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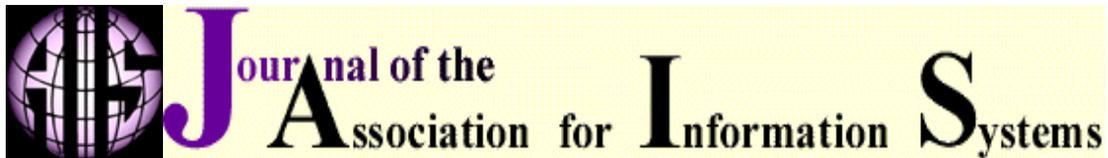
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Research Article

## Consumer Adoption of Net-Enabled Infomediaries: Theoretical Explanations and an Empirical Test <sup>1</sup>

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### **Abstract**

*The emergence of infomediaries — which allow online consumers to search for, and provide comparisons among, many online retailers — is a prominent trend in e-commerce. However, little research has been done on consumer reactions to this new e-commerce tool. To explain why and how online shoppers adopt a new infomediary website, this study proposes a conceptual model with insights obtained from literatures on the technology acceptance model (TAM), the economics of intermediation, and transaction cost analysis (TCA). Infomediaries provide powerful search capabilities to online shoppers to provide them with a list of potential retailers (efficiency benefits), and then provide information to aid in selecting from this list of retailers (effectiveness benefits). Accordingly, the proposed model posits that infomediaries offer two major types of utilitarian benefits to online customers: namely, perceived efficiency and perceived effectiveness. In addition, the model predicts that one's willingness to adopt an infomediary is a function of his/her evaluation of the two types of utilitarian benefits of using the infomediary, which are in turn determined by the subjective interpretation of his/her e-commerce transaction environment. The model was tested using data collected from an online questionnaire administered to 367 online shoppers. Online shoppers' intention to use the infomediary was found to be a function of the two types of utilitarian benefits and perceived ease of use. In addition, our findings suggest that online shoppers who are low on asset specificity (e.g., consumers who have not made a high*

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<sup>1</sup> Elena Karahanna was the accepting senior editor. Jonathan Palmer and Jonathan Wareham were the reviewers. This paper was submitted on May 2, 2005, and went through 2 revisions.

*transaction-specific investment toward a specific online retailer) and who also are high on uncertainty (e.g., consumers who believe that online retailers in general are opportunistic) tend to appreciate the benefits of using an infomediary more than other online shoppers.*

**Keywords:** E-commerce, TAM, transaction cost analysis, net-enhanced B2C systems, online shopping

## **Introduction**

Net-enabled business-to-consumer (B2C) commerce continues to hold significant promise for helping consumers satisfy their shopping needs. This promise grows as more and more consumers take advantage of increasingly powerful online shopping functionalities (Nielsen/NetRatings, 2003). Although some researchers have argued that moving toward net-enabled commerce would lead to disintermediation, online commerce has given rise to a new breed of intermediaries, so-called information intermediaries or infomediaries (Grover and Teng, 2001; Hagel and Singer, 1999; Kauffman and Walden, 2001). Often also referred to as cybermediaries (Sarkar et al., 1995) or shopbots (Smith, 2002), infomediaries play a pivotal role in lubricating commercial exchanges by providing powerful price comparison functionality that comes with a variety of services that go beyond those offered by traditional intermediaries in the offline marketplace. For instance, infomediaries often provide a wealth of information, "helping customers deal more effectively and efficiently with online vendors" (King, 1999) so that they can make more informed decisions.

Many consumers believe that using infomediaries to search for online retailers and choose the best one among them is a valuable shopping method (Bakos, 2001). The widespread adoption of these infomediaries (Nielsen/NetRatings, 2003) is expected to have a profound impact on online markets by reducing consumer search costs, increasing market transparency, intensifying the nature of competition in the online space, and dramatically shifting market power toward infomediaries. Nonetheless, we have only a rudimentary understanding of why and how consumers adopt a new infomediary website, because little research has been done on their interaction with this new e-commerce tool.

It is this gap in the literature that this study intends to fulfill. The study develops a conceptual model by employing the technology acceptance model (TAM), the economics of intermediation literature, and transaction cost analysis (TCA) theory as conceptual lenses through which to examine online shoppers' adoption of infomediaries. The model posits that infomediaries offer two major types of utilitarian benefits to online customers: perceived efficiency and perceived effectiveness. The model also suggests that one's subjective analysis of an e-commerce environment will influence his or her evaluation of these two types of utilitarian benefits that result from using an infomediary, and that these judgments in turn ultimately affect willingness to adopt the infomediary in question. In particular, an online customer's subjective analysis of an e-commerce environment is based largely on the extent to which he or she has made a highly transaction-specific investment toward forming a relationship with an online retailer (asset specificity) and the degree to which he or she perceives potential risk arising from opportunistic behavior by online retailers (uncertainty). Based on data collected from 367 online shoppers, we found the conceptual model to receive strong support.

The organization of this paper is as follows. In the next section, we provide conceptual foundations to understand the role of infomediaries in electronic commerce. The following section develops a research model to be tested. We then present a detailed description of the research methodology, including scale development and data collection. The results of data analysis follow. The paper concludes with a discussion of the study's results, its limitations, and suggestions for future research.

## **Conceptual Foundations: Infomediaries in Net-enabled Commerce**

Markets consist of buyers, sellers, and various types of intermediaries that enable and/or enhance transactions between buyers and sellers. The study of intermediaries and their role in economic exchange in providing value-added services along the value chain is called market microstructure (Spulber, 1996). Intermediaries have existed as long as there has been commerce. Spulber (1996) defines an intermediary as "an economic agent that purchases from suppliers for resale to buyers or that helps buyers and sellers meet and transact." He outlines four important actions of economic intermediaries as (1) setting prices and clearing markets, (2) providing liquidity and immediacy, (3) coordinating buyers and sellers, and (4) guaranteeing quality and monitoring performance. In a similar vein, Brousseau (2002) outlines four roles of intermediaries that include (1) an information role to match potential buyers and sellers, (2) a logistics role in which intermediaries may hold inventory and transport goods to facilitate a transaction, (3) a security role in which the intermediary helps limit the impact of information asymmetries that can lead to adverse selection and moral hazard problems, and (4) the provision of insurance and liquidity services to lessen the problem that buyers and sellers do not know up front what the supply and demand will be in the market.

The role of intermediaries in the online marketplace is much different from their role in the physical world because online intermediaries are able to quickly and economically connect buyers and sellers to one another, provide vast search capabilities to either party, and offer sophisticated decision support capabilities based on extensive historical data about different entities in the market (Bakos, 1998). Grover and Teng (2001) distinguish between physical intermediaries and online infomediaries by noting that infomediaries tend to focus on information-based services and may not be equipped to take possession of the goods or to provide physical logistics services. Therefore, while offline intermediaries may exist in any of three different marketing channels that include communication channels, transaction channels, and distribution channels (Peterson et al., 1997), new online infomediaries are intermediaries that are more likely to leverage the digitization of online commerce by providing their services within the communications channel.

At the same time, however, the Internet allows customers to go directly to manufacturers or to their favorite online retailer, thus bypassing certain intermediaries and their services. For example, the success of the Dell direct model has locked in many corporate clients and individual customers despite the commoditization of the PC market (Magretta, 1998). Clay et al. (2001) studied the online book industry and concluded that the dominance of a small number of online retailers indicates that "many consumers may not be engaging in search, despite its low cost and significant payoff." Bockstedt et al. (2006) suggest

that an artist-led transformation is occurring in the recorded music industry in which well-known artists are able to bypass the traditional music labels and take their creations directly to the consumer over the Internet. If specific sellers are able to generate such loyalty in the online marketplace, then the services provided by new infomediaries may not be perceived as valuable to many potential users. Wareham et al. (2003) show that in the online business-to-business context, profitability of an intermediary is closely linked to the extent to which it provides both information-based and physical-based services. Therefore, the ability to convince potential users of the value of their services is critical if infomediaries are to establish themselves as profitable ventures.

Although infomediaries can accomplish all of the tasks of traditional intermediaries described above, the Internet and digitization are better suited to certain tasks than to others. Some Internet-based intermediaries such as Amazon.com and 1-800-Flowers.com act as online retailers and perform all four of Spulber's (1996) tasks, including setting prices, allowing for immediate purchases, arranging shipments between the product source and the end customer, and guaranteeing consumer satisfaction. In this paper, we are interested in the role of infomediaries that focus on information-based services rather than on physical-based services such as storage and transportation. Specifically, Grover and Teng (2001) define "generic agents" as a type of online infomediary that maintains open relationships with both buyers and sellers and involves no relationship-specific investment on either side of the transaction. These unbiased infomediaries, such as Bizrate.com and Shopping.com, provide matching and decision support services to buyers; however, the final purchase decision including vendor, source, logistics, and terms of purchase is up to the buyer and supplier. These infomediaries essentially fill the last two roles defined by Spulber (1996) by providing buyers with a list of potential suppliers and then providing information to aid in their decision making among the suppliers. In other words, an online shopper can save time and effort in his or her online shopping (efficiency benefits), and make more informed decisions when shopping online (effectiveness benefits). As such, this study suggests that infomediaries offer two major types of utilitarian benefits to online customers, namely, perceived efficiency and perceived effectiveness.

## **Development of Research Model and Hypotheses**

### ***The Technology Acceptance Model***

#### **TAM and Infomediary**

Since its introduction more than a decade ago (Davis, 1989; Davis et al., 1989), TAM has received a great deal of attention among IS researchers in their efforts to predict and explain user acceptance of information technology (IT). Numerous empirical studies have validated the efficacy of this model, and TAM is widely considered a "robust, powerful, and parsimonious model" for predicting and explaining user acceptance of a new IT (Venkatesh and Davis, 2000). TAM theorizes that a belief structure consisting of two salient beliefs—perceived usefulness and perceived ease of use—largely determines an individual's intention to accept a new IT, which in turn influences the acceptance of the IT (Davis, 1989; Davis et al., 1989). According to TAM, perceived usefulness is defined as "the extent to which a person believes using a system will enhance job performance" and perceived ease of use as "the extent to which a person believes that using the system will be free of effort" (Venkatesh and Davis, 2000).

