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The Relative Importance of Perceived Ease of Use in IS Adoption: A Study of E-Commerce Adoption

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Abstract

The technology acceptance model (Davis 1989) is one of the most widely used models of IT adoption. According to TAM, IT adoption is influenced by two perceptions: usefulness and ease-of-use. Research has shown that perceived usefulness (PU) affects intended adoption of IT, but has mostly failed to do so regarding perceived ease of use (PEOU). The basic proposition of this study is that this varying importance of PEOU may be related to the nature of the task. PEOU relates to assessments of the *intrinsic* characteristics of IT, such as the ease of use, ease of learning, flexibility, and clarity of its interface. PU, on the other hand, is a response to user assessment of its *extrinsic*, i.e., task-oriented, outcomes: how IT

helps users achieve task-related objectives, such as task efficiency and effectiveness.

Accordingly, the study theorizes that PEOU directly affects IT adoption only when the primary task for which the IT is deployed is directly associated with intrinsic IT characteristics, such as when the task itself is an integral part of an IT interface. Extending this proposition to e-commerce, it was hypothesized that when a Web site is used to *purchase* products, PEOU would not affect IT adoption because IT ease-of-use is not an inherent quality of the purchased product. On the other hand, when the Web site is used to *inquire* about products, PEOU should affect IT adoption because the required information is embedded in the IT and thus its quality is directly related to IT ease-of-use. Data collected from 217 subjects in a free simulation experiment support these hypotheses. Implications for future Web development and theoretical refinements are discussed.

Keywords: Technology acceptance model, TAM, e-commerce, perceived ease of use, PEOU, perceived usefulness, PU, IT adoption, diffusion of innovation theory, Web development, system use, intrinsic and extrinsic tasks

I. INTRODUCTION

Since its introduction, the technology acceptance model (Davis 1989; Davis et al. 1989)—TAM—has received considerable attention in the IT community. Recent studies suggest it applies also to e-commerce and to the adoption of Internet technology (Gefen 1997). In essence, TAM posits that IT adoption is affected by prior use-related beliefs. TAM identified two such beliefs: perceived usefulness (PU) and perceived ease of use (PEOU). The former is “the degree to which a person believes that using a particular system would enhance his or her job performance” (Davis 1989, p. 320); while the latter is “the degree to which a person believes that using a particular system would be free of effort” (Davis 1989, p. 320). These two beliefs create a favorable disposition or intention toward using the IT that consequently affects its self-reported use (Davis et al. 1989).

Studies that have investigated self-reported system usage and intended use have found that PU plays a significant role in determining such downstream effects. However, most of the studies, beginning with Davis himself, have *not* found a direct linkage between PEOU and IT adoption. Indeed, Davis suggested that “ease of use operates through usefulness” (p. 332), a thesis that has also been posited by later research (e.g., Adams et al. 1992; Gefen 2000; Keil et al. 1995; Venkatesh and Davis 1994). Not surprisingly, some research has questioned the overall importance of PEOU in IT adoption (e.g., Keil et al. 1995). The role of PEOU in TAM, however, remains controversial in that some studies show that PEOU does directly affect either self-reported use or intended IT use.

The objective of this study is to propose a theoretical explanation of the varying effects of PEOU on IT adoption by differentiating between *tasks* that are intrinsic and tasks that are extrinsic to the IT. Tasks that are intrinsic to the IT are tasks where the IT itself provides the primary “ends,” i.e., the product or service for which the IT is ultimately being used. Tasks that are extrinsic to the IT, on the other hand, are those in which the IT is only the “means” to achieving the primary product or service, i.e., where the IT is not the central component of the process but is instrumental in achieving it, such as when the IT is the interface through which one accomplishes a goal.

Specific examples will help to make the point concrete. Purchasing a book through a Web site (which is itself an IT, of course) is a task *extrinsic* to the IT because the IT serves only as an interface (collecting book order data) to another system that handles the primary purchase activities involved (shipping and payments). Conversely, using the same Web site to inquire about a book represents an *intrinsic* IT task because the IT, itself an integrated application using both an intelligent interface and database, provides the actual service.

Based on this distinction, the basic proposition of this study is that PEOU should directly influence IT adoption only when the task, too, is intrinsic to the IT. In other words, it is hypothesized that PEOU will influence IT adoption only when

the IT itself provides the primary product or service. The data collected in this study, analyzing potential adopter intended use of a book-selling Web site for the two distinctly different activities of inquiry about and purchase of books, support this proposition. The responses show that PU influenced adoption of the Web site for both purchase and inquiry objectives, while PEOU influenced adoption of the Web site only when its intended use involved inquiries.

