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# EXAMINING GENDER EFFECTS IN TECHNOLOGY ACCEPTANCE BY ARABIAN WORKERS: A SURVEY STUDY

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## Abstract

*While information technology is increasingly ubiquitous globally, the pace at which the technology has disseminated varies in different regions. We study technology acceptance by working individuals in the Arabian region, which has recorded substantial growths in technology infrastructure and deployments. We focus on gender because the Arabian region has a long-standing cultural tradition and entrenched social norms that distinctly define the gender roles. We develop a factor model, premised on the theory of planned behavior and the technology acceptance model, which explains the focal technology acceptance phenomenon. We test the model and the hypotheses with the responses from 1,088 Arabian workers from 56 firms that participate in our survey voluntarily. The model accounts for a significant portion of the variances in the workers' intentions to use computer technology. We find that gender moderates the effect of subjective norms on intention (significantly stronger for males than for female workers) and the influence of perceived usefulness on attitude (significantly stronger for male than for female workers). However, the moderating role of gender appears insignificant on other relationships we hypothesized. Our findings have several important implications for both research and practice, which we will discuss in this paper.*

*Keywords: Technology Acceptance Model, Theory of Planned Behavior, Gender Effect, Developing Country.*

# 1 INTRODUCTION

While information technology (IT) is increasingly ubiquitous, the pace at which technology has disseminated seems to vary in different regions (Al-Kahtani et al., 2005). The differential diffusion rate affects people's technology exposures and may be partly explained by their sociocultural background that encapsulates cultural traditions and social norms capable of influencing people beliefs about how a technology should work or be utilized (Hill et al., 1998). In light of heterogeneous sociocultural backgrounds, it is important to re-examine a salient theory or model that explains individuals' technology acceptance decisions in different regions, thereby increasing its validity and applicability (Venkatesh et al., 2007). Such investigations are also vital for technology management practices. The growing globalization compels organizations to better understand essential factors influencing the technology acceptance by people in different regions (Al-maghrabi and Dennis, 2009).

The Arabian region plays a growing role in the global economy and has progressively realized the technology-enabled modernization. This region is not particularly familiar to information systems (IS) researchers, in spite of its substantial infrastructural improvements and technology deployments in recent years (Cherrayil, 2008). For researchers and practitioners, examining technology acceptance by working individuals in the region is critical as technology has become a central integral in Arabian business landscape and modernization. A handful of studies examine different issues pertinent to IT; however, they often emphasize the technology itself and do not consider the importance of sociocultural factors (Loch et al., 2003). Our literature review suggests that few studies examine how people decide on whether or not to accept computer technology in a work environment in this area. To mitigate this gap we study the technology acceptance by Arabian workers from a sociocultural perspective. In particular, we focus on the effect of gender, a fundamental sociocultural dimension that has important implications to technology management research and practice (Gefen et al., 1997).

We took a grounded theory approach and conducted a survey study to examine the acceptance of computer technology by Arabian workers. By analyzing the focal technology acceptance phenomenon and synthesizing the extant literature, we developed a nomological network and tested it with a survey data collected from 1,088 Arabian workers in 56 organizations. Overall, our model can explain individual workers' intentions to use computer technology available in their work environment. According to our results, perceived usefulness affect attitude and intention; perceived ease of use influences perceived usefulness and attitude. Subjective norms as well as perceived behavioral control appear to impact intention. The mediating effect of attitude in the relationship between its predictors and intention appears statistically insignificant. In addition, we analyzed the moderating role of gender. According to our results, gender has a significant moderation effect on the relationship between perceived usefulness and attitude, and that between subjective norms and intention. However, the moderating effects in other hypothesized relationships are not statistically significant.

## 2 BACKGROUND OVERVIEW AND LITERATURE REVIEW

We provide an overview of the technology development in the Arabian region, analyze technology acceptance by people in this region and the potential effects of gender, review relevant previous research and salient theories and models, and highlight the research gap that motivates our study.

### 2.1 Overall Technology Development in Middle East

The overall development of IT in the Arabian region has been relatively slow (El Louadi, 2008). Internet connections were not established until 1997; Internet access by the general public was available in 1999 (Al-Kahtani et al., 2005); Internet users only accounted for 5.41% of the population in 2003 (Al-Kahtani et al., 2005). According to El Louadi (2008), one key barrier to large-scale, rapid technology disseminations is the incompatibility between the entrenched sociocultural background and the imported western technology. To some extent, people may consider the technology, mostly developed in the North American or Europe, culturally biased or socially invasive (Hill et al., 1998).

In turn, these sociocultural obstacles can prevent people from accepting and thus making good use of the technology available in work environments (Hill et al., 1998).