Although TAM has normally been applied to diverse work-related organizational and nonorganizational contexts, researchers have recently used the model to explain a variety of consumer behaviors within the context of B2C net-enabled commerce. The behaviors addressed include the intended use of B2C e-commerce sites (Gefen et al., 2003), intention to return to an online retailer (Koufaris, 2002), satisfaction with the B2C online channel (Devaraj et al., 2002), and the extent of online purchasing (Lee et al., 2001). Similarly, we postulate that TAM can be used to predict and explain consumer acceptance of online infomediaries; that is, the TAM-based antecedents of perceived usefulness and ease of use are expected to play an important role in predicting and explaining consumer acceptance of infomediaries.

### **Controversy over the Dimensionality of Perceived Usefulness**

In his work on the development of TAM, Davis (1989) explained that the perceived usefulness construct was originally conceptualized based on the definition of the word useful as being “capable of being advantageous.” He added that, since enhancing their performance is of key interest to people within an organizational context, an IS that a user perceives to be useful is one that he or she believes will provide a positive use-performance relationship. However, the original conceptualization (and accordingly operationalization) of the perceived usefulness construct might be too broad, at least in some contexts, because one’s job performance can be enhanced in many ways by using an IS (Moore and Benbasat, 1991).

For example, the original scale of perceived usefulness—which was developed through Campbell and Fiske’s (1959) multitrait, multimethod (MTMM) technique and exploratory factor analysis in a study by Davis et al. (1989)—consists of the following six items:

using XYZ (an IS) in my job would enable me to accomplish tasks more quickly,  
using XYZ would improve my job performance,  
using XYZ in my job would increase my productivity,  
using XYZ would enhance my effectiveness on the job,  
using XYZ would make it easier to do my job, and  
I would find XYZ useful in my job.

Segars and Grover (1993) later attempted to validate this scale by using the contemporary confirmatory factor analysis technique, and they empirically showed that the first item of the original scale did not converge properly with other items. Furthermore, the remaining five items lacked evidence of unidimensionality. Segars and Grover suggested that to help alleviate these problems, it would be necessary to respecify the model so that the perceived usefulness construct is split into two distinct constructs of usefulness and effectiveness. Meanwhile, disagreeing with Segars and Grover (1993), Chin and Todd (1995) argued that the dimensionality of perceived usefulness should be evaluated on the basis of a priori theory rather than on mere statistical results. Overall, the discussion mentioned previously leads us to realize that researchers should be careful in conceptualizing (and operationalizing) the concept of perceived usefulness in a new research context. Otherwise, they risk encountering the problems caused by the variety of notions that perceived usefulness represents in a new environment.

## **Two Factors of Extrinsic Benefits**

As we discussed in the previous section, we posit that generic agent infomediaries (e.g., Bizrate.com, Shopping.com, or Yahoo! Shopping) in B2C e-commerce essentially fill the last two roles defined by Spulber (1996) by providing a list of online retailers for each product type and then providing information to aid shoppers' decision making in selecting a retailer from this list. More specifically, infomediaries not only list online retailers for a specific product category, but they also often reveal price information for the product at each of the online stores listed and rate each vendor on such attributes as on-time delivery and customer support. Such services should be useful to shoppers in comparing retailers and in choosing one that best meets their shopping objectives. Without such value-added services, selecting a particular retailer from a list of numerous retailers would be an enormous task for many consumers.

In fact, the two distinct types of value offered by infomediaries are comparable with Holbrook's (1994) two-dimensional view of utilitarian function. In his classification of customer value, Holbrook (1994) categorized extrinsic value into two components: efficiency and excellence. Efficiency is acquired through the saving of the time and effort required for an actual encounter with a product/service. On the other hand, excellence, which is a reactive value, results from a careful evaluation of the quality of a product/service in relation to one's needs/wants. In both offline and online shopping contexts, empirical evidence confirmed that consumers indeed evaluate their own shopping experiences in terms of these two distinct values (Mathwick et al., 2001).

In a recent study, Häubl and Trifts (2000) conducted a controlled experiment to investigate the value of online interactive decision aids and showed that recommendation screening mechanisms can provide efficiency benefits by lowering the effort required to screen multiple alternatives down to a manageable size. Furthermore, they showed that comparison decision aids can provide effectiveness benefits to users by helping them make better purchasing decisions. This work corroborates that the perceived benefits of using online infomediaries can be broken down into perceived efficiency benefits related to search activities and perceived effectiveness benefits related to purchase decision making.

Similarly, we propose that there are two conceptually distinct, but closely related, dimensions of perceived usefulness for consumers using an infomediary: reduced consumer search costs and assistance in making more informed decisions. To connote the distinct nature of the benefit of using infomediaries in online shopping, the two dimensions are labeled perceived efficiency and perceived effectiveness, respectively.<sup>2</sup> Perceived efficiency is defined as the extent to which an online shopper believes using an infomediary can save time and effort in his or her online shopping, and perceived effectiveness is defined as the extent to which an online shopper believes that using an infomediary would enable him or her to make more informed decisions when shopping online. Given that reducing search costs (efficiency) by using an infomediary does not necessarily lead to more informed decisions (effectiveness) in online shopping, and vice

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<sup>2</sup> Consistent with prior studies based on TAM, these two dimensions of perceived usefulness in this study represent beliefs about the outcomes associated with performing a behavior by using a system ("behavioral beliefs") rather than beliefs about a system itself ("object-based beliefs"). Wixom and Todd (2005) provide an excellent discussion about the two distinctive types of beliefs used in prior studies on technology acceptance and user satisfaction.

versa, we believe that the extant single-dimensional view of the perceived usefulness construct in TAM should be broadened to a two-dimensional view in the case of online shopping via infomediaries. Furthermore, this two-dimensional view would allow us to propose that each of the dimensions has a relationship with other variables in our research model of adoption of infomediaries.<sup>3</sup>

### **Research Hypotheses**

Ample evidence exists for the positive paths that TAM theorizes, including the links from perceived ease of use to perceived usefulness, from perceived ease of use to intention to adopt a new IS, and from perceived usefulness to intention to adopt a new IS. Because, in the case of infomediaries, we conceptualize the perceived usefulness construct in TAM with a two-dimensional view consisting of perceived efficiency and perceived effectiveness, we can construct the following hypotheses:

- H1: Perceived efficiency will have a positive influence on an online shopper's intention to adopt online infomediaries.
- H2: Perceived effectiveness will have a positive influence on an online shopper's intention to adopt online infomediaries.
- H3: Perceived ease of use will have a positive influence on an online shopper's intention to adopt online infomediaries.
- H4: Perceived ease of use will have a positive influence on the perceived efficiency of using online infomediaries.
- H5: Perceived ease of use will have a positive influence on the perceived effectiveness of using online infomediaries.

### ***Determinants of the Benefits of Using Infomediaries***

Scholars in the economics of intermediation recognize their analysis "as having the roots in the work of Ronald Coase (1937) and Oliver Williamson (1975), who have identified the importance of transaction costs in shaping the organization of firms" (Spulber 1996, p. 136). That is, the theoretical framework—what is known as transaction cost analysis (Coase, 1937; Williamson, 1975)—offers useful conceptual guidance in understanding the role of an intermediary in economic exchanges. In this sense, it seems natural to turn our attention to the theoretical reasoning of TCA. Specifically, we found that TCA is particularly useful to identify two major determinants—asset specificity and uncertainty—of the benefits of using infomediaries.

#### **Asset Specificity**

Since its inception, the framework of transaction cost analysis has been used to explain a variety of social and economic phenomena, ranging from marriage to vertical integration, corporate finance, financial markets, marketing channel relationships, franchising, regulation, and international trade (Rindfleisch and Heide, 1997; Shelanski and Klein, 1995). Williamson (1985) indicated that any economic and social phenomena that can be formulated directly or indirectly as a contracting problem has the potential to be investigated using the TCA framework.

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<sup>3</sup> Empirical support for the distinctiveness of the two dimensions will be provided subsequently.

TCA has recently received increased attention as a well-grounded theory that is particularly useful for understanding online consumer behavior in the context of B2C net-enabled commerce (Steinfeld and Whitten, 1999). For instance, Liang and Huang (1998) successfully applied TCA to investigate what types of products are more suitable for purchase through the B2C online channel. Devaraj et al. (2002) developed and empirically tested a framework of consumer satisfaction and preference in the B2C shopping channel by incorporating constructs from TCA as well as from TAM and Service Quality (SERVQUAL). In a more recent study, Teo et al. (2004) applied the TCA framework to identify factors that influence consumers' perceived transaction costs associated with online shopping.

Following the reasoning mentioned earlier, we postulate that the determinants of transaction costs, such as asset specificity, uncertainty, and frequency, as originally proposed in the theoretical work of TCA, are key determinants of the two dimensions of perceived usefulness in the use of infomediaries.<sup>4</sup> Specifically, the two TCA-based constructs of asset specificity and uncertainty are incorporated in our research model as key determinants of perceived efficiency and/or effectiveness. Frequency was not included as a key determinant in this study because previous empirical studies based on the TCA framework gave little evidence that it has a major role as a determinant (Devaraj et al., 2002; Rindfleisch and Heide, 1997).

**Asset specificity** refers to the extent to which the value of an investment made by a transacting party, such as a firm or an individual, is specific to the relationship with the other party (Malone et al., 1987; Williamson, 1985). The value of a transaction-specific investment is significantly lower when employed in alternative uses. A variety of types of asset specificity have been identified, including site specificity, physical asset specificity, and human asset specificity (Dyer, 1996; Williamson, 1991). Site specificity deals with the degree to which successive production stages that are assumed to be immobile are located close to one another to economize on inventory and transportation costs and to improve coordination. Physical asset specificity refers to the extent of the investment in specialized physical capital (e.g., customized machinery, tools) of a transaction-specific kind. Human asset specificity refers to the extent that the accumulated know-how of a transacting party (or its personnel) is specific to another party in a transaction relationship. Safeguarding these various types of asset specificity is a primary objective of an economic entity in its choice of a transaction mode from among alternatives.

