in the present study included gender, major, year, and full-time/part-time status. The items related to access to campus computing network and orientation to library services were also included to gather additional information on the respondents.
The measures for the constructs in the research model were mostly adapted from those validated in prior studies with minor wording changes made to incorporate the context of Web-based subscription databases. However, the psychometric properties of the measures were further evaluated in the targeted context using a pilot test. Necessary changes were made to the final instrument based on the results of the pilot test. Complying with Churchill’s (1979) recommendation, multiple measurement items were used for each construct.

The measures for PU and PEOU were adapted from those validated by Venkatesh and Davis (2000). The measures for both constructs consisted of four items, rated on seven-point Likert scales ranging from (1) strongly disagree to (7) strongly agree.

Validated items were adapted from Venkatesh and Davis (2000) to measure subjective norm in the final instrument. The two-item scale was used to measure the construct, rated on a seven-point Likert scale. The measure for subjective norm used in the pilot test was dropped due to its poor reliability and convergent validity shown in the pilot test. This will be discussed in more detail in the following section.

Three antecedents for usefulness perceptions implied in the research model, job relevance, output quality, and result demonstrability, were identified from TAM2 (Venkatesh & Davis, 2000). The measures for the constructs were also adapted from those validated in their study. Each of the constructs was measured using multiple measurement items, rated on seven-point Likert scales.

A new scale was developed to measure the user training construct. The respondents were asked whether they had received enough training on how to use databases and whether they had received the training they needed to be able to use databases effectively. An eight-point scale was used for the construct. The respondents who had attended the training were asked to rate how strongly they agree using the scale ranging from (1) strongly disagree to (7) strongly agree. The respondents who had not attended the training related to the databases were asked to indicate (0) never attended the training.

The measure for accessibility was adapted from Culnan (1984). Two items were adapted from Culnan’s eight-item scale measuring a physical dimension of accessibility. The measure was rated on a seven-point Likert scale ranging from (1) strongly disagree to (7) strongly agree. The measure for terminology clarity was initially adapted from a
previous study (Hong et al., 2002). However, the results of the pilot test indicated poor reliability of the measure. Based on the results obtained from the pilot test, one item was modified in the final instrument. The measure for the construct was rated on a seven-point Likert scale.

The measure for intended use was adapted from Agarwal and Karahanna (2000) and Chau and Hu (2001). A two-item scale was used to measure the construct. The respondents were asked whether they intend to continue using the database in the future and whether they intend to use the database as often as needed. The measure was rated on seven-point Likert scale.

Pilot Test

The instrument was pilot tested to evaluate the psychometric properties of the measures. Thirty-eight undergraduate students enrolled in classes in information studies participated in the pilot test. Among the respondents, 26 reported that they had experience with the database specified in the instrument. The responses from those who had no experience with the database were discarded.

In the pilot test, 27 percent of the respondents were male and 73 percent were female. The respondents were primarily juniors and seniors. Thirty-eight percent of the respondents were full-time students, and 62 percent were part-time students. About 85 percent of the respondents reported that they usually accessed the campus computing network from home, and additional 12 percent reported access from the computer labs. However, no respondents reported that they accessed the campus computing network from labs, offices, departments, or other. Forty-two percent reported that they had participated in an orientation to library services while 58 percent had not. Descriptive statistics of the respondents of the pilot test are presented in Table 4.1.

In the pilot test, the reliability of the measures was assessed using the Cronbach’s alpha test. Cronbach’s alpha coefficients greater than .70 are considered acceptable (Nunally, 1978). Most of the measures demonstrated adequate reliability with Cronbach’s alpha coefficients ranging from .75 to .97, except for the measures of the three constructs:
Table 4.1 Descriptive Statistics of Respondents of the Pilot Test

<table>
<thead>
<tr>
<th>Respondent Characteristics</th>
<th>Frequency</th>
<th>Percentage</th>
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n=26
Table 4.2 Reliability of the Measures in the Pilot test

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<td>Output Quality</td>
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<tr>
<td>Result Demonstrability</td>
<td>.65</td>
</tr>
<tr>
<td>User Training</td>
<td>.97</td>
</tr>
<tr>
<td>Accessibility</td>
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<tr>
<td>Terminology Clarity</td>
<td>.48</td>
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<td>Perceived Usefulness</td>
<td>.95</td>
</tr>
<tr>
<td>Perceived Ease of Use</td>
<td>.95</td>
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<tr>
<td>Intended Use</td>
<td>.89</td>
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</table>
subjective norm ($\alpha = .53$), terminology clarity ($\alpha = .48$), and result demonstrability ($\alpha = .65$). The measures that showed poor reliability in the pilot test were modified as described later in this section. Cronbach’s alpha coefficients of the measures obtained from the pilot test are presented in Table 4.2.

Convergent validity of the measures was assessed using principal component factor analysis. To demonstrate convergent validity, a single eigenvalue of each measure should be greater than 1, which verifies that the items measuring the same construct load onto a single factor. The analysis of the pilot test verified that for most constructs in the model, the items measuring the same construct loaded onto a single factor, suggesting that the items measuring each construct are “highly interrelated and do constitute a construct” (Straub, 1989, p.160). These results verified the unidimensionality of the constructs. However, the measure of subjective norm loaded onto two factors, indicating that it had poor convergent validity.

To incorporate the results obtained from the pilot test, several changes to the instrument were made. The items measuring subjective norm, which showed poor reliability and convergent validity were dropped from the instrument. Instead, the previously validated measures were adapted from Venkatesh and Davis (2000) to measure subjective norm. One of the items measuring terminology clarity was modified to improve reliability of the measure. The Cronbach’s alpha coefficient for result demonstrability was .65, which is a little lower than what is recommended by Nunally (1978), but it was considered acceptable for the pilot test. Thus, no changes were made to the items measuring result demonstrability. The measurement items used in the pilot test are presented in Appendix D.

Discriminant validity was not assessed due to the small sample size used in the pilot test. None of the responses collected in the pilot test were used in the final analysis.
CHAPTER 5
DATA ANALYSIS AND RESULTS

Characteristics of the Respondents

A total of 214 students participated in the Web survey. Of these participants, 124 reported that they had experience with the database specified in the instrument. The responses from the participants who had not previously used the database were discarded. Three responses that provided problematic answers were removed from the analysis, leaving a final sample of 121 responses.²

Table 5.1 presents descriptive statistics of the respondents including gender, major, year, status, access to campus computing network, and participation in orientation to library services. The respondents were largely registered in three majors: education (32.2 percent), psychology (37.2 percent), and information studies (25.6 percent). The remaining five percent of the respondents were registered in other majors. Approximately 27 percent of the respondents were male and 72 percent were female. The respondents were primarily juniors and seniors. More than 80 percent of the respondents were seniors and approximately 20 percent were juniors. The majority of the respondents were full-time students (91.7 percent), with the remainder being part-time students (8.3 percent). About 56 percent of the respondents reported that they usually accessed the campus computing network from home, and the additional 37.2 percent reported access from the computer lab. Less than 10 percent of the respondents reported they usually accessed the campus computing network in labs, offices, departments, or other. Sixty-two percent of the respondents reported they had not received an orientation to library services while 38 percent reported they had attended an orientation.