Although the Arabian countries are generally viewed as late IT adopters, the demand for technology-enabled services and products has been strong (Al Sukkar and Hasan, 2005). Although the region has displayed fast IT growths, the co-existence of the technology and the long-standing sociocultural tradition is challenging and, in effect, has constrained the technology progression and penetration in nearly all aspects of life (Cherrayil, 2008). Previous studies have examined the technology diffusion in the Arabian region and identified several important issues to be considered by firms that provide technology products or services in this region (e.g., Al Sukkar and Hasan, 2005). From a research perspective, the growing importance of technology in the Arabian region and its unique sociocultural background warrant re-examinations of salient theories and prevalent models.

## **2.2 Analysis of Technology Acceptance in the Middle East**

Previous research has investigated different facets of IT in the Arabian region; e.g., Internet banking (Al Sukkar and Hasan, 2005), e-commerce (Al-maghrabi and Dennis, 2009) and e-government (Chatfield and Alhujran, 2009). Many studies use a particular theory or model to examine the focal technology-related phenomenon in a consumer context and few investigate individuals' technology acceptance in a work environment by considering the sociocultural influences within the organizational structure. For example, Loch et al. (2003) examine the adoption of Internet by knowledge workers in the Arab world, and report that social norms and technological culture can influence an individual's technology acceptance. The study lacks a consideration of individuals' perceptions of a technology, and thus offers limited insights into the mechanisms of the sociocultural factors that affect people's perceptions. Al-Gahtani et al. (2007) also examine the technology acceptance by knowledge workers in the Arabian region and their results show that an individual's personal beliefs and perceptions can affect his or her technology adoption decision. Baker et al., (2007) investigate the effects of gender and age on new technology implementation however, only the theory of planned behavior (TPB, Ajzen, 1985) related factors are examined, and the gender effect on individual's perceived technology characteristics is unclear.

Women constitute a minority of the work force in this region (Al-Gahtani et al., 2007) and might be less likely to learn, accept, and use IT. Women account for nearly two thirds of the population in the Arabian region, but only represent 4% of its Internet users (El Louadi, 2008). Female participations in technology-related activities have increased steadily; nevertheless, the growing female participations remain a serious underrepresentation (Khreisat, 2009). Female workers in the Arabian region represent a unique user group influenced by a considerable gender segregation that is encouraged by cultural tradition and societal norms in this region. These unique phenomena underscore the considerable impact of gender on people's technology acceptance and dissemination in the Arabian region. Previous research has recognized gender as a critical contingency, and has examined the gender difference in technology acceptance; e.g., Gefen and Straub (1997); Venkatesh and Morris (2000). These studies examine subjects in developed countries, in which people's sociocultural background significantly differs from that in the Arabian region. Gender introduces an interesting complexity as women in this region often are expected to comply with the established cultural tradition and eminent social norms.

## **2.3 Previous Technology Acceptance Research**

Several theories and models have prevailed for explaining or predicting a person's technology acceptance; e.g., the theory of planned behavior (TPB, Ajzen, 1985), the technology acceptance model (TAM, Davis, 1989), and the unifying theory for technology acceptance and use (UTAUT, Venkatesh et al., 2003). Among them, the TPB and the TAM are generic and have been used to study various technology acceptance phenomena that differ in terms of technology, target users, and context.

According to the TPB, an individual's acceptance of a technology can be explained by his or her intention, which is jointly determined by attitude, subjective norms, and perceived behavioral control.

Attitude refers to a person's positive or negative evaluative affect about performing a behavior (Ajzen, 1985); subjective norms denote the person's perception of relevant others' opinions about whether he or she should perform the focal behavior (Ajzen, 1985); and perceived behavioral control is the person's perception of the presence or absence of required resources for performing a behavior (Ajzen, 1985). The TPB is salient and can explain a person's behavior in a social setting. This theory has been tested with a wide range of behavior; e.g., health care (Conner and Sparks, 1996), consumer decision making (Fortin, 2000), and technology acceptance/adoption (e.g., Chau and Hu, 2001). The accumulated empirical evidence suggests the theory's explanatory utilities and predictive validity (Venkatesh et al., 2007).

The TAM is developed specifically for explaining and predicting an individual's acceptance of an IT (Davis, 1989; Davis et al., 1989). This model argues that perceived usefulness and perceived ease of use are critical determinants of an individual's technology acceptance (Davis, 1989; Taylor and Todd, 1995; Chau and Hu, 2001). Perceived usefulness refers to the degree to which a person believes that using the focal technology would enhance his or her performance, whereas perceived ease of use denotes the extent to which a person believes his or her use of the technology would be free of effort (Davis, 1989). The TAM has been empirically examined across a variety of technology acceptance scenarios that include email (e.g., Gefen and Straub, 1997), office automation software (e.g., Mathieson, 1991), online consumer decision making (e.g., Koufaris, 2002), and enterprise systems (Venkatesh et al., 2003). This model has shown high predictive power of technology adoption across different technologies, user groups, and organizational contexts (Davis et al., 1989; Venkatesh and Davis, 2000).