Though the three components of asset specificity are considered important in traditional offline business-to-business transactions, all of them are not necessarily relevant in the new online business-to-consumer context that is our particular interest. Specifically, the extent to which an online retailer's physical address disclosed in its website is close to online customers (i.e., site specificity) is not considered particularly important in determining online customers' transaction decisions. In addition, unlike organizations, online shoppers are relatively free from physical investments that are specific to a certain online retailer. In contrast, human assets—which represent, more or less, an

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<sup>4</sup> While some previous research such as Venkatesh and Davis (2000) has attempted to extend the TAM model by incorporating constructs drawn from social influence processes (i.e., subjective norm, voluntariness, and image) and cognitive instrumental processes (i.e., job relevance, output quality, and result demonstrability) as the determinants of perceived usefulness, we felt that those determinants are not suitable for this study because they have been identified primarily in the consideration of information systems whose main objective is to enhance job-related performance.

intangible facet of capital—continue to play an important role in the online business-to-consumer environment. This soft form of investment is made by online customers typically in the form of providing detailed personal profiles, learning how to navigate and use the specific shopping site, or in building relationships with other customers by participating in community aspects of the provider's site. In fact, of the three types of asset specificity, human asset specificity has received the most attention in both empirical and conceptual studies based on the TCA framework (Lohita et al., 1994; Rindfleisch and Heide, 1997). Thus, this article focuses on human asset specificity (e.g., setting up an account, learning procedures) as the representative concept of asset specificity.

The effort that an online shopper has previously put into a transaction with a particular retailer—termed asset specificity of an online consumer in this study—is expected to play an important role in valuing the service infomediaries provide when they list online retailers for each product type (i.e., efficiency benefits). In general, shoppers will perceive value from such a listing because otherwise they would need to search the Internet to locate potential retailers by themselves. However, customers with highly transaction-specific investments in a particular online retailer are not expected to perceive much value from the list of online retailers given by infomediaries for each product type unless additional rating information on the retailers is given. Although those customers are given a chance to view a list of competing retailers, they will likely return to their incumbent retailer if the infomediary did not provide the information necessary to determine whether competing retailers are superior to the one in which they have already made transaction-specific investments. This is especially the case given that transaction-specific investments made by a customer will increase costs associated with switching (a.k.a. switching cost) to other sellers of a product, which makes the customer stay with an incumbent seller (Burnham et al., 2003). In this sense, customers with highly transaction-specific investments in a particular online retailer will perceive that infomediaries that simply provide a list of competing retailers increase their time and effort associated with online shopping. We therefore expect that asset specificity should have a negative impact on the perceived efficiency dimension of perceived usefulness from using online infomediaries. Therefore, we can formally propose the following:

H6: Asset specificity of an online consumer will have a negative influence on perceived efficiency of using online infomediaries.

However, shoppers' transaction-specific investments in a particular retailer appear to have little influence on how they value information that infomediaries provide to assist them in rating attributes of online retailers such as price, on-time delivery, and customer support (i.e., effectiveness benefits). Such information may lead online shoppers to switch to a competing retailer, although they have already invested a certain amount of time and effort in transactions with a specific retailer. If this is the case, because of their informed shopping experience, online shoppers are expected to perceive much value from infomediaries in terms of effectiveness. On the other hand, it also is possible that such information may have little value for shoppers who have been satisfied to a great extent with an online retailer in which they have made transaction-specific investments. Because no well-grounded reasoning is found to propose a directional hypothesis, we do not hypothesize a relationship between asset specificity and the effectiveness dimension of perceived usefulness from using infomediaries.

## **Uncertainty**

Along with asset specificity, **uncertainty** is regarded as a critical dimension for characterizing the governance of transactions for an exchange party (Williamson, 1979; 1985). Environmental and behavioral uncertainties have been proposed as two major types of uncertainty in the theoretical work of TCA (Rindfleisch and Heide, 1997). Uncertainty can originate either from the broad environment surrounding an economic exchange between parties (i.e., environmental uncertainty) or from transaction partners within exchange relationships because of these partners' opportunistic behavior (i.e., behavioral uncertainty). According to Rindfleisch and Heide (1997), both types of uncertainty have been widely used in previous empirical studies using the TCA framework. Similarly, within the context of B2C electronic commerce, Pavlou (2003) indicates that online shoppers may be uncertain because they perceive that the Internet environment has too few legal and technological assurances (e.g., environmental uncertainty) and/or that online retailers are opportunistic (e.g., behavioral uncertainty). Behavioral uncertainty appears to have received a great deal of attention as the more relevant form of uncertainty in online shopping (e.g., (Devaraj et al., 2002; Liang and Huang, 1998)). This form of uncertainty increases consumers' transaction costs in purchasing products online; the higher transaction costs, in turn, have a negative impact on consumers' overall satisfaction with online shopping (Devaraj et al., 2002).

While TCA assists us in identifying the primary sources (broad transaction environment vs. transaction partners) of uncertainty, it appears that no universal definition exists for the uncertainty construct itself in the extant literature. For instance, uncertainty is often defined as a probability of loss from a transaction (Bauer, 1960; Peter and Ryan, 1976; Taylor, 1974). In this sense, several researchers have often equated uncertainty with the notion of perceived risk (Bauer, 1960; Taylor, 1974). Another stream of research often views uncertainty as lack of information needed to make a decision about a future event or transaction (Brindley and Ritchie, 2004; Downey and Slocum, 1975; Rowe, 1977), or as the difference between the information needed to make a decision and the information at hand (Galbraith, 1977; Lamberti and Wallace, 1990).

We conceptualize uncertainty by incorporating (1) a probability of loss; and (2) behavioral uncertainty. Specifically, uncertainty in this study refers to an online shopper's perception of the possibility of having undesirable outcomes (i.e., probability of loss) because of his or her inability to monitor and evaluate the performance of online vendors (i.e., behavioral uncertainty). We chose behavioral uncertainty over environmental uncertainty in this study because the primary type of uncertainty that infomediaries strive to reduce originates from the opportunistic behavior of online retailers (e.g., price and quality of products, on-time delivery, customer support, etc.) rather than from the broad institutional environment of the Internet. We also conceptualized uncertainty as a probability of loss because shoppers' ultimate concern is the potential loss from transacting with an online retailer rather than lack of information needed to shop for a product from the online retailer.

It is reasonable to expect that as consumers perceive a high level of uncertainty, which refers to extensive potential risk arising from opportunistic behavior by online vendors, they are more likely to seek information necessary to make informed decisions. Infomediaries seem to play a crucial role by reducing the time and effort (efficiency) associated with searching for the information that helps online shoppers choose the best vendor (effectiveness) by rating vendors on certain attributes such as on-time delivery

and customer support. In particular, those customers whose perceptions make them most uncertain about online transactions will be more likely to value the efficiency and effectiveness associated with using infomediaries. This leads to our final two hypotheses as follows:

- H7: Uncertainty will have a positive influence on the perceived efficiency of using online infomediaries.
- H8: Uncertainty will have a positive influence on the perceived effectiveness of using online infomediaries.

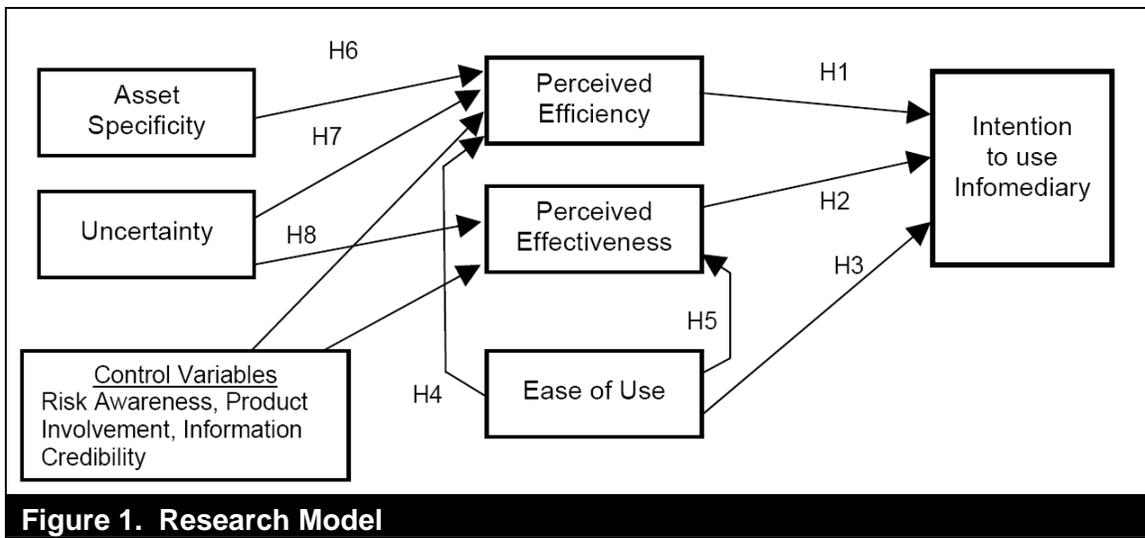
**Control Variables**

We added three control variables that are expected to influence the two dimensions of perceived usefulness. Risk awareness and information credibility are considered two important criteria in evaluating the usefulness of information provided by infomediaries and were added to the research model as antecedents of the two dimensions of perceived usefulness. Risk awareness refers to the extent to which information about online retailers increases an online shopper’s awareness of both the positive and negative aspects of the consequences of online transactions with these retailers. Information credibility refers to an online shopper’s perception of the credibility of information from infomediaries. Finally, given the findings of prior empirical studies (e.g., (Koufaris, 2002; Venkatesh and Davis, 2000)), product involvement, which refers to an online shopper’s interest in a specific category of products, was added as the third control variable. Incorporating these control variables into our research model allowed us to control their effects in examining the causal relationships between theoretical variables. However, no research hypotheses associated with the controls were explicitly developed because our primary focus in this study is on the theoretical variables described earlier.

A summary of the research constructs is presented in Table 1 and the proposed research model is depicted in Figure 1.

<b>Table 1. Summary of Research Constructs and Hypotheses</b>		
Construct	Theoretical Base	Related Hypotheses
Perceived Efficiency	Intermediation Theory, TAM	H1: Perceived Efficiency → Intention to Use (+)
Perceived Effectiveness	Intermediation Theory, TAM	H2: Perceived Effectiveness → Intention to Use (+)
Ease of Use	TAM	H3: Ease of Use → Intention to Use (+) H4: Ease of Use → Perceived Efficiency (+) H5: Ease of Use → Perceived Effectiveness (+)
Asset Specificity	TCA	H6: Asset Specificity → Perceived Efficiency (-)
Uncertainty	TCA	H7: Uncertainty → Perceived Efficiency (+) H8: Uncertainty → Perceived Effectiveness (+)
Intention to Use	TAM	

Note: TCA = Transaction cost analysis, TAM = Technology acceptance model



## Research Methodology

### *Instrument Development*

We adapted existing scales that were proven reliable and valid measures from previous studies to this study wherever possible. We adapted previously validated TAM scales from Venkatesh and Davis (2000) and Pavlou (2003) for measuring the two constructs of ease of use and intention to use. These TAM scales have been applied successfully to empirical studies carried out within the context of B2C net-enabled commerce (Devaraj et al., 2002; Gefen et al., 2003; Koufaris, 2002; Pavlou, 2003).