² Three participants did not answer all the items, leaving incomplete responses.
Table 5.1 Descriptive Statistics of the Respondents

<table>
<thead>
<tr>
<th>Respondent Characteristics</th>
<th>Frequency</th>
<th>Percentage</th>
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<td>Information Studies</td>
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<td></td>
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<td>0</td>
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<tr>
<td>Sophomore</td>
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<td>0</td>
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<tr>
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<td>Senior</td>
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<td>91.7</td>
</tr>
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<td>Part time student</td>
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<td>8.3</td>
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<td><strong>Access to Campus Network</strong></td>
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<td></td>
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<tr>
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<td>In computer lab</td>
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<td>In lab/office</td>
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<td>1.7</td>
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<td>In department</td>
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<td>62.0</td>
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</table>

n=121
Descriptive Statistics

Table 5.2 shows descriptive statistics of the constructs in the research model. As indicated by the standard deviations, all items representing the constructs demonstrated a reasonable dispersion in their distributions.

<table>
<thead>
<tr>
<th>Construct</th>
<th>Mean</th>
<th>Standard Deviation</th>
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</thead>
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<td>1.39</td>
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<td>Job Relevance</td>
<td>4.97</td>
<td>1.55</td>
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<tr>
<td>Output Quality</td>
<td>4.94</td>
<td>1.48</td>
</tr>
<tr>
<td>Result Demonstrability</td>
<td>4.98</td>
<td>1.45</td>
</tr>
<tr>
<td>User Training</td>
<td>4.55</td>
<td>2.24</td>
</tr>
<tr>
<td>Accessibility</td>
<td>4.89</td>
<td>1.70</td>
</tr>
<tr>
<td>Terminology Clarity</td>
<td>5.00</td>
<td>1.52</td>
</tr>
<tr>
<td>Perceived Usefulness</td>
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</tr>
<tr>
<td>Perceived Ease of Use</td>
<td>4.80</td>
<td>1.57</td>
</tr>
<tr>
<td>Intended Use</td>
<td>5.25</td>
<td>1.64</td>
</tr>
</tbody>
</table>

Notes: All constructs except user training are seven-point Likert scales ranging from (1) strongly disagree to (7) strongly agree. User training is an eight-point scale with anchors (0) never attended the training, (1) strongly disagree, and (7) strongly agree.
Model Testing

The data were analyzed using PLS, which is a second-generation multivariate technique. PLS has been widely used recently in information systems research. Examples include Igbaria and Iivari (1995), Venkatesh and Morris (2000), Karahanna, et al. (1999), Gefen and Straub (1997), Thompson, et al. (1991), and Agarwal and Karahanna (2000). PLS uses a component-based approach and is “more close to the data, more explorative, and more data analytic” (Lohmöller, 1981, p.7). PLS makes minimal demands on measurement scales, sample size, and residual distributions (Chin, 1998). The software package used to perform the analysis is PLS Graph, Version 03.00 Build 1126 (Chin, 2003).

Estimation of the Measurement Model

The test of the research model includes two stages: the estimation of the measurement model and the estimation of the structural model. In the estimation of the measurement model, the psychometric properties of the measures are evaluated in terms of reliability and validity.

Reliability. Reliability is the extent to which “a particular technique, applied repeatedly to the same object, would yield the same result each time” (Babbie, 1992, p.129). Reliability of the measures was assessed in terms of composite reliability and Average Variance Extracted (AVE) measures. To assess the internal consistency for the
Table 5.3 Assessment of the Measurement Model

<table>
<thead>
<tr>
<th>Construct</th>
<th>Composite Reliability&lt;sup&gt;a&lt;/sup&gt;</th>
<th>AVE&lt;sup&gt;b&lt;/sup&gt;</th>
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</thead>
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<td>Output Quality</td>
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<td>Result Demonstrability</td>
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<td>.84</td>
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<td>User Training</td>
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<td>Accessibility</td>
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<tr>
<td>Intended Use</td>
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<td>.88</td>
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</table>

<sup>a</sup>Composite Reliability = $\rho_c = (\Sigma \lambda_i)^2 / (\Sigma \lambda_i)^2 + \Sigma \text{var}(\varepsilon_i)$

<sup>b</sup>AVE = $\Sigma \lambda_i^2 / \Sigma \lambda_i^2 + \Sigma \text{var}(\varepsilon_i)$

($\lambda_i$ is the component loading to an indicator; $\text{var}(\varepsilon_i) = 1 - \lambda_i$)
indicators of each construct, the composite reliability was calculated. In comparison to Cronbach’s alpha, composite reliability does not assume that all items are equally weighted (Chin, 1998). All constructs in the research model exhibited good internal consistency as indicated by their composite reliability scores (Table 5.3). Composite reliability scores greater than .70 are considered acceptable. Composite reliability of all the constructs exceeded .90, indicating the measurement model demonstrates high internal consistency.

Another measure that can be used to assess the internal consistency for the items of each construct is the AVE. The AVE attempts “to measure the amount of variance that a latent variable (construct) component captures from its indicators relative to the amount due to measurement error” (Chin, 1998, p.321). The AVE can be interpreted as a measure of reliability for the items of the construct and is inclined to be more conservative than composite reliability. The AVE greater than .50 is considered acceptable, which means that “50% or more variance of the indicators should be accounted for” (Chin, 1998, p.321). As shown in Table 5.3, the AVE measures of all the constructs exceeded the minimum level, ranging from .83 to .98.

In summary, these results indicate that all the constructs in the model demonstrate high internal consistency.

Validity. Validity is defined as “the extent to which measures indicate what they are intended to measure” (Schutt, 1999, p.83). Construct validity of the measures was assessed in terms of convergent validity and discriminant validity. Convergent validity is defined as “the extent to which multiple attempts to measure the same construct are in agreement” (Campbell & Fiske, 1959). To assess convergent validity, the item loadings were analyzed. Item loadings greater than .70 are considered acceptable (Fornell & Larcker, 1981). As shown in Table 5.4, all items exhibit high loadings on their corresponding constructs, ranging from .87 to .99. All loadings are statistically significant at the .001 level. In summary, the results show that all the constructs demonstrate strong convergent validity.
Table 5.4 Loadings and Cross-Loadings for the Measurement Model

<table>
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<th>SN</th>
<th>JR</th>
<th>OQ</th>
<th>RD</th>
<th>TRA</th>
<th>ACC</th>
<th>TERM</th>
<th>PU</th>
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<th>IU</th>
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<td>.57</td>
<td>.72</td>
<td>.80</td>
<td>.70</td>
<td>.94</td>
</tr>
</tbody>
</table>

SN = Subjective Norm; JR = Job Relevance; OQ = Output Quality; RD = Result Demonstrability; TRA = User Training; ACC = Accessibility; TERM = Terminology Clarity; PU = Perceived Usefulness; PEOU = Perceived Ease of Use; IU = Intended Use
Discriminant validity refers to “the degree to which items differentiate among constructs or measure distinct concepts” (Igbaria & Iivari, 1995, p.596). To assess discriminant validity, loadings and cross-loadings were compared. To demonstrate discriminant validity, loadings should be higher than cross-loadings. In other words, the indicators should load higher for their associated construct than indicators for other constructs. This suggests that the construct component score predicts each indicator for the associated construct better than indicators for other constructs (Chin, 1998). In the initial measurement model estimation, the loading of one item measuring PEOU (PEOU3) was lower than one of the cross-loadings. The measurement model was revised by dropping the item. The model was retested to incorporate the results of the initial measurement model estimation. As shown in Table 5.4, all indicators loaded higher for their associated construct than other constructs. This suggests that all the constructs in the research model demonstrate adequate discriminant validity.