Both TPB and TAM posit that a person's behavior is determined by his or her intention to perform the behavior, and that intention is influenced by the person's attitude towards the behavior. One important advantage of the TAM is its ability to identify specific salient beliefs that influence technology acceptance (Taylor and Todd 1995); however, it does not consider other factors, such as the influence of significant others, perceived ability or control that have been shown to affect people's behaviors as well (Taylor and Todd 1995). In this vein, the TPB stresses the direct determinants of intention and therefore can be used in conjunction with the TAM to predict intention. According to Chau and Hu (2002), to examine technology acceptance by working individuals, it is essential to include factors that pertain to the individual (e.g., attitude, perceived behavioral control), the technology (e.g., perceived usefulness, perceived ease of use), and the social-organizational context (e.g., social influence). Hence, it is desirable to develop a nomological network grounded in the TPB and the TAM, which consists of key factors pertinent to the technology, the users, and the context.

Gender represents an important sociocultural factor that has been studied within people in developed countries. For example, Gefen and Straub (1997) examine the gender difference in people's perceptions and use of e-mail. Venkatesh and Morris (2000) examine the moderating role of gender in the TAM and report that the effect of social influence is greater with females than with males, partially because females are generally more sensitive to others' opinions and feelings. Straub et al. (1997) comparatively test the TAM with users from Japan, Switzerland, and the United States. Their results show that the TAM applies for both the U.S. and Switzerland, but not for Japan, a finding suggesting that this model might not predict technology acceptance equally well across different sociocultural contexts. Bandyopadhyay (2007) examines the TAM with workers by focusing on the role of culture in people's technology acceptance, and show this generic model not equally predictive of user technology acceptance across different cultures. These findings suggest the need to further examine the effects of key sociocultural factors on technology acceptance in different regions.

## **2.4 Gap Analysis and Motivation**

Our literature review suggests that limited prior research has examined the gender effects in the technology acceptance by working individuals in the Arabian region, though several studies take a qualitative approach to analyze the technology deployment and use by different user groups (e.g., Al-Kahtani et al., 2005; Hill et al., 1998; Khreisat, 2009). It is essential to investigate general workers' acceptance of computer technology in this region for several reasons. First, the Arabian region is

representative of developing countries with fast technology growths, but exhibits trends and patterns seemingly different from those commonly observed elsewhere. The countries in the Arabian region are experiencing fast IT growths, but struggle with models for the co-existence of technology and cultural identity (Cherrayil, 2008). Investigations of technology acceptance and diffusion in the Arabian region can provide interesting insights to the technology developments in other developing countries as well (Al Sukkar and Hasan, 2005). Second, most Arabian countries have unique social environments (Loch et al., 2003); the sociocultural background may affect people's beliefs and perceptions of technology in a way distinct to Western cultures or elsewhere. As Venkatesh et al. (2007) commented that "identifying boundary conditions and situational contingencies related to technology adoption models presents an important step on the road to scientific progress and maturity within a stream" (p. 270). It is crucial to re-examine an established theory or a commonly used model in this unique sociocultural context, thereby improving its applicability and casting light on the probable boundaries. Third, re-examinations of salient technology acceptance theories or models in work environments have become increasingly important, partly because of the rapid and permissive technology penetration in an expanding array of work settings. Compared with general consumers, working individuals may have different perspectives or considerations when deciding on whether to use a new technology at work, and they may perceive the influence of peers differently (Chau and Hu, 2002). As the social influence or behavioral control may be perceived differently in a working context, it is necessary to investigate their effects on working individuals' technology acceptance.

To address this gap, we develop a theory-based, nomological network for explaining the acceptance of computer technology by general workers in the Arabian region. Our model is premised on the TPB and the TAM and particularly focuses on the gender effects. We target the following queries:

1. Can a nomological network, premised in salient theories and models (e.g., the TPB, the TAM), explain the technology acceptance by Arabian workers?
2. How may gender influence the technology acceptance by Arabian workers?

### **3 RESEARCH MODEL AND HYPOTHESES**

Our research model consists of the key constructs of the TAM and the TPB. We allow comparisons of our empirical results with those reported by prior studies that use similar theoretical premises. In addition to the influences of key antecedents of intention and attitude, we also examine the moderation of gender on the effects of these antecedents.