We used caution in developing the scales for perceived efficiency and perceived effectiveness. After a closer examination of existing scales for the TAM construct of perceived usefulness and similar constructs, we developed three- and four-item scales to measure perceived efficiency and perceived effectiveness, respectively. It was found that because of the broad conceptualization of the perceived usefulness construct in TAM, many empirical studies on TAM tended to operationalize the construct with items measuring both efficiency- and effectiveness-oriented benefits (Davis, 1989; Gefen et al., 2003; Moon and Kim, 2001). We developed the scale for perceived efficiency in this study primarily on the basis of the measure for the time efficiency construct in Devaraj et al. (2002) and on the efficiency-oriented measure of the perceived usefulness construct in prior studies on TAM (Davis, 1989; Gefen et al., 2003). The scale for the perceived usefulness construct in Devaraj et al. (2002) appears to coincide closely with our conceptualization of the perceived effectiveness construct and we consequently adapted it to this study to measure the construct.

We developed our own four-item scale for asset specificity. Rather than tapping into each portion of the multifaceted nature of the construct (e.g., setting up an account, learning procedures, building relationships with other customers, etc.), we operationalized the concept globally so that the four items can be reflective of the concept of asset specificity. We measured uncertainty with four items adapted from scales in prior studies (e.g., (Gefen, 2002; Jarvenpaa et al., 1999)) that can closely

capture the notion of uncertainty proposed in our study. Finally, we measured information credibility with three items adapted from McKinney et al. (2002) and Bobinski et al. (1996); product involvement with three items adapted from Beatty and Talpade (1994); and risk awareness with three items adapted from Jarvenpaa et al. (1999).

Except for information credibility, we measured all constructs on seven-point Likert scales, ranging from 1 (strongly disagree) to 7 (strongly agree). Several IS faculty members and doctoral students reviewed the initial version of the survey instrument with emphasis on the content validity and on the clarity of instructions. Their feedback was used to modify the instrument, and this newer version was used to conduct pilot tests on a small number of subjects ( $n = 36$ ) drawn from the same sample frame used for the main survey described here in succeeding paragraphs. Subjects in the pilot test were asked to comment on the clarity of the instructions and questions and on the length of the questionnaire. Based on their feedback, we deemed the questionnaire ready to be used for the main data collection. Scales for all key research variables of this study are listed in Appendix A.

### ***Data Collection Procedure and Sample Characteristics***

We administered an online survey questionnaire to actual online shoppers as a field study to empirically test the proposed research model. We chose Bizrate.com as the specific context for this study because it has consistently been rated among the most popular infomediary sites in B2C online shopping (King, 1999; Times, 2002). Since actual users of online firms are difficult to recruit because of the firms' reluctance to cooperate in a research project that may interrupt customers in their shopping or use of the site (Koufaris, 2002), we decided to simulate the online shoppers' experience of the Bizrate.com site.

We designed the survey questionnaire with three main sections. First, subjects were asked to provide a single kind of product that they are most likely to purchase online in the next twelve months and answer questions related to measuring several key research constructs (e.g., asset specificity, uncertainty) with respect to online retailers selling the product they have chosen. The types of products for which they chose to answer the questions are listed in Appendix B. Next, they were instructed to visit and browse the Bizrate.com website to choose a particular online retailer from whom they would like to purchase the product they had chosen. Last, they were asked to provide an online retailer that they had chosen based on the information provided by Bizrate.com and to complete the remainder of the questionnaire that contained measures for other key research constructs (e.g., perceived efficiency, perceived effectiveness, ease of use, risk awareness, information credibility, and intention to use) and demographic information.

Both current and potential online shoppers were the population of interest in this study because they are generally targeted customers of infomediaries such as Bizrate.com. The sampling frame was drawn from panel members of an online market research firm. All of the panel members were Internet users, and the Web-based survey was administered to collect data necessary for testing the research model proposed in this study. The online market research firm sent an invitational e-mail to its 2,000 panel members nationwide to solicit their participation in a Web-based survey that was designed to collect data about their experiences in using Bizrate.com. Each panel member received a unique identification number in the invitation e-mail message and was asked to provide the number when completing the survey questionnaire.

Of the 2,000 panel members who received the invitation, 392 completed and submitted the online survey, yielding a response rate of 19.6%. Of the 392 responses, 21 were discarded because the respondents were unable to proceed to the last section of the questionnaire, as Bizrate.com did not list the products they would be interested in purchasing. Four more responses were discarded because the same identification number was found in responses submitted earlier. This resulted in a dataset of 367 usable and valid responses, yielding an effective response rate of 18.4%.

The final data set consisted of 186 men (50.1%) and 181 women (49.9%); their average age was 36. Most respondents (n = 355) had prior experience in purchasing products online. The remainder of the respondents could be classified as potential shoppers because all respondents in the sample indicated that they browse or search the Internet for any product/service: less than once per week (n = 65), 1 to 2 times (n = 101), 3 to 4 times (n = 60), 5 to 6 times (n = 53), 7 to 10 times (n = 43), 11 to 20 times (n = 17), and more than 20 times (n = 28). The average amount spent online during the past six months was \$651. The profile of the respondents closely matched that of online shoppers reported in recent studies (Cimino, 2001; UCLA Internet Report 2003), which led us to believe that our sample closely represents the population of online shoppers. Respondents chose from among a variety of product types in searching for an online vendor (see Appendix B). These types of products have also been reported as being among the most popular products bought by online shoppers (UCLA Internet Report 2003).

## **Analysis and Results**

We followed the two-step approach recommended by Anderson and Gerbing (1988) to first assess measurement quality, and then to test the research hypotheses. Specifically, we estimated a measurement model, without imposing any structural constraints, to assess the measurement properties of the constructs under a confirmatory factor analysis approach. Subsequently, we estimated a structural model. Its structural constraints were based on hypothesized relationships proposed in the research model. The correlation matrix, means, and standard deviations of the items used as input data in the Lisrel estimation are shown in Appendix C.

### ***Measurement Model***

A nine-factor measurement model was set up to validate our measures under a confirmatory factor analysis approach. Each item was restricted so that it could only load on its prespecified factor, but the factors themselves were allowed to freely correlate. We estimated the measurement model by analyzing the covariance matrix using the LISREL8 program (Jöreskog and Sörbom, 1996). Although the chi-square statistic ( $\chi^2 = 591.16$ , degree of freedom (df) = 369,  $p < 0.01$ ) of the measurement model is significant, thereby suggesting a lack of fit, the analysis of the various overall fit indices indicates the model is a reasonable fit for the data ( $\chi^2 / df = 1.60$ , goodness-of-fit index (GFI) = .90, adjusted goodness-of-fit index (AGFI) = .88, root mean square error of approximation (RMSEA) = .041, comparative fit index (CFI) = .99, standardized root mean square residual (SRMR) = .028, and normed fit index (NFI) = .97). As presented in Table 2, all item loadings between an indicator and its posited underlying construct factor were large and significant. These results, coupled with t-values greater than 16.23, suggest the convergent validity of our measures.

<b>Table 2. Reliability Tests and Item Loadings</b>				
Factor	Composite Reliability	Item	Standardized Loading	t-value
Intention to Use	.98	INT1	.96	25.06*
		INT2	.98	26.03*
		INT3	.97	25.67*
Perceived Efficiency	.95	EFC1	.96	25.07*
		EFC2	.96	24.72*
		EFC3	.87	20.84*
Perceived Effectiveness	.96	EFT1	.93	23.52*
		EFT2	.95	24.53*
		EFT3	.89	21.82*
		EFT4	.92	22.94*
Ease of Use	.95	EOU1	.88	21.16*
		EOU2	.93	23.47*
		EOU3	.96	24.59*
		EOU4	.90	22.31*
Asset Specificity	.89	AS1	.88	20.42*
		AS2	.74	16.23*
		AS3	.95	22.99*
Uncertainty	.90	UNC1	.85	19.24*
		UNC2	.87	20.31*
		UNC3	.83	19.06*
		UNC4	.87	17.98*
Risk Awareness	.96	RA1	.92	23.05*
		RA2	.96	25.03*
		RA3	.95	24.44*
Information Credibility	.94	IC1	.92	22.66*
		IC2	.94	23.43*
		IC3	.90	22.16*
Product Involvement	.91	PI1	.76	16.87*
		PI2	.97	24.98*
		PI3	.74	23.65*

\* $p \leq .001$

To assess the discriminant validity of the constructs, we set up a two-factor measurement model for each pairwise combination of two constructs; measures of each construct were restricted to load only on their corresponding construct. Using a chi-square difference test, we compared each of the unconstrained measurement models with a constrained model in which the correlation between the two constructs was set to equal 1 (Anderson and Gerbing, 1988; Venkatraman, 1989). We found all of the chi-square difference tests to be significant ( $p < .001$ ), indicating that any two constructs in this study could not be combined into a single factor (see Appendix D). In addition, we computed the square root of average variance extracted (AVE) for each construct and compared it with the correlations between the construct and other constructs (Barclay et al., 1995; Chin, 1998). As shown in Table 3, we found the square root of the AVE (diagonal elements) to be larger than the correlations (off-diagonal elements) between

the constructs. Taken together, these results confirmed that our scales demonstrate adequate discriminant validity.

Finally, we assessed the composite construct reliabilities, and the results, as shown in Table 2, offered strong evidence for the measurement reliability property for all constructs. The minimum level of 0.89 in the results is greater than the commonly accepted cutoff value of .70 (Gefen et al., 2000). Correlations between research constructs and descriptive statistics of the constructs are reported in Table 3.