Another test of discriminant validity is to compare the inter-construct correlations and the square root of the AVE. The square root of the AVE should be greater than the inter-construct correlations (Chin, 1998), indicating that “the constructs were correlated more highly with their indicators than with other constructs in the model” (Igbaria, Guimaraes, & Davis, 1995, p.102). In other words, the AVE shared between the construct and its indicators should be greater than the variance shared between the construct and other constructs (Chin, 1998). As shown in Table 5.5, the square root of the AVE measures for all constructs (in diagonals) are greater than the inter-construct correlations (off-diagonals). These results indicate that all the constructs meet the criteria for adequate discriminant validity. In summary, all the constructs demonstrate adequate reliability and validity, indicating that the measurement model is acceptable.
Table 5.5 Inter-Construct Correlations

<table>
<thead>
<tr>
<th>Construct</th>
<th>Composite Reliability</th>
<th>SN</th>
<th>JR</th>
<th>OQ</th>
<th>RD</th>
<th>TRA</th>
<th>ACC</th>
<th>TERM</th>
<th>PU</th>
<th>PEOU</th>
<th>IU</th>
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<tr>
<td>JR</td>
<td>.93</td>
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<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
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<td>.64</td>
<td>.97</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RD</td>
<td>.91</td>
<td>.34</td>
<td>.68</td>
<td>.81</td>
<td>.91</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>TRA</td>
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<td>.09</td>
<td>.31</td>
<td>.35</td>
<td>.38</td>
<td>.99</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACC</td>
<td>.91</td>
<td>.03</td>
<td>.48</td>
<td>.71</td>
<td>.58</td>
<td>.33</td>
<td>.91</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TERM</td>
<td>.96</td>
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<td>.63</td>
<td>.71</td>
<td>.80</td>
<td>.36</td>
<td>.59</td>
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<td>.55</td>
<td>.76</td>
<td>.92</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PEOU</td>
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<td>.20</td>
<td>.60</td>
<td>.78</td>
<td>.77</td>
<td>.37</td>
<td>.69</td>
<td>.81</td>
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<td>.61</td>
<td>.73</td>
<td>.84</td>
<td>.70</td>
<td>.94</td>
</tr>
</tbody>
</table>

Square root of the AVE shared between the constructs and their measures (in diagonals); Inter-construct correlations (Off-diagonals)

SN = Subjective Norm; JR = Job Relevance; OQ = Output Quality; RD = Result Demonstrability; TRA = User Training; ACC = Accessibility; TERM = Terminology Clarity; PU = Perceived Usefulness; PEOU = Perceived Ease of Use; IU = Intended Use
Estimation of the Structural Model

**Testing of the structural model.** The structural model was tested to examine the relationships between the constructs in the research model. The structural model depicts the relationships among the constructs. The constructs in the research model were measured using multiple indicators. The indicators of all the constructs were modeled in a reflective mode. R-square values are used to assess model fit. The interpretation of R-square is identical to that of traditional regression (Chin, 1998). The path coefficients and explained variances (R-squares) for the model are shown in Table 5.7 and Figure 5.1. The outer model is not depicted in Figure 5.1. Instead, the outer model loadings of all the items are shown in Table 5.6.

As shown in Table 5.7, the R-square for intended use is .73, indicating that perceived usefulness, perceived ease of use, and subjective norm together explain 73% of the variance in intended use. The R-squares for PU and PEOU are .86 and .72 respectively, indicating that the exogenous variables in the model explained approximately 86% and 72% of the variance in PU and PEOU respectively. In summary, these results indicate that the model performs well in explaining the variance for the endogenous variables. Thus, the model was found to be effective in explaining the variance of intended use.

**Hypotheses Testing**

The hypotheses are tested by assessing statistical significance of the path coefficients with t-statistics calculated using the bootstrap resampling method of 100 samples. The bootstrap is a “nonparametric approach for estimating the precision of the PLS estimates” (Chin, 1998, p.320). In bootstrapping, in order to get N estimates for each parameter in
Table 5.6 PLS Outer Model Loadings

<table>
<thead>
<tr>
<th>Construct</th>
<th>Weight</th>
<th>Outer Model Loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>SN1</td>
<td>.56</td>
<td>.96</td>
</tr>
<tr>
<td>SN2</td>
<td>.49</td>
<td>.95</td>
</tr>
<tr>
<td>JR1</td>
<td>.52</td>
<td>.93</td>
</tr>
<tr>
<td>JR2</td>
<td>.55</td>
<td>.94</td>
</tr>
<tr>
<td>OQ1</td>
<td>.52</td>
<td>.97</td>
</tr>
<tr>
<td>OQ2</td>
<td>.51</td>
<td>.97</td>
</tr>
<tr>
<td>RD1</td>
<td>.53</td>
<td>.91</td>
</tr>
<tr>
<td>RD2</td>
<td>.57</td>
<td>.92</td>
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<tr>
<td>TRA1</td>
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<td>.99</td>
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<td>TRA2</td>
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<td>.99</td>
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<td>ACC1</td>
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<td>.88</td>
</tr>
<tr>
<td>ACC2</td>
<td>.64</td>
<td>.94</td>
</tr>
<tr>
<td>TERM1</td>
<td>.49</td>
<td>.95</td>
</tr>
<tr>
<td>TERM2</td>
<td>.55</td>
<td>.96</td>
</tr>
<tr>
<td>PU1</td>
<td>.25</td>
<td>.87</td>
</tr>
<tr>
<td>PU2</td>
<td>.27</td>
<td>.91</td>
</tr>
<tr>
<td>PU3</td>
<td>.28</td>
<td>.95</td>
</tr>
<tr>
<td>PU4</td>
<td>.29</td>
<td>.94</td>
</tr>
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<td>.52</td>
<td>.93</td>
</tr>
<tr>
<td>IU2</td>
<td>.55</td>
<td>.94</td>
</tr>
</tbody>
</table>

Note: All loadings are significant at .001

SN = Subjective Norm; JR = Job Relevance; OQ = Output Quality; RD = Result Demonstrability; TRA = User Training; ACC = Accessibility; TERM = Terminology Clarity; PU = Perceived Usefulness; PEOU = Perceived Ease of Use; IU = Intended Use
Table 5.7 Statistical Significance of Coefficients

<table>
<thead>
<tr>
<th>Endogenous Variables</th>
<th>$R^2$</th>
<th>Independent Variables</th>
<th>Standardized Coefficients</th>
<th>T-statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>PU</td>
<td>.86</td>
<td>Subjective Norm</td>
<td>.08</td>
<td>2.02</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Job Relevance</td>
<td>.40</td>
<td>5.53</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Output Quality</td>
<td>.08</td>
<td>1.60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Result Demonstrability</td>
<td>.44</td>
<td>6.98</td>
</tr>
<tr>
<td></td>
<td></td>
<td>User Training</td>
<td>.02</td>
<td>0.52</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PEOU</td>
<td>.06</td>
<td>1.19</td>
</tr>
<tr>
<td>PEOU</td>
<td>.72</td>
<td>User Training</td>
<td>.05</td>
<td>0.98</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Accessibility</td>
<td>.32</td>
<td>3.24</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Terminology Clarity</td>
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<td>6.84</td>
</tr>
<tr>
<td>Intended Use</td>
<td>.73</td>
<td>Subjective Norm</td>
<td>-.01</td>
<td>0.21</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PU</td>
<td>.71</td>
<td>8.41</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PEOU</td>
<td>.19</td>
<td>2.72</td>
</tr>
</tbody>
</table>
Subjective Norm

Job Relevance

Output Quality

Result Demonstrability

User Training

Accessibility

Terminology Clarity

PU

(r²=.86)

Intended Use

(r²=.73)

PEOU

(r²=.72)

.08*

.40***

.44***

n.s

n.s

.71***

.19**

.32**

.60***

.60*

n.s

n.s

n.s

n.s

Figure 5.1 Structural Model Results

*** Significant at .001

** Significant at .01

* Significant at .05
the model, N samples sets are developed by sampling with replacement from the original data set. The statistical significance is assessed at the .05 level.