Attitude refers to as a person's feelings (evaluative affect) about performing a behavior (Ajzen, 1985); a person's intention to perform a behavior can be determined by the person's attitude and subjective norm concerning that behavior (Ajzen, 1985). A person's attitude toward a behavior is a function of his or her beliefs about the outcome of performing that behavior and an evaluation of the value of those outcomes (Ajzen, 1985). When assessing the value of being positive, a person is more likely to perform the behavior. The positive relationship between attitude and behavioral intention is central to salient theories and model for technology acceptance and has garnered substantial empirical support (e.g., Davis et al., 1989; Venkatesh et al., 2003). In our case, a worker would evaluate the value of using computer technology, on the basis of his or her personal beliefs. When people believe the use of computer technology at work to be positive and capable of producing desirable outcomes, they will form strong intentions to use the technology. Thus, we test the following hypothesis:

*H1: A worker's attitude toward computer technology positively affects his or her intention to the technology in the work environment.*

Subjective norms refer to people's perceptions of whether people important to them think that they should or should not perform a particular behavior (Ajzen, 1985). Subjective norms are a function of a person's perceived expectations of the referent individuals or groups, and his or her motivation to comply with such expectations; subjective norms can affect a person's behavioral intention (Ajzen, 1985). The reference group's opinions or expectations have been shown to impact an individual's technology acceptance decision (e.g. Venkatesh and Davis, 2000). The Arabian culture has a relatively high power distance and a prominent collectivism orientation (Hofstede, 1980). The closely

knitted nature of the social structure also increases the conformance pressure facing people in this region. As a result, people have a tendency of accepting their leader's opinions and comply with referent other's expectations. In the work settings, people perceive social influences stemming from both organizational and sociocultural sources; they may show a strong desire to comply with the expectations of their supervisors or colleagues. Accordingly, we test the following hypothesis:

*H2: Subjective norms positively affect a worker's intention to use computer technology in the work environment.*

Perceived behavioral control refers to a person's perception of the availability of the skills, resources, or opportunities necessary for performing a behavior (Ajzen, 1985), and can directly affect intention. Perceived behavioral control reflects a person's beliefs regarding his or her access to the resources and opportunities needed to perform a behavior; it also embraces key factors, internal or external, that may impede his or her performing a behavior (Taylor and Todd 1995). In our context, perceived behavioral control represents the environments designed to reduce the barriers hindering people's technology acceptance (Venkatesh et al., 2003). This control consideration can be directly fostered by resources and opportunities, and has been shown essential to continued technology use (Venkatesh et al., 2003). When an organization provides appropriate resources (e.g., training, assistance) in the work environment, it reduces workers' cost for using computer technology. As a result, people are likely to perceive their use of computer technology well supported by the organization and thus exhibit a strong intention to use the technology at work. We therefore test the following hypothesis:

*H3: Perceived behavioral control positively affects a worker's intention to use computer technology in the work environment.*

Intention can be determined by perceived usefulness (Davis et al., 1989). In an organizational setting, people form intentions to use a technology on the basis of their beliefs that such technology use can enhance their job performance, above and beyond the positive or negative feelings that may be evoked by the behavior (Davis et al., 1989, p.986). From a utilitarian aspect, people tend to accept a technology when they consider their use of the technology beneficial to work tasks and performance. In a work setting, people need to fulfill job requirements by completing the tasks assigned to them; they are more likely to use computer technology if they perceive that the technology allows them to accomplish that goal with increased performance or efficiency. Thus, perceived usefulness represents an important acceptance determinant (Davis et al., 1989). We then test the following hypothesis:

*H4: Perceived usefulness positively affects a worker's intention to use computer technology in the work environment.*

A person's attitude toward a behavior is a function of his or her beliefs about the outcome of performing that behavior and an evaluation of the probable outcomes. Perceived usefulness represents a person's beliefs about the outcome of using a technology and such evaluative beliefs can impact his or her attitude toward the technology. Learning and affective-cognitive consistency mechanisms provide the theoretical premises underlying this relationship; that is, positively valued outcomes increase a person's affect toward the behavior that generates those outcomes (Davis et al., 1989). The posited linkage between perceived usefulness and attitude congruent with the extant behavioral decision-making literature, which show people attempt to minimize efforts and adopt what is beneficial to them (Thompson et al., 1991). In our case, individual workers value job performance and therefore would assess tools available in the work environment in terms of usefulness for their tasks. That is, workers will form positive attitudes toward a technology if they perceive that technology to be useful for job performance. Hence, we test the following hypothesis:

*H5: Perceived usefulness positively affects a worker's attitude toward computer technology in the work environment.*

The effect of perceived ease of use on attitude can be explained by self-efficacy and instrumentality (Davis et al., 1989). If a technology is easy to interact with, people will have confidence about their use the technology to achieve the expected outcomes (Davis et al., 1989). When a technology is easy to use, people are likely to realize considerable savings in the time or effort required for completing a task. Compared with their counterparts in the developed countries, Arabian workers in general are not

particularly savvy with computer technology due to the limited diffusion of common computer use (Al Sukkar and Hasan, 2005). Their attitudes toward computer technology can be dampened if their use of the technology requires substantial learning and cognitive efforts. On the other hand, workers are likely to form positive attitudes if they consider their use of computer technology requires little efforts. Accordingly, we hypothesize the following:

