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Gender Differences in Technology Usage—A Literature Review

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Abstract

The usage of Information Technology has expanded dramatically in today's homes, business organizations and Government departments Technology has become an inevitable part of human life. Researchers have come up with various models and theories to investigate factors that influence the extent to which humans use computers and its applications. Unified Theory of Adoption and Use of Technology (UTAUT) is the latest model which has been conceived to understand the nature of technology usage and has been applied in various domains like education, banking, health care etc. Gender has been attributed as a significant variable in explaining the technology acceptance behaviour of humans. The objective of this study is to review the existing literature on the technology usage and intention to use technology from the gender perspective. It has been observed from the review that in few contexts, gender plays a significant role in determining the intention of accepting new technology and there are cases where gender differences cannot be discerned.

Keywords

Unified Theory of Adoption and Use of Technology (UTAUT), Technology Acceptance Model (TAM), Gender, Technology, Usage, Intention

1. Introduction

The usage of Information Technology has expanded dramatically in today's homes, business organizations and Government departments. Card, S. K. *et al.* (1983) stated that the interaction between humans and computer had remarkably increased for the purpose of completing any task [1]. Westland and Clark has observed that since 1980s, organizations have invested about 50 percent of new capital in Information Technology [2]. Researchers have propounded various models and theories that investigate factors influencing humans to use computers and its applications.

In spite of institutional efforts to reduce gender inequalities, women in many countries in comparison to their

male counterparts, encounter a significant disadvantage in areas such as education, politics and workplace discrimination. Mayoux pointed out that women faced more challenges in terms of socio-cultural, educational and technological issues than men when managing their business ventures [3]. Orji found that the differences between the men and women have been studied in various areas such as electronic mail, information retrieval, e-learning, communication technologies and online purchasing behaviour and majorly, the studies revealed more favorably towards men as compared to women [4]. The author has suggested that understanding the reasons behind gender inequalities on the acceptance of new technologies would help in overall development of technologies.

Various theoretical models have been established to study the behavioral intentions to adopt technologies. Such models are the Theory of Reasoned Action (TRA) [5], the Theory of Planned Behaviour (TPB) [6], the Technology Acceptance Model (TAM) [7], the Combined-TAM-TPB model (C-TAM-TPB) [8], the Motivational Model (MM) [9], the Innovation Diffusion Theory (IDT) [10], Model of PC Utilization (MPCU) [11], Social Cognitive Theory (SCT) [12]. Venkatesh *et al*. (2003) combined these 8 models to form Unified Theory of Adoption and Use of Technology (UTAUT) to study the behavioural intention to use technology [13]. It has been observed that Technology Acceptance Model (TAM) and Unified Theory of Adoption and Use of Technology (UTAUT) are being widely used by the researchers to study the behavioral aspect in using technology.

The objective of this study is to review the existing literature on the technology usage and intention to use technology from the gender perspective.

In this study, we discussed the framework of the two prominent technology adoption models, namely, Technology Acceptance Model (TAM) and Unified Theory of Acceptance and Use of Technology (UTAUT) in Section 2. Thereafter in Section 3, we have surveyed literature spanning from 2000 till 2015 to discuss how the adoption and usage of various ICT applications such as Information Technology, e learning, e banking, e commerce, stock trading and social media differ on the basis of gender. In the last section, we present the conclusions.

2. Models of Technology Adoption

2.1. Technology Acceptance Model (TAM)

In the initial TAM Model, Davis states that the success of a system is determined by the user acceptance of the system which is measured by three factors: perceived usefulness, perceived ease of use and attitudes towards usage of the system. Davis (1989) defined Perceived Usefulness as “the degree to which a person believes that using a particular system would enhance his or her performance” and Perceived Ease of Use as “the degree to which a person believes that using a particular system would be free of effort” [7]. Perceived Usefulness and Perceived Ease of Use are influenced by external variables such as design, features of the IT system and organizational training. Davis also defined Attitude towards usage as “the degree to which an individual evaluates and associates the target system with his or her job” [7]. A behavioral intention to use the system of the user is influenced by his/her attitude and perceived usefulness of the system.

