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Modeling the electronic transactions acceptance using an extended technology acceptance model

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Abstract The outlook for e-commerce and e-government depends not only on individuals acceptance of internet technologies as viable transaction means, but also on the recognition of the Web as a reliable milieu. In light of this, a comprehensive model describing the factors that drive individuals to accept on-line transactions over the Web was developed and tested. This study attempts to integrate the well-established technology acceptance model (TAM) with three constructs; namely trust, credibility and risk, which are of paramount importance in predicting individual acceptance of on-line transactions.

This study seeks empirical support for an extended TAM with three constructs related to e-transactions in Saudi Arabia. The structural equation modeling technique was used to evaluate the causal model and to examine the reliability and validity of the measurement model. Our findings show that each of trust, credibility and risk plays an important role toward the acceptance of on-line transactions in the Saudi settings. To view a broader picture of electronic transaction acceptance in Saudi Arabia, general Internet use with four demographic variables were also incorporated into the model. We hope this study would contribute to a better understanding of individual on-line behavior in the emerging e-commerce and e-government environments. Such understanding would enable

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Saudi IT policy and decision makers solve problems in moving to the digital economy and information society.

Implications for management and practice of these findings are discussed to improve the acceptance of e-commerce and e-government as new technologies in Saudi Arabia.

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1. Introduction

In today's increasingly global, digital, and networked economy, corporate spending and organizational dependence on information and communications technologies (ICT) are escalating at unprecedented rates (Agarwal, 2000). In recent years, the advent of electronic commerce and Internet technologies have created opportunities to generate sophisticated and novel business-to-business (B2B) and business-to-customer (B2C) e-commerce and e-government strategies.

The Internet and networks – as the backbone for modern communications – transformed the world into a ubiquitous connectivity. That is, anytime, anywhere, “always on” there is access to the digital network and digital services. We believe that the pace of evolution (and revolution) in ICT that fueled remarkable economic changes in the latter part of the twentieth century will increasingly accelerate during the 21st century. Yet these rapid technical changes are incapable short of considering how they can prosper the social, economic, and other matters that shape the daily life.

How can a nation or a society prepare itself for and thus join the information highway toward higher levels of economic and social development? The answer is neither short, nor direct and to the point. However, we can say that it could be done in two ways: making use of other experiences, and through education and curriculum development. Other experiences can manifest themselves in tailoring conceptual research models and transplant them to suite our cultural values and environment.

The outlook for e-commerce and e-government depends not only on individual acceptance of Internet technologies as viable transaction means, but also on the recognition of the Web as a reliable milieu. In light of this, a comprehensive model describing the factors that drive individuals to accept on-line transactions would be useful for both academicians and practitioners, in that it would help them to better understand individual on-line behavior in the emerging e-commerce and e-government environment. In order to provide a solid theoretical basis for selecting influential driving factors, this paper integrates two important streams of literature under the nomological structure of the theory of reasoned action (TRA): (a) the technology acceptance model (TAM), and (b) the literature on trust, credibility and risk. TAM's value in technology-driven contexts has been consistently important (Bernadette, 1996; Gefen and Straub, 2002; Pavlou, 2003; Venkatesh and

Davis, 2000); therefore employing it in the technology-driven context of e-transaction is a rational undertaking.

Similarly, employing trust, credibility and risk perceptions in the uncertain context of e-commerce and e-government is also reasonable. Drawing upon these literatures, this paper theoretically develops and empirically validates a research model that predicts individual acceptance of e-transaction.

In summary, the open nature of the Internet as a transaction infrastructure and its global nature create uncertainty around on-line transactions, and this poses trust, credibility and risk as crucial elements of e-transaction (Hoffman et al., 1999). Stewart et al. (2002) and Aladwani (2003) argue that the notion of trust is perhaps the most important component of consumer–marketer transactions. Therefore, perceptions of trust, credibility and risk are likely to be important factors in predicting individual e-transaction acceptance.

This paper conducts a field study to explore the potential effects of a set of motivators and inhibitors of electronic solutions in the Kingdom of Saudi Arabia (KSA). More specifically, this study aims to empirically investigate some antecedents such as trust, risk and credibility, and their effects on intention to transact online in virtual communities by testing an extended technology acceptance model.

1.1. Internet in Saudi Arabia

Internet was officially made available in KSA in 1997 by a ministerial decision and the public access finally debuted in 1999. In December 2000 there were about 200,000 Internet users in Saudi Arabia. By 2005 the number of Internet users in KSA had surged to 2.54 million, making a growth rate of 1170% and putting the KSA as one of the fastest growing Internet markets (source: Internetworldstats website <http://www.internetworldstats.com/middle.htm#sa>).

Though the kingdom now has the single largest Internet community in the Arab world, Internet penetration stands at a mere 6.8% – out of the kingdom's 23.5 million population – which is over four percentage points above pan-Arab average, but more than three percentage points below world average. In terms of Internet penetration, Saudi Arabia now ranks the fifth among Gulf Cooperation Council (GCC) states and sixth among Arab countries (Madar Research Journal, 2002).

The CITC annual report (2005) show that the Internet in Saudi Arabia will witness a promising future as it is estimated that the Internet usage will keep on growing rapidly. In addition to the new Internet structure that can cut the prices of Internet access, there are also other factors that can speed up the growth of Internet usage in Saudi Arabia. One reason for the growth is that 60% of the Saudi population comprises teenagers and young adults who are adapting to new technologies faster than expected. Also, as the usage of Internet grows in all the Arab countries, the amount of Arabic content on the Internet will grow as well. This in

turn will attract more and more Saudis to join the Internet, says the report (<http://www.internet.gov.sa/learn-the-web/guides/internet-in-saudi-arabia>). The current total number of Internet users in Saudi Arabia is about 5 million users.

Several universities and colleges in KSA are now adopting e-learning as part of their curriculum. It is estimated that the Saudi Arabia's e-learning market will expand by 33% annually over the next five years and hit US\$125 million by 2008. As more banks and companies will offer more of their services online, more customers are drawn to use these services. It is estimated that ecommerce in the GCC countries will cross altogether the US\$1 billion mark by the year 2008, with Saudi Arabia taking the lion's share of these revenues.

2. Theoretical background

Saudi Arabia is struggling hard toward the adoption of ICT applications manifested in the electronic solutions of e-commerce and e-government. When trying to put Saudi Arabia into the context of the extant of electronic solutions literature, the situation reveals a scarcity of sources. Saudi Arabia makes up one third of the Arab PC market and ranks fourth for the total ICT market among the 22 Arab states. Furthermore, Internet users are widely proliferating to jump from 200 thousand users by the end of the year 2000 to 4.8 million users by the end of the year 2006 (<http://www.internet.gov.sa>). The advent of the Internet and the impetus by high authority toward e-commerce and e-government are important catalysts for individuals and organizations toward the adoption of electronic solutions for their competitive advantage.

KSA scores 1.05 and ranks the fifth among Arab countries in the Madar Research Group (2005) ICT index which consists of four ICT parameters: PC installed base and the number of Internet users, mobile phones and fixed lines. The sum of these parameters is divided by the country's population figure. The higher the index' score the higher the level of ICT adoption.

In 2004, the Saudi Crown Prince issued a decree to the Saudi Computer Society to provide a National IT Plan (NITP) for Saudi Arabia. The Saudi NITP project, just recently approved by the Saudi government in 2007, utilizes information and other technologies to promote knowledge and to support economic development throughout the Kingdom. The plan asserts that scientific and technological innovation is an essential feature for the economic development, such that support for the development of science and technology is seen as a measure of development. The plan stresses the importance of disseminating information services and of enhancing the awareness of IT throughout Saudi society. Two specific initiatives to foster IT adoption include: (1) an incentive policy that offers a 25% bonus of basic salary to Saudi nationals who specialize in computers or pursue an IT career; and (2) a new initiative from the Communications and Information Technology Commission (CITC) to provide one personal computer per Saudi household to leverage IT assimilation and diffusion.