II. LITERATURE REVIEW

THE TECHNOLOGY ACCEPTANCE MODEL

TAM is one of the most widely researched models predicting IT adoption. Davis (1989) originally examined an e-mail system and a file-editor used at the time at IBM Canada and found that both PEOU and PU were significantly correlated with self-reported use of both systems. However, when the combined effect of PU and PEOU on self-reported use was examined using linear regression, only PU significantly affected use. In a follow-up study presented in the same paper, Davis asked 40 MBA students to evaluate two graphics systems with which they were previously unfamiliar. The subjects used workbook manuals to learn how to use both packages before filling in the instruments. Analysis of the responses given by the MBA subjects showed that for both graphic systems, only PU determined their intention to use the software.

In a separate study, Davis et al. (1989) asked MBA students to fill out instruments regarding a word-processor after examining it for one hour and again after 14 weeks. Unlike the first study, Davis et al. found that PEOU, after one hour, significantly affected intended use even when the effect of PU on intended use was controlled. This significant regression relationship became insignificant, however, when reexamined 14 weeks later with the same subjects. Unlike PEOU, PU significantly affected self-reported use in both time-periods.

Later studies in the TAM research stream are also inconsistent with respect to the effect of PEOU on downstream effects and on the mediating effect of PU.

Table 1 lists a representative group of TAM studies to show this variation. A quick glance at the far right column indicates the extent to which studies to date report variant findings about the role of PEOU in TAM. It is important to note in the context of this study that the TAM studies in the tables below dealt with an *unspecified* task, mainly asking subjects generally about “use” or “adoption” and without indicating the specific tasks to which the IT would be applied. The next section will discuss how the intrinsic and extrinsic nature of the task might help to explain this apparent changing role of PEOU in TAM.

THE ROLE OF PEOU: TASKS AND SYSTEM CHARACTERISTICS

According to TAM (Davis 1989; Davis et al. 1989), PEOU and PU are important perceptions determining IT adoption. In a later study that expanded on the original TAM studies, Davis et al. (1992) explained the role of these beliefs, suggesting that user intention to adopt a new IT is affected by both extrinsic and intrinsic motivations. According to Davis et al., “extrinsic motivation refers to the performance of an activity because it is perceived to be instrumental in achieving valued outcomes that are distinct from the activity itself” (1992, p. 1112). In contrast, “intrinsic motivation refers to the performance of an activity for no apparent reinforcement other than the process of performing the activity *per se*” (p. 1112). Davis et al. classified enjoyment as a type of intrinsic motivation and PU as a type of extrinsic motivation, arguing that extrinsic motivation should have a stronger impact on IT adoption. The reason PU is such an important antecedent of IT adoption is that in many cases a new IT is adopted primarily because it is instrumental in achieving tasks that are not inherent in the use of the IT itself. PU deals with user assessments of these aspects of a new IT (Davis et al. 1992).

However, the possible intrinsic or extrinsic contributions of PEOU to IT adoption were not discussed by Davis et al. (1992). What they did posit was that PEOU would affect IT adoption indirectly through its effect on PU, because ease-of-use is instrumental in making a new IT more useful.

Table 1. Summary of TAM Studies (1989-2000)

Study	Subjects	Use Measure (TAM dependent variable)	Did PEOU Affect Use?
Davis 1989 (Study 1)	Knowledge workers	Self-reported use	No
Davis 1989 (Study 2)	MBA students	Intended use	No
Davis et al. 1989 (after 1 hour)	MBA students	Intended use	Yes
Davis et al. 1989 (after 14 weeks)	MBA students	Self-reported use	No
Mathieson 1991	Undergraduate students	Intention to use a spreadsheet	No
Moore and Benbasat 1991	Knowledge workers	PC adoption	Yes
Thompson et al. 1991	Knowledge workers	PC utilization	Yes
Davis et al. 1992 (study 1)	MBA students	Intentions to use a new word-processor	Not examined
Davis et al. 1992 (study 2)	MBA students	Intentions to use a new computer-graphics package	Not examined
Adams et al. 1992 (study 1)	Knowledge workers	Self-reported use of e-mail	No
Adams et al. 1992 (study 2)	Knowledge workers	Self-reported use of voice mail	No
Hendrickson et al. 1993	Undergraduate students	Not relevant	Not measured
Segars and Grover 1993	Adams et al.'s (1992) data	Not relevant	No
Subramanian 1994	Knowledge workers	Predicted adoption of voice mail	No
Subramanian 1994	Knowledge workers	Predicted adoption of a dial-up system	No
Sambamurthy and Chin 1994	Undergraduate students	Use and attitude toward use of a GDSS	Not directly measured
Venkatesh and Davis 1994	Undergraduate students	Self-reported intentions to use e-mail and gopher systems	Yes
Straub 1994	Knowledge workers	Self-reported use of e-mail and FAX	Not reported
Szajna 1994	MBA students	Adoption of software packages	No
Chin and Todd 1995	Knowledge workers	Perceived usefulness of e-mail	Not relevant
Premkumar and Potter 1995	Knowledge workers	Adoption of CASE tools	No
Straub et al. 1995 (model 1)	Knowledge workers	Self-reported use of voice mail system	No
Straub et al. 1995 (model 2)	Knowledge workers	Actual use of voice mail system	No