<b>Table 3. Descriptive Statistics and Construct Correlation Matrix</b>												
	Mean	SD	1	2	3	4	5	6	7	8	9	
1. Product Involvement	5.78	1.22	0.88									
2. Uncertainty	2.77	1.38	-0.04	0.84								
3. Asset Specificity	5.45	1.42	0.20	-0.06	0.86							
4. Perceived Efficiency	4.30	1.97	0.06	0.25	-0.12	0.93						
5. Perceived Effectiveness	4.48	1.78	0.09	0.15	0	0.85	0.92					
6. Ease of Use	5.57	1.38	0.15	-0.03	0.08	0.51	0.61	0.92				
7. Risk Awareness	3.72	1.71	0.01	0.21	0.06	0.42	0.53	0.32	0.95			
8. Intention to Use	4.66	1.85	0.06	0.15	-0.10	0.73	0.74	0.58	0.42	0.97		
9. Information Credibility	2.54	1.17	0.03	-0.16	0.05	0.26	0.39	0.50	0.23	0.38	0.92	

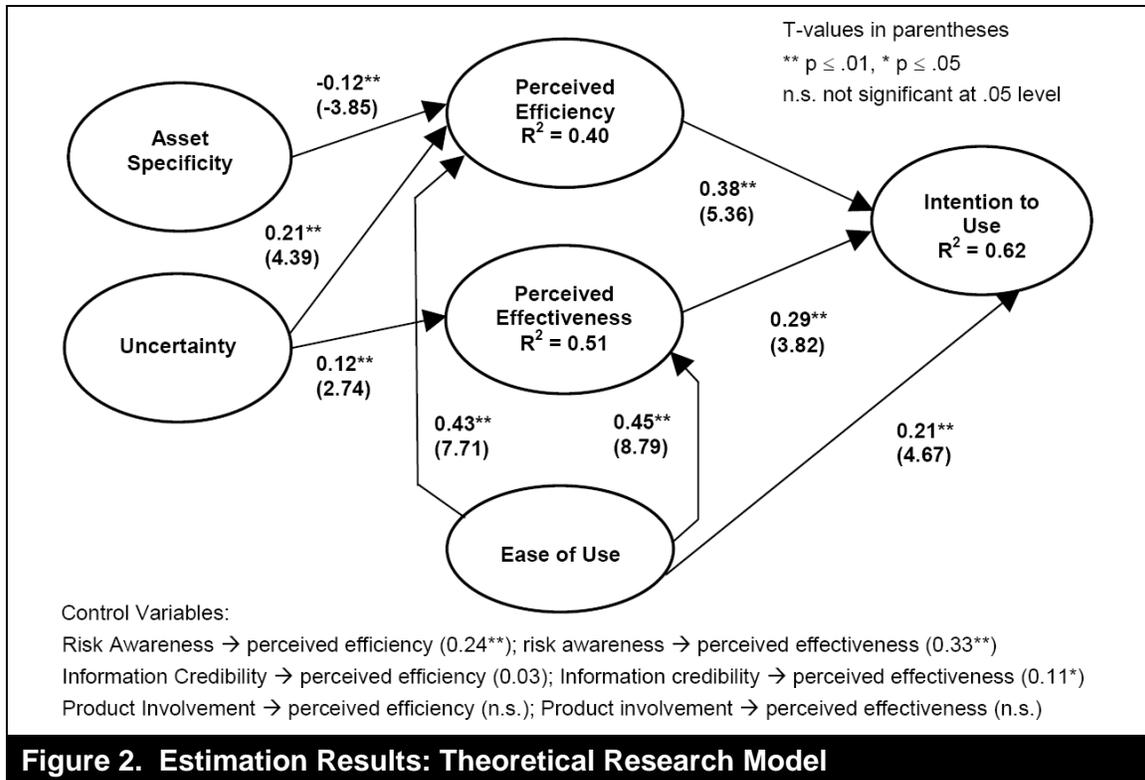
Notes: 1. SD = Standard deviations

2. Diagonal elements display the square root of average variance extracted (AVE)

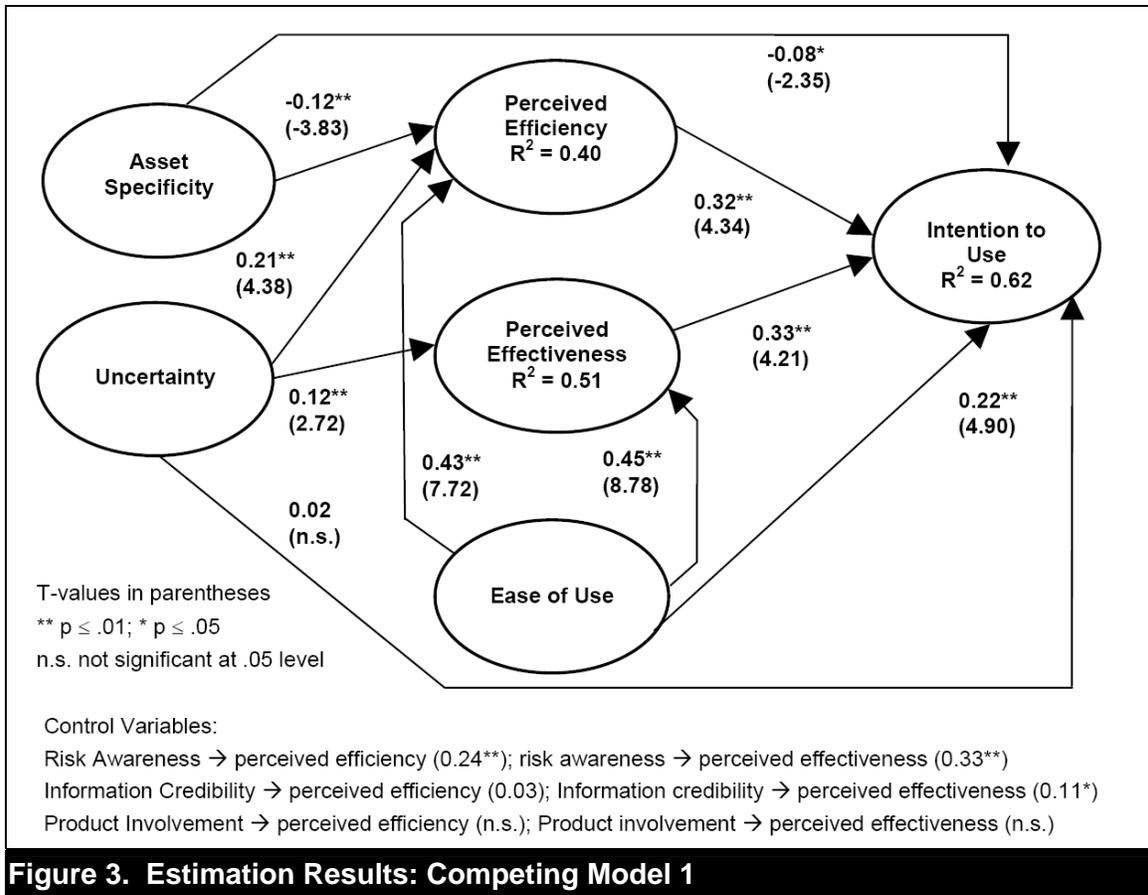
### **Structural Model**

As in the estimation of the measurement model, we used the LISREL program to analyze the research model depicted in Figure 1. We created a structural model by specifying asset specificity, uncertainty, ease of use, risk awareness, information credibility, and product involvement as exogenous constructs and perceived efficiency, perceived effectiveness, and intention to use infomediary as endogenous constructs. Corresponding to the hypothesized relationships in the research model, paths were specified from the exogenous to endogenous constructs and between endogenous constructs. Based on a high correlation but no causal relationship between the two dimensions of perceived efficiency and perceived effectiveness, error terms for the two constructs were allowed to freely correlate because this correlation did not significantly alter the structural parameter estimates (Fornell and Bagozzi, 1983). We fitted the structural model to the data, and analyzed the significance of coefficients on the paths to formally test our study hypotheses.

Although the chi-square statistic ( $\chi^2 = 603.85$ ,  $df = 375$ ,  $p < 0.01$ ) is significant, the analysis of various goodness-of-fit statistics indicates the overall acceptability of the structural model analyzed:  $\chi^2 / df = 1.61$ , GFI = .90, AGFI = .88, RMSEA = .041, CFI = .99, SRMR = .033, and NFI = .97. Figure 2 shows the results of the tests of the structural model, including standardized path coefficients, their t-statistics and their significance based on two-tailed t tests, and the amount of variance explained for endogenous constructs (R<sup>2</sup>). Approximately 62 percent of the variance is explained for intention to use, 40 percent for perceived efficiency, and 51 percent for perceived effectiveness. Based on the significance of the path coefficients, all research hypotheses are supported.



To further examine whether the subjective interpretation of the e-commerce transaction environment indirectly influences intention to use an infomediary through one's evaluation of the utilitarian benefits from using the infomediary, as we proposed in our theoretical model, we set up a competing model by introducing two plausible direct paths from TCA factors to intention to adopt (competing Model 1). In addition, we set up another competing model by adding a path from asset specificity to effectiveness (competing Model 2) so as to further support the two-dimensional view of the utilitarian benefits of using an infomediary. We then used the chi-square difference test to compare the fit of the theoretical model with each of the two competing models. We used this test because the theoretical model and competing models are nested. Competing Model 1 exhibited an acceptable level of fit to the data (see Table 4). Various goodness-of-fit statistics for the competing model were as follows:  $\chi^2 / df = 1.60$ , GFI = .90, AGFI = .88, RMSEA = .041, CFI = .99, SRMR = .031, and NFI = .98. However, the result of the chi-square difference test (difference in  $\chi^2 = 5.37$ ,  $df = 2$ , n.s.) indicated that the additional paths do not improve the model fit. This suggests that the theoretical research model is preferable to the competing model (Gefen et al., 2000). Figure 3 shows that, whereas the uncertainty-intention link is insignificant ( $\gamma = 0.02$ , n.s.), asset specificity has a direct effect on intention ( $\gamma = -0.08$ ,  $p < 0.05$ ). However, the effect of asset specificity on intention is relatively small, and the addition of the path does not add to the explained variance in intention. Thus, it is safe to conclude that, compared with competing Model 1, the proposed model represents reality equally well in a more parsimonious way—a desirable characteristic for a conceptual tool. As reported in Table 4, competing Model 2 also exhibited an acceptable level of fit to the data:  $\chi^2 / df = 1.61$ , GFI = .90, AGFI = .88, RMSEA = .041, CFI = .99, SRMR = .031, and NFI = .97. However, the result of the chi-square difference test (difference in  $\chi^2 = 2.35$ ,  $df = 1$ , n.s.) indicated that the additional paths do not improve model fit, again suggesting that the theoretical