2.1. Toward an information society and a digital economy

The United Nations Economic and Social Committee for West Asia (ESCWA) report (Mandorah, 2003) gave an overview of the development undertaking place in Saudi Arabia in the transformation process toward an Information Society. This report discloses recent indicators for the information society in Saudi Arabia. It emphasizes that the Saudi market is the largest information market among Arab countries with a strong expectation for substantial growth in the future. The underlying motivating factors at Saudi economy were: (1) high percentage of population growth rate which exceeds 3% and having the majority of the population being under 20 years old (43.4% of the population is under 15 years old), and (2) the high financial resources. Major developments toward a Saudi information society summarized by Mandorah (2003) are:

- (a) The development of a Saudi national IT plan by a royal decree issued in 1999.
- (b) The creation of a new ICT ministry.
- (c) The successive price rate reductions in the communications services.
- (d) The commissioning of several ICT technologies such as: ADSL, ISDN, VPN.
- (e) The construction of the first PCs factory in the country.

In May 2007, the Saudi government approved a national plan for the development of its telecom and IT sector with the objective of transforming the Kingdom into a knowledge-based society and a digital economy. This plan includes continuing work on Saudi Arabia's first Knowledge Economic City (KEC) in Madinah (Arab News, 2007).

In a digital economy the Internet provides the necessary infrastructure to exchange information and to ease business and non-business transactions between government, organizations and individuals. The following matrix resembles the possible relationships among these entities (Tapscott, 1996).

	Government (G)	Business (B)	Consumer (C)
Government (G)	G2G Coordination between government depts.	G2B Providing business with information	G2C Providing consumers with information
Business (B)	B2G Tenders and procurements	B2B Electronic commerce	B2C Electronic commerce
Consumer (C)	C2G Inquiry of government services and payments	C2B Search for products and services	C2C Virtual communities and e-auctions

Using ICT and networking the world are becoming of increasing importance for sustainable development paving the way toward building the digital economy and developing the knowledge society (Bakry, 2006). A recent study by the Center for International Development (CID) at Harvard University defined the term “e-readiness” as the “preparedness for the networked world” (Geoffery et al., 2002). Recently, Al-Osaimi et al. (2006) developed an integrated framework for conducting e-readiness assessments of five domains “strategy, technology, organization, people, and environment” and each domain consists of several factors. These domains deal explicitly or implicitly with factors contributing to the resistance/acceptance of e-transactions including ICT infrastructure, security, users’ concerns, awareness and skills, and regulations. In a survey of the key Internet characteristics and e-commerce issues in Arab countries, Aladwani (2003) contends that Internet security and customers trust and awareness dominates the top tier indicating their importance. All of these stress the roles of trust, risk and credibility in promoting e-transactions for successful e-commerce and e-government.

A vital aspect of e-readiness is the level of information security that an emerging market can assure. Poor protection of intellectual property can stunt the growth of the national software development industry. Inadequate protection of personal data creates barriers to information exchange and raises risk levels. Failure to recognize electronic signatures or to permit the use of encryption undercuts trust in the new ways of doing business.

Modern ICTs offer the prospect of vast improvements in the speed and efficiency with which governments communicate with citizens. By making governments more accessible and more accountable, e-government can help to improve citizens’ engagement toward online transactions in those applications. Many countries have and continue to benefit from the acceptance of e-government. Layne and Lee (2001) have the viewpoint that e-Government provides progress toward a higher level of integration and interoperability to government levels and branches. In essence, interoperability leads to extensive information sharing among and between governmental entities.

Pons (2004) in researching the problems and difficulties encountered in promoting the concept of e-government in the Middle East evaluate the opportunities along with the adoption of the technology to render advantages to the Arab world. Pons argues that understanding e-government applicability and effectiveness in the Arab countries is of vital importance to increase and promote its use. Among the barriers affecting e-government in the Arab countries were: information security, technical and infrastructure, educational, governmental, social and cultural factors. Just recently, the Saudi government approved several laws that govern the informational transactions. Such a move is a real driving force for citizens to engage in electronic transactions. However, the obstacles preventing rapid progress in this direction are not merely technical. In fact, the technology side may prove the least difficult to address; the organizational, legal, political and social aspects may prove to be much more of a challenge. Hence, in an information society

and digital economy, it is inevitable for individuals and organizations (public and private) to engage in electronic transactions. But, what are the motivators and inhibitors for online transactions?

2.2. Uncertainty around online transactions

The spatial and temporal separation between consumers and Web retailers and the unpredictability of the Internet infrastructure generate an implicit uncertainty around on-line transactions (Brynjolfsson and Smith, 2000). First, there is the risk of monetary loss, since consumers have to rely on electronic information and thus become vulnerable to incomplete or distorted information provided by Web retailers and third parties (Lee, 1998). Second, there is the risk of loss of privacy associated with providing (whether intentionally or involuntarily) personal information to Web retailers (Culnan and Armstrong, 1999). Hence, e-transaction is associated with an important delegation of authority that consumers surrender during on-line transactions. In summary, the open nature of the Internet as a transaction infrastructure and its global nature create uncertainty around on-line transactions, and this makes trust and risk crucial elements of e-transaction (Hoffman et al., 1999). Stewart et al. (2002) argue that the notion of trust is perhaps the most important component of consumer–marketer transactions. Therefore, perceptions of trust and risk are likely to be important factors in predicting e-transaction acceptance.

Trust has long been regarded as a catalyst for buyer–seller transactions that can provide consumers with high expectations of satisfying exchange relationships. Many researchers maintain that trust is essential for understanding interpersonal behavior and economic exchanges (e.g., Doney and Cannon, 1997; Luhmann, 1979; McKnight and Chervany, 2002). The importance of trust is elevated in e-commerce because of the high degree of uncertainty and risk present in most on-line transactions (Benassi, 1999). Jarvenpaa and Tractinsky (1999) empirically showed the favorable effect of trust on consumer purchase intentions. Thus, the role of trust is of fundamental importance for adequately capturing consumer behavior in e-commerce.

Credibility is another important factor reported in the literature that is likely to influence e-transaction. Some authors regard credibility as a component of trust or risk (e.g., McKnight et al., 2002; Pavlou, 2003) while others deal with credibility as a distinguished concept (Liao et al., 1999, 2003; Wang et al., 2003). This study follows the latter direction and considers credibility as a distinguished concept. In general, the perceived credibility that people have in the system, to securely conclude their transactions and maintain the privacy of their personal information, affects their voluntary acceptance of e-transaction. Perceived risk is also an important element of B2C e-commerce that is likely to affect consumer behavior (Jarvenpaa and Tractinsky, 1999). Risks are either technology-driven which is derived from the underlying infrastructure (environmental risks), or relational,

resulting from the trading partner (behavioral risks) (Ring and Van de Ven, 1994). Since trust, perceived credibility, and perceived risk are essential constructs when uncertainty is present (Luhmann, 1979; Schoorman et al., 1995), these beliefs are integrated here in the proposed e-transaction acceptance model.

3. Research model and hypotheses

Electronic transaction (e-transaction) is the ability of consumers to purchase products and carry out services on-line using Internet technologies and associated infrastructure (Olson and Olson, 2000). As with most information systems, Internet technology acceptance and use can be partially explained by the technology acceptance model. While this model initially focused on system usage in the workplace, recent research has applied it to understand Web site use (Moon and Kim, 2001). Therefore, individuals' intentions to use the Internet for on-line transactions should consider the major TAM constructs, which theorize that perceived usefulness and perceived ease of use determine actual system use (Davis, 1989). Following Davis, perceived usefulness is defined as the degree to which consumers believe that a particular technology will facilitate the transaction process. Perceived ease of use is defined as the degree to which an individual believes that using a particular technology will be effortless.

The research presented in this paper aims to predict individual acceptance of e-transaction by integrating TAM with the constructs of trust, credibility and risk, which are essential when uncertainty is present in the technology-driven virtual environment. The proposed e-transaction acceptance model draws from the Technology Acceptance Model (TAM) which is based on the theory of reasoned action (TRA) that has been extensively validated on consumer intentions (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975; Sheppard et al., 1988). The major building blocks of the TAM model are salient beliefs, which are used to ascertain and consequently determine intentions and behavior. TAM has been successfully applied in technology acceptance in a variety of environments, systems, tasks, and subjects.