Table 1. Summary of TAM Studies (1989-2000)

Study	Subjects	Use Measure (TAM dependent variable)	Did PEOU Affect Use?
Chin and Gopal 1995	Undergraduate students	Intention to adopt briefly described GSS	Yes
Keil et al. 1995	Knowledge workers	Self-reported use of an ES	No
Taylor and Todd 1995a; 1995b	Students	Self-reported attitude toward adopting the computer center	Not examined
Igbaria et al. 1995	MBA students	Self-reported PC usage	No
Hendrickson and Collins 1996	Undergraduate students	Self-reported logged time of use over a four week period measuring frequency and duration.	Better model fit available when the path is modeled.
Montazemi et al. 1996	Knowledge workers	Assessment of software packages	Not relevant
Chau 1996 (study 1)	Administrative/clerical staff	Intention to use a word-processor	No
Chau 1996 (study 2)	Administrative/clerical staff	Intention to use a spreadsheet	No
Szajna 1996 (study 1: pre-implementation)	Graduate business students	Intention to use an e-mail after an hour's hands-on demonstration	No
Szajna 1996 (study 2: post-implementation)	Graduate business students	Intention to use an e-mail and actual usage 15 weeks later	No
Gefen and Straub 1997	Knowledge workers in airline industry	Self-reported use of e-mail	No
Straub et al. 1997	Knowledge workers in airline industry	Self-reported use of e-mail	No
Gefen 1997	MBA students	Intended adoption of freeware (without examining the software)	Yes
Gefen and Keil 1998	Knowledge workers	Self-reported use of an expert system (ES)	No
Doll et al. 1998	Undergraduate students	Not examined	Not examined
Fenech 1998	Undergraduate students	Self-reported use	Not reported
Rose and Straub 1999	Knowledge workers	Self-reported use of computers	Yes
Karahanna and Straub 1999	Knowledge workers	Self-reported use of e-mail	No
Karahanna et al. 1999 (study 1)	Knowledge workers	Intended use of Windows among potential adopters	Yes

Table 1. Summary of TAM Studies (1989-2000)

Study	Subjects	Use Measure (TAM dependent variable)	Did PEOU Affect Use?
Karahanna et al. 1999 (study 2)	Knowledge workers	Intended use of Windows among actual users	No
Venkatesh 1999	Knowledge workers taking non-work related training in either lecture-based training or game-based training	Intended use of an Internet based application dealing with a virtual workplace system (but not related to the knowledge workers' actual work place)	Yes
Gefen 2000	Knowledge workers	Intended adoption of a new ERP	No

The role of PEOU, however, is likely to be more complex than that. PEOU measures user assessments of ease of use and ease of learning. PEOU, thus, deals with user motivation that is based on the assessment of the *intrinsic* aspect of using the IT, such as its interface and the process involved in using it. Arguably, since the *extrinsic* aspect of the IT (captured through PU) and not its *intrinsic* aspect, in many cases, is the reason a new IT is adopted, this implies that PU and not PEOU should directly affect IT adoption. Much of the TAM-related research seems to support this conclusion (see Table 1).

Nonetheless, by the same logic, PEOU should affect IT adoption when the intrinsic characteristics of the IT, such as its interface clarity and navigational ease, contribute to the value of the actual outcome for which the IT is being used. Conceptually, this should occur when the output of the IT is inextricably bound to the interface itself, in which case, the PEOU of the IT should correlate directly to the value placed on IT outcomes.

Whether the motivation to use the new IT is intrinsic or extrinsic depends upon the nature of the task for which the new IT is being employed, not upon the nature of the technology. Thus, e-mail usage can be an intrinsic task, for example, if the objective in using it is simply to inform, or an extrinsic task, if the objective is

specifically to improve organizational performance through better communication. Unfortunately, because the TAM studies cited in Table 1 seldom specify the nature of the task, it is difficult to assess in most cases whether the IT studied was used for intrinsic or extrinsic tasks.

Despite this ambiguity, partial support for the proposition above might be derived from Table 1. Excluding studies using students (Chin and Gopal 1995; Gefen 1997; Venkatesh and Davis 1994) and non-work related settings (Venkatesh 1999)—where arguably the subjects did not use the IT to perform extrinsic tasks—the only cases where PEOU directly affected intended or actual use dealt either with PC adoption (Moore and Benbasat 1991), PC utilization (Rose and Straub 1999; Thompson et al. 1991), or new users (Karahanna et al. 1999). These studies could be interpreted to support the basic proposition of the study. In the cases of PC adoption or utilization, the ease of use of the IT is both an intrinsic characteristic of the IT and an important aspect of its extrinsic value. Also in the case of new users, ease of learning to use the IT (as measured through PEOU) is a central element enabling users to obtain extrinsic value from the IT, i.e., to perform a work-related task. Finally, consistent with this observation, many of the TAM studies in Table 1 that clearly deal with knowledge workers applying the IT to achieve a work-related task show that PEOU did not directly affect intended use (e.g., Gefen 2000; Gefen and Keil 1998; Gefen and Straub 1997; Keil et al. 1995; Straub et al. 1997).¹ Thus, a sizable proportion of the studies that did find a direct effect of PEOU on self-