Hypothesis 1: Perceived usefulness will have a positive direct effect on intended use of Web-based subscription databases.

As indicated in Table 4.9, the path coefficient for PU to intended use is .71, which is statistically significant at the .001 level. The results provide strong support for hypothesis 1, which was drawn from TAM. This suggests that PU has a significant effect on intended use of Web-based subscription databases, implying that an increase in PU would exert a positive influence on the user’s intention to use the databases. In fact, as the path coefficient indicates, PU is a major determinant of intended use.

Hypothesis 2: Perceived ease of use will have a positive direct effect on intended use of Web-based subscription databases.

As shown in Table 4.9, the path coefficient for PEOU to intended use is .19, which is statistically significant at the .01 level. The results provide support for hypothesis 2, which was drawn from TAM. This suggests that PEOU has a positive impact on intended use of Web-based subscription databases, implying that an increase in PEOU would exert a positive influence on the user’s intention to use the databases. PEOU is a significant determinant of intended use. However, PEOU appears to be relatively less influential than PU in determining intended use.

Hypothesis 3: Perceived ease of use will have a positive direct effect on perceived usefulness of Web-based subscription databases.

As shown in Table 4.9, the path coefficient for PEOU to PU is .06, which is not statistically significant. The results do not lend support for hypothesis 3. The results show that PEOU does not have a significant effect on PU, suggesting that PEOU is not a
significant factor influencing PU of the databases. It implies that users do not relate ease of use with usefulness of Web-based subscription databases.

Hypothesis 4: Job relevance will have a positive direct effect on perceived usefulness of Web-based subscription databases.

As shown in Table 4.9, the path coefficient for job relevance to PU is .40, which is statistically significant at the .001 level. The results provide strong support for hypothesis 4. This suggests job relevance has a positive effect on PU of Web-based subscription databases. It implies that as the users perceive the databases are highly applicable to their job, they are likely to perceive the databases to be useful. Along with result demonstrability, job relevance appears to be an important factor affecting user perceptions of usefulness of Web-based subscription databases.

Hypothesis 5: Output quality will have a positive direct effect on perceived usefulness of Web-based subscription databases.

As shown in Table 4.9, the path coefficient for output quality to PU is .08, which is not statistically significant. Thus, hypothesis 5 is not supported. This suggests that output quality does not have a significant effect on PU of Web-based subscription databases. Contrary to hypothesis 5, the results show that output quality does not affect the user’s perception of usefulness, implying that users do not relate output quality with usefulness of the databases.

Hypothesis 6: Result demonstrability will have a positive direct effect on perceived usefulness of Web-based subscription databases.

As shown in Table 4.9, the path coefficient for result demonstrability to PU is .44, which is statistically significant at the .001 level. The results lend support for hypothesis 6. This suggests that result demonstrability has a positive direct effect on usefulness of Web-based subscription databases. It implies that as the users perceive that subsequent
results of using the databases are readily discerned to be positive, they tend to build favorable perceptions of the usefulness of Web-based subscription databases. Along with job relevance, result demonstrability is a significant determinant of usefulness of Web-based subscription databases.

Hypothesis 7: User training will have a positive direct effect on perceived usefulness of Web-based subscription databases.

As shown in Table 4.9, the path coefficient for user training to PU is .02, which is not statistically significant. The results do not lend support for hypothesis 7. The results indicate that user training does not have a significant effect on usefulness of Web-based subscription databases. This suggests that user training is not a significant determinant of PU, implying that user perceptions of usefulness of Web-based subscription databases are not influenced by user training.\(^3\)

Hypothesis 8: User training will have a positive direct effect on perceived ease of use of Web-based subscription databases.

As shown in Table 4.9, the path coefficient for user training to PEOU is .05, which is not statistically significant. The results do not lend support for hypothesis 8. This suggests that user training does not affect user perceptions of ease of use. The results imply that user perceptions of ease of use are not influenced by user training. In fact, user training is not a significant determinant of any of the user belief constructs drawn from TAM. This suggests that user training might not be an effective way to increase user perceptions of ease of use and usefulness in the context of Web-based subscription databases.\(^4\)

\(^3\) The author conducted an additional analysis using the responses from only those who received user training, which were measured on a 7-point Likert scale. The results of the analysis showed that the path coefficient for user training to PU was .03, which was not statistically significant.

\(^4\) The author conducted an additional analysis using the responses from only those who received user training, which were measured on a 7-point Likert scale. The results of the analysis showed that the path coefficient for user training to PEOU was .10, which was not statistically significant.
Hypothesis 9: Perceived accessibility will have a positive direct effect on ease of use perceptions of Web-based subscription databases.

As shown in Table 4.9, the path coefficient for accessibility to PEOU is .32, which is statistically significant at the .01 level. The results provide support for hypothesis 9. This suggests that accessibility has a positive direct effect on PEOU of Web-based subscription databases. The results imply that the users are likely to perceive the databases are easy to use as accessibility increases. In summary, accessibility was found to be a significant determinant of user perceptions of ease of use.

Hypothesis 10: Terminology clarity will have a positive direct effect on perceived ease of use of Web-based subscription databases.

As shown in Table 4.9, the path coefficient for terminology clarity to PEOU is .60, which is statistically significant at the .001 level. The results provide strong support for hypothesis 10. This suggests that terminology clarity has a positive direct effect on user perceptions of ease of use. The results imply that the users are likely to perceive Web-based subscription databases to be easy to use as terminology clarity increases. As the path coefficient indicates, terminology clarity is a major determinant of PEOU, suggesting that user perceptions of ease of use of Web-based subscription databases are greatly influenced by terminology clarity.

Hypothesis 11: Subjective norm will have a positive direct effect on intended use of Web-based subscription databases.

As shown in Table 4.9, the path coefficient for subjective norm to intended use is -.01, which is not statistically significant. The results do not lend support for hypothesis 11. This suggests that subjective norm does not have a significant effect on intended use. The results imply that the user’ intention to use Web-based subscription databases is not influenced by subjective norm.
Hypothesis 12: Subjective norm will have a positive direct effect on perceived usefulness of Web-based subscription databases.

As shown in Table 4.9, the path coefficient for subjective norm to PU is .08, which is statistically significant at the .05 level. The results provide support for hypothesis 12. This suggests that subjective norm is a significant factor influencing user perceptions of usefulness of Web-based subscription databases. The results imply that the users are likely to perceive the databases are useful when people who are important to them think they should use the databases.