By closely adhering to the structure of TAM, the proposed model integrates a set of salient beliefs, drawing upon TAM and the trust, credibility and risk literatures, which are jointly proposed to influence on-line transaction intentions. In addition, the proposed model describes the complex set of interrelationships among the key e-transaction drivers – trust, credibility, risk, usefulness, and ease of use with a set of demographic variables.

In short, this research aims at providing a basic model that predicts individual acceptance of e-transaction by explaining their intentions when using Internet technology for transactions. The main research issues are:

- Predicting the drivers of individual intention to accept e-transaction leading to engage in online transaction behavior.

- Integrating TAM key beliefs with trust, credibility and risk extended with several demographic variables to jointly predict individual intention for on-line transaction.

Fig. 1 presents the proposed research model. The dependent variable – intention to transact – is posited as the primary construct to determine consumer acceptance of e-transaction. Following the application of TRA to a technology driven environment, the TAM variables (perceived usefulness and perceived ease of use) are posited as key drivers of e-transaction acceptance. The proposed model integrates additional key drivers of e-transaction acceptance, such as trust, credibility and perceived risk. All five key drivers are defined and explained, and their relationships with transaction intentions and acceptance of e-transaction are proposed. The practical utility of considering TAM stems from the fact that e-transaction is heavily technology-driven. Trust, credibility and perceived risk are considered because of the uncertainty of the e-transaction environment. Placing these variables under the nomological structure of TAM (as cognitive responses) that are predicted by several (external stimuli: age, gender, level of education, work type and Internet use) posited to predict intention for e-transaction (behavioral intention) and describing their interrelationships justify the proposed

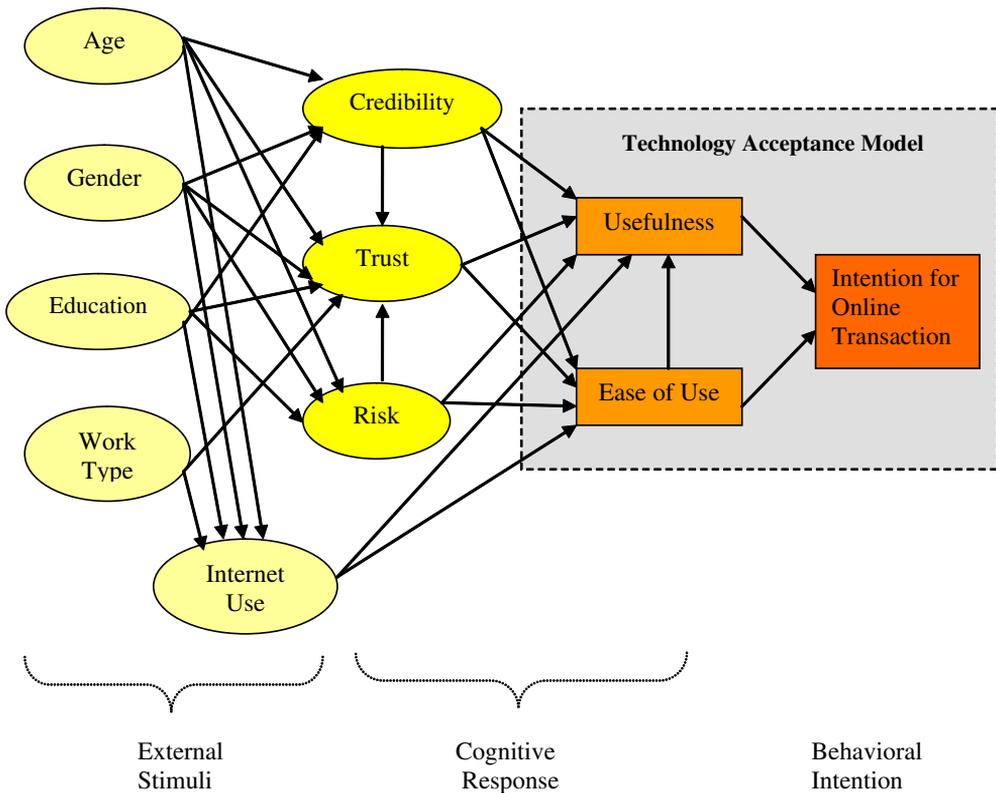


Figure 1 Research conceptual model.

integration of the hypothesized key e-transaction drivers into a coherent and parsimonious research model.

3.1. Electronic transaction acceptance

e-Transaction acceptance can be broadly described as the customer's engagement in electronic exchange relationships with Web vendors. Hence, online transactions can be viewed as instances of interactive marketing communications (Pavlou and Stewart, 2000). Drawing both from the marketing and consumer behavior literature and from B2C e-commerce empiricism, consumer-retailer exchange relationships typically involve several activities along the process (Information Retrieval → Information Transfer → Product/Service Purchase).

Consumer-vendor exchange relationships typically involve several activities. The first step often involves basic data exchange from the retailer to the consumer, such as browsing, gathering information, and making product and price comparisons. The next step usually involves the consumer providing some personal information by registering an e-mail address, describing product preferences, and providing feedback. This step is often supplemented by automatic information exchange that is intentionally or involuntarily captured through cookies, log-data, and data-mining tools. The final step involves provision of private and monetary information, such as credit card information, actual purchase preferences, and payment and address information, in order to complete the purchase of a product or service.

3.2. Intention to transact

Intention to transact is defined as the consumer's intent to engage in an on-line exchange relationship with a Web site, such as sharing business information, maintaining business relationships, and conducting business/governmental service transactions (Pavlou, 2003; Ranganathan and Jha, 2007; Zwass, 1998). Based upon the description of the on-line transaction process, B2C e-commerce acceptance necessitates that the consumer intend to use a retailer's Web site to obtain and provide information and then complete a transaction by purchasing a product or service. Although the number of Internet users is constantly increasing (CommerceNet, 2001), a recent study found that more than 75% of on-line consumers abandoned their shopping carts before purchase. This poses a tremendous problem for Web retailers, since they prefer buyers and not just browsers. However, as is true of traditional shopping, even if consumers finally decide not to purchase, their initial intentions when engaging in information exchange are typically to complete the ongoing transaction process if everything occurs according to their confident expectations (Hoyer and MacInnis, 2001). The "intention to transact" construct aims to encompass intentions regarding the entire on-line transaction process, and proposes that intentions span the entire process, whereas actual

activities may often cease during the process. Even if information exchange and product purchase may be theoretically distinct intentions, they are posited, without loss of generality, as practically indistinguishable in on-line transactions. Likewise, issues involving e-commerce can be applied to e-government on-line transactions in order to predict the concerns and problems of citizens with the technology.

The positive relationship between behavioral intentions and actions is extensively described by the theory of reasoned action (Ajzen and Fishbein, 1980) and the theory of planned behavior (Ajzen, 1985; Ajzen and Fishbein, 1980). Research following TRA and TAM consistently showed a high correlation between intentions and actual use (Bernadette, 1996). Drawing upon TRA's theoretical rationale and abundant empirical evidence, this paper – although not examined here – posits that there is a positive relationship between transaction intentions and actual on-line transaction behavior.

In contrast to traditional consumer behavior, on-line transactions have certain unique dimensions, such as (1) the extensive use of technology for transactions, (2) the distant and impersonal nature of the on-line environment, and (3) the implicit uncertainty of using open technological infrastructures for transactions. Overall, these three unique differences reduce consumer perceptions of control over on-line transactions, thereby increasing their apprehension about acceptance of e-transactions. In terms of Web retailer opportunism and related risks, theories regarding trust and risk in B2C e-commerce are employed. In terms of technology use for on-line transactions, TAM is employed to describe and predict system use.