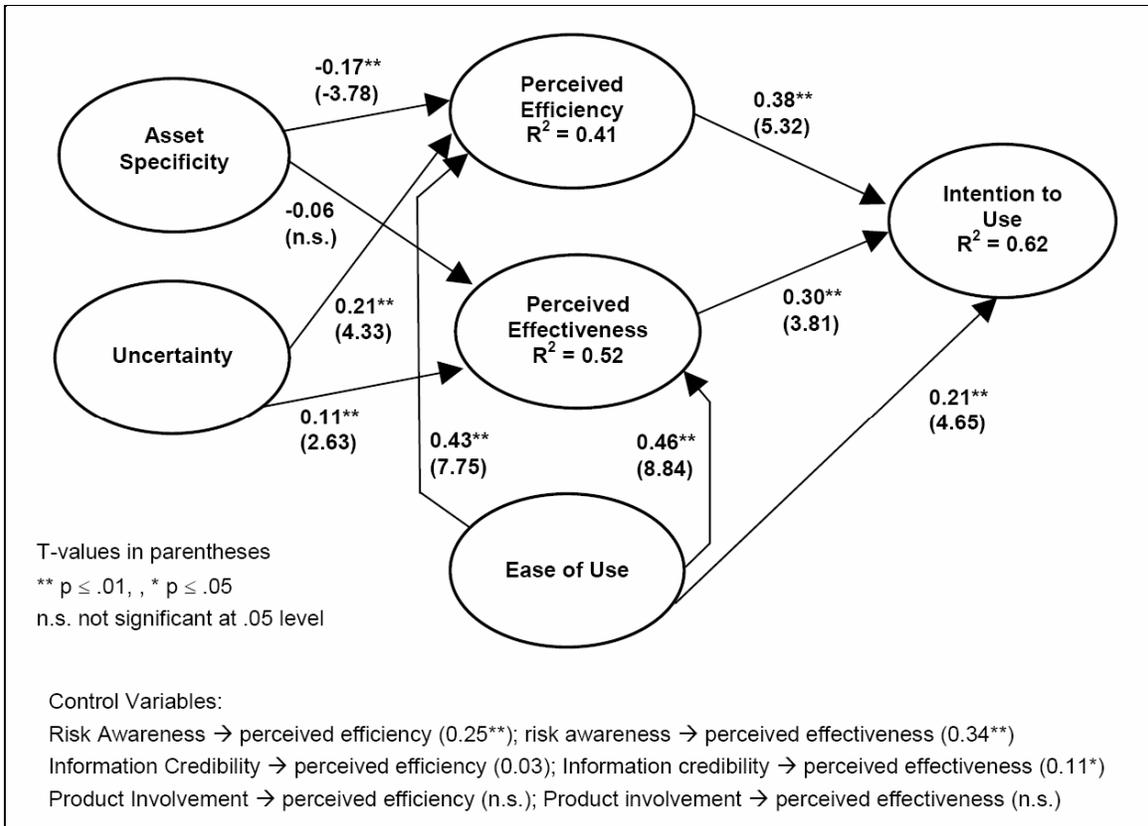


research model is preferable to the competing model (Gefen et al., 2000). The path from asset specificity to perceived effectiveness was not significant (see Figure 4). The results confirmed the two-dimensional view of the perceived usefulness construct in that the two dimensions of perceived efficiency and effectiveness are associated with different determinants.

We found that the two control variables, risk awareness and information credibility, have an important role in shaping online shoppers' beliefs about the usefulness of an infomediary. In particular, risk awareness was found to influence the two distinct types of perceived effectiveness and efficiency. On the other hand, information credibility was found to have a strong impact only on perceived effectiveness, providing additional evidence on the distinctiveness of the two types of utilitarian benefits. Contrary to our expectation, product involvement did not emerge as a strong factor in predicting the levels of perceived efficiency and effectiveness.

## Discussion and Conclusion

The objective of this study is to offer theoretical explanations for individuals' acceptance of an infomediary—a new form of net-enabled commerce application designed to link consumers and retailers on the Internet. Our findings indicate that, consistent with TAM, intention to use the infomediary is a function of perceived ease of use and utilitarian benefits. However, in this particular context of infomediary adoption, we found that two



**Figure 4. Estimation Results: Competing Model 2**

Fit Indices	Measurement Model	Original Model	Competing Model 1	Competing Model 2
$\chi^2$	591.16	603.85	598.48	601.50
df	369	375	373	374
$\chi^2/df$	1.60	1.61	1.60	1.61
CFI	.99	.99	.99	.99
GFI	.90	.90	.90	.90
AGFI	.88	.88	.88	.88
NFI	.97	.97	.98	.97
RMSEA	.041	.041	.041	.041
SRMR	.028	.033	.031	.031

Recommended thresholds for these fit indices are as follows: below 2.0 (Hair et al., 1998) or 3.0 (Gefen et al., 2000) for  $\chi^2/df$ ; above .90 for GFI and NFI (Gefen et al., 2000); above .95 for CFI (Hu and Bentler, 1999); above .80 for AGFI (Gefen et al., 2000); below .06 (Hu and Bentler, 1999) or .08 (Byrne, 1998) for RMSEA; below .05 (Gefen et al., 2000) or .08 (Hu and Bentler, 1999) for SRMR.

types of utilitarian benefits exist, namely, perceived efficiency and perceived effectiveness, and that each of them independently exerts a significant effect on behavioral intention. In addition, the TCA factors such as asset specificity and uncertainty play pivotal roles in shaping consumers' perceptions about the utilitarian

value of using the infomediary. Taken as a whole, this research indicates that the theoretical framework proposed in this study offers a useful conceptual tool to understand consumer acceptance of a new infomediary website.

### ***Implications of Findings***

#### **Perceived Efficiency and Perceived Effectiveness**

An important finding of this study is that perceived efficiency and perceived effectiveness are conceptually and empirically distinct. Supporting our conceptual argument, discriminant validity was successfully established between them, and different sets of antecedents were identified for each type of perceived usefulness. This finding contributes to the IS literature by showing that utilitarian benefits, which typically are referred to as “perceived usefulness,” require careful conceptualization and operationalization when applied to new contexts. This is especially true within the context of net-enabled infomediaries. We believe this is the first study in the IS domain to demonstrate that the utilitarian value of using information systems is not a single-dimensional concept, especially within the context of net-enabled infomediaries.

Our findings on the two distinct types of value also deserve particular attention among infomediaries who endeavor to better serve their customers. Rather than simply providing a list of online retailers for each product category, infomediaries should assist their visitors in choosing the online retailer that best meets their specific shopping needs. Online shoppers would appreciate such value-added services.

Although extrinsic value represents the most salient beliefs within the context of technology acceptance, intrinsic value, such as perceived enjoyment, also is known to be a significant determinant of intention to use an IT application (Childers et al., 2001; Davis et al., 1992; Koufaris, 2002; Venkatesh, 1999). Interestingly, Holbrook's (1994) taxonomy—which provides a theoretical account for the two distinct dimensions of utilitarian benefits—contends that intrinsic value can also be classified into two dimensions. According to Holbrook (1994), perceived enjoyment represents only an active aspect of intrinsic value, whereas aesthetics, or beauty, reflects a reactive component of intrinsic value. Given that perceived enjoyment is generally equated with intrinsic value in IS research, Holbrook's (1994) framework challenges IS researchers to further refine the conceptualization of intrinsic value. Certainly, further research should examine this two-dimensional view of intrinsic value to enrich our understanding of individuals' reactions to B2C net-enabled commerce.

#### **Determinants of Perceived Usefulness of Using Infomediaries**

A key finding of this study is that infomediaries do not provide the same important benefits to all online shoppers. As we predicted, individuals with a higher degree of asset specificity saw use of the infomediary as a less efficient way of online shopping (i.e., lower perceived efficiency). The asset specificity construct has a mean value of 5.45 (see Table 3), suggesting that many of the subjects in the sample had a high level of transaction-specific investment in an online retailer for certain online purchases. Those customers did not seem to highly value the perceived efficiency benefits of using an infomediary. Previous studies have found that customers' transaction-specific investments in a seller increase the costs associated with switching to other sellers of a product, making the customer stay with the incumbent seller (Burnham et al., 2003;

Jones et al., 2002). However, this is the first study, to the best of our knowledge, that demonstrates the role of a customer's transaction-specific investments in valuing the services provided by an infomediary, which in turn determines their intention to use the infomediary.

Specifically, our findings suggest that consumers who are committed to an online retailer due to a high level of transaction-specific investment probably were disturbed by the numerous options provided by an infomediary because they knew that ultimately they would choose the incumbent online retailer. Building on the notion of bounded rationality, Payne et al.'s (1993) accuracy-effort framework sheds light on the process underlying this observed relationship. In particular, this accuracy-effort theory asserts that individuals tend to use a "quick and dirty" heuristic strategy to save cognitive effort that needs to be allocated to important tasks. Because much purchase-related information provided by an infomediary in the task of online shopping conflicts with this heuristic technique, consumers committed to a particular online retailer did not see much value in using the infomediary. This study is the first to show this interesting phenomenon in the context of infomediary adoption.

As mentioned earlier, we found that the impact of asset specificity on intention was mediated by perceived efficiency. The finding suggests that all things being equal, consumers committed to a particular online retailer because of higher asset specificity are less likely to rely on an infomediary in the future (i.e., lower intention to use). We can also infer that those individuals will continue to return to the same retailers although they are given a chance to use an infomediary. That is, our study offers preliminary evidence that a customer's transaction-specific investments made with an online seller make the customer stay with the incumbent seller. This type of consumer inertia is expected to grow over time in the absence of other interventions (e.g., advertisement, word-of-mouth). Therefore, our finding presents good news to major online websites that already have large, loyal customer bases. On the other hand, the results of this study indicate that new players in the net-enabled commerce arena will face a substantial challenge at the outset to overcome consumer inertia. In light of this finding, having their products listed on infomediary sites is not sufficient for new ecommerce entrants to attract new users. To overcome the customer inertia and the winner-take-most phenomena often seen in online markets (Economides, 2001), new entrants will need to differentiate themselves from major incumbent players and inform online consumers of their superiority through various communication methods.