¹In the case of studies on students, the reader is seldom told enough to assess whether the task is intrinsic or extrinsic. Karahanna et al.'s (1999) second study (dealing with post-adoption assessment) also deals with extrinsic tasks. Keil et al. (1995) and Gefen and Keil (1998) examined an expert system that was used to assist in the configuration of new IT, the primary task being building the actual IT for the customer. Gefen and Straub (1997) and Straub et al. (1997) dealt with e-mail systems in the airline industry that were deployed to enhance the organization's performance by adding electronic communication to existing communication systems. The primary task here too, was not the communication, but improving organizational performance. Gefen (2000) dealt with the adoption of enterprise resource planning (ERP) systems. These are large and complex software packages that integrate and manage the information needs of companies.

reported use may deal with tasks that are intrinsic to the IT, as implied by the basic intrinsic-extrinsic proposition of this study.²

III. HYPOTHESES AND RESEARCH MODEL

To examine this proposition, this study utilized a popular e-commerce site specializing in selling books. The growing importance of e-commerce (Colecchia 1999; Halhead 1995; Harrington and Reed 1996; Rayport and Sviokla 1994, 1995) and its exponentially increasing economic impact (Colecchia 1999) makes the study of this effect of PEOU especially important in the context of e-commerce.³ The use of such a site is also ideally suited to the context of this study because in a typical Web site users can apply the Internet to either *inquire* about products and services or to *purchase* them. These two types of possible use correspond to the two types of use affecting the role of PEOU in IT adoption, as discussed earlier.

When using the Web site for inquiry, the outcome of using the IT is embedded in the IT (through its interface and database) and is the primary task. As such, the characteristics of the IT itself should directly affect the ease of the information retrieval process and the presentation of results. Moreover, since the inquiry task is intrinsic to the searching capabilities of the IT, and the entire process is performed within the Web site interface and database, PEOU—assessing the intrinsic characteristics of the IT—should influence user intentions to use the IT. On

²Reviewing these two constructs through a diffusion of innovation (DOI) perspective offers additional insights that might explain why PEOU affects intended use depending on the type of use. Most people adopt an innovation because of its perceived outcomes (Rogers 1983, 1995). This is also true regarding IT adoption where most people adopt an IT because of its perceived effects on outcomes that are extrinsic to the IT itself, such as its usefulness to performing work related activity (Moore 1991). Only very few people, the “innovators,” adopt an IT because of its intrinsic value, such as the novelty and beauty of the new technology itself (Moore 1991).

³According to the credit-card company VISA, its clients' Internet purchases in 1998 totaled \$13 billion or approximately 1% of its total charge activity. This figure is expected to reach the \$100 billion mark or 11% of its total transactions by 2003, according to the *New York Times* (12/15/1998) (www.nytimes.com/library/tech/reference/teseschibio.html/library/tech/reference/teseschibio.html). A more recent estimate by *The Economist* (2/26/2000) put these figures at \$20 billion in 1999, estimated to increase to \$150 billion by 2003.

the other hand, when users engage the Web site to actually purchase a product or service, the primary task—purchasing and shipping the product—is not an inherent part of the IT. The IT in the latter case is only an interface to a more complex process that takes place beyond the boundaries of the customer-facing Web interface.

In this manner, propositions regarding the importance of PEOU can be examined in one interaction with exactly the same IT (Web site), reducing the threat of internal validity problems related to instrumentation, selection, history, testing, and diffusion of imitation of treatments (Cook and Campbell 1979). Since the primary task involved in using a Web site for inquiry is intrinsic to the IT and is affected by these characteristics, the ease of use of the IT should contribute to the applicability of the IT to this task. Thus, user assessments of its PEOU should influence their willingness to adopt the IT. On the other hand, in the case of navigating the Web site to purchase products or services, the IT does not handle the primary task and its characteristics are not likely to affect product selection. Thus, PEOU should *not* affect intended use for this task. Accordingly, it can hypothesized that:

H_{1a}: *PEOU affects intended use when a Web site is used for an inquiry task.*

H_{1b}: *PEOU does **not** affect intended use when a Web site is used for a purchasing task.*

In accordance with the original TAM model and previous TAM studies, the next hypotheses assume that the relationships found in other TAM studies will apply to Web sites, as they are assumed to apply to many other types of IT. Specifically, it is hypothesized that PU will influence both types of IT adoption:

H_{2a}: *PU affects intended use when a Web site is used for an inquiry task.*

H_{2b}: *PU affects intended use when a Web site is used for a purchasing task.*

Finally, in accordance with the classic TAM, it is hypothesized that PEOU will influence PU because an easy-to-use IT is more useful (Davis 1989; Davis et al. 1992), as shown in many of the studies in Table 1:

H₃: *PEOU affects PU.*

The research model summarizing these hypotheses is presented in Figure 1, below. Hypothesized significant effects are displayed in solid line arrows; hypothesized non-effects are displayed in broken-line arrows.