There is a broad consensus that both traditional merchants and Web-exclusive retailers have widely embraced the low-cost Internet infrastructure to increase their consumer reach. However, consumers have not adopted B2C e-commerce to the same degree, primarily because of risk concerns and trust-related issues (Harris Poll, 2000; Hoffman et al., 1999; Palmer et al., 2000). Therefore, uncertainty around consumer transaction intentions is fundamental in predicting acceptance of B2C e-commerce. In order to understand better the role of uncertainty in the proposed e-commerce acceptance model, the constructs of trust, credibility and perceived risk are put forward as fundamental in predicting B2C e-commerce acceptance. The practical utility of proposing trust, credibility and perceived risk as salient beliefs stems from the fact that Web retailers have considerable influence on these variables, mainly through their trustworthiness, reliability and integrity and ability to mitigate risk.

3.3. Technology use and intention to transact

Virtually every step in the proposed on-line transaction process requires individuals to interact with Web sites and use Internet technologies. Since intentions to transact entail technology use, it is justifiable to consider the variables of the technology acceptance model in predicting intentions to use Internet technology for on-line transactions. TAM has received substantial attention in the information

systems literature because it focuses on system use, has reliable instruments with excellent measurement properties, is parsimonious, and is empirically sound. It has been shown to apply to a wide range of information technologies, including e-commerce. For example, Gefen and Straub (2000) examined the effect of perceived ease of use on e-commerce acceptance, and Moon and Kim (2001) investigated the impact of perceived usefulness and ease of use on consumer use of the Internet. Therefore, even if TAM was originally intended to predict technology use in the workplace, the TAM variables can also be employed to predict individual behavior in online transactions.

The technology acceptance model would argue that two key variables (i.e., perceived usefulness and perceived ease of use) influence the acceptance of Internet technology. Applied to on-line consumer behavior, a Web interface that is perceived as facilitating the transaction process and easy to operate is likely to be accepted by consumers. Previous research has consistently argued that there is a positive relationship between perceived usefulness and perceived ease of use with acceptance of information technology (e.g., Dishaw and Strong, 1999; Gefen and Straub, 2000; Venkatesh and Davis, 2000), and this finding has also been validated in Internet technology use (e.g., Lederer et al., 1999; Gefen and Straub, 2002; Moon and Kim, 2001). The general premise is that both perceived usefulness and ease of use directly influence intention, but perceived ease of use also acts indirectly through usefulness (Davis, 1989). Gefen and Straub discuss this relationship extensively, showing that in most cases perceived ease of use should affect use intentions through perceived usefulness (Gefen and Straub, 2000). Given the wide variety of technologies, applications, and information systems for which TAM has been validated; Internet technology and Web interfaces should also adhere to the major TAM predictions albeit these web technologies are being used mainly for transactions. Therefore, it is hypothesized that perceived usefulness and perceived ease of use have a positive influence on intentions to transact with Web retailers, suggesting that these variables contribute to individual acceptance of e-transaction. The practical relevance of the TAM variables stems from the fact that they can be influenced by the Web retailer's actions through external variables. A Web interface that is perceived as facilitating the on-line transaction process and easy to use is likely to influence individual behavioral intentions. The previous arguments lead to the following hypotheses:

- H1.** Individual intention to transact on-line is positively influenced by perceived usefulness of the Internet website.
- H2.** Individual intention to transact on-line is positively influenced by perceived ease of use of the Internet website.
- H3.** Perceived usefulness of a website is positively influenced by perceived ease of use.

3.4. Trust

Trust is a defining feature of most economic and social interactions in which uncertainty is present. Trust has long been regarded as a catalyst in consumer–marketer relationships because it provides expectations of successful transactions. Practically all interactions require an element of trust, especially those conducted in the uncertain environment of e-commerce such as the Internet-based e-commerce context (Ba and Pavlou, 2002; Benedictus and Andrews, 2006; Jarvenpaa et al., 2000; McKnight et al., 2002). Trust can be described as the belief that the other party will behave in a socially responsible manner, and, by so doing, will fulfill the trusting party's expectations without taking advantage of its vulnerabilities (Gefen and Straub, 2000; Mayer et al., 1995). Lack of trust has been touted as one of the main reasons for consumers not engaging in e-commerce (Fung and Lee, 1999; Hoffman et al., 1999). Hoffman et al. (1999) argued that lack of trust prevents consumers from engaging in on-line transactions because they are unlikely to transact with a Web retailer that fails to convey a sense of its trustworthiness.

Following the work of McKnight and his colleagues (McKnight et al., 2002, 1998), trust is defined here as the belief that allows individuals to willingly become vulnerable to Web retailers after having taken the retailers' characteristics into consideration. Researchers have found trust to be important to both virtual teams (e.g., e-government and e-learning) and e-commerce as increased transaction complexity makes conditions more uncertain, as is the case in computer-mediated commerce, the need for trust grows (McKnight and Chervany, 2002).

Trust as a salient belief could be regarded (McKnight et al., 2002, 1998; Pavlou, 2003; Tan and Thoen, 2000a, b) as a second order construct which includes two first order constructs (1) goodwill trust (benevolence) and, (2) credibility (honesty, reliability, and integrity). This conceptualization captures two distinct facets of trust in e-commerce. First, it involves the traditional view of trust in a specific party (the Web retailer), and second, it implicitly encompasses trust in the integrity of the transaction medium (trust in the infrastructure). Since a certain level of uncertainty is a prerequisite for trust to exist, the proposed conceptualization of trust suggests that when consumers willingly become vulnerable to a Web retailer, they consider the characteristics of the Web retailer, goodwill trust, (due to behavioral uncertainty) and the characteristics of the related technological infrastructure, credibility, (due to environmental uncertainty). In this study, following Ganesan (1994) and Geyskens et al. (1998), we manipulate these two concepts as separate concepts where the first concept covers the dimensions of trust whereas the second concept covers the dimensions of credibility as did Gefen et al. (2003).

Trust is emerging as a key element of success in the on-line environment and considerable research on trust in the offline world has been performed, however, to date empirical studies of on-line trust has been limited (Corritore et al., 2005, 2003). For e-vendors, it is critical, therefore, to promote trust in order to transform a potential consumer from curious observer to one who is willing to transact

over the website. Several researchers, in fact, have proposed trust to have a significant impact on the success and acceptance of e-transactions. For instance, Palmer et al. (2000) argue that building consumer trust in Web retailers is essential for the growth of B2C e-commerce. Jarvenpaa and Tractinsky empirically showed that trust has a direct effect on consumer purchase intentions in multiple cultures (Jarvenpaa and Tractinsky, 1999). Gefen showed that trust is instrumental in the acceptance of Internet technologies (Gefen et al., 2000). Stewart et al. (2002) argue that trust is fundamental in consumer–marketer communications. Furthermore, Keen (1999) argued that trust is the foundation of e-commerce, focusing on the strategic implications of trust for consumer–marketer relationships.

Understanding the nature and antecedents of consumer trust in the web can provide web vendors with a set of manageable, strategic levers to build such trust, which will promote greater acceptance of e-commerce (McKnight et al., 2002) and similarly e-government to a certain extent (Kampen et al., 2006; Warkentin et al., 2002). Trust and trustworthiness of e-vendors by potential customers were found to strongly impact their perceived usefulness and ease of use of the e-vendor website (Pavlou, 2003). The individuals' perceived usefulness and ease of use of new technology, such as the Internet, are known as antecedents to individuals' intentions to use the technology (Moon and Kim, 2001).

Therefore, the following hypotheses are explored here.

H4. Perceived usefulness of a website is positively influenced by individual trust in the Internet website.

H5. Perceived ease of use of a website is positively influenced by individual trust in the Internet website.

3.5. *Credibility*

As stated above credibility is considered here as a distinct construct. Ganesan (1994) defines credibility as the extent to which the consumer believes that the marketer has the expertise and honesty to perform the transaction effectively and reliably. Fogg and Tseng (1999) and Geyskens et al. (1998) argue that credibility is an important factor in users' perceptions of on-line environments. From the work of McKnight and his colleagues, credibility as a salient belief captures the concepts of honesty, reliability, and integrity. This definition implicitly encompasses trust in the integrity of the transaction medium (trust in the infrastructure). The proposed conceptualization of credibility suggests that when consumers willingly become vulnerable to a Web retailer, they implicitly consider the characteristics of the related technological infrastructure due to environmental uncertainty.