Summary of Data Analysis

Chapter 5 presented the results of data analysis. Descriptive statistics were provided to illustrate the characteristics of the respondents. The results of the estimation of the measurement model and structural model were presented. In the estimation of the measurement model, the psychometric properties of the measures were assessed in terms of reliability and validity. In the estimation of the structural model, the validity of the research model was evaluated. The results of hypotheses testing were also presented. Chapter 6 will present a summary of the study, conclusion, implications for practice and recommendations for future research.
CHAPTER 6
SUMMARY AND CONCLUSIONS

This chapter summarizes the study and discusses the research findings in connection with the research questions. It presents the conclusion that can be drawn from the study and makes implications for practice. Recommendations for future research are also included.

Summary of the Study

The purpose of this study was to determine the factors affecting user acceptance of Web-based subscription databases. Prior research has reported that Web-based subscription databases have been underutilized. It also emphasized the importance of promoting the databases and creating a demand by potential users. However, there has been little research on user acceptance of Web-based subscription databases. Thus, this study aimed to provide a better understanding of the determinants of user acceptance of Web-based subscription databases based on a well-established theoretical foundation. It examined how user beliefs are related to intended use and what are the antecedents of user beliefs.

This study tested an integrated model of the antecedents and consequents of user beliefs toward intended use of Web-based subscription databases by extending TAM. TAM provided the theoretical perspective for this study. TAM is one of the most prominent models used to explain the effects of users’ internal beliefs and attitudes on their system usage behavior and has received extensive theoretical and empirical support by a number of studies. This study extended TAM by including the subjective norm construct and the antecedents of user beliefs. The findings from this study are expected to
provide practitioners with insights into the strategies for facilitating user acceptance of Web-based subscription databases.

This study employed a cross-sectional field study using a Web survey method as the technique for data collection. The study targeted undergraduate students who have experience using Web-based subscription databases provided by the University Libraries. The instrument used to measure the constructs in the research model was developed by adapting existing scales from previous studies and constructing new scales where necessary. A pilot test was conducted to verify the psychometric properties of the scales, and the scales were modified based on the results of the pilot test.

A final sample of 121 responses was analyzed. The measurement model was tested to assess reliability and validity of the scales. The structural model was tested to examine the relationships between the constructs in the research model using PLS. The responses from this study were examined at the p<.05 level of significance. Overall, the research model was found to be effective in explaining user acceptance of Web-based subscription databases. 73 percent of the variance in intended use, 86 percent of the variance in perceived usefulness, and 72 percent of the variance in perceived ease of use were explained by the research model.

**Findings and Discussions**

This section summarizes the findings in connection with each research question.

**Research Question 1**

What relationships exist between ease-of-use and usefulness perceptions and user acceptance of Web-based subscription databases?

As implied in TAM, both PU and PEOU were found to have significant direct effects on intended use. Consistent with the findings of prior research, the effect of PU on intended use is greater than the effect of PEOU. User beliefs about ease of use are also
found to be a significant determinant of intended use although the magnitude of the effect is smaller than usefulness perceptions. Many previous studies have empirically shown that usefulness has a stronger effect on user acceptance of an information system than ease of use (Adams et al., 1992; Agarwal & Karahanna, 2000; Davis et al., 1989; Gefen et al., 2003; Straub et al., 1995). This implies that users accept Web-based subscription databases primarily because of the utility that they offer. These results suggest that the user’s positive beliefs about usefulness are key to their acceptance of an information system. The results support Davis’ (1989) assertion that ease of use cannot compensate for a system that lacks functionality.

Research Question 2

What relationships exist between perceived usefulness and the proposed antecedents?

The results obtained from the present study suggest that three antecedents are positively related to PU: subjective norm, job relevance, and result demonstrability. They explained 86% of the variance in PU. Among these antecedents, job relevance and result demonstrability showed strong effects on PU. In contrast, output quality and user training showed no significant effects on PU. The results also indicated that PEOU has no significant effect on PU.

Among the three constructs related to cognitive instrumental processes implied in TAM2, job relevance and result demonstrability were found to have significant effects on PU while output quality did not show a significant effect. Job relevance, defined as “an individual’s perception regarding the degree to which the target system is applicable to his or her job” (Venkatesh & Davis, 2000, p.191), was found to have a positive impact on PU. This suggests that when Web-based subscription databases can support users’ job-related tasks, their beliefs about the usefulness of the databases are likely to be reinforced. Result demonstrability, defined as the “tangibility of the results of using the innovation” (Moore & Benbasat, 1991, p.203), also showed a significant effect on PU. This implies that if subsequent results of using Web-based subscription databases are regarded as positive, users will build favorable perceptions about the usefulness of the
databases. In contrast, output quality was not found to have a significant effect on PU. Venkatesh and Davis (2000) found that the effect of job relevance and output quality on PU was interactive and output quality moderated the relationship between job relevance and PU. This suggests that the relationship between job relevance and PU may be moderated depending on the level of output quality.

A significant effect of subjective norm on PU was found in the present study. This result is consistent with the findings obtained from previous studies (Karahanna & Straub, 1999; Venkatesh & Davis, 2000). Salancik and Pf effer (1978) asserted that social influence by various referent groups may exert a positive impact on the formation of job-related beliefs in many ways. The results obtained in the present study also suggest that subjective norm exerts a positive impact on user beliefs about the utility of Web-based subscription databases.

Contrary to the relationship implied in TAM, PEOU was found to have no significant effect on PU. According to TAM, the direct effect of PEOU on PU implies that increased PEOU can help improve performance by reducing effort needed to do the same task. However, in a study to examine the applicability of TAM in explaining physicians’ acceptance of telemedicine technology, Hu et al. (1999) found no significant effect of PEOU on PU. They attributed the results to possible differences in physicians’ general competence, adaptability to new technologies, intellectual and cognitive capacity, and the nature of their work compared to other user groups. Lucas and Spitler (1999) also found no significant effect of PEOU on PU in a study that examined the use of broker workstations. They provided explanations for the results, which were the nature of the system or a poor model. A possible explanation for the nonsignificant effect of PEOU on PU found in the present study may lie in the unique characteristics of Web-based subscription databases that are highly task-oriented compared to the systems investigated in other studies.

Research Question 3

What relationships exist between perceived ease of use and the proposed antecedents?
The results suggest that two of the three antecedents in the research model are positively related to PEOU: accessibility and terminology clarity. They explained 72% of the variance in PEOU. Terminology clarity was the most influential determinant of PEOU.

On the other hand, user training was not found to have a positive impact on user perceptions of ease of use. This result is inconsistent with the findings of prior studies that have reported a significant effect of training on user acceptance of a system (Agarwal & Prasad, 1999; Gist, 1987; Igbaria et al., 1997; Nelson & Cheney, 1987). However, some previous studies have reported a nonsignificant effect of training on user beliefs and system acceptance (Karahanna & Straub, 1999; Winter, Chudoba, & Gutek, 1997). Karahanna and Straub (1999) found that availability of training and support had no significant effect on either perceptions of ease of use or usefulness. According to Winter et al.’s (1997) study to examine the relationships between support infrastructure, training, various computer configurations, and computer literacy of work groups, training was not associated with computer literacy of the work groups while many measures of computer configurations were associated with computer literacy. These findings suggest that training might not be the most effective way to enhance computer literacy of end-users. The findings of the present study call for the need to reexamine the effectiveness of user training in the context of Web-based subscription databases.