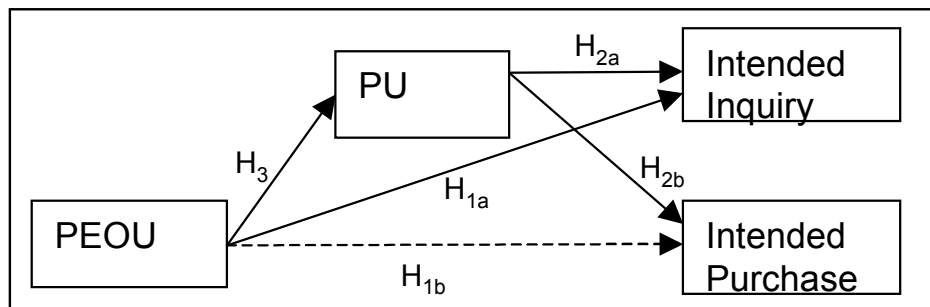


Figure 1. Research Model and Hypotheses

IV. RESEARCH METHOD

PROCEDURE

The study employed a free simulation experimental method (Fromkin and Streufert 1976) in which the researchers place subjects in a real-world situation and ask them to make decisions and choices. In free simulation experiments, treatments are not preprogrammed, but are allowed to range freely and to occur naturally as responses to the experimental tasks.

To explore the hypothesized role of PEOU, 217 MBA students at a large business school in the mid-Atlantic region of the United States were asked to navigate the Internet to a well-known Web site that specializes in books. Once there, they were instructed to request the textbook used in the course they were taking. All subjects completed the instrument in the same computer-equipped Internet-connected classroom managed by the researchers during class sessions.

All the PCs in the classroom had identical configurations and all were equipped with the same browser, namely, Internet Explorer. The researcher in charge used an operationalization manual to assure that all of the subjects were exposed to exactly the same procedure.⁴ The manual appears in Appendix A.

Since all subjects were presented with the same information using the same interface, the potential effect of exogenous variance due to PC configuration and browser type was controlled. Subjects were instructed to search for their textbook and then read about it. Subjects did not actually purchase the textbook, although over half of them reported that they had purchased textbooks on other occasions through the Web. The objective of the task was to make sure all of the subjects were familiar with the specific IT and that the interface and procedure were fresh in their minds before filling in the instrument, consistent with Davis et al. (1989).

After completing this task, subjects were asked to fill in a research instrument. They were not rewarded for their participation in the study and were told of its objective only after all the instruments were returned. Accessing a real-world Web site represents the use of a “live” environment, which adds to the external validity of the results (Cook and Campbell 1979) in that it embodies “critical realism” (Fromkin and Streufert 1976). External validity is also reasonably good in this context in that business students serve as good surrogates for real world managers in decision making contexts (Remus 1986) and are an integral part of the population of online book buyers.

The instrument gathered data on PU and PEOU via items adapted from the original TAM scales proposed by Davis (1989) and by Davis et al. (1989).⁵ Subjects

⁴All the PCs in the classroom used Windows NT, which was set up in such a way that students could not change the “C” drive, including the “Temporary Internet Files” (which is where cookies are usually placed). Thus, the Web site software could not use cookies to customize the interface and present subjects with different interfaces based on past activities, further insuring that all the students experienced exactly the same interface.

⁵The sixth item of the original PU scale was dropped from the analysis because in the pretest it did not show sufficient discriminant validity. A closer examination of this item during the pretest suggested that the term “useful” as used in the item was ambiguous in the context of this study.

were also asked to assess the likelihood that they would use that Web site *in the future* to inquire about its books and purchase them. All items used a seven-point Likert scale, ranging from “strongly agree” to “strongly disagree.”

To ensure items showed convergent and discriminant validity and that the intended-use measures had high internal consistency (Cronbach’s α), the instrument was validated before the data collection phase in a separate pretest on a smaller sample of MBA students. The pretest also examined whether the instrument items were worded in a non-ambiguous manner and whether each reflected the construct to which it was posited to be related. Table 2 contains a list of the items used and the constructs they reflected; Appendix B contains the actual instrument. In Table 2 and in Appendix B, ABC stands in for the name of the actual Web site, and Dr. X for the actual researcher name. In the experiment, however, the subjects received the actual Web site name and researcher name.

The Web navigation activity and instrument were administered to 217 subjects. All subjects agreed to take part in the study and filled in the instrument. Of the 217 instruments, 15 were dropped because of missing data. Subject demographics are presented in Table 3.

Consequently, the complete data collection relied only on the other five PU items that examine specific types of usefulness.