Hoffman et al. (1999) argued that lack of credibility prevents consumers from engaging in on-line transactions because they are unlikely to transact with a Web site where high concerns about the utilization of the associated Internet

infrastructure exist. Web retailers can substantively affect credibility in the infrastructure by facilitating encrypted transactions, installing firewalls, utilizing authentication mechanisms, and ensuring privacy seals and disclosures (Benassi, 1999, 1996; Cassell and Bickmore, 2000). Therefore, environmental uncertainty is strongly influenced by behavioral actions of Web retailers that aim to reduce infrastructure-related concerns and increase trust in e-commerce. Subsequently, the Web retailer credibility encompasses a substantial portion of credibility in the focal transaction, even if the retailer has no absolute control over the Internet infrastructure. The role of credibility in the infrastructure (interface) has been extensively described by Cassell and Bickmore (2000).

Wang et al. (2003) have conceptually distinguished perceived credibility from perceived risks (e.g., Liao et al., 2003) and trust, and found that perceived credibility had a significant positive influence on the behavioral intention to use Internet banking. According to Wang et al. (2003), perceived credibility is defined as the extent to which a person believes that the use of mobile banking will have no security or privacy threats. Generally, individuals' perceived credibility in the system affects their voluntary acceptance of the technology as a transaction medium. This is because of their concerns to securely conclude their transactions and maintain the privacy of their personal information.

Possible factors related to credibility due to environmental uncertainty would include navigational architecture, interface design elements, information content accuracy, and reputation (Fogg et al., 2001; Moon and Kim, 2001). Other possible factors inherent in a trusting situation could include the control the user has in interacting with the website. The perceptions of usefulness and ease of use of a website reflect how useful and simple the website is to use. Perceived usefulness and perceived ease of use are key constructs of new technology acceptance (Davis, 1989). Davis's definitions of usefulness and ease of use focus on how usefully and easily users can achieve their goals using a technology. Other studies have also indicated that usefulness and ease of use affect online trust and credibility (Pavlou, 2003). Hence, the following hypotheses are explored here.

H6. Perceived usefulness of a website is positively influenced by individual perceived credibility of the Internet website.

H7. Perceived ease of use of a website is positively influenced by individual perceived credibility of the Internet website.

Fogg and Tseng (1999) propose that trustworthiness is a key component of credibility, rather than credibility being a cue for trustworthiness. By contrast, we agree with Corritore et al. (2003) to see it the other way around, i.e., credibility as a cue for trustworthiness. That is, if an object has credibility (e.g. the author is a recognized expert), that credibility is a positive signal of the trustworthiness of the object. Hence, credibility provides a reason to trust but is not trust itself. This will guide the direction of causality between credibility and trust as the former predicts the latter.

Corritore et al. (2003) identify three perceptual factors that impact on-line trust: perception of credibility, ease of use and risk. Later, Corritore et al. (2005) identify perceived credibility as an antecedent and a predictor of trust. Accordingly, the following hypothesis is derived:

H8. Individual trust in the Internet website is positively influenced by individual perceived credibility of the Internet website.

3.6. *Perceived risk*

Consumer concerns and perceived risks are much higher in online transactions than in brick-and-mortar purchasing, so much that a very high level of trust is needed to stimulate increases in online spending (Hoffman et al., 1999; Jarvenpaa et al., 2000). The realization of the remarkable potential of B2C Internet activity (Wang et al., 1998) is contingent on consumer willingness to employ the web for transacting personal business, such as purchasing or gathering information. There is, however, considerable evidence that users perceive significant risks and uncertainty in interacting with web-based vendors (Friedman et al., 2000; Hoffman et al., 1999; Tan, 1999; Wang et al., 1998). The web environment does not allow people to inspect the product, directly observe the vendor (Grazioli and Jarvenpaa, 2000), or look the vendor in the eye (Ba et al., 1999), assurance mechanisms on which humans have depended for ages. Thus, users find it difficult to assess whether web-based vendors will deliver on their commitments or protect the privacy of personal information shared with the vendor. As Dellarocas (2001a, b) noted, "...the more the two sides of a transaction are separated in time and space, the greater the risks".

The distant, impersonal nature of the on-line environment and the implicit uncertainty of using a global open infrastructure for transactions have rendered risk as an inevitable element of e-transaction. Two forms of uncertainty are naturally present in on-line transactions: behavioral uncertainty and environmental uncertainty (Bensaou and Venkataman, 1996). Similarly, in Ring and Van de Ven's classification, risks are either technology-driven, and thus derived from the underlying infrastructure (environmental risks), or relational, resulting from the trading partner (behavioral risks). Behavioral uncertainty arises because Web retailers have the chance to behave in an opportunistic manner by taking advantage of the distant and impersonal nature of e-commerce and the government's inability to monitor adequately all transactions. The behavioral and environmental forms of uncertainty are typically inter-twined because the actions of Web retailers have an important bearing on the extent of third-party risk, through encryption, firewalls, and authentication. When engaging in an on-line transaction process, consumers are rightly alarmed about the different types of risks that confront them.

Consumer transaction intentions are contingent upon beliefs about Web retailers that are partly determined by behavioral and environmental factors.

Given the uncertain context of e-transaction, it is expected that perceived risk would lower consumers' trust to use Internet sites for transactions. For example, consumers are not likely to engage in on-line transactions with a Web retailer thought to be opportunistic. Similarly, fears that a Web retailer has not taken adequate steps to reduce infrastructure-related risks will also negatively affect trust to transact. Recently, Im et al. (2007) report significant interacting/moderating effects of perceived risk on the PEOU-BI and PUSEF-BI relationships. The relationship between perceived risk and PEOU can be explained by the notion of perceived behavioral control (PBC), described in the theory of planned behavior (Ajzen, 1991). Since PEOU and PBC are typically beliefs documented to be similar and lead to actions, reduction of perceived risk is expected to influence willingness to transact. In fact, Jarvenpaa et al. suggested that reducing the risk associated with buying from an Internet store would increase the probability of a consumer purchasing from it (Jarvenpaa et al., 2000). Perceived risk has been shown to negatively influence transaction intentions with Web retailers (Im et al., 2007; Jarvenpaa and Tractinsky, 1999; Pavlou, 2003). The perceived risk associated with on-line transactions may reduce perceptions of behavioral and environmental control, and this lack of control is likely to negatively influence transaction intentions. However, consumers are likely to transact on-line if their risk perceptions about behavioral and environmental uncertainties are alleviated, so that they gain control over their on-line transactions. The theory of reasoned action, which TAM is based on, predicts that consumers would be willing to transact if their risk perceptions were low (Ajzen and Fishbein, 1980).

Linking trust and risk components reflecting the stance of potential adopters to salient characteristics of a new technology to investigate their adoption decisions using TAM is an important research agenda in the field (Bahmanzari et al., 2003; Pavlou, 2003). Besides the ease of use and usefulness beliefs in the TAM, the intention of online transaction can be affected indirectly by the trust, credibility and risk concerns of the users. We believe that these factors operate on the individual' intention of online transaction through usefulness and ease of use. The following hypotheses can be derived accordingly.

H9. Perceived usefulness of a website is negatively influenced by the individual' perceived risk in transacting on-line over the Internet website.

H10. Perceived ease of use of a website is negatively influenced by the individual' perceived risk in transacting on-line over the Internet website.

Individual's perceptions of risk have been identified as a significant factor affecting trust in the offline and online trust literature. Risk is the likelihood of an undesirable outcome and users' perceptions of risk are closely related to their trust (Corritore et al., 2003). Corritore et al. (2003) identify the perception of risk among three other perceptual factors that impact on-line trust. Later, Corritore

et al. (2005) identify both perceived credibility and perceived risk as important antecedents and predictors of trust. Consequently, the following hypothesis is derived:

H11. Individual trust in the Internet website is negatively influenced by individual perceived risk in transacting on-line over the Internet website.