*H6: Perceived ease of use positively affects a worker's attitude toward computer technology in the work environment.*

Perceived ease of use is instrumental to perceived usefulness. An easy-to-use technology allows people to accomplish tasks with little efforts, enhancing performance from the cost-effectiveness or cost-efficiency aspect. By and large, computer technology is not extensively used by Arabian workers; some of them may consider the technology complex and difficult to use. When attempting to use computer technology at work, people need to learn the fundamentals and apply the technology in their work tasks through repetitive trials-and-errors. All else being equal, if a technology is difficult to use, people are not likely to see its usefulness and harness its full utilities. On the other hand, if a technology is easy to use, people will likely experiment with technology in their tasks and thus gain first-hand observations about its power. We therefore test the following hypothesis:

*H7: Perceived ease of use positively affects a worker's perception of computer technology's usefulness.*

Gender, a fundamental sociocultural factor, can influence people's perceptions and behaviors significantly (Gefen and Straub, 1997). In general, men are encouraged to be assertive and competitive, and women to be nurturing and cooperative; such differential gender roles are often transferred through socialization (Gefen and Straub, 1997). Gender plays an important role in determining a person's frame of reference in evaluating a technology; e.g., usefulness or ease of use. Some empirical evidence suggests perceived usefulness more salient for men than for women (Venkatesh and Morris, 2000). The social roles and expectations for women seem rigid in the Arabian culture (Al-Gahtani et al., 2007); for example, women in Saudi Arabia are expected to act in accordance with strict social norms and expectations. An individual's opinions or judgments may be suppressed or even bow to social influences. Along this reasoning, female workers may rely less on their own judgments when forming attitudes toward computer technology, whereas male workers, expected to be assertive and independent, may depend more on their beliefs for developing attitudes toward computer technology. Thus, we hypothesized the following:

*H8: Gender moderates the effect of perceived usefulness on a worker's attitude toward computer technology in the work environment.*

Prior research has shown the influence of effort expectancy on technology acceptance to be more salient for females than for males (Venkatesh and Morris, 2000; Venkatesh et al., 2003). Several previous studies report that male students generally seem more comfortable learning and experimenting with IT than female students; e.g., Venkatesh and Morris (2000). Hofstede (1980) commented that women tend to place more importance on service aspects than do men. In this light, female workers may be more appreciative of the ease of use of computer technology than their male counterparts. Women seem more anxious than men about the use of computer technology and such anxiety can dampen computer self-efficacy. A review of extent literature suggests the influence of perceived ease of use on people's attitudes toward a technology may differ between men and women, perhaps stronger for women than men. Accordingly, we develop the following hypothesis:

*H9: Gender moderates the effect of perceived ease of use on a worker's attitude toward computer technology in the work environment.*

Men and women usually differ in their orientation and frame of reference toward a focal (social) phenomenon (Eagly 1987); males tend to be task-oriented and females communally-oriented (Eagly 1987). Male workers are more likely than female workers to pay attention to whether a technology can help to improve their job performance; that is, the effect of perceived usefulness on people's intentions to use computer technology may be more salient for men than for women. The differential orientation and frame of reference can be analyzed with the gender schema theory, which attributes



the differences to gender roles and socialization processes reinforced since birth (Venkatesh et al., 2003). The gender schema is prominent when the social norms are strong and have great influences on people's behaviors. In our case, the difference between the gender roles is more distinct in the Arabian culture than elsewhere; hence, we anticipate the differential influence of perceived usefulness on intention to be obvious between male and female workers, and test the following hypothesis:

*H10: Gender moderates the effect of perceived usefulness on a worker's intention to use computer technology in the work environment.*

In general, women are more sensitive to others' feelings than men, and have a tendency not to upset others (Gefen and Straub, 1997); they tend to be compliant; e.g., more likely to conform to the majority's opinions (Eagly, 1987). The extent to which people can be influenced by others appears to differ between men and women (Eagly, 1987). In a social system, women usually place more value on harmonious relationships and smooth communications with others than men, who often emphasize getting the job done in an effective or efficient way. Hence, women are more likely to be influenced by peers and the social norms. We posit that female workers in the Arabian region tend to accept the opinions of their supervisors and other significant others, and align with the social norms when deciding on whether to use computer technology. Thus, we hypothesize the following:

*H11: Gender moderates the effect of subjective norms on a worker's intention to use computer technology in the work environment.*

From an aspect of instrumentality, men tend to emphasize the outcome (i.e., instrumentality) rather than the process (Venkatesh and Morris, 2000) and thus may be likely to pay less attention than women to the facilitating conditions. Alternatively women usually stress the importance of service aspects (Venkatesh and Morris, 2000); female workers would appreciate the resources and supports for using computer technology more than their male counterparts. All else being equal, female workers may consider the resources in support of their use of computer technology more important to their technology acceptance decision than male workers. The facilitating condition implemented in an organization also manifest in the organization's policy or expectation, with which female workers may be more likely to comply than male workers. We anticipate the effect of perceived behavioral control on intention to be stronger for female workers than for male workers. Therefore, we test the following hypothesis:

