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Dimensions of Internet Commerce Trust

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ABSTRACT. Trust is a central construct and plays a critical role in understanding Internet consumer behavior. This research seeks to directly address the subject of Internet Commerce Trust (ICT) by developing a valid, reliable, and generalizable scale to measure this multifaceted subject. Two separate studies reveal a common five-factor structure. These dimensions are labeled (1) Certification, (2) Resources and Capabilities, (3) Shopping Method, (4) Reliability, and (5) Communication Viability. An accurate measurement of ICT will serve as a viable control factor in future studies of Internet consumer behaviors, segmentation analyses, and in marketing strategy research. doi:10.1080/15332860802086136 [Article copies available for a fee from The Haworth Document Delivery Service: 1-800-HAWORTH. E-mail address: <docdelivery@haworthpress.com> Website: <<http://www.HaworthPress.com>> © 2007 by The Haworth Press. All rights reserved.]

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INTRODUCTION

The analytical evolution of the study of trust has led researchers to uncover dimensions that can be broadly categorized as cognitive, affective, and behavioral bases (Ganesan, 1994; Doney & Cannon, 1997; Swan, Bowers & Richardson, 1999; Chen & Dhillon, 2003; Johnson & Grayson, 2005). In this sense, trusting behavior is determined by the rational and emotional components that guide it. In the last decade or so, with the foundational components in hand, researchers have made noteworthy gains through numerous, more specific, inquiries into the multifaceted and dynamic nature of trust. Recent research has discussed the development and stages of trust (Aiken, 1999; Hoffman, Novak & Peralta, 1999; Luo, 2002; Luo & Najdawi, 2004; McKnight, Kacmar & Choudhury, 2004), the processes of trust (Williamson, 1993; Doney & Cannon, 1997), the types of trust (McKnight & Chervany, 2001-2002; McKnight, Choudhury & Kacmar, 2002; Koehn, 2003), as well as several antecedents of trust (Bart et al., 2005; Wingreen & Baglione, 2005). A good deal of this research points to trust as being target-, context-, and situation-specific. Hence, new studies of trust in the context of Internet commerce become both relevant and necessary.

The current work posits that a complex and unique form of trust revolves around Internet commerce itself. We recognize that Internet Commerce Trust (ICT) is a concept that is distinct from both interpersonal trust (e.g., I trust my bank teller and the clerk at my favorite bookstore) and firm-specific or website-specific trust (e.g., I trust Bank of America and Amazon.com) and plays a unique role in determining how consumers will shop on the Internet. Further, we propose that ICT is distinct from institution-based trust (McKnight & Chervany, 2001-2002) in that ICT deals with trust in the communications processes, the transactions processes, and the socio-interactive processes of the parties involved in Internet commerce. McKnight, Choudhury, and Kacmar (2002) state that institution-based trust is "the sociological dimension of trust" (p. 336). We recognize that ICT stems from complex combinations and intricate interactions related to both *internal* psychological factors and *external* sociological factors. ICT no doubt affects the way web-consumers view the Internet, the way they feel about the Internet, and

the way they behave on the Internet. Given the astounding growth of Internet commerce in combination with the evolution of exchange (Parasuraman & Zinkhan, 2002), it is imperative that marketing researchers investigate the complex, idiosyncratic, and overarching notion of ICT.

The purpose of this research is to explore the complexities of ICT and then to develop a valid, reliable, and generalizable scale to measure this multifaceted subject. First, we delve into the importance of trust as a general construct in commerce. Second, we discuss the contextual uniqueness of Internet trust. Third, we explore the role of ICT and define it as a related form of institution-based trust. Fourth, we detail the development of the Internet Commerce Trust Scale (ICTS). Accurate measurements of ICT will provide researchers with a greater understanding of moderating effects related to more direct measurements of online firm-specific trust. Moreover, measurements of ICT will serve as viable control factors in future studies of other Internet consumer behaviors. Finally, we conclude with a discussion of the managerial implications of the ICTS and propose viable future research.

BACKGROUND

Examining the Importance of Trust

Trust has been labeled the most precious of all business assets (Benassi, 1999; Luo, 2002), as well as the very foundation upon which relationship marketing is built (Berry, 1995). Sharma and Sheth (2004) reason that issues of trust will become increasingly important in the "coming revolution of marketing thought and strategy" (p. 696). In e-commerce, trust development is complicated by the very nature of the computer-mediated environment (CME), as key traditional elements of trust building are noticeably absent in CMEs (such as personal, non-verbal cues, and physical contact with products) (Keen et al., 2004). Consumers wishing to shop or purchase over the Internet not only need to trust the e-tailer, but also need to trust the Internet itself as a mode of communication, distribution, and commerce in general. These notions relate to the widely discussed evolution of commerce, consumer behavior, information acquisition, and information management (Parasuraman & Zinkhan, 2002).