The results obtained from the present study indicate that terminology clarity has the strongest effect on PEOU. The strong effect of terminology clarity is consistent with prior research. In Hong et al.’s (2002) study that examined the factors influencing users’ adoption of digital libraries, terminology showed the strongest effect on PEOU among the factors such as computer self-efficacy, knowledge of search domain, relevance, terminology, and screen design. The results of the present study confirm the importance of terminology clarity on user beliefs about ease of use. As mentioned earlier, user training was not found to have a positive impact on PEOU. These findings suggest that rather than emphasizing user training, improving terminology clarity may be the most effective way to help people use the databases with ease. It is crucial to make the terminology used in the databases closer to users’ vocabulary. Eliminating jargon on a search form can be a solution (Ortiz-Repiso & Moscoso, 1999). The importance of
terminology clarity in an information system in user acceptance has also been emphasized in prior research (Hill et al., 1997; Hong et al., 2002; Spivey, 2000).

Accessibility was found to have a significant positive impact on PEOU, indicating that accessibility is an important determinant of user beliefs about ease of use. This result is consistent with the findings obtained by Karahanna and Straub (1999). Perceived accessibility can exert a greater influence on user acceptance when the system under investigation has some degree of variations in its accessibility than when it is uniformly accessible to all users (Davis et al., 1989). Accessibility of Web-based subscription databases can be perceived differently by users depending on whether or not the user has access to the Internet or a computer, or whether the user accesses the databases from home or on campus. As Culnan (1984) pointed, physical accessibility is independent of the perceived accessibility of an information system, and factors such as command language or system response time can influence perceived inaccessibility. Thus, in addition to improving physical access to the databases, adequate support to help the users effectively retrieve needed information should be provided to improve perceived accessibility.

**Research Question 4**

What relationships exist between subjective norm and user acceptance of Web-based subscription databases?

The results obtained in the present study suggest that subjective norm does not have significant effect on user intention to use Web-based subscription databases. The theory of reasoned action postulates that subjective norm is a key determinant of behavioral intention based on the rationale that people tend to perform a behavior that important referents think they should. In accordance with the theory, Lucas and Spitler (1999) found that social norms are more important than user perceptions in predicting use of the technology. However, Davis et al. (1989) found a nonsignificant effect of subjective norm on system use. Chau and Hu (2001) also found that subjective norms had no significant effect on physician’s behavioral intention to use telemedicine technology.
They attributed the result to highly autonomous nature of the profession. Some researchers suggested the possibility of moderating factors. Venkatesh and Morris (2000) found gender differences in the effect of subjective norm on behavioral intention. While men’s decisions were not influenced by subjective norm, women’s decisions were affected by normative influences at early stages of technology introduction. On the other hand, Venkatesh and Davis (2000) suggest that subjective norm exerts an influence on intentions when use of a system is mandatory, but not when it is voluntary.

The nonsignificant effect of subjective norm on intended use found in the present study may be attributed to the voluntary context of the database usage. However, further research can be pursued to examine possible moderating effects of gender, experience, or organizational factors. The results of the present study suggest that although social influence does not directly affect behavioral intention, it may have a positive impact on user beliefs about the utility of Web-based subscription databases.

**Conclusion**

The following conclusion was drawn from the results of the study. This conclusion may be useful to practitioners in libraries and information centers that provide Web-based subscription databases and researchers studying user acceptance of information systems.

The present study examined the effects of user beliefs and subjective norm on user acceptance of Web-based subscription databases by extending TAM. TAM provides a theoretical framework to explain user acceptance of an information system based on user perceptions. It posits that user perceptions of usefulness and ease of use are fundamental determinants of user acceptance of an information system. The present study proposed a research model that integrated the antecedents of user beliefs to provide a better understanding of the factors influencing user acceptance of the databases.

Based on the findings obtained in the present study, the following conclusions are drawn.
1. Both ease of use and usefulness perceptions have significant effects on intended use of Web-based subscription databases. However, perceived usefulness has a stronger effect on user acceptance than ease of use. Thus, it is suggested that user acceptance of Web-based subscription databases depends primarily on the utility they offer.

2. Job relevance and result demonstrability have significant effects on usefulness perceptions while output quality does not. However, the interactive effect between output quality and job relevance in determining usefulness perceptions can further be examined.

3. User training does not have a significant effect on either user perceptions of usefulness or ease of use. This result calls for the need to re-examine the effectiveness of user training in the context of Web-based subscription databases.

4. Terminology clarity is a major determinant of user perceptions of ease of use. Considering that user training does not positively affect user perceptions of ease of use, improving terminology clarity may be the most effective way to help people use the databases with ease rather than emphasizing user training.

5. Accessibility is an important determinant for user perceptions of ease of use in the context of Web-based subscription databases. In order to improve perceived accessibility, it is crucial to provide adequate support to help users effectively retrieve needed information.

6. Subjective norm does not affect intended use of Web-based subscription databases. The nonsignificant effect of subjective norm on behavioral intention may be associated with the voluntary nature of the use of the databases. On the contrary, the study found that subjective norm has a significant effect on usefulness perceptions. The researcher concludes that although subjective norm does not directly affect intended use, it exerts a positive influence on user beliefs about the utility of Web-based subscription databases.
Implications for Practice

The findings from the present study have meaningful managerial implications and raise challenging questions for future research.

1. The results obtained in the present study suggest that terminology clarity is the most influential determinant of user perceptions of ease of use. It is highly recommended to avoid using technical jargon in the interface of the databases and library homepages. In fact, the terms used in the interface of Web-based subscription databases may affect ease of use more than any other system features do.

2. The findings of the present study indicate that accessibility is a significant determinant of user perceptions of ease of use. As Culnan (1984) suggested, accessibility is a multidimensional concept and it includes the ability to retrieve the needed information successfully. To help users perceive the databases to be accessible, practitioners can make one-on-one support available to assist the users to effectively retrieve the needed information in addition to the provision of physical access. To support remote users, it could be beneficial to make an instant chat service link available on every web page where users can go to get the needed information. That way, the users can chat with support staff and get help at any stage while they move to the databases and retrieve the information.

3. The present study found that user training does not have a positive impact on either user perceptions of usefulness or ease of use. Given the findings, practitioners can consider allocating more organizational resources to one-on-one support (whether it is provided on site or through the Internet) rather than providing user training.

4. Considering that perceived usefulness is a major determinant of user acceptance of Web-based subscription databases, practitioners should offer managerial support to promote positive beliefs about the utility of the databases. It may be essential to provide a list of links to the databases according to their subjects so that users can easily recognize the relevance of the databases to their field of interest.
Recommendations for Future Research

1. In a preliminary analysis to examine the applicability of TAM in explaining usage of Web-based subscription databases, the results indicated that the model explained 15 percent of the variance in self-reported usage. The results of testing the model that explains self-reported usage were not reported in this dissertation. Considering that the research model explaining intended use accounted for 73 percent of the variance in intended use, it is suggested that TAM explains behavioral intention better than self-reported usage in the context of Web-based subscription databases. Additional research is needed to determine what factors mediate the relationship between behavioral intention and usage.

2. In the present study, the data were pooled across three different Web-based subscription databases. Although pooling data across different systems has been frequently applied in previous studies (Davis et al., 1989; Venkatesh & Davis, 1996; Venkatesh & Morris, 2000), the possibility of the confounding results based on specific databases can be further examined.