*H12: Gender moderates the effect of perceived behavioral control on a worker's intention to use computer technology in the work environment.*

Men place great importance on advancement and earning power, whereas women rate interpersonal aspects, service, and physical environment highly (Hofstede, 1980; Venkatesh and Morris, 2000). To make a decision, men tend to depend on self-judgments and women usually rely on peers' opinions and other environmental factors. According to the TPB, behavioral intention is jointly determined by attitude, subjective norms and perceived behavioral intention (Ajzen, 1985). As women may depend on subjective norms more, they are likely to pay more attention to resource-related issues when making the technology adoption decision, and are less affected by their own attitude. In our case, male workers form the behavioral intention on the basis of their assessments and attitudes, while female workers may suppress their own judgments and pay great attentions to environmental cues. We anticipate the effect of attitude on intention to be stronger for male workers than for female workers. Hence, we test the following hypothesis:

*H13: Gender moderates the effect of attitude on a worker's intention to use computer technology in the work environment.*

## **4 STUDY DESIGN AND DATA COLLECTION**

In this section, we describe our measurements, target subjects, and data collection.

*Measurements.* We operationalized each investigated construct with previously validated question items, with minor wording changes to fit our context. Specifically, items for subjective norms,

perceived behavioral control and attitude were adapted from Taylor and Todd (1995); items for perceived usefulness and perceived ease of use were from Davis (1989); and items for behavioral intention were taken from Mathieson (1991). All items employed a 7-point Likert-type scale, with anchors on extremely disagreed and strongly agreed. We used a binary dummy variable to represent gender: 0 for female and 1 for male. All survey items, originally written in English, were translated into Arabic. We had these items translated back and forth between English and Arabic by multiple bilingual professors, and repeated this process until both versions perfectly converged.

*Target Subjects.* We recruited subjects from workers in 56 organizations in Saudi Arabia, public and private. The participating organizations are located throughout the country and cover all the major industries and sectors; e.g., financial and banking, merchandising, manufacturing, petroleum, education, health care, and public administration. Essentially, we targeted workers with hands-on experiences using computer technology for the purpose of work.

*Data Collection.* As part of a project funded by the Saudi government to understand important determinants of people's acceptance of computer technology at work, we obtained from the central government a comprehensive listing of government agencies and major commercial companies. With the assistance of the chamber of commerce in each of the four provinces, we solicited voluntary participations of these organizations. A letter issued by the vice president of a major university was sent to these organizations, seeking their participations in the study. Each organization that agreed to take part in our study was asked to identify a contact person as central liaison to distribute the questionnaire survey to ordinary workers in the organization and collect from them the completed survey. A total of 56 firms agreed to participate voluntarily; through designated contact persons we distributed our survey to 1,900 workers and received 1,088 completed surveys. Our sample was consistent with the cultural preponderance of male workers in Saudi Arabia (Al-Gahtani et al., 2007), though imbalanced between males (78%) and females (22%).

## 5 DATA ANALYSES AND RESULTS

We tested our model and hypotheses with partial least squares (PLS) that allows simultaneous testing of the measurement and the structural models. In our analyses, we mean-centered the variables at the indicator level before creating the interaction terms to limit potential multicollinearity for all the constructs in our model (Chin et al., 2003). We employed a bootstrapping method (250 times) that randomly selected subsamples to test various PLS models.

*Measurement model testing results.* To assess item reliability, we analyzed the loading of each item on its corresponding construct. According to Nunnally (1978), items with a loading greater than .7 are generally reliable. Judged by this threshold value, our instrument exhibited satisfactory reliability as all the item loadings exceeded .7 and were statistically significant at the .001 level. Each investigated construct has a Cronbach's alpha and a composite reliability value greater than or close to .7, common threshold values signifying satisfactory internal consistency (Nunnally, 1978) and construct reliability (Fornell and Larcker, 1981) in social science research. Overall, our results show the instruments possessing satisfactory construct reliability. We then examined the convergent validity using average variance extracted (AVE), and each construct has an AVE score exceeding .5, indicating adequate convergent validity (Fornell and Larcker, 1981). We further examine the cross-loadings for each construct's component score and the manifest indicators of other constructs. All the items loaded substantially higher on their own construct than on other constructs. The square roots of the AVEs are also greater than the correlation among any pair of latent constructs (Chin et al., 2003). Taken together, our results suggest the instrument exhibiting adequate convergent and discriminant validity.