Thus, while millions of people flock to Internet commerce, they continue to clamor for stricter privacy laws, tighter web security, and greater control of personal information (Sheehan & Hoy, 2000). Internet researchers have reported that, regardless of the number of privacy policies or "high-tech" encryption systems, what web consumers really want is "... another type of exchange-characterized by an explicit social contract executed in the context of a cooperative relationship built on trust" (Hoffman, Novak & Peralta, 1999; p. 82). This finding is both recognition of the uniqueness of the Internet as a computer-mediated business environment and an allusion towards the critical importance of trust in any Internet relationship. Through distinctive processes of interactive electronic communications, consumers must achieve levels of trust that surpass perceptions of personal vulnerability (Aiken et al., 2004). While previous research has studied Internet trust largely at the firm-specific level (Luo, 2002; Shankar, Urban & Sultan, 2002; Sultan et al., 2002; Yoon, 2002), the current work serves to analyze trust in terms of a broader context.

Defining Internet Trust

Prior to the explosion of the Internet as a revolutionary distribution, promotion, and marketing tool, researchers recognized the multitude of situational factors and noted that trust is both target- and context-specific (Schurr & Ozanne, 1985; Aiken, 1999). Thus, society in the information age (Glazer, 1991) seems to have developed a new form of contextual trust—a form of trust that is characterized by the unique representations of e-consumers and firms as encoded, transmitted, and decoded through an electronics-driven CME (Aiken & Boush, 2006). Contextual trust appears to be affected by the communications media involved, the unusual shopping environment, and the transaction-specific risks and rewards. Every aspect of Internet consumption, including communications, transactions, and even terms of delivery, is moderated by an omnipresent trust of the media context itself. Further, this form of contextual trust in the Internet encompasses issues of risk, reliability, privacy, and security, as well as perceptions related to control of information (Rust, Kannan & Peng, 2002).

An ever-expanding subset of the business and marketing literature concentrates on how the concept of trust is unique in a CME

(Hine & Eve, 1998; McKnight & Chervany, 2001-2002; Bhattacharjee, 2002; Koehn, 2003). In the context of the Internet, buyers and sellers exist in a computer-mediated marketplace, wherein issues are not resolved face-to-face, but rather distant users attempt to communicate through a globally elaborate "web" of electronics hardware and software (Dugal & Roy, 2000). Communications and transactions occur electronically, thereby increasing risks for on-line consumers and placing a heavy communications burden on sellers whose website effectiveness is affected by a variety of design characteristics (Geissler, Zinkhan & Watson, 2001). Trust in the Internet is further complicated by the fact that developmental attributes of online trust are influenced by the shopping trip's specific purpose (Reibstein, 2002).

Contemporary definitions of trust in the Internet reflect new-found consumer apprehensions. Overcoming perceptions of uncertainty has linked trust to the diffusion and acceptance of e-commerce in general (Grabner-Kraeuter, 2002; Shankar, Urban & Sultan, 2002). Internet consumers worry about everything from excessive spam e-mails and intrusive cookie files, to costly credit card fraud and perilous identity theft. Milne and Boza (1999) define trust in terms of this largely affective privacy element, noting the expectancy of an Internet consumer to rely on marketers to treat personal information fairly. Thus, issues of risk, reliability, privacy, security, and control of information emerge as key variables in Internet trust development. These issues dominate firm-specific or website-specific trust research (e.g., Sultan *et al.*, 2002; Yoon, 2002; Garbarino & Strahilevitz, 2004), and we posit that many of these same issues are relevant in ICT as well.

Overcoming the concern for privacy is a major building block for trust development in the Internet (Hine & Eve, 1998; Benassi, 1999). Researchers have observed that privacy is a multidimensional concept and plays a critical role in fear of purchasing online (Hine & Eve, 1998; Sheehan & Hoy, 2000). This concern for privacy likely derives from fear of the unknown (Hoffman, Novak & Peralta, 1999). In as much as trust requires a cognitive and affective leap of faith (a movement beyond calculative prediction—see Williamson, 1993), trust in the Internet implies, to some extent, behaviorally overcoming a concern for privacy. To take action in the face of risk is to engage in trusting behavior. Such action appears as a cognitive abstraction of trust—an imperfect attempt to rationally estimate the incalculable possibilities of risks and rewards (Aiken *et al.*, 2004).

Moreover, trust in the Internet involves unique issues of control. In the off-line world consumers think nothing of giving their phone numbers or home addresses to seemingly disinterested cashiers and store managers. However, online consumers often cite feelings of helplessness and fear while shopping on the Internet (Hine & Eve, 1998). E-consumers often desire complete control over their personal information, control over the actions of a web vendor, and control over the Internet site. Managing the actions of an Internet firm affects consumer perceptions of privacy and security (Bhatnagar & Ghose, 2004; Hoffman, Novak & Peralta, 1999). Thus, Internet consumers carefully guard their personal information.