Table 2. List of Questionnaire Items

Construct	Code	Question Wording
Intended Purchase	PUR1	I would use my credit card to purchase from ABC.
	PUR2	I would not hesitate to provide information to ABC.
	PUR3	I am very likely to buy books from ABC.
Intended Inquiry	INQ1	I would use ABC to retrieve information.
	INQ2	I would use ABC to inquire what readers think of a book.
	INQ3	I would use ABC to find out about the author of a book.
	INQ4	I would use ABC to inquire about book ratings.
Perceived Usefulness (PU)	PU1	ABC improves my performance in book searching and buying.
	PU2	ABC enables me to search and buy books faster.
	PU3	ABC enhances my effectiveness in book searching and buying.
	PU4	ABC makes it easier to search for and purchase books.
	PU5	ABC increases my productivity in searching and purchasing books.
Perceived Ease of Use (PEOU)	PEOU1	ABC is easy-to-use.
	PEOU2	It is easy to become skillful at using ABC.
	PEOU3	Learning to operate ABC is easy.
	PEOU4	ABC is flexible to interact with.
	PEOU5	My interaction with ABC is clear and understandable.
	PEOU6	It is easy to interact with ABC.

Table 3. Sample Population Demographics

Demographics	Mean
Age	28
Number of times used the specific Web site before this study	2.94
Number of subjects who had previously purchased on the Internet	89
Women / Men (some subjects did not answer)	86/ 93

V. ANALYSIS AND RESULTS

The data were first analyzed using a PCA factor analysis to establish convergent and discriminant validity. The factor analysis showed four orthogonal factors with eigenvalues above 1.0, together accounting for 77.7% of the variation, with item communality ranging between .64 and .88. The results of the factor analysis after a VARIMAX rotation are presented in Table 4. Loadings above .40 are in shown in boldface. Overall, the factor analysis shows a simple loading pattern with high convergent and discriminant validity. All constructs (factors) that emerged from the factor analysis showed high Cronbach α 's, establishing the reliability of the instrument. Intended use for purchase had a Cronbach α of .79, intended use for inquiry .90, PU .91, and PEOU .93. These values are well within the thresholds suggested by Nunnally (1967). Descriptive statistics of the constructs are also presented in Table 4.

After establishing that items loaded appropriately on their expected constructs, the hypotheses were examined using linear regression. The linear regression results shown in Table 5 support all hypotheses. Linear regression results show that both PEOU and PU significantly affected intended use for inquiry (supporting H_{1a} and H_{2a} , respectively), but that only PU affected intended use for purchase (supporting H_{2b}). The analysis also shows that PEOU significantly affects PU (supporting H_3). There was no significant effect of PEOU on intended use for purchase, supporting the research proposition and H_{1b} . Table 6 summarizes the findings.

Table 4. Factor Analysis and Descriptive Statistics

Item	Factor 1 Perceived Ease of Use	Factor 2 Perceived Usefulness	Factor 3 Intentions to Inquire	Factor 4 Intention to Purchase	Item Communality
PEOU3	.85124	.20085	.17379	.06464	.79933
PEOU2	.84960	.22347	.18567	.05579	.80935
PEOU4	.81996	.30444	.12507	.06598	.78501
PEOU6	.80587	.27109	.08000	.20241	.77029
PEOU5	.80475	.23668	.09006	.14550	.73291
PEOU1	.74433	.30439	.16028	.14091	.69222
PU3	.29849	.85604	.17844	.16571	.88121
PU4	.27007	.85599	.15647	.15831	.85520
PU5	.24375	.83264	.09680	.11727	.77583
PU2	.35230	.79699	.16897	.19378	.82541
PU1	.31603	.72455	.16793	.11212	.66561
INQ2	.14805	.21785	.86197	.17520	.71622
INQ4	.10737	.11544	.84396	.29051	.84307
INQ1	.19578	.14461	.80277	.11194	.72209
INQ3	.13941	.11987	.79727	.22944	.82152
PUR1	.15147	.08355	.23285	.84042	.79044
PUR2	.09603	.16443	.23291	.74138	.64015
PUR3	.17740	.32948	.27361	.71022	.71930
Eigenvalue	8.607	2.522	1.618	1.098	
Percent Explained Variance	47.8	14.0	9.0	6.1	
Mean (std. dev.) of construct	2.08 (.80)	2.42 (1.04)	2.55 (1.10)	3.14 (1.26)	

Table 5. Stepwise Linear Regression Results

Dependent Variable	R ²	F-value (p-value)	Independent Variables	T value (p-value)	Beta
Intended Purchase	.20	24.42522 (<.0001)	PU	4.185 (<.0001)	.3502
			PEOU	1.623 (.1061)	.1359
Intended Inquiry	.18	21.05828 (<.0001)	PU	3.270 (.0013)	.2772
			PEOU	2.224 (.0273)	.1885
PU	.39	126.1561 (<.0001)	PEOU	11.232 (<.0001)	.6248

VI. DISCUSSION AND IMPLICATIONS

This research tested the thesis that the task for which the IT is employed determines whether PEOU directly impacts intention to use an IT. It was hypothesized that PEOU, which assesses *intrinsic* IT characteristics, affects intended use only of tasks that are intrinsic to the IT, i.e., where the IT itself provides the primary process involved in the task. The data tentatively support this proposition, showing that PEOU is a dynamic construct with varying levels and effects depending upon whether the type of use is intrinsic or extrinsic to the IT.