3.7. Internet general use

Familiarity with the Internet for different purposes other than intended e-commerce and e-government online transactions is thought to be a good competence toward the latter. General Internet surfing provides individuals with certain perceptions about vendors' websites in terms of how useful and easy to use are they. Lee-Kelley and James (2003) contend that previous Internet usage is significantly correlated with e-government adoption. Based on a survey, Yoh et al. (2003) assert that customer' prior Internet experience to be a strong determinant of their online shopping behavior. Thus, the following hypothesis is derived:

H12. Individual general Internet use positively impacts perceived usefulness of the Internet website.

H13. Individual general Internet use positively impacts perceived ease of use of the Internet website.

3.8. Individual characteristics

The role of different Individual characteristics in Individual's trust formation process and related constructs is important and should be investigated (Pennanen, 2005). Four Individual characteristics are explored in this study and therefore included in the model: age, gender, education level and type of work. Hence, four hypotheses are derived accordingly.

H14. Individual's age, gender and educational level impact individual's perceived credibility in transacting on-line over the Internet website.

H15. Individual's age, gender, educational level, and work type impact individual's trust in transacting on-line over the Internet website.

H16. Individual's age, gender, and educational level impact individual's perceived risk in transacting on-line over the Internet website.

H17. Individual's age, gender, educational level, and work type impact individual's general Internet use.

4. Research methodology

4.1. Constructs and measures

A survey questionnaire was designed to measure the research model variable constructs. Appendix A presents the survey measurement items for each construct. Each variable construct (e.g. computer use, trust, credibility, risk, usefulness, ease of use, and intention to transact) was measured using multiple items. The survey instrument also captured values for the four single-item demographic variables, gender, age, level of education, and work type. The items comprising the constructs of computer use, trust, credibility, risk, usefulness, ease of use, and intention to transact were adapted from published IS research (see Appendix A). All survey items, originally published in English, were adapted for this study in Arabic using Brislin's (1986) back translation method. The items were translated back and forth between English and Arabic by several bilingual professors, and this process was repeated until both versions converged.

4.2. Sampling and data collection

Participants in the study were faculty members, staff, and students in a major university comprising nine men colleges and two women colleges in Saudi Arabia. Participants were approached such that they are engaged in electronic transaction over the Internet for the purpose of accomplishing useful tasks. The returned usable responses from participants (out of 300) were 128, with a response rate of 42.67%. Of the 128 participants, 79.6% were men, while 20.4% were women. Respondents ranged in age from 18 to 61 years old. In terms of level of education, 6.1% hold high school, (7.1%) had earned a diploma, 19.4% were university graduates, (15.3%) were holding a master degree; and (52.1%) earned a PhD.

5. Data analysis and results

The research model depicted in Fig. 1 was analyzed using PLS-Graph (build 1126), a Partial Least Squares (PLS) Structural Equation Modeling (SEM) tool. PLS-Graph simultaneously assesses the psychometric properties of the measurement model (i.e., the reliability and validity of the scales used to measure each variable), and estimates the parameters of the structural model (i.e., the strength of the path relationships among the model variables).

Reliability results from testing the measurement model indicate that the measures are robust in terms of their internal consistency reliabilities as indexed by their composite reliabilities. The composite reliabilities of the different measures in the model range from 0.71 to 0.90, which exceed the recommended threshold value of 0.70 (Nunnally, 1978).

The convergent validity was tested with PLS-Graph by extracting the factor loadings (and cross loadings) of all indicator items to their respective latent constructs. These results indicate that all items loaded: (1) on their respective construct from a lower bound of 0.72 to an upper bound of 0.93; and (2) more highly on their respective construct than on any other construct. A common rule of thumb to indicate convergent validity is that all items should load greater than 0.7 on their own construct (Yoo and Alavi, 2001), and should load more highly on their respective construct than on the other constructs.

Tables 1 and 2 present the results of the structural model, where the beta values of the path coefficients (β) indicate the direct influences of the predictor upon the predicted latent constructs. Path analysis was conducted to compute the indirect and total effects. The path coefficient of an exogenous variable represents the direct effect of that variable on the endogenous variable. An indirect effect represents those effects interpreted by the intervening variables; it is the product of the path coefficients along an indirect route from cause to effect via tracing arrows in the headed direction only. For more than one indirect path, the total indirect effect is their sum. The total effect of a variable on an endogenous variable is the sum of the direct and the indirect effects.

Perceived usefulness (PUSEF) of the web technology exhibited a strong positive influence ($\beta = 0.35, p < 0.01$) on intention for e-transaction. Perceived ease of use (PEOU) of the web technology also exhibited a strong positive influence ($\beta = 0.174, p < 0.01$) on intention for e-transaction. PEOU has a very strong and positive influence on PUSEF ($\beta = 0.574, p < 0.001$). However, the total effect of PEOU on intention for e-transaction is greater compared to the total effect of PUSEF ($\beta = 0.377, \beta = 0.350$ respectively).

Each of the three constructs of trust, credibility, and risk regarding the use of the web for e-transaction exhibited significant effects on both PUSEF and PEOU ($(\beta = 0.107, \beta = 0.100, \beta = 0.247); (\beta = 0.338, \beta = -0.079, \beta = -0.221)$)

Table 1 PLS results: reliability (α), variance (R^2) and (direct, indirect and total) effects of X (exogenous) \rightarrow Y (endogenous)^a.

Y	X													
	Reliability (α)	Variance Explained (R^2) (%)	Age			Gender			Education			Work Type		
			D	I	T	D	I	T	D	I	T	D	I	T
Intention to transact	0.75	24.88	.000	.029	.029	.000	.090	.090	.000	.092	.092	.000	.005	.005
Usefulness	0.82	29.36	.000	.040	.040	.000	.231	.231	.000	.130	.130	.000	.002	.002
Ease of use	0.83	27.72	.000	.029	.029	.000	.239	.239	.000	.124	.124	.000	.015	.015
Credibility	0.86	17.84	.076	.000	.076	.268	.000	.268	.215	.000	.215	.000	.000	.000
Trust	0.77	24.58	.077	.000	.077	.270	.000	.270	.076	.000	.076	.033	.000	.033
Risk	0.90	11.27	.005	.000	.005	.196	.000	.196	.090	.000	.090	.000	.000	.000
Internet-use	0.83	21.96	-.079	.000	-.079	.205	.000	.205	.137	.000	.137	.075	.000	.075

D = direct effect, I = indirect effect, T = total effect.

^a $\beta \geq 0.04$ is significant at $p > 0.05$ or better.

Table 2 PLS results: (direct, indirect and total) effects of Y (endogenous) → Y (endogenous)^a.

Y	Y																	
	Usefulness			Ease of Use			Credibility			Trust			Risk			Internet Use		
	D	I	T	D	I	T	D	I	T	D	I	T	D	I	T	D	I	T
Intention to transact	.350	.000	.350	.174	.203	.377	.000	.220	.220	.000	.214	.214	.000	-.111	-.111	.000	.044	.044
Usefulness	.000	.000	.000	.579	.000	.579	.107	.254	.361	.247	.196	.443	-.079	-.128	-.207	-.086	.114	.028
Ease of use	.000	.000	.000	.000	.000	.000	.100	.149	.249	.338	.000	.338	-.221	.000	-.221	.197	.000	.197
Credibility	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
Trust	.000	.000	.000	.000	.000	.000	.442	.000	.442	.000	.000	.000	-.087	.000	-.087	.000	.000	.000
Risk	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
Internet use	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

D = direct effect, I = indirect effect, T = total effect.

^a $\beta \geq 0.04$ is significant at $p > 0.05$ or better.

respectively]. In addition, perceived credibility and perceived risk exhibited significant effects on trust ($\beta = 0.442$, $\beta = -0.087$ respectively). However, the total effects of credibility, trust, and risk on intention for e-transaction were ($\beta = 0.220$, $\beta = 0.214$, and $\beta = -0.111$ respectively).

Previous individual Internet use exhibited significant effects on both PUSEF and PEOU ($\beta = -0.086$, $\beta = 0.197$ respectively). It also exhibited a total effect of ($\beta = 0.044$) on intention for e-transaction and exhibited total effects of ($\beta = 0.028$, $\beta = 0.197$) on PUSEF and PEOU respectively.