Finally, Internet trust has been noted to carry with it unusual behavioral burdens. That is, Internet behaviors and behavioral intentions are consistently judged by e-consumers and potential e-consumers alike. A firm's resources and abilities are meticulously judged, discussed in chat rooms, and rated by all types of consumers and groups. Trust in an Internet context, then, largely develops through keeping behavioral promises. Accordingly, an evolving sense of "Darwinian trust" emerges as the new essence of online commerce (Alsop, 1999). Koehn (2003) speaks of the related concepts of calculative trust, wherein parties judge another's history of keeping promises, as well as the knowledge-based trust that emerges when two parties are familiar with each other and interact frequently. Past behaviors lead to greater trust. Also, in an Internet context wherein both inexperience and uncertainty abound, any and all concrete behavioral assessments are applied in trust development. Thus, third-party certifications, ratings, reviews, and "trustmarks" take on greater weight through the process of trust transference (Miliman & Fugate, 1988; Doney & Cannon, 1997; Aiken, 2001; Aiken et al., 2004).

Exploring the Role of Internet Commerce Trust

We conceptualize the role of ICT within the framework proposed by McKnight and Chervany (2001-2002). They describe a conceptual trust typology linking disposition to trust to institution-based trust, and institution-based trust to trust in a web vendor/business. McKnight and Chervany (2001-2002) state that institution-based trust (as derived from sociology) ". . . refers to the legal, regulatory, business, and technical environment perceived to support success" (p. 45). Trust in

the institutional environment, in this case, relates to issues of perceptual control, felt security, and beliefs that adequate mechanisms are in place to facilitate transaction success (McKnight, Choudhury & Kacmar, 2002; Pavlou & Gefen, 2004). Walczuch and Lundgren (2004) describe institution-based trust as trust in the structure of e-tailing in general.

We propose that Internet commerce and the technological infrastructure behind it be considered a unique social institution, and thus ICT arises as a form of institution-based trust. McKnight and Chervany (2001-2002) describe two subconstructs of institution-based trust: structural assurance and situational normality. Structural assurance is primarily the belief that "protective structures" exist to ensure that an encounter or situation (e.g., transaction) will be successful. In the case of ICT, one might evaluate the resources and capabilities of on-line firms, or some other indicators of a supportive framework for conducting business. Situational normality is the belief that an encounter or situation will unfold as expected. For ICT this refers to the belief that the processes and outcomes of an e-commerce transaction will be roughly similar to a "normal" retail transaction. Thus, the concept of ICT formally encompasses psychological beliefs associated with each of these subconstructs, as well as the associated feelings of security which reflect the affective side of trust. Therefore, we propose the following tripartite definition: Internet Commerce Trust is the combination of (1) the belief that the Internet provides a safe communications and shopping environment involving predictable processes and outcomes, and (2) the resulting personal feelings of security, leading to (3) trusting commerce behaviors.

Clearly then, ICT is not equivalent to firm-specific trust (Bhattacharjee, 2002). Still, ICT is hypothesized to influence firm-specific trust, as well as choice of shopping mode. For Internet-based firms (so called "pure-play" companies that only conduct business on-line), the relationship of ICT to firm-specific trust should be relatively strong due to the context-specific nature of trust (Schurr & Ozanne, 1985; Swan, Bowers & Richardson, 1999; Aiken, 1999). That is, if someone is mistrustful of Internet commerce as a whole (low ICT), the person will be less likely to trust an Internet firm than would someone with high ICT. For an Internet-enhanced firm (i.e., a brick-and-mortar company which also operates online), trust in the firm could develop outside the context of the Internet, so the impact of ICT on firm-specific trust would be lessened. However, the choice of

shopping mode would still be influenced by ICT, as those with high ICT would be more willing to purchase on-line than would those with low ICT. Koehn (2003) notes the widespread consumer tendency to seek out and replicate traditional (offline) business relationships online, thus allowing ICT to transfer from offline sources—just as high levels of ICT might transfer to the offline environment (e.g., should Amazon open up a traditional brick-and-mortar store).

Drivers of ICT are predisposition to trust, previous Internet experience, and demographic/psychographic variables. Predisposition to trust is a general propensity to be willing to rely on others when confronted with a new or unfamiliar situation (noted offline by Rotter, 1980, and Jones, Couch & Scott, 1997; and online by McKnight & Chervany, 2001-2002; McKnight, Choudhury & Kacmar, 2002). In this context of ICT, someone might be willing to trust the Internet as a means and method for commerce unless or until experience dictates that trust is unwarranted. The impact of previous experience on trust is well-documented (Hoffman, Novak & Peralta, 1999; Koehn, 2003). Yoon (2002) and Sultan et al. (2002) have demonstrated the importance of similar personal or consumer characteristics in developing trust for specific on-line vendors. We would expect that, over time, experience quickly becomes the dominant driver of ICT as well. Numerous researchers have identified demographic and psychographic correlates of trust in a wide variety of contexts (Swan, Bowers & Richardson, 1999).

For ICT to become useful to researchers and managers, it must be operationalized. Our intended contribution to the Internet trust literature is to develop and present an ICT scale which (1) is consistent with previous conceptual treatments of trust, (2) reflects the multidimensional nature of trust, (3) reflects both the structural assurance and situational normality subconstructs of institution-based trust, (4) demonstrates construct, discriminant, convergent, and nomological validity, and (5) is parsimonious.