Although the bounded rationality of individuals is manifested in this seemingly irrational consumer inertia, the possibility of being the victim of opportunistic behavior was also found to influence consumer decision-making processes. More specifically, the results of this study showed that the presence of uncertainty considerably increased the value of both the perceived efficiency and perceived effectiveness benefits. As we discussed earlier, various forms of potential opportunism on the Internet (e.g., abuse of personal information) remain major concerns among online consumers (UCLA Internet Report 2003). With this situation in mind, our findings further indicate that consumers who are skeptical about online transactions will be willing to examine the retailers' reputations and backgrounds, and it is these consumers who will see the benefit of using an infomediary.

The findings with respect to the effects of uncertainty also confirm theoretical arguments found in the literature on the economics of intermediation, which suggests that

specialized intermediaries should lessen uncertainty in trade relationships. Spulber (1996) notes that intermediaries improve welfare by reducing or eliminating the uncertainty associated with the need to match buyers and suppliers. He further points out that monitoring trading partners is costly, thereby leading to potential moral hazard problems if the other party does not act in the best interest of the first party. Therefore, intermediaries add value to the market by reducing uncertainty when they monitor the performance of suppliers. Similarly, in the online channel, even after amassing a set of online retailers on an infomediary website, uncertainty in the selection process exists related to the trustworthiness of a given retailer. This uncertainty can occur if the retailer has no known physical retailer presence, sells experience goods, or does not have a transparent returns policy. Our findings suggest that a user who perceives considerable uncertainty in the online shopping environment perceives both a great deal of efficiency benefits in searching a comprehensive set of potential sellers, and a great deal of effectiveness benefits in receiving help in choosing the best seller as a result of the performance monitoring based on prior online seller activity and customer reviews. These findings have important implications for managers of online companies because infomediaries can be a critical means of building trust, at least with consumers who perceive considerable uncertainty in their online shopping environment (Gefen et al., 2003; Luo, 2002; McKnight et al., 2002).

### ***Limitations of the Study***

This study has several limitations that deserve consideration by those applying our findings or using them to generalize. These limitations also present areas for further research. One limitation pertains to our sampling approach in which individuals' reactions to only a single infomediary website were sought. This approach has been widely used in other studies on individuals' experiences in B2C e-commerce (e.g., (Gefen et al., 2003; Koufaris, 2002; Pavlou and Gefen, 2004; Van der Heijden, 2004)). The approach also allowed us to control for the effects of potentially confounding factors related to the characteristics of infomediaries that could have been introduced by having individuals with experiences from different infomediaries in the sample. However, it is worth noting that this sampling approach limits our ability to generalize the findings of this study to other infomediaries. For example, certain characteristics of an infomediary (e.g., reputation) may have a more important role in determining individuals' intention to use the intermediary than those examined in this study. For instance, our results may not hold for infomediaries with different characteristics and principles. Further research is required to test the proposed model with other infomediaries to establish the external validity and general applicability of the results.

A second limitation lies in the use of behavioral intention as a proxy for actual behavior instead of using direct measurements of individuals' usage of the infomediary. Of course, behavioral intention has been shown to correlate strongly with actual behavior in a variety of contexts (Ajzen, 1991; Copeland and McKenney, 1988; Sheppard et al., 1988; Taylor and Todd, 1995). Moreover, as with this present study, much research in IS adoption and use has used behavioral intention as a proxy for actual behavior. One exception to this is a recent study by Pavlou and Gefen (2004), who collected both self-reported and objective data about transactions via an electronic marketplace and successfully established a causal link from intention to the actual behavior data. Similarly, our study could have been strengthened if we collected self-reported usage data through a follow-up survey after a certain period of time. Future research that confirms the causal

linkage of intention and usage within the context of infomediary adoption and use is necessary to extend the credibility of the conceptual model proposed in this study.

A third limitation relates to our scale for asset specificity. Human asset specificity has many different aspects (e.g., personal account, learning, building relationships with other customers, etc.), and we attempted only to operationalize the concept globally instead of measuring the multifaceted nature of the construct. Inevitably, the resulting scale becomes more oriented toward the overall effect of asset specificity than toward each specific aspect of the construct itself. Given that the concept represented by our global scale is still an antecedent of the perceived effectiveness of an infomediary, our operationalization of asset specificity seems to suffice at least for the purpose of this study. Nevertheless, future research may further clarify the concept of (human) asset specificity and carefully operationalize it using, for instance, a second-order scale (e.g., (Agarwal and Karahanna, 2000; Malhotra et al., 2004)). Until our global scale is shown to reasonably approximate such a sophisticated measure, the findings of this study should be interpreted carefully.

Our findings on the two distinct types of perceived usefulness pose a fourth limitation. To demonstrate the two factors of utilitarian value, this study successfully established the discriminant validity between their scales and identified different sets of antecedents for each type of utilitarian value. Yet, it is worthwhile to note that a high level of correlation was also observed between the two factors. We suspect that this relatively high correlation is quite specific to the context examined in this study. This is because bizrate.com simultaneously tells online shoppers that an online store sells a particular product and the product's price in each online store. Thus, in this particular context, it seems natural to observe a certain degree of correlation between efficiency (e.g., who is selling the product?) and effectiveness (e.g., how much does the product cost?). Nevertheless, a low correlation between efficiency and effectiveness is expected in other situations. For example, some infomediaries list stores that sell a product but do not divulge price information or the stores' ratings. Other infomediaries exclusively feature customers' opinions of a product and say nothing about where the product can be bought. Taken as a whole, we believe that as demonstrated in the customer behaviors literature (Holbrook, 1994; Mathwick et al., 2001), extrinsic value consists of two distinct factors. Thus, it is our hope that future studies further reveal the existence of the two distinct types of perceived usefulness in a variety of net-enabled infomediary websites.

A fifth limitation relates to common method variance (CMV) that may arise from measuring all variables in a single questionnaire. The observed relationships in this study possibly were overestimated because of a lack of explicit controls for CMV (Williams and Brown, 1994). Despite this possibility, we found several pieces of evidence that indicate CMV bias is not a serious concern here. For example, no strong relationships were found between asset specificity and perceived effectiveness, nor between information credibility and perceived efficiency. These relationships could have been significant under the influence of CMV. As a matter of fact, a meta-analysis study by Crompton and Wagner (1994) demonstrated that CMV through self-reports was less severe than some had thought. Although the possibility of CMV appears weak, caution should be exercised in interpreting the results of this study.

The sixth and final limitation relates to the applicability of the market microstructure theory to the electronic commerce context. It is worth noting that the theory was originally developed to understand the role of traditional intermediaries. Unlike

infomediaries, traditional intermediaries perform an array of additional functions such as hold inventory and act as brokers or dealers. Therefore, there are distinct differences between the context for which the theory was originally developed and the current context. Though the theory provided a useful lens via which to understand the role of infomediaries in this study, additional theoretical development is warranted that explores the differences between the original formulation of the theory and its applicability to the current context.

### **Concluding Remarks**

It is expected that many consumers will increasingly rely on infomediaries to take advantage of the assortment of opportunities created by net-enabled commerce. However, little is understood about (1) critical factors that drive consumer adoption of infomediaries and (2) the types of consumers who react more favorably to the services offered by infomediaries. With insights obtained from literatures on the technology acceptance model (TAM), the economics of intermediation, and transaction cost analysis (TCA), this study sheds light on the two issues that seem essential for a deeper understanding of individuals' adoption and use of infomediaries. First, we show that potential adopters look for an infomediary to help them reduce search costs (i.e., higher efficiency) and to make more informed decisions (i.e., higher effectiveness). Second, our findings suggest that consumers who do not have a favorite online retailer (i.e., lower asset specificity) and who feel that online retailers in general are opportunistic (i.e., higher uncertainty) tend to appreciate the benefits of using an infomediary. We believe that the proposed model will serve as a useful conceptual tool for analyzing consumer reactions to an e-commerce application. It is our hope that researchers will find our conceptual model useful in their investigations into the areas of infomediaries in particular and net-enabled commerce applications in general.

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## **Appendix A. Survey Instrument**

### **Section 1**

#### Choice of Products

Please indicate a single kind of product (e.g., digital camera, wine, book, flower, CD, computer memory, ...) that you are most likely to purchase from an online store in the next twelve months. \_\_\_\_\_

#### **Product Involvement (PI)**

In general, I have strong interest in this product.

This product is very important to me.

This product matters a lot to me.

Please answer the following questions on your views with respect to online retailers selling the product you have chosen above.

#### **Uncertainty (UNC)**

It is risky for me to make a transaction with many of the online retailers.

There is significant potential for loss when making a transaction with many of the online retailers.

Many of the online retailers put me in a negative situation when I make a transaction with them.

Many of the online retailers do not securely handle my personal information, including credit card numbers.

#### **Asset Specificity (AS)**

For the purchase of this product, there is an online store(s) that takes less effort to order than other online stores.

For the purchase of this product, there is an online store(s) that I am more comfortable with than other online stores.

For the purchase of this product, there is an online store(s) that takes less time to order than other online stores.

### **Section 2**

Please click the link below to visit the Bizrate.com Website. After opening its main page in a separate browser window, browse the Website to choose a particular online retailer from which you would like to purchase the product you have chosen (in Section 1). After choosing the online retailer, proceed to Section 3 of this survey to answer questions related to your experience in using the Bizrate.com Website.

### **Section 3**

#### Choice of a Vendor

Please indicate the name of the online retailer that you have chosen to purchase the product from, based on the information provided by Bizrate.com Website.

Please answer the following questions regarding your experience and views in using Bizrate.com Website to purchase the product you have chosen in Section 1.

**Perceived Efficiency (EFC)**

Without using Bizrate.com Website, I would have to spend more time to find out who are selling the product online.

Without using Bizrate.com Website, I would have to spend more effort to find out who are selling the product online.

Without using Bizrate.com Website, I would have to visit many Websites to find out who are selling the product online.

**Perceived Effectiveness (EFT)**

Using Bizrate.com Website improved the quality of my decision making in online shopping of the product.

Using Bizrate.com Website gave me greater control over online shopping of the product.

Using the Website enabled me to make a more informed decision in shopping the product online.

I believe that using Bizrate.com Website is a more effective way of shopping the product online.