Each of age, gender, and educational level significantly influenced perceived credibility and perceived trust [$(\beta = 0.076$, $\beta = 0.077)$; $(\beta = 0.286$, $\beta = 0.270)$; $(\beta = 0.215$, $\beta = 0.076)$ respectively]. Both gender and educational level significantly influenced perceived risk ($\beta = 0.196$, $\beta = 0.090$) respectively. Additionally, each of age, gender, and educational level significantly influenced individual Internet use ($\beta = -0.079$, $\beta = 0.205$, $\beta = 0.137$) respectively. Finally, Individual work type exhibited a significant effect on individual Internet use ($\beta = 0.075$).

The conceptual model tested in this study revealed a very good explanation for the variations in the endogenous constructs by their antecedents among the respondents who participated in the study. About 25% of the variance of e-transactions, 30% of PUSEF, 28% of PEOU, 18% of perceived credibility, 25% of perceived trust, 11% of perceived risk, and 22% of Internet use were explained by the model.

Respondents of this study reported that the major obstacles that face them regarding the adoption and use of computers and Internet were 17.6% lack of interest, 63.7% lack of training, 33% technological, 36.3% financial, 3.3% no feasibility. Their access channels to the Internet were 6.6% via ISP, 64.8% pre-paid cards, 62.6% in the work, 3.3% Internet café.

6. Discussion

This study sought empirical support for an extended TAM to evaluate electronic transactions acceptance in Saudi Arabia. A prominent finding of this study was

the corroboration of the applicability of TAM in Saudi Arabia in the field of Internet as a medium for e-transactions. Our findings show that intention for online transaction over the Internet is predicted by both PUSEF and PEOU, and PEOU in turn is a major predictor of PUSEF. Therefore, all the structural paths in TAM proved to be significant in the Saudi settings. Accordingly, this study adds further support to Al-Gahtani (2007) for the applicability of TAM in Saudi Arabia as a viable model in investigating individual acceptance of new and emerging technologies.

The well known TAM was augmented with four major constructs related to e-transactions in addition to several demographic variables to view a broader picture of e-transactions acceptance in Saudi Arabia. Credibility, trust, risk, and general Internet use were hypothesized to be antecedent to perceived usefulness and ease of use as major predictors of new technologies acceptance. Intention to transact over the Internet is the dependent variable in this study which is considered as the surrogate for actual online transaction over the Internet. The total effects of these four antecedents on intention for e-transactions came in order of strength as ($\beta = 0.220$, $\beta = 0.214$, $\beta = -0.111$, $\beta = 0.044$ respectively). This shows the hierarchical importance of each of these variables in predicting Saudi individuals' intention to adopt and use online transactions over the Internet.

Trust, credibility and free of jeopardy are pivotal factors to interpersonal, inter-organizational and commercial relationships because it is crucial wherever risk, uncertainty, or interdependence exist. These conditions flourish in many settings, but they thrive in socially distant relationships. This study supports previous research findings (McKnight and Chervany, 2002) regarding the importance of trust and credibility to both virtual teams and e-commerce. As increased transaction complexity makes conditions more uncertain, as is the case in e-commerce and e-government, the need to ease jeopardy and to promote trust and credibility grows.

It is of utmost importance that policy and decision makers pay special attention to individual concerns in this regard in order to endorse the acceptance of e-transactions as the footsteps to the successful adoption and use of e-commerce and e-government. There are several measures to attain certain levels of security in order to provide assurance of trust and credibility and to alleviate jeopardy in electronic transactions. The digital signature using the public key infrastructure (PKI) is one of the effective measures here. Another measure is the trust seal provided by a third-party trust logos and seals of approval. More organizations employ trust seal on their website from trust service agents to provide assurance of trust in their electronic transactions. To name a few organizations that offer trust services, three famous organizations are (Cashell and Aldhizer, 1999): Council for Better Business Bureaus offering BBBonline, TRUSTe offering TRUSTe, and American Institute of Certified Public Accountants/Canadian Institute of Chartered Accountants offering WebTrust. The last but not least measure is the governmental legislations to control e-transactions. Recently, the Saudi government issued a package of legislations pertaining to e-transactions which is the right move in the right time.

Table 3 Results summary.

Potential influencing variables [cognitive responses and external stimuli (demographic variables and Internet use)] and each specific hypothesis	β and its significance	Result
<i>Cognitive responses</i>		
H1: Individual intention to transact on-line is positively influenced by perceived usefulness of the Internet website	0.350 ($p < 0.01$)	Supported
H2: Individual intention to transact on-line is positively influenced by perceived ease of use of the Internet website	0.174 ($p < 0.01$)	Supported
H3: Perceived usefulness of a website is positively influenced by perceived ease of use	0.579 ($p < 0.001$)	Supported
H4: Perceived usefulness of a website is positively influenced by individual trust in the Internet website	0.247 ($p < 0.01$)	Supported
H5: Perceived ease of use of a website is positively influenced by individual trust in the Internet website	0.338 ($p < 0.01$)	Supported
H6: Perceived usefulness of a website is positively influenced by individual perceived credibility of the Internet website	0.107 ($p < 0.01$)	Supported
H7: Perceived ease of use of a website is positively influenced by individual perceived credibility of the Internet website	0.100 ($p < 0.01$)	Supported
H8: Individual trust in the Internet website is positively influenced by individual perceived credibility of the Internet website	0.442 ($p < 0.001$)	Supported
H9: Perceived usefulness of a website is negatively influenced by the individual' perceived risk in transacting on-line over the Internet website	-0.079 ($p < 0.05$)	Supported
H10: Perceived ease of use of a website is negatively influenced by the individual' perceived risk in transacting on-line over the Internet website	-0.221 ($p < 0.01$)	Supported
H11: Individual trust in the Internet website is negatively influenced by individual perceived risk in transacting on-line over the Internet website	-0.087 ($p < 0.05$)	Supported
H12: Individual general Internet use positively impacts perceived usefulness of the Internet website	-0.086 ($p < 0.05$)	Supported
H13: Individual general Internet use positively impacts perceived ease of use of the Internet website	0.197 ($p < 0.01$)	Supported
<i>External stimuli (demographic variables and Internet use)</i>		
H14: Individual's age, gender, and educational level impact individual's perceived credibility in transacting on-line over the Internet website	0.076 ($p < 0.05$)	Supported
	0.268 ($p < 0.01$)	
	0.215 ($p < 0.01$)	
H15: Individual's age, gender, educational level, and work type impact individual's trust in transacting on-line over the Internet website	0.077 ($p < 0.05$)	Partially supported
	0.270 ($p < 0.01$)	
	0.076 ($p < 0.05$)	
	0.033 ($p > 0.1$)	
H16: Individual's age, gender, and educational level impact individual's perceived risk in transacting on-line over the Internet website	0.005 ($p > 0.1$)	Partially supported
	0.196 ($p < 0.01$)	
	0.090 ($p < 0.05$)	
H17: Individual's age, gender, educational level, and work type impact individual's general Internet use	-0.079 ($p < 0.05$)	Supported
	0.205 ($p < 0.01$)	
	0.137 ($p < 0.01$)	
	0.075 ($p < 0.05$)	

General Internet use was also hypothesized to be an antecedent to perceived usefulness of transacting online over the Internet towards its acceptance. Additionally, this study integrated individual age, gender, educational level, and work type to test their potential effects to some antecedents to e-transactions. All hypothesized relationships related to these demographic variables were supported in our survey except that of the impact of work type on trust and the impact of age on perceived risk as they were found to be non-significant.