INTERNET COMMERCE TRUST SCALE DEVELOPMENT

Given that ICT plays such a central role in determining e-consumers' trust in Internet firms, as well as in on-line shopping mode, it is critical to have a reliable and accurate tool for managers and researchers to measure ICT. Following the stepwise pro-

gram for scale development presented by DeVellis (1991), we defined the construct, generated an item pool, reviewed the test variables, and administered the variables to a development sample. The initial pool of items was collected from various literature sources (in an offline context, Schurr & Ozanne, 1985; Doney & Cannon, 1997; Swan, Bowers & Richardson, 1999) (in an online context, Van den Poel & Leunis, 1999; Sheehan & Hoy, 2000). Additional items were generated from student volunteers using focus groups as standard qualitative techniques utilized to bring out contemporary issues not yet in print.

While many would argue that scale development should be primarily a theory-driven process, it is reasonable to propose that a major technological development like the Internet may require an empirically-driven process, at least initially, to enable researchers to begin to discuss relevant constructs. For example, within the context of website-specific trust formation, Sultan *et al.* (2002) state “. . . we adopt an empirically driven approach to identify the dimensions and antecedents of trust as articulated by consumers” (p. 7). We attempted to combine both theory and empirical data to develop the ICT. In this project, we used an empirically-driven process for the generation of our initial items, though the process itself was guided by a theoretically-derived structural understanding of trust. Lewis and Weigart (1985); MacAllister (1995); Doney and Cannon (1997) and others, have all contributed to the tripartite conceptualization of trust comprised of cognitive, affective, and behavioral components. The moderator's guide used to direct the student focus groups contained open-ended questions specifically designed to elicit cognitive, affective, and behavioral responses from the student participants.

The initial pool contained over 50 relevant items adopted from a subset of the major works cited above. Variables were derived from both online and offline research—some were tailored to fit the ICT context. As DeVellis (1991) states, in this phase of scale development, redundancy with respect to content is viewed as an asset rather than a liability (DeVellis, 1991). A panel of five experts, knowledgeable in the subject areas of both trust and Internet marketing, examined the initial item pool. All members of the expert panel received a working definition of ICT. The members were instructed to rate the relevancy of the items with regard to what they were intended to measure. These experts were also asked to evalu-

ate the items with regards to clarity and conciseness. Additionally, these reviewers were asked to point out any ways of tapping the construct that might have been missing from this initial item pool. If four out of five experts wanted to remove an item from the list, then the item was removed. Thirty six items were retained for pre-testing on a development sample. Additionally, in order to assess discriminant validity, the pretest presented respondents with Harrison and Rainer's (1992) 18-question Computer Anxiety Rating Scale (CARS). A paper-and-pencil survey tested all items on a 5-point, strongly disagree–strongly agree, Likert scale.

A convenience sample of student subjects was recruited from a first-year business course at a large northwestern university in the U.S. Using Cronbach's alpha as a measure of reliability, the pool of 36 items was reduced to 25. A significant negative correlation with the CARS indicated some degree of discriminant validity ($r = -.17$; $p < .01$; $n = 168$). Through this pretest, researchers learned a great deal about ICT, as well as the appropriate presentation, structure, and format of future test variables. We then conducted two field studies to further refine and test the scale.

Study 1–Method

Study 1 utilized a convenience sample of first- and second-year students at the same university in the northwestern United States. The student subject pool contained a total of 497 possible respondents. Petty and Cacioppo (1996) reason that research into cognitive, emotional, and rational thought processes are not tied to “the peculiarities of the subject population that is studied” (p. 4) and that student samples often relate generalizable phenomena. While one could argue that these student subjects are qualitatively and quantitatively different from the general population of Internet users, one might also reason that students go through the same consumer thought processes as others in the population and therefore they represent a valid sample.

For Study 1, response rates were optimized in two ways. First, professors offered course credit in exchange for participation in the study. Second, respondents were entered into a prize drawing offering monetary awards to purchase merchandise or books at the university's bookstore. A total of 389 usable surveys were received, yielding a response rate of 78.3%.

Subjects were invited to participate via e-mail messages from their professors. The e-mail provided a link to the survey's website. After a brief introduction, the survey site posed a series of questions related to trust in the Internet commerce in general, relevant consumption behaviors, and demographics. Data collection took place over a period of one week.

Study 1—Results

Exploratory factor analysis (EFA) was conducted on the data collected in Study 1. Factors were extracted using principal component analysis and rotated using the Oblimin method with Kaiser Normalization. Correlations between factors ranged from .097 to .306. As there was no theoretical reason for presuming that rotated factors should be independent, an oblique rotation method was deemed appropriate. One common problem of oblique rotation methodology is that it often yields results which are tied to a given sample and thus are not generalizable. The use of two substantially different samples addresses this concern.