3. The results of the present study indicated that subjective norm does not have a significant effect on intended use. Previous studies have reported that the influence of subjective norm on behavioral intention attenuates as the user’s experience with the system increases (Venkatesh & Davis, 2000). Gender differences have also been found in the influence of subjective norm on user acceptance, suggesting that women are more motivated by subjective norm at the initial stage of system adoption than men (Venkatesh & Morris, 2000). Further research can be pursued to investigate how experience or gender influences the effect of subjective norm on intended use in the context of Web-based subscription databases.

4. The results of the present study showed that user training does not have a significant effect on either perceived usefulness or ease of use. These results warrant further research in relation to various methods of training and their respective effectiveness. Additional research can be conducted to develop training
methods that can bring positive impact on user beliefs about usefulness and ease of use.

5. Further empirical research can be pursued to identify factors that positively affect perceived accessibility. Considering that physical access is independent of perceived accessibility of an information system (Culnan, 1984), additional research is needed to examine the effects of the factors. Some examples include the availability of a computer and network, system features, the user’s computer efficacy, and experience with information retrieval systems.

6. As found in the present study, terminology clarity is the most influential determinant of ease of use. This suggests that improving terminology clarity would have a great positive impact on ease of use of Web-based subscription databases. Extensive further research is needed to investigate which terms are most likely to cause confusions or misunderstandings, and what changes in the terminology improve users’ understanding.
APPENDIX A

CONSTRUCTS AND MEASURES (FINAL INSTRUMENT)
CONSTRUCTS AND MEASURES (FINAL INSTRUMENT)

Perceived Usefulness
Using the PsycINFO database improves my performance in my job (or in my study).
Using the PsycINFO database in my job (or in my study) increases my productivity.
Using the PsycINFO database enhances my effectiveness in my job (or in my study).
I find the PsycINFO database to be useful in my job (or in my study).

Perceived Ease of Use
I find the PsycINFO database to be easy to use.
Interacting with the PsycINFO database does not require a lot of my mental effort.
My interaction with the PsycINFO database is clear and understandable.
I find it easy to get the PsycINFO database to do what I want it to do.

Job Relevance
In my job (or in my study), usage of the PsycINFO database is relevant.
In my job (or in my study), usage of the PsycINFO database is important.

Output Quality
The quality of the output I get from the PsycINFO database is high.
I have no problem with the quality of the PsycINFO database’s output.

Result Demonstrability
The results of using the PsycINFO database are apparent to me.
I would have no difficulty explaining why using the PsycINFO database may or may not be beneficial.

User Training
I have received enough training on how to use databases provided by libraries.
I have received the training I need to be able to effectively use databases provided by libraries.
**Accessibility**

The PsycINFO database is accessible.

My access to the PsycINFO database is unrestricted.

**Terminology**

I understand most of the terms used throughout the PsycINFO database.

I find it easy to understand the terms used throughout the PsycINFO database.

**Subjective Norm**

People who influence my behavior think that I should use the PsycINFO database.

People who are important to me think that I should use the PsycINFO database.

**Intended Use**

I intend to use the PsycINFO database as often as needed.

I intend to continue using the PsycINFO database in the future.
Dear student.

I am a doctoral candidate under the direction of Professor Kathleen Burnett in the School of Information Studies at Florida State University. I am conducting a research study to explore students’ perceptions and usage of Web-based subscription databases provided by the Florida State University Libraries.

I am requesting your participation, which will involve taking a Web survey. The questionnaire will take approximately 10 minutes to complete. Your participation in this study is voluntary. You must be at least 18 years old to participate in this survey. If you choose not to participate or to withdraw from the study at any time, there will be no penalty. The questionnaire is anonymous. The results of the study may be published but your name will not be known.

If you have any questions concerning the research study, please call me at (850) 644-8117 or email me at jjk0425@garnet.acns.fsu.edu.

If you have questions about your rights as a participant in this survey, or if you feel you have been placed at risk, you can contact the Chair of the Human Subjects Committee, Institutional Review Board, through the Office of the Vice President for Research, at (850) 644-8633.

Submission of the questionnaire will be considered your consent to participate.

Thank you.

Sincerely,

Jong-Ae Kim
APPENDIX C

QUESTIONNAIRE (FINAL INSTRUMENT)
General Directions for Questionnaire

Thank you for taking time to participate in this survey. The questions in this survey are related to the Web-based databases provided by the Florida State University (FSU) Libraries. Please answer all of the questions.

As you may know, you can access the databases such as PsycINFO, FirstSearch, Lexis/Nexis, ERIC, etc. through the FSU Libraries website. To assist your understanding of what the databases are, this URL (http://www.lib.fsu.edu/__databases.html) indicates the web page that can lead you to the databases provided by the FSU Libraries. If you are not sure what the databases are, you can simply copy and paste the URL and see the Web page using another Web browser window. However, please understand that you don't have to use the databases now for this survey.

1. Have you ever used any of the databases provided via the FSU Libraries website (For example: PsycINFO, FirstSearch, Lexis/Nexis, ERIC, etc.)? (Note: FSU Library Catalog such as WebLuis is not considered as one of the databases here.)

   (1) Yes                               (2) No

2. Among those databases provided via the FSU Libraries website, have you ever used the PsycINFO database?
   (Note: To assist your understanding of what the PsycINFO database is, this URL (http://webluis.fcla.edu/cgi-bin/cgiwrap/fclwlv3/wlv3/DGCR/DBQA/CM30/P2FHP/P1k598=fspsy) indicates the web page that can lead you to the PsycINFO database provided via the FSU Libraries website. If you are not sure what the PsycINFO database is, you can simply copy and paste the URL and see the web page using another Web browser window. However, please understand that you don't have to use the database now for this survey.)

   (1) Yes                               (2) No
# Part I

## Background information

1. Your gender:  
   (1) Male   (2) Female

3. Your major:  

4. Your year:  
   (1) Freshman   (2) Sophomore   (3) Junior
   (4) Senior   (5) Other (Please specify)  

5. Are you a full-time student or part-time student during the current academic year  
   (Fall 2003 – Summer 2004)?  
   (1) Full-time   (2) Part-time

6. Your residence (during the current academic year):  
   (1) On-campus housing   (2) Off-campus housing

7. Where have you usually accessed FSU’s campus computing network during the current academic year?  
   (1) At home   (2) In computer lab   (3) In lab/office   (4) In department  
   (5) Other (Please specify)  

8. Have you ever attended any online database workshop held by the FSU Libraries?  
   (1) Yes   (2) No

9. Have you ever received an orientation to library services held by the FSU Libraries?  
   (1) Yes   (2) No
Part II

Section 1 (Perceptions about the PsycINFO database): The questions in this section focus on your perceptions about the PsycINFO database.