Later, Davis and Venkatesh (1996) modified the model and eliminated attitude variable as they found through a study that attitude played a minor role in system usage behavior [14]. It was also analyzed that the external variables possibly could be system characteristics, user training, user participation in design and nature of the implementation process (**Figure 1**).

2.2. Unified Theory of Acceptance and Use of Technology (UTAUT)

UTAUT model consists of four core determinants of intention and usage: Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Conditions and also of four moderators of key relationships: Gender, Age, Experience and Voluntariness. The core determinants are the key factors which influence directly the user’s behavioral intention to use new technologies. Moderators are factors, which control the influence of the key factors (**Figure 2**). The definitions of the constructs are given in **Table 1**.

3. Gender Differences with Respect to Usage of ICT Applications

3.1. Information Technology

Using the Unified Theory of Adoption and Use of Technology (UTAUT) Model, Nysveen *et al.* (2005) studied

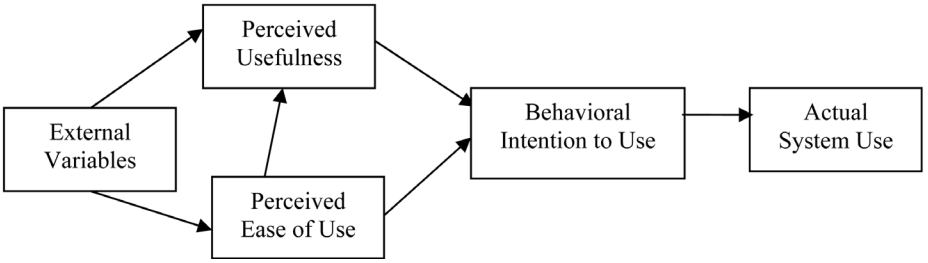

Figure 1. Technology acceptance model (TAM).

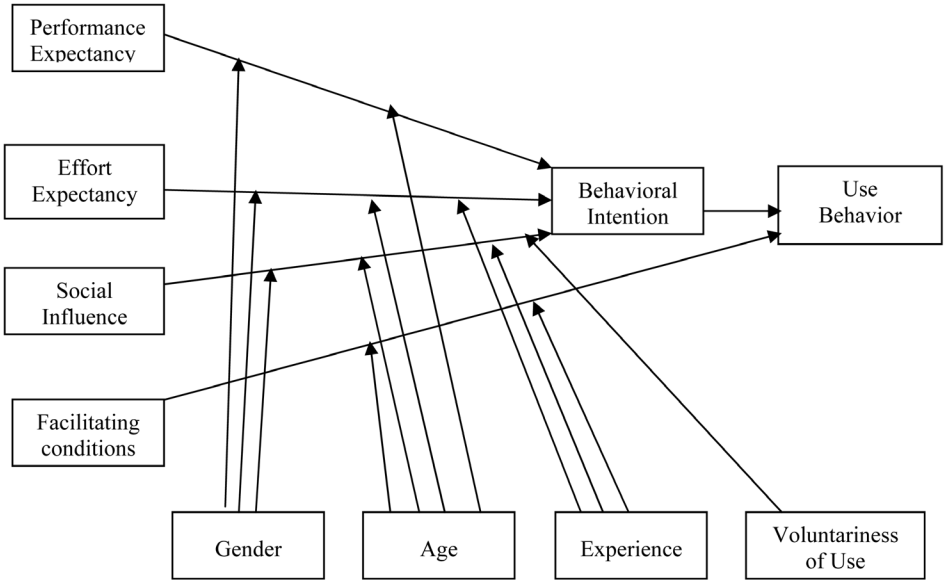

Figure 2. The UTAUT model.

Table 1. Definition of the constructs