Five factors were identified using both standard eigenvalue (eigenvalue >1.0) and scree plot criteria. Variables were removed from the scale if they had high cross-loadings (above .30), if they cross-loaded on more than two components, if they did not contribute much to a component (i.e., the lowest factor-loading on individual components), and if the overall percent of variance explained was not substantially lowered (after removing the variable). We labeled the five factors as follows: resources & capabilities, certification, shopping method, communication viability, and reliability.

Study 2—Method

The primary purpose of Study 2 was to further evaluate scale items, reduce the set of test items, re-test the items, and confirm the factor structure amongst a nationwide sample of adult Internet users. As DeVellis (1991) states, "[evaluation and reduction] . . . is, in many ways, the heart of the scale development process" (p. 80). Just as in Study 1, Study 2 inquired about various Internet behaviors and Internet proficiency. So, while data collection took place over a two-week period, all of the other procedures were identical to Study 1.

The second pool of subjects came from the listserv of a nationally recognized classical music festival. The Communications Director of the program provided a list of 1,252 news group e-mail subscribers. The list did not differentiate people as ticket buyers or non-ticket buyers; it was simply a list compiled by the festival containing people who have opted to receive periodic updates of this musical program and news briefings of musical performances. Although this was a nationwide listserv, the Director estimated that approximately of 75% of subscribers were from western states.

Again, attempts were made to enhance the response rate of the study. First, all correspondence came from the Communications Director of the program, a person whom subscribers would be familiar with as the caretaker of the listserv and the provider of valuable program information. Second, a promise was made concerning monetary contributions for every completed survey—essentially a fund-raising campaign for the arts, not uncommon for this type of program. Finally, at the end of the first week, the Communications Director sent a reminder letter in an effort to encourage additional participation. A total of 294 usable responses were received, yielding a response rate of 23.5%. This is a relatively high response rate for an Internet study (Dillman, 2000).

Sample demographics appeared to approximate national averages with regards to Internet user characteristics. Gender was relatively evenly split, wherein 52.5% were female compared with the US average of 51.1% (NUA, 2002). On the whole, income appeared to be relatively evenly matched with national income categories never varying by more than 5% when compared to the GVU's Tenth Annual WWW User Survey (GVU, 1998). However, both education and age variables were somewhat skewed compared to national averages. Almost 86% of Study 2's sample reported to be college graduates, whereas nationally 45.4% of Internet users present themselves as such (*Business 2.0*, 2001). Additionally, 53% of the Study 2 sample was over 50 years old. This is substantially older than the 16.9% reported nationally (GVU, 1998).

Study 2—Exploratory Factor Analysis

Respondents were randomly split into a test sample and a hold-out sample. Exploratory factor analysis (EFA) was conducted on the test sample data collected in Study 2, and confirmatory factor analysis (CFA) was conducted on the hold-out sample. Once again, in the ex-

ploratory factor analysis, factors were extracted using principal component analysis and rotated using the Oblimin method with Kaiser Normalization. The rotated factor solution for the test sample EFA appears in Exhibit 1. Again, five factors were identified using both standard eigenvalue and scree plot criteria. The revealed factor structure was conceptually identical to that obtained in Study 1, though the order of factors extracted was different and one different item loaded on each of two factors. The "resources & capabilities," "certification," and "shopping method" factors were identical to those found in Study 1.

Exhibit 1. Study 2–Test Sample–Exploratory Factor Analysis

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
<u>Certification</u>					
I will not do business with a web-based firm unless it provides me with a written guarantee.(r)	.881				
I will not do business with a web-based firm unless I see that it has been certified by some credible third party.(r)	.758				
Consumers should always evaluate how long a web-based firm has been in business before making a purchase decision.(r)	.633				
<u>Resources & Capabilities</u>					
Companies with the expertise to run their own websites are worthy of my trust.		.910			
Companies with the resources to run dependable websites are trustworthy.		.725			
Companies that maintain their own websites are Generally reliable.		.710			
<u>Shopping Method</u>					
The Internet is a viable consumer tool.			-.914		
Websites provide an easy and convenient way to shop.			-.851		
<u>Reliability</u>					
After purchasing a product over the Internet, you can expect timely delivery.				-.871	
Products bought over the Internet will perform as advertised.				-.841	
Most web sites are designed to honestly convey product/company information.	-.350			-.415	
<u>Communication Viability</u>					
People can communicate safely over the Internet.					-.834
Sending information over the Internet is perfectly safe.					-.732
Consumers should always be concerned about losing control of personal information when purchasing products over the Internet.(r)					-.614

Note: (r) reverse coded

Rotation: Oblimin with Kaiser Normalization

Factor loadings between -.30 and +.30 not shown

Two of the three items loading on the "reliability" factor were identical to those from Study 1, while the third ("honesty in advertising") replaced the "timely delivery" item from Study 1. In addition, this item cross-loaded on Factor 1. Finally, the first two items of the "safe communication" factor were identical to those uncovered in Study 1, though an alternatively-worded item focused on "personal information" loaded as the third item. With these minor differences noted, we judged the underlying factor structure revealed in these two EFAs to be substantively similar. However, our secondary goal of further reducing the number of scale items was not achieved. Further reduction of items clouded the structure and reduced the overall percentage of variance explained.