**Ease of Use (EOU)**

My interaction with Bizrate.com Website was clear and understandable.

Interacting with Bizrate.com Website did not require a lot of mental effort.

I found Bizrate.com Website easy to use.

I was able to easily locate the information that I needed in Bizrate.com Website.

**Risk Awareness (RA)**

Using Bizrate.com Website made me aware of the level of risk associated with purchasing the product from an online retailer.

Using Bizrate.com Website made me aware of whether significant potential for loss would be associated with purchasing the product from an online retailer.

Using Bizrate.com Website made me aware of whether I would confront a negative situation by purchasing the product from an online retailer.

**Information Credibility (IC)**

In choosing a particular online retailer, the information provided by Bizrate.com was:

Not dependable---dependable

Not credible---credible

Not trustworthy---trustworthy

**Intention to Use (INT)**

Given the chance, I intend to use Bizrate.com Website in my future online shopping of the product.

Given the chance, I predict that I would use Bizrate.com Website in my future online shopping of the product.

It is likely that I use Bizrate.com Website in my future online shopping of the product.

## Appendix B. Product Types Chosen by Subjects

Product Types	Frequency (out of 367)
Books	68
Computers/Peripherals	61
Software/Games	27
Electronics	49
CDs/DVDs	50
Clothes	39
Flowers	11
Jewelry	5
Others (auto parts, cosmetics, collectibles, office supplies, sporting goods, toys, vitamins, wine, etc.)	57

### Appendix C. Item Correlations and Descriptive Statistics

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. PI1	1.000															
2. PI2	0.736	1.000														
3. PI3	0.713	0.920	1.000													
4. UNC1	-0.020	-0.034	-0.029	1.000												
5. UNC2	-0.024	-0.026	-0.010	0.775	1.000											
6. UNC3	-0.028	-0.020	-0.004	0.672	0.714	1.000										
7. UNC4	-0.086	-0.084	-0.062	0.653	0.643	0.708	1.000									
8. AS1	0.122	0.163	0.177	0.016	-0.024	-0.057	-0.045	1.000								
9. AS2	0.167	0.171	0.187	-0.110	-0.081	-0.118	-0.130	0.651	1.000							
10. AS3	0.134	0.175	0.184	-0.028	-0.042	-0.060	-0.041	0.834	0.707	1.000						
11. EFC1	0.103	0.049	0.057	0.212	0.199	0.158	0.182	-0.079	-0.115	-0.115	1.000					
12. EFC2	0.072	0.043	0.045	0.224	0.210	0.153	0.197	-0.087	-0.120	-0.111	0.927	1.000				
13. EFC3	0.081	0.077	0.079	0.217	0.211	0.213	0.185	-0.073	-0.104	-0.104	0.829	0.828	1.000			
14. EFT1	0.083	0.065	0.072	0.171	0.167	0.123	0.125	0.013	-0.012	-0.026	0.779	0.771	0.723	1.000		
15. EFT2	0.102	0.093	0.094	0.130	0.134	0.099	0.083	0.027	0.015	0.000	0.782	0.756	0.742	0.895	1.000	
16. EFT3	0.133	0.105	0.100	0.115	0.095	0.092	0.089	0.058	0.019	0.025	0.690	0.679	0.637	0.828	0.851	1.000
17. EFT4	0.092	0.046	0.049	0.128	0.105	0.088	0.092	-0.003	0.012	-0.022	0.761	0.755	0.736	0.840	0.871	0.830
18. RA1	0.073	0.025	0.055	0.192	0.157	0.182	0.124	0.046	0.032	0.065	0.425	0.403	0.429	0.477	0.491	0.449
19. RA2	0.062	0.004	0.034	0.197	0.168	0.198	0.155	0.061	0.022	0.069	0.383	0.368	0.408	0.449	0.471	0.434
20. RA3	0.044	-0.021	0.008	0.166	0.143	0.178	0.147	0.044	0.027	0.051	0.377	0.352	0.402	0.445	0.473	0.463
21. EOU1	0.201	0.141	0.144	-0.008	-0.027	-0.042	-0.030	0.073	0.011	0.069	0.477	0.466	0.472	0.533	0.539	0.570
22. EOU2	0.166	0.140	0.133	-0.039	-0.011	-0.107	-0.077	0.052	0.043	0.055	0.438	0.446	0.410	0.499	0.530	0.543
23. EOU3	0.129	0.113	0.105	-0.003	-0.011	-0.065	-0.036	0.086	0.030	0.080	0.439	0.444	0.433	0.495	0.521	0.557
24. EOU4	0.151	0.150	0.127	0.028	-0.006	-0.006	-0.001	0.090	0.032	0.088	0.459	0.486	0.459	0.521	0.524	0.558
25. IC1	0.074	0.053	0.048	-0.096	-0.120	-0.173	-0.127	0.029	0.042	0.069	0.242	0.243	0.232	0.315	0.346	0.330
26. IC2	0.034	0.015	0.024	-0.105	-0.133	-0.176	-0.141	0.002	0.056	0.057	0.229	0.238	0.196	0.312	0.344	0.334
27. IC3	0.000	-0.011	0.003	-0.087	-0.110	-0.150	-0.108	-0.015	0.005	0.040	0.217	0.241	0.189	0.336	0.342	0.346
28. INT1	0.063	0.058	0.026	0.149	0.131	0.124	0.165	-0.088	-0.049	-0.099	0.685	0.689	0.656	0.692	0.662	0.659
39. INT2	0.059	0.068	0.032	0.121	0.099	0.116	0.151	-0.106	-0.067	-0.098	0.695	0.683	0.648	0.690	0.669	0.653
30. INT3	0.064	0.069	0.030	0.116	0.096	0.105	0.128	-0.100	-0.065	-0.087	0.677	0.667	0.656	0.669	0.652	0.646
Mean	6.112	5.627	5.610	2.929	2.954	2.504	2.681	5.174	5.580	5.109	4.251	4.253	4.390	4.362	4.463	4.561
S.D.	1.217	1.377	1.354	1.621	1.603	1.489	1.573	1.610	1.576	1.685	2.068	2.044	2.085	1.901	1.874	1.904

	17	18	19	20	21	22	23	24	25	26	27	28	29	30
17. EFT4	1.000													
18. RA1	0.486	1.000												
19. RA2	0.468	0.888	1.000											
20. RA3	0.481	0.875	0.919	1.000										
21. EOU1	0.560	0.338	0.336	0.339	1.000									
22. EOU2	0.536	0.281	0.285	0.297	0.828	1.000								
23. EOU3	0.531	0.289	0.271	0.288	0.815	0.901	1.000							
24. EOU4	0.568	0.284	0.233	0.254	0.806	0.810	0.874	1.000						
25. IC1	0.339	0.185	0.185	0.171	0.485	0.432	0.421	0.475	1.000					
26. IC2	0.334	0.196	0.185	0.185	0.463	0.433	0.405	0.450	0.858	1.000				
27. IC3	0.320	0.243	0.229	0.238	0.455	0.415	0.413	0.432	0.828	0.847	1.000			
28. INT1	0.697	0.411	0.394	0.404	0.550	0.504	0.516	0.567	0.364	0.339	0.344	1.000		
29. INT2	0.698	0.396	0.377	0.381	0.537	0.507	0.518	0.561	0.357	0.343	0.335	0.943	1.000	
30. INT3	0.703	0.385	0.378	0.381	0.537	0.503	0.517	0.570	0.349	0.324	0.327	0.937	0.957	1.000
Mean	4.529	3.752	3.711	3.708	5.379	5.640	5.684	5.575	5.583	5.428	5.371	4.638	4.665	4.684
S.D.	1.886	1.767	1.767	1.795	1.504	1.362	1.457	1.549	1.311	1.359	1.342	1.849	1.887	1.919

## Appendix D. Pairwise Discriminant Validity Analyses

Two Factor Combination	Constrained Model		Unconstrained Model		$\chi^2$ Difference
	$\chi^2$	df	$\chi^2$	df	
Intention to Use with					
Perceived Efficiency	639.27	9	22.27	8	617.00*
Perceived Effectiveness	1215.58	14	38.70	13	1176.88*
Ease of Use	1113.16	14	59.54	13	1053.62*
Asset Specificity	986.09	9	8.52	8	977.57*
Uncertainty	1064.05	14	40.11	13	1023.94*
Risk Awareness	996.29	9	9.63	8	986.66*
Product Involvement	694.37	9	4.97	8	689.5*
Information Credibility	753.2	9	6.26	8	746.94*
Perceived Efficiency with					
Perceived Effectiveness	540.24	14	42.46	13	497.78*
Ease of Use	841.80	14	61.57	13	780.23*
Asset Specificity	820.81	9	2.79	8	818.02*
Uncertainty	857.07	14	42.15	13	814.92*
Risk Awareness	804.43	9	20.2	8	784.23*
Product Involvement	699.16	9	9.53	8	689.63*
Information Credibility	816.75	9	9.5	8	807.25*
Perceived Effectiveness with					
Ease of Use	1587.71	20	78.38	19	1509.33*
Asset Specificity	606.95	14	13.97	13	592.98*
Uncertainty	1072.03	20	45.98	19	1026.05*
Risk Awareness	1265.31	14	24.18	13	1241.13*
Product Involvement	708.43	14	15.39	13	693.04*
Information Credibility	763.54	14	15.48	13	748.06*
Ease of Use with					
Asset Specificity	628.24	14	40.51	13	587.73*
Uncertainty	1118.67	20	93.37	19	1025.30*
Risk Awareness	932.88	14	61.80	13	871.08*
Product Involvement	737.72	14	49.95	13	687.77*
Information Credibility	810.35	14	61.76	13	748.59*
Asset Specificity with					
Uncertainty	1083.82	14	45.36	13	1038.46*
Risk Awareness	593.89	9	3.56	8	590.33*
Product Involvement	695.7	9	4.51	8	691.19*
Information Credibility	791.33	9	9.24	8	782.09*
Uncertainty					
Risk Awareness	1042.17	14	36.31	13	1005.86*
Product Involvement	730.47	14	33.88	13	696.59*
Information Credibility	824.0	14	33.74	13	790.26*
Risk Awareness					
Product Involvement	703.34	9	8.11	8	815.89*
Information Credibility	776.62	9	9.85	8	767.77*
Product Involvement					
Information Credibility	706.44	9	8.62	8	697.82*

\*p ≤ .001

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