Placed in this context, the results may help the field clarify an important issue in TAM studies, namely, when and why PEOU influences intention to use a system. Since there is little common ground among previous TAM-related studies, the importance and role of PEOU in these studies can, to date, only be assumed. This study, however, used exactly the same subjects, research method, scenario, and measures to examine the varying effects of PEOU. By controlling exogenous factors when comparing the two types of intentions to use the software, this study suggests that it is the *task or type of intended use* that seems to determine whether PEOU directly affects use-intention. These results provide researchers with a tentative answer to the questions raised in some TAM studies (e.g., Keil et al. 1995) concerning the importance and role of PEOU. The findings also confirm previous

observations in TAM-related studies that PU is the primary belief affecting intentions to use an IT and support the conclusion drawn by Davis et al. (1992) that extrinsic motivation is more important than intrinsic motivation in IT adoption.

Table 6. Overall Results of Hypothesis Testing

#	Hypothesis	Supported?
H _{1a}	<i>PEOU affects intended use when a Web site is used for an inquiry task.</i>	Yes
H _{1b}	<i>PEOU does not affect intended use when a Web site is used for a purchasing task.</i>	Yes
H _{2a}	<i>PU affects intended use when a Web site is used for an inquiry task.</i>	Yes
H _{2b}	<i>PU affects intended use when a Web site is used for a purchasing task.</i>	Yes
H ₃	<i>PEOU affects PU.</i>	Yes

IMPLICATIONS

Practitioners, who might have been guided by previous TAM studies to underestimate the importance of PEOU, should reconsider the extent to which PEOU affects system use. PEOU is important and does influence intended use, but its effects are task-dependent. Consequently, when advertising, marketing, or implementing new systems, IT providers might find it beneficial to advocate the ease of use of the IT for given tasks rather than present it in a task-independent manner.

Web developers need to keep in mind that ease-of-use will be particularly important in creating the search engines that accompany their sites. These basic engines and the terms that allow for advanced search need to be intuitive and clear to potential customers. Aspects of the site that process the order and shipping information and display collected data are less sensitive in that the customer is instrumentally and extrinsically motivated.

From the standpoint of TAM research, the theoretical contribution of the paper is to suggest an explanation for the variation in TAM studies with respect to the linkage between PEOU and IT adoption. If confirmed by other studies, this finding would better explain the inner workings of the socio-psychological factors that lead to use of an information system. Thus, researchers should be aware that PEOU might be better studied in the context of a given IT applied to a given task and base their predictions on the nature of the task(s) for which the IT is primarily used. This redefinition of the effects of PEOU may augment the construct validity of this belief, a desired goal in any research (Cook and Campbell 1979). This clarification might also explain the ambiguous results in previous TAM studies. The other element—the task—should also be measured and assessed in all future TAM studies.

LIMITATIONS AND ADDITIONAL RESEARCH

Before discussing additional research questions that this study raises, some caution is necessary in interpreting the results. To begin with, the effect of PEOU on intended inquiry is significant only at the .05 level (albeit this is the same cutoff of significance as used by Davis et al. [1992]) and the R^2 is somewhat low. Another issue requiring caution is the factor analysis. The factor analysis showed, as expected, a clean loading pattern with the four expected factors. The explained variance of the fourth factor, intended inquiry, however, is somewhat weak, standing at only 6.1%. While this is in the same order of magnitude for the adoption of a graphical package as reported by Davis et al. (1992), some caution is called for and additional research replicating these results is needed.

Another possible limitation is that the PU and PEOU items purposefully did not differentiate between the inquiry and purchase tasks. While designing the study in this manner allowed for the comparison of the two tasks against identical scales, it may have introduced an element of bias into the study. Additional research should examine this possible bias.

Within these limitations, the study tentatively supports the basic research proposition that task does matter in TAM. Extending this proposition a step further implies some intriguing additional questions and insights. The study examined when PEOU affects IT adoption, but by the same logic, it implies that the effects of PU, too, might be context-dependent. Specifically, when there is little extrinsic value to using an IT, such as in computer games, PU might not affect IT adoption. Additional research is needed to examine this interesting idea, which runs counter to studies on IT adoption.