*Model testing results.* Figure 1 summarizes our model testing results. As shown, the full model with moderators explains a considerable portion of the variances in perceived usefulness ( $R^2 = 24\%$ ), attitude ( $R^2 = 20\%$ ), and intention ( $R^2 = 34\%$ ). Perceived usefulness appears to be the most influential antecedent of intention, followed by perceived behavioral control and then subjective norms. Perceived ease of use also can affect intention indirectly through its influence on perceived usefulness. Gender seems to moderate the effect of some, but not all, antecedents.

*Hypothesis testing results.* As shown in Figure 1, our data supported most of the direct effects we hypothesized: perceived ease of use effecting perceived usefulness (path coefficient = .49,  $p$ -value < .001); perceived usefulness influencing attitude (path coefficient = .28,  $p$ -value < .001); perceived ease of use impacting intention (path coefficient = .23,  $p$ -value < .001); perceived usefulness affecting intention (path coefficient = .32,  $p$ -value < .001); subjective norms impacting intention (path coefficient = .17,  $p$ -value < .001); perceived behavioral control affecting intention (path coefficient = .20,  $p$ -value < .001). However, the effect of attitude on intention is not statistically significant (path coefficient = .12,  $p$ -value > .05). Regarding the moderating role of gender, we observed a significant moderating effect of gender on the influence of subjective norms on intention (path coefficient = .04,  $p$ -value < .05); the moderating effect is stronger with male workers than with female workers. Gender also significantly moderates the effect of perceived usefulness on attitude (path coefficient = 0.07,  $p$ -value < .05); this moderating effect seems stronger with males than with females. However, the moderation of gender on any other relationships is not of statistical significance. Overall, our results of the gender effects are not completely congruent with those reported by some previous studies; e.g. Venkatesh and Morris (2000). The differential findings may reinforce the importance of re-examining a salient theory or model with people of different sociocultural backgrounds.

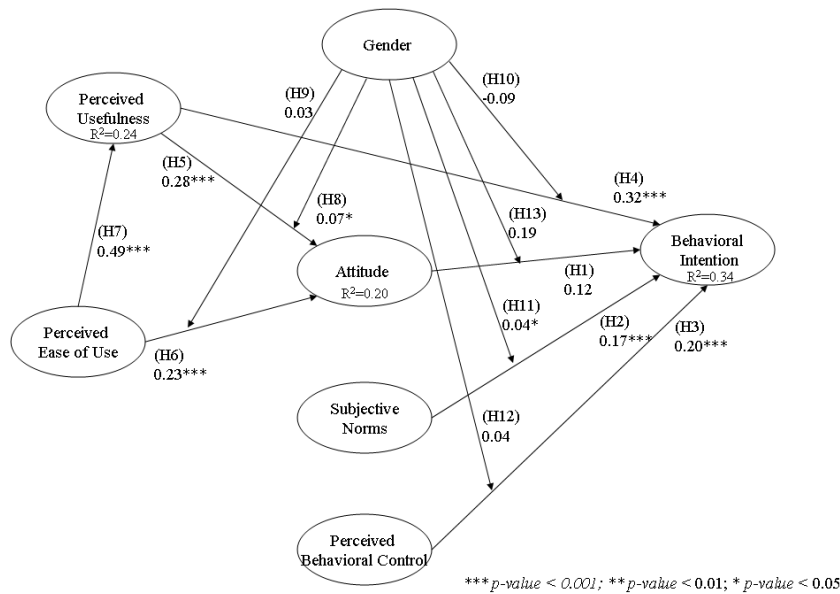


Figure 1. Model Testing Results

## 6 DISCUSSION

Our results of the direct effects on the investigated antecedents are mostly consistent with the findings of prior research (e.g. Davis 1989; Chau and Hu, 2001), with the exception of attitude mediating the influence of perceived usefulness and perceived ease of use on intention. This finding echoes the suggestion that attitude is a weak mediator between the beliefs and behavioral intention (Venkatesh and Davis, 2000). Our research model is capable of explaining Arabian workers' acceptance of computer technology reasonably well, accounting for 34% of the variances in their intention to use the technology. Perceived usefulness has the strongest influence on intention, followed by perceived behavioral control. The effect of perceived ease of use is greater than the effect of subject norms, though the influence of perceived ease of use is mediated through perceived usefulness. Prior study has pointed out some situations in which the effect of perceived ease of use may not affect perceived usefulness and attitude (Chau and Hu, 2001). While the users are individual professionals and very goal oriented, the users would perceive usefulness as more important than perceived ease of use in determining whether to use a technology (Chau and Hu, 2001). However, the research target in this

study is general computer users with less knowledge and specific goals to use the computer. The users depend on the computer to facilitate their daily jobs, and therefore the perceived ease of use also highly impacts the decision of whether to use a technology. Our results underscore the importance of providing adequate facilitating conditions when introducing a new technology in work environment, specifically in the Arabian region. Social influences are also critical as they can create favorable norms and atmospheres for promoting a new technology among the target users in an organization.