A. Using the following scale, please indicate how strongly you agree or disagree with the following statements. (1=strongly disagree, 2=moderately disagree, 3=slightly disagree, 4=neutral (neither disagree nor agree), 5=slightly agree, 6=moderately agree, and 7=strongly agree)

- Using the PsycINFO database improves my performance in my job (or in my study).
- In my job (or in my study), usage of the PsycINFO database is important.
- People who influence my behavior think that I should use the PsycINFO database.
- People who are important to me think that I should use the PsycINFO database.
- I intend to use the PsycINFO database as often as needed.
- My access to the PsycINFO database is unrestricted.
- I understand most of the terms used throughout the PsycINFO database.
- I find it easy to get the PsycINFO database to do what I want it to do.
- My interaction with the PsycINFO database is clear and understandable.
- The PsycINFO database is accessible.
- Using the PsycINFO database in my job (or in my study) increases my productivity.
- I would have no difficulty explaining why using the PsycINFO database may or may not be beneficial.
- Using the PsycINFO database enhances my effectiveness in my job (or in my study).
- I find it easy to understand the terms used throughout the PsycINFO database.
- Interacting with the PsycINFO database does not require a lot of my mental effort.
- I intend to continue using the PsycINFO database in the future.
- I find the PsycINFO database to be useful in my job (or in my study).
- I find the PsycINFO database to be easy to use.
- In my job (or in my study), usage of the PsycINFO database is relevant.
- The quality of the output I get from the PsycINFO database is high.
- I have no problem with the quality of the PsycINFO database’s output.
- The results of using the PsycINFO database are apparent to me.
Section 2 (User training related to databases): The questions in this section focus on user training related to databases.

Using the following scale, please indicate how strongly you agree or disagree with the following statements. (If you have never received training related to databases provided by libraries, please check the “never received” column.)

(0=never received, 1=strongly disagree, 2=moderately disagree, 3=slightly disagree, 4=neutral (neither disagree nor agree), 5=slightly agree, 6=moderately agree, and 7=strongly agree)

I have received enough training on how to use databases provided by libraries. 01234567
I have received the training I need to be able to effectively use databases provided by libraries. 01234567

Raffle
If you are interested in entering the random drawing of 100 dollar Best Buy gift certificate, please present your name and your major here. (This question is optional.)

Extra Credit
If you would like to get extra credit for the course which referred you to this survey, please answer the following question. (This question is optional.)
Would you please present your name and the title or number for the course which referred you to this survey? (For example, "EEP3612, your name" or "Introduction to Statistics, your name")

Thank you very much for your valuable time and effort.
If you have any questions regarding this survey, please email Jong-Ae Kim, researcher, at jjk0425@garnet.fsu.edu. If you would like to have a copy of the analysis of the data, please email Jong-Ae Kim at the same email address.
CONSTRUCTS AND MEASURES (PILOT TEST)

**Perceived Usefulness**
Using the database improves my performance in my job (or in my study).
Using the database in my job (or in my study) increases my productivity.
Using the database enhances my effectiveness in my job (or in my study).
I find the database to be useful in my job (or in my study).

**Perceived Ease of Use**
I find the database to be easy to use.
Interacting with the database does not require a lot of my mental effort.
My interaction with the database is clear and understandable.
I find it easy to get the database to do what I want it to do.

**Job Relevance**
In my job (or in my study), usage of the database is relevant.
In my job (or in my study), usage of the database is important.

**Output Quality**
The quality of the output I get from the database is high.
I have no problem with the quality of the database’s output.

**Result Demonstrability**
The results of using the database are apparent to me.
I would have no difficulty explaining why using the database may or may not be beneficial.

**User Training**
I have received enough training on how to use databases provided by libraries.
I have received the training I need to be able to effectively use databases provided by libraries.
**Accessibility**
The database is accessible.
My access to the database is unrestricted.

**Terminology**
I understand most of the terms used throughout the database.
The use of terms throughout the database is consistent.

**Subjective Norm**
Faculty strongly supports my using the database.
I would like to use the database because my colleagues think I should use it.
I would like to use the database because faculty thinks I should use it.
My colleagues strongly support my using the database.

**Intended Use**
I intend to use the database as often as needed.
I intend to continue using the database in the future.
Office of the Vice President For Research  
Human Subjects Committee  
Tallahassee, Florida 32306-2763  
(850) 644-8673 · FAX (850) 644-4392

APPROVAL MEMORANDUM (for change in research protocol)

Date: 5/20/2004

To:  
Jong-Ae Kim  
1767 Hermitage Blvd #3209  
Tallahassee, FL 32308

Dept: INFORMATION STUDIES

From: John Tomkowiak, Chair

Re: Use of Human subjects in Research  
Project entitled: User acceptance of Web-based Database Services: Extending the Technology Acceptance Model

The memorandum that you submitted to this office in regard to the requested change in your research protocol for the above-referenced project have been reviewed and approved. Thank you for informing the Committee of this change.

A reminder that if the project has not been completed by 4/11/2005, you must request renewed approval for continuation of the project.

By copy of this memorandum, the chairman of your department and/or your major professor is reminded that he/she is responsible for being informed concerning research projects involving human subjects in the department, and should review protocols of such investigations as often as needed to insure that the project is being conducted in compliance with our institution and with DHHS regulations.

This institution has an Assurance on file with the Office for Protection from Research Risks. The Assurance Number is IRB00000446..

cc: Kathleen Burnett  
APPLICATION NO. 2004:192
Office of the Vice President For Research  
Human Subjects Committee  
Tallahassee, Florida 32306-2763  
(850) 644-8673 • FAX (850) 644-4392

APPROVAL MEMORANDUM

Date: 4/12/2004

To:  
Jong-Ae Kim  
1767 Hermitage Blvd #3209  
Tallahassee, FL 32308

Dept.: INFORMATION STUDIES  
From: John Tomkowiak, Chair

Re: Use of Human Subjects in Research  
User acceptance of Web-based Database Services: Extending the Technology  
Acceptance Model

The forms that you submitted to this office in regard to the use of human subjects in the proposal referenced above have been reviewed by the Secretary, the Chair, and two members of the Human Subjects Committee. Your project is determined to be Exempt per 45 CFR § 46.101(b) 2 and has been approved by an accelerated review process.

The Human Subjects Committee has not evaluated your proposal for scientific merit, except to weigh the risk to the human participants and the aspects of the proposal related to potential risk and benefit. This approval does not replace any departmental or other approvals, which may be required.

If the project has not been completed by 4/11/2005 you must request renewed approval for continuation of the project.

You are advised that any change in protocol in this project must be approved by resubmission of the project to the Committee for approval. Also, the principal investigator must promptly report, in writing, any unexpected problems causing risks to research subjects or others.

By copy of this memorandum, the chairman of your department and/or your major professor is reminded that he/she is responsible for being informed concerning research projects involving human subjects in the department, and should review protocols of such investigations as often as needed to insure that the project is being conducted in compliance with our institution and with DHHS regulations.

This institution has an Assurance on file with the Office for Protection from Research Risks. The Assurance Number is IRB00000446.

Cc: Kathleen Burnett  
HSC No. 2004.192
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Venkatesh, V., & Morris, M. G. (2000). Why don’t men ever stop to ask for directions?: Gender, social influence, and their role in technology acceptance and usage behavior. MIS Quarterly, 24, 115-139.


BIOGRAPHICAL SKETCH

Education

*Ph.D. Information Studies*, 2000 –
College of Information, Florida State University
(Minor: Management Information Systems)

*M.A. in Library and Information Science*, 1997
Department of Library and Information Science
Kyungpook National University, Korea

*B.A. in Library and Information Science*, 1994
Department of Library and Information Science
Kyungpook National University, Korea

Teaching Experience

*Instructor*, Fall 2004 – Spring 2005
College of Information, Florida State University

*Teaching Assistant*, Fall 2000 – Summer 2004
College of Information, Florida State University

Work Experience

*Specialist*, February 1997 – July 2000
Korea Development Institute (KDI), Seoul, Korea.

Kyungpook National University, Taegu, Korea

Professional Memberships

American Society for Information Science and Technology (ASIST)
Association for Library and Information Science Education (ALISE)