Study 2—Confirmatory Factor Analysis

Confirmatory factor analysis (CFA) was conducted to estimate goodness-of-fit indices to determine how well empirical data from the hold-out sample fit the hypothesized factor structure model. In addition, certain CFA metrics were used to assess the construct validity of the model. Fornell and Larcker (1981) suggest that construct validity be assessed by (1) determining the amount of variance in the scale that is explained by the latent construct, and (2) comparing the variance explained in a single scale with the variance shared by all the relevant scales.

The factor structure revealed in the test sample EFA was subjected to confirmatory factor analysis using LISREL 8.54. Results of the CFA—including between-factor correlations (phi matrix), the factor-item mean squared multiple correlations, and the fit indices—appear in Exhibit 2.

Note that goodness-of-fit indices exceeded acceptable model fit guidelines (Joreskog & Sorbom, 1988). Specifically, the goodness-of-fit index (GFI), normed fit index (NFI) and Tucker-Lewis goodness-of-fit index (TLI) all met or exceeded .90. Particularly the Tucker-Lewis goodness-of-fit index has been shown to be the most robust amongst alternative fit indices (Marsh, Balla & McDonald, 1988). Therefore, we concluded that the overall fit of the model to the empirical data was adequate. In the next section we will further discuss the validity test of this proposed scale.

Tests of Validity

Since the major goal of this research was to develop an accurate and reliable scale to represent the focal construct, ICT, it was critical to as-

EXHIBIT 2. Study 2—Hold-Out Sample—Confirmatory Factor Analysis¹

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
<u>Certification</u>					
Consumers should always evaluate how long a web-based firm has been in business before making a purchase decision.(r)	1.26				
I will not do business with a web-based firm unless I see that it has been certified by some credible third party.(r)	1.09				
I will not do business with a web-based firm unless it provides me with a written guarantee.(r)	1.48				
<u>Resources & Capabilities</u>					
Companies with the expertise to run their own websites are worthy of my trust.		1.37			
Companies that maintain their own websites are generally reliable.		1.19			
Companies with the resources to run dependable websites are trustworthy.		1.24			
<u>Shopping Method</u>					
The Internet is a viable consumer tool.			1.14		
Websites provide an easy and convenient way to shop.			1.10		
<u>Reliability</u>					
After purchasing a product over the Internet, you can expect timely delivery.				1.40	
Products bought over the Internet will perform as advertised.				0.87	
Most web sites are designed to honestly convey product/company information				0.88	
<u>Communication Viability</u>					
People can communicate safely over the Internet.					2.17
Sending information over the Internet is perfectly safe.					1.46
Consumers should always be concerned about losing control of personal information when purchasing products over the Internet.(r)					0.58
Goodness-of-Fit Index (GFI)	0.92				
Adjusted Goodness-of-Fit Index (AGFI)	0.86				
Normed Fit Index (NFI)	0.90				
Comparative Fit Index (CFI)	0.97				
Root Mean Square Error of Approximation (RMSEA)	0.051				
Root Mean Square Residual (RMR)	0.18				
Mean of Squared Multiple Correlations	0.43	0.62	0.63	0.56	0.49
Correlations between factors					
Factor 1					
Factor 2	-.01				
Factor 3	-.07	.03			
Factor 4	.28	.63	.21		
Factor 5	.16	.41	.48	.43	

Note: LISREL 8.54 -- All factors are significant at $p < .01$

1. These are unscaled maximum likelihood lambda estimates. The LISREL 8.54 default for estimating LAMBDA is to set factor variances to 1, which can result in LAMBDA estimates greater than 1.

sess the validity of this scale. To test the construct validity, especially the convergent and discriminant validities, we adopted the procedures and criteria introduced by Fornell and Larcker (1981), which have since then been referred to in 173 research papers, including various research projects in the marketing discipline (e.g., McColl-Kennedy & Fetter, 1999).

Fornell and Larcker (1981) recommend using CFA to assess construct validity and to examine: (1) the amount of each scale's variance explained by its underlying construct, and (2) the amount of variance shared by each of the constructs' scales in the CFA. To assess the amount of each scale's variance explained by its underlying construct, one calculates the mean of the squared multiple correlations for the items hypothesized to be caused by the underlying factor. Assessment of the variance shared between two constructs is calculated by squaring the appropriate value in the standardized PHI (F) matrix of the CFA output. According to Fornell and Larcker (1981), a scale is said to possess convergent validity if more than 50% of its variance is explained by its underlying construct (i.e., the mean of the squared multiple correlations should be at least 0.50). A scale is said to possess discriminant validity when more of its variance is explained by its underlying factor than the amount of variance it shares with each of the other constructs' scales in the model. Thus, the mean of the squared multiple correlations for a construct-of-interest should be greater than the square of its inter-correlations with other constructs in the confirmatory factor analysis model. Based on these procedures and criteria, we performed the CFA and found the significant results (highlighted in Exhibit 2).

All five factor sub-scales satisfy accepted standards for discriminant validity (Fornell & Larcker, 1981). The maximum variance shared by any two sub-scales (Resources & Capabilities and Reliability) is 36%, considerably less than the 62% and 56%, respectively, explained by each underlying factor alone. Therefore, we conclude that the scale possesses discriminant validity.

Results of the tests of convergent validity exceed the Fornell and Larcker (1981) guidelines for four of the five factors, and fall only slightly below these guidelines for the remaining factor. Fornell and Larcker (1981) suggest the mean of the squared multiple correlations between the relevant underlying factor and each related item should be at least .50; four of the squared multiple correlation coefficients clearly exceed that figure, and one is only slightly lower at .43. Therefore, the scale possesses convergent validity.

As for content validity, the measurement items of this scale were generated through the screening process of a panel of five experts and a large number of subjects who read each item of the scale and indicated they understood what the items referred to. Hence, the scale possesses content validity as well.

Finally, in order to evaluate nomological validity, we first grouped ICT scores into Low, Medium, and High trust groups based on mean scale scores and quartiles (Low and High Trusters representing the lowest and highest quartile groups). We then tested a number of key variables. For instance, high ICT subjects were found to have greater self-reported experience scores as well as proficiency quiz scores. That is, higher levels of experience and proficiency had a direct relationship with the likelihood of being in the high ICT group (Chi-square = 38.19; $p < .001$ for experience groups, and Chi-square = 31.69; $p < .001$ for proficiency groups). Further, subjects were asked a set of firm-specific questions related to an experimental web site described as a new web site that was described as "under construction" (this occurred after administration of the ICTS). In terms of their ICT scores (and corresponding groups), low ICT subjects had consistently lower firm-specific trust scores, lower evaluations of product quality and lower perceptions of product value (t-values ranging from 1.8 to 6.5, p-values ranging from .07 to .00.) These results show that our scale possesses predictive validity.

Interesting demographic differences also emerged between the high and low ICT groups. For instance, men were more likely to fall into the high ICT group (Chi-square = 5.68, $p < .02$), higher aged groups tended to fall into the high ICT group (Chi-square = 8.45, $p < .07$), and higher education levels tended to correspond to membership in the high ICT group (Chi-square = 14.5, $p < .01$). The ICT scale seems to have uncovered some interesting relationships that should prove valuable in future research. In addition, based on these findings, we conclude that the scale possesses nomological validity.

CONCLUSIONS AND MANAGERIAL IMPLICATIONS

The consistency of these results across analyses using data from two samples representing two different populations provides a solid structure for the ICTS. In addition, the ability of the CFA results to meet the relatively strict standards of discriminant and construct validity developed by Fornell and Larcker (1981) suggests the ICTS presented here

possesses desirable psychometric properties and exhibits construct validity. Thus, we conclude that the concept of ICT can be accurately measured and is comprised of five distinct, but slightly inter-related, factors.

Factor one, certification, brings together issues of consumer assurance and guarantees as a means of instilling trust. Here, the element of time in business implies behavioral truth—that lasting firms keep their promises. In this sense, the lasting Internet firm has been certified by a group of unknown others. This factor relates the notion of confidence in competence. Interestingly, this factor also contains the notion that credibility can be transferred through some trusted third party (see Miliman & Fugate, 1988; and, Doney & Canon, 1997 in an offline context; see Aiken, 2001; and, Aiken et al., 2003 in an online context). In this instance, third parties are often seen as more credible and objective (Boush et al., 1993). Finally, the certification factor envelops the concepts of inference-making (Broniarczyk & Alba, 1994), trust transference (Miliman & Fugate, 1988; Doney & Cannon, 1997), and guarantees as signals of trustworthiness (Kirmani & Rao, 2000).

Factor two, resources & capabilities, deals with the largely cognitive assessment of firms' aptitudes relative to their resources. Here, subjects appear to be making general assessments of Internet firms' means and abilities. Previous offline studies have cited issues of expertise (Doney & Cannon, 1997). In this instance, it appears that consumers make foundational judgments of trust related to firms' technological capabilities as well as their resources. These judgments are then applied to a generalized trust in the computer mediated environment (CME). The resources & capabilities factor also brings in notions of abilities (Alsop, 1999; Koehn, 2003) that have largely been studied offline.