Another interesting avenue for new research is the differentiation among types of adopters. According to DOI, there are several types of adopters. Most adopt a new IT because of its extrinsic value (Moore 1991). The first to adopt a new IT are the “innovators” (estimated at 2.5% of the population) who adopt it because of its intrinsic value. Later, the “early adopters” adopt it because it provides strategic advantage. Only then does the “early majority” adopt the technology for pragmatic reasons, such as return-on-investment (ROI). They are followed by the “late adopters” and “conservatives,” who wait until it is very well established. This implies that the importance of the intrinsic IT characteristics, including PEOU, should be greater with innovators. The sample size applied in this study did not allow us to examine this additional aspect of the research proposition. Additional research is needed here, too.

In conclusion, TAM studies need to move into the e-commerce space to determine the extent to which traditional IS models like TAM apply to cyberspace. This study found support for a theoretical refinement of TAM that makes it perfectly applicable to business to commerce and business to business systems. However, one study does not make a research stream. Therefore, for the sake of rapidly influencing practice, further studies need to be conducted well and conducted quickly.

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Appendix A

Research Operationalization Manual

1. The data are to be collected from MBA students in the Matheson Internet-connected classroom during regular class sessions.
2. Explain to the class that we are conducting research on Internet use and would appreciate if they could spend about five minutes helping us by navigating to a certain Web site, examining it, and completing an instrument. Make sure to mention that this is voluntary.
3. Next, tell the students that they can obtain a detailed description of the study and results so far by contacting the lead researcher. Write the e-mail address on the whiteboard.
4. Instruct the class to log in to the network and help any student in the unlikely event that a student might require help (the user IDs and passwords are kept at the Instructor Station).
5. While the students are logging in, give out the instrument.
6. Next, tell the class to go to the Web site in the instrument. Once there, ask the students to search for the textbook, read about it, inspect its price, and go through the process of ordering it (but to stop before actually paying for it).
7. Walk up and down the aisle just to make sure none of the students requires help.
8. After collecting the instruments, thank the students and remind them that a detailed description of the study can be obtained by e-mailing the lead researcher.

Appendix B

Questionnaire Used

Instructions:

As part of an ongoing study on Internet use, we would be grateful if you could devote 10 minutes to completing this instrument.

1. Please logon to the Internet and access WWW.ABC.COM.
2. Use the Web site to search for the textbook of this course.
3. Then, please fill in the instrument.

Thank you

Dr. X

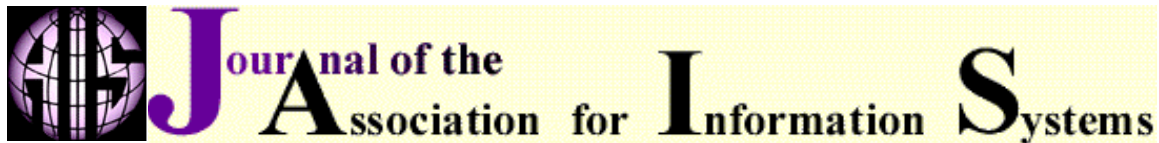
Please circle the appropriate category:

Gender	M	F
Age group	15-19, 20-24, 25-29, 30-34, 35-39, 40-44, 50-54, 55-59, 60-64, 65-69	above 70
Have you ever bought products on the World Wide Web	Yes	No
How many times have you used ABC.com?		

Please indicate your agreement with the next set of statements using the following rating scale:

	1	2	3	4	5	6	7
	Strongly Agree	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree	Strongly Disagree
	Item						Code
	Assessing the Web site						
1	ABC.com is easy-to-use						1 2 3 4 5 6 7
2	It is easy to become skillful at using ABC.com						1 2 3 4 5 6 7
3	Learning to operate ABC.com is easy						1 2 3 4 5 6 7
4	ABC.com is flexible to interact with						1 2 3 4 5 6 7
5	My interaction with ABC.com is clear and understandable						1 2 3 4 5 6 7
6	It is easy to interact with ABC.com						1 2 3 4 5 6 7
7	ABC.com is useful for searching and buying books						1 2 3 4 5 6 7
8	ABC.com improves my performance in book searching and buying						1 2 3 4 5 6 7
9	ABC.com enables me to search and buy books faster						1 2 3 4 5 6 7
10	ABC.com enhances my effectiveness in book searching and buying						1 2 3 4 5 6 7
11	ABC.com makes it easier to search for and purchase books						1 2 3 4 5 6 7
12	ABC.com increases my productivity in searching and purchasing books						1 2 3 4 5 6 7
	Using the Web Site						
1	I would use ABC.com to retrieve information						1 2 3 4 5 6 7
2	I would use ABC.com to inquire what readers think of a book						1 2 3 4 5 6 7
3	I would use ABC.com to find out about the author of a book						1 2 3 4 5 6 7
4	I would use ABC.com to inquire about book ratings						1 2 3 4 5 6 7
5	I would use my credit card to purchase from ABC.com						1 2 3 4 5 6 7
6	I would not hesitate to provide information about my habits to ABC.com						1 2 3 4 5 6 7
7	I am very likely to buy books from ABC.com						1 2 3 4 5 6 7

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