Table 3 presents summaries of results for each hypothesis and declares whether such hypothesis is supported or otherwise. In fact, all hypotheses of this study were supported except that of H15 regarding the individual's work type impact on perceived trust of e-transaction and H16 that deals with the individual's age impact on perceived risk of e-transaction. This indicates that all types of work (clerical, technical, professional, academic, or administrative) consider perceived trust in transacting on-line over the Internet website an important concern to all Saudi individuals. Additionally, individual's perceived risk in transacting on-line over the Internet website is important to all Saudi individuals apart of any age category. Saudi females consider perceived credibility and trust as important concerns for them to transact on-line over the Internet website compared to their males counterparts. Saudi males consider perceived risk an important concern for them to transact on-line over the Internet website compared to their females counterparts. However, Saudi individuals of higher educational level consider perceived credibility, trust, and risk as important concerns for them to transact on-line compared to their low educational level counterparts.

An implication of this study's findings would be that government better take a proactive policy to encourage those who are reluctant to engage in the emerging e-commerce and e-government. Lee-Kelley and James (2003) argue that such policy will provide the facilitating conditions to promote use and experience of these new technologies. The Saudi NITP include a plan for IT caravan voyages through the country towns, villages and suburbs for hands on training on computers and endorsement of Internet adoption and use. Such a plan is intended to leverage citizens' computer literacy and to mitigate impediments and resistance to the adoption and use of e-transactions technologies. We believe it is time to implement and run such a proactive course of action which shall provide the facilitating conditions in promoting the use and experience of these emerging technologies.

7. Conclusion

This study attempted to testing a conceptual model of five cognitive variables and five external stimuli variables reported in the literature to be antecedents to e-transactions. TAM was used as a base model for the study conceptual model which is extended here to incorporate three major cognitive constructs (credibility, trust, and risk) related to e-transactions. General Internet use and several demographic variables (age, gender, educational level, and work type) were also

incorporated in the research model to view a broader picture of individual acceptance of e-transactions in Saudi Arabia.

The TAM model and the e-transactions conceptual model are validated in the Saudi settings. Of the 17 hypotheses in this study, fifteen hypotheses were supported while the remaining two hypotheses were partially supported.

The importance of the four antecedents to intention for e-transactions in terms of their total effects came in this order: credibility, trust, risk, and general Internet use. The provision and adherence to active trust services integrated to retailers' websites are important requirements for the flourishing of e-transaction technologies. Gender and educational level as demographic variables were also proved to be important in predicting individual intention for e-transactions. However, Individual' age and work type did not prove to be important antecedents to e-transactions acceptance in Saudi Arabia. However, it is a noteworthy that this study findings should be taken with some caution as the generalizability might be questionable, given the fact that the subjects sample is only from one Saudi university with the majority having postgraduate educational levels.

We hope this study would contribute to a better understanding of individual online behavior in the emerging e-commerce and e-government environments. Saudi IT policy and decision makers can make use of our findings in solving problems facing them in moving to a digital economy and information society. Media programs should communicate to the public the roles and benefits of e-transactions in all levels and how they could be made use of in our daily life. Another important role of the media would be the preaching of the recently approved legislations by the Saudi government to govern the informational transactions. Of concern is the existence of a hard core of reluctant or non-users of e-transactions. A proactive policy such as the IT caravan voyages would provide those with the relevant facilitating conditions to promote e-transactions via practical applications of e-commerce and e-government.

Appendix A. Survey instrument

Subjects responded to the following questions by marking a circle "O" around one of the seven options indicated for each question, where 1 is extremely disagree and 7 is extremely agree.

A.1. Intention to transact (Pavlou, 2003)

(IT1) Given the chance, I intend to use the Internet Web site.

(IT2) Given the chance, I predict that I should use the Internet Web site in the future.

(IT3) It is likely that I will transact online over the Internet Web sites in the near future.

A.2. *Perceived usefulness (Davis, 1989)*

- (PUSEF1)** Retailers' Web sites are functional (purposeful and practical).
- (PUSEF2)** The contents on retailers' Web sites are useful to me.
- (PUSEF3)** I believe that retailers' Web sites are valuable to me.
- (PUSEF4)** Overall, I find retailers' Web sites useful.

A.3. *Perceived ease of use (Davis, 1989)*

- (PEOU1)** My interaction with retailers' Web sites is clear and understandable.
- (PEOU2)** I find it easy to locate the information that I need in retailers' Web sites.
- (PEOU3)** Interacting with retailers' Web sites does not require a lot of mental effort.
- (PEOU4)** Overall, I find retailers' Web sites easy to use.

A.4. *Credibility*

- (C1)** The information published and provided over the Internet are objective and robust.
- (C2)** I feel confident about the information published and provided over the Internet.
- (C3)** The information published and provided over the Internet are credible.

A.5. *Trust (Pavlou, 2003; McKnight et al., 2002)*

- (T1)** Electronic transaction via the Web is trustworthy.
- (T2)** Many Web sites – I used to deal with – keep promises and commitments.
- (T3)** I trust those Web sites that keep my best interests.
- (T4)** In general, the Internet environment is reliable and secure for electronic transactions.

A.6. *Perceived risk (Pavlou, 2003)*

Subjects responded to the following three (Perceived Risk) semantic scales by marking "X" in the center of one of the seven places indicated for the following question:

A.6.1. How would you characterize the decision to transact online over the Internet Web sites?

(Disclosing personal information, credit card information, buying, and other dealings)

(PR1)

Significant risk _____: _____: _____: _____: _____: _____: _____ Insignificant risk
 extremely quite to a certain extent neutral slightly to a certain extent extremely

(PR2)

Very negative situation _____: _____: _____: _____: _____: _____: _____ Very positive situation
 extremely quite to a certain extent neutral slightly to a certain extent extremely

(PR3)

High potential for loss _____: _____: _____: _____: _____: _____: _____ High potential for gain
 extremely quite to a certain extent neutral slightly to a certain extent extremely

A.7. Internet use (Adapted from Igarria et al., 1997)

A.7.1 (IU1) On an average working day, how much time do you spend using the Internet?

(Choose one.)

- | | | | |
|--------------------------|---------------|--------------------------|---------------|
| <input type="checkbox"/> | Almost never | <input type="checkbox"/> | 1–2 h |
| <input type="checkbox"/> | Less than ½ h | <input type="checkbox"/> | 2–3 h |
| <input type="checkbox"/> | From ½ to 1 h | <input type="checkbox"/> | More than 3 h |

A.7.2. (IU2) On average, how frequently do you use the Internet?

(Choose one.)

- | | | | |
|--------------------------|------------------------|--------------------------|---------------------|
| <input type="checkbox"/> | Less than once a month | <input type="checkbox"/> | A few times a week |
| <input type="checkbox"/> | Once a month | <input type="checkbox"/> | About once a day |
| <input type="checkbox"/> | A few times a month | <input type="checkbox"/> | Several times a day |

A.7.3. (IU3) How frequently do you use the Internet to get products/services?

(Choose one.)

- | | | | |
|--------------------------|----------------------|--------------------------|----------------------|
| <input type="checkbox"/> | Almost never | <input type="checkbox"/> | Once a week |
| <input type="checkbox"/> | Once a year | <input type="checkbox"/> | Several times a week |
| <input type="checkbox"/> | Several times a year | <input type="checkbox"/> | About once a day |
| <input type="checkbox"/> | Once a month | <input type="checkbox"/> | Several times a day |

A.7.4. (IU4) In general, how would you describe yourself as an Internet/Email user?
A.8. Demographic (Moderator) variables

Age: (Choose one.)

<input type="checkbox"/>	Less than 20 years	<input type="checkbox"/>	41–50 years
<input type="checkbox"/>	20–30 years	<input type="checkbox"/>	51–60 years
<input type="checkbox"/>	31–40 years	<input type="checkbox"/>	over 60 years

Gender: (Choose one.)

<input type="checkbox"/>	Male
<input type="checkbox"/>	Female

Education: (Choose one.)

<input type="checkbox"/>	Less than HS	<input type="checkbox"/>	Graduate
<input type="checkbox"/>	High school	<input type="checkbox"/>	Higher studies
<input type="checkbox"/>	Diploma		

Work type: (Choose one.)

<input type="checkbox"/>	Clerical	<input type="checkbox"/>	Academic
<input type="checkbox"/>	Administrative	<input type="checkbox"/>	Academic/Administrative
<input type="checkbox"/>	Technical/Professional	<input type="checkbox"/>	Other, please specify

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