Factor three, shopping method, is best exemplified by the item "The Internet is a viable consumer tool." This factor addresses subjects' general comfort or ease in utilizing the Internet for commerce. The inclusion of this factor is unique in that it allows for an assessment of the shopping medium itself. Of course, such an assessment is not common when evaluating many other consumer behaviors (i.e., we do not think about the shopping medium when we give our credit card to the server at a restaurant or the clerk at a supermarket). However, in measuring ICT we contend that the Internet is a unique communications and shopping environment. Of course, ambiguity is a prerequisite to trust (Miliman & Fugate, 1988); but in the CME of the Internet, ambiguity often runs quite high. With the click of a mouse, scores of unknown firms from around the world can be brought to a consumer's consideration set. Most consumers will never understand the

technological complexity behind the massive network of computers. Thus, consumer uncertainty is likely to be high, and in such a context inference-making becomes critical (Broniarczyk & Alba, 1994). The shopping method factor relates the uniqueness of the Internet as a communications and shopping medium. In this case, consumers hold opinions as to the viability and convenience of the Internet.

Factor four relates to the behavioral notion of reliability in delivery and performance. While some previous work has studied reliability issues related to trust in an offline context (Ganesan, 1994; Doney & Cannon, 1997), reliability in the context of the Internet has not been closely studied. Still, perceived honesty, performance as promised, and counting on deliveries appear to emerge as critical issues for ICT. The reliability factor deals largely with perceptions of honesty and the ability to perform as promised. In this instance consumers appear to assess behaviors and develop trust accordingly.

Finally, factor five, communication viability, addresses the notions of privacy, security, and control of personal information. Of course, many previous studies have linked such issues (Hine & Eve, 1998; Benassi, 1999; Milne & Boza, 1999; Rust, Kannan & Peng, 2002); however, this study is the first to bring forth communication viability as an overarching factor in ICT. The Internet allows for consumer evaluations of privacy, security, and control that, just a few years ago, may have seemed nonsensical. Today, however, these issues relate a critical element in ICT formation.

Interestingly, the factor structure supported in this work does not significantly differ from the theoretical factor structures discussed in the offline realm. While few studies have even attempted to factor analyze the complex notion of trust, many have discussed the underlying framework as made up of an affective/emotional component, a conative/behavioral component, and a cognitive/rational component (Ganesan, 1994; Doney & Cannon, 1997; Swan, Bowers & Richardson, 1999; Aiken, 1999; Johnson & Grayson, 2005). In the present work, it appears that the five factors can be mapped onto such a framework. Notably, issues surrounding the communication viability factor appear to be affective in nature. That is, concerns for privacy, security, and the fear derived from loss of control of personal information dwell in human emotion. The items that make up the certification and reliability factors appear to involve behavioral intentions and judgments of human behavior. Finally, the shopping method and resources & capabilities factors relate to cognitive evaluations about ICT. With regards to these factors,

Internet consumers appear to be making rational judgments about e-tailers and the Internet in general.

Significantly, the uncovered factor structure also provides supportive evidence for the two subconstructs proposed by McKnight and Chervany (2001-2002), structural assurance and situational normality. Structural assurance, the belief that supportive structures exist, seems to be related to the certification and resources and capabilities factors. Specifically, items associated with these factors address the degree to which internal and external supportive structures exist in the context of an internet shopping experience. Situational normality, the belief that one's experience will in some sense be "normal," appears related to the reliability and shopping method factors. Items associated with *reliability* are focused on specific elements of a normal shopping experience, while items associated with *shopping method* are focused on the viability of the internet shopping experience in general.

The ICT scale has potential applications across a wide array of marketing strategy and consumer behavior issues. For example, if ICT proves to be a significant antecedent of firm-specific trust, e-commerce firms collectively will likely want to determine how to leverage this knowledge into a greater share of consumer spending over the Internet. Also, individual firms might seek to understand the relationship between ICT and choice of shopping mode. Policy-makers might reasonably investigate the impact of investing in additional "structures" to improve ICT amongst the population. Researchers will want to uncover linkages between ICT and a variety of e-consumer behaviors.

In summary, Internet Commerce Trust has been shown to be a five-dimensional construct. Based upon a broad literature review on the topic of trust, the underlying ICTS factor structure has a sound foundation. Moreover, the factor structure of the ICTS appears to be stable in samples drawn from two different populations, and the fourteen-item scale appears to be relatively parsimonious, given this structure. Further, the scale has desirable psychometric properties of both discriminant and construct validity.

FUTURE RESEARCH

All of the subjects participating in our two studies were at least somewhat Internet savvy. In fact, the method of data collection required subjects to visit a test shopping site on the Internet, and respond to an on-line survey. Thus, it could be argued that the scale being developed

really measured ICT, given that someone is willing to use the Internet at all. Extension of this concept to the population of shoppers who refuse even to log on to the Internet would likely yield additional insights regarding Internet commerce.

A related limitation of this study is that it focused on potential e-shoppers only from the United States. Given that one of the most powerful attributes of the Internet is its global potential, and given that trust in this context appears to be a globally-relevant construct, the dimensionality of ICT needs to be examined within a variety of cultural settings.

Finally, future research might construct a theoretical model involving a test of the relationships between ICT and other relevant constructs. Testing the complex relationships between ICT, experience on the Internet, proficiency with electronic media, demographic and psychographic characteristics, firm-specific trust, etc., would provide a sound strategic framework. Such research would reveal the degree to which the ICT construct also possesses nomological validity.

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