Gender seems to moderate the effect of perceived usefulness on attitude, more so for men than for women. This suggests male workers in the Arabian region consider a technology's usefulness more important than female workers when shaping their attitudes toward the technology. Male workers tend to rely on their beliefs in the attitude formation, which is in concert with an instrumental view, suggesting that men emphasize the outcome. For female workers in this region, their attitudes are less determined by their own judgment of the usefulness of the technology, but rather on other external factors that need further investigations. Nevertheless, the determination of final behavioral intention does not differ on the gender basis. It implies that even under the conditions of strong social influence, the female and male workers similarly rely on perceived usefulness to make the technology acceptance decision. Taken together, our results suggest the desirability of emphasizing a technology's usefulness when promoting the technology to male workers but a focus on supervisors' opinions and referent peer's views for female workers.

According to our results, gender also moderates the influence of subjective norms on intention, stronger for male workers than their female counterparts. However, the direction of the moderating effect is in contrast to the results of prior studies. Our result shows that the effect of subjective norms on behavioral intention is stronger for male subjects than for female subjects. It implies that male workers in the Middle East region are more sensitive to the social pressures, and have higher motivation to comply with the social norms. This result highlights the cultural difference between Western and Middle East region. Men in the Western culture have more freedom in making their technology acceptance decision than their female counterparts, less influenced by social pressure. On the other hand, men in the Middle East region have more responsibility to comply with the traditions or the expectations from the society. Therefore, male workers in the Middle East are under significant pressure from social influence in technology acceptance decisions. While introducing a new technology to companies in Middle East countries, the practitioners should carefully manage the social pressure or the peer influence for male workers to assist them to adopt the new technology. For female workers, the influence of subjective norm on their adoption intention is also significant, but weaker than the effect on male workers. It indicates that other external factors may be a more important predictor for female worker's adoption intention. However, the moderating role of gender is not statistically significant in the relationship between perceived usefulness and intention, between perceived ease of use and attitude, between attitude and intention, or between perceived behavioral control and intention. This result indicates that the effect of perceived ease of use for the female worker in the Middle East region is mostly consistent in context; the resource of supporting computer adoption is equally important for male and female workers.

## **7 CONCLUSION AD FUTURE RESEARCH DIRECTIONS**

This study examines technology acceptance by individual workers in the Arabian region, using a factor model that includes key acceptance determinants and have a focus on gender effects. The results show that users' attitude toward computer technology in the work environment is determined jointly by perceived ease of use and perceived usefulness, and the behavioral intention is influenced by perceived usefulness, subjective norms and perceived behavioral control. Our findings show that gender moderates the influence of social influence on workers' acceptance of computer technology as well as the impact of perceived usefulness on their attitudes toward the technology.

This study contributes to technology acceptance research in several ways. First, we contribute to prior research by re-examining salient theories and model with Arabian workers who have a sociocultural background different from developed countries in the U.S., Europe, or Asia. Our results suggest results adequate for explaining the technology acceptance by people in this region, hence increasing

their predictive validity and generalizability. Our model is grounded in the TPB and the TAM and can reasonably explain the focal acceptance phenomenon. Our results reinforce the importance of several essential acceptance antecedents for Arabian workers, including perceived usefulness, subjective norms, and perceived behavior control. Perceived ease of use is particularly important, and its influence on acceptance seems to be mediated through perceived usefulness. Second, we study the gender effects on Arabian workers' acceptance of computer technology in the work environment. We noted the significant role of gender in moderating the effect of perceived usefulness on attitude and the influence of subjective norms on intention. Third, our study contributes to the literature by examining the technology acceptance of less technology-savvy users in a developing country. We advocate the importance of the environmental factors (i.e. subjective norms and perceived behavioral control) when the users have generally less sophisticated computer-related knowledge.

This study has several limitations that must be considered when interpreting our results. First, our results are derived from a single study; although we believe this sample is reasonably representative, we cannot rule out self-selection biases. Second, our study represents a re-examination of generic theory and model in a unique context. We therefore did not consider the antecedent of the acceptance determinants suggested by the respective theory or model. Further investigations should consider a broader set of factors that may directly or indirectly affect the technology acceptance by Arabian workers. Candidate factors may include management support, user participation, training, reward systems or incentives. Third, the gender effect we investigated in this study is considered due to the unique cultural context. Further research should include sociological factors that can better represent the social context in addition to social norm, such as normative belief, motivation to comply and power distance. Nevertheless, our research points to a promising future direction for incorporating key sociocultural dimensions in studying the acceptance of a technology by target users in an organization. Fourth, our study has a limited scope as it focuses on computer technology and targets Arabian workers. Future studies should consider different technologies and user groups to further validate results. Fifth, our study is only a snapshot of the user acceptance intention, and generates little insights on the potential changes of the user adoption decision. Future study may consider a longitudinal design to track the attitudinal or behavioral changes when the users become more sophisticated with computer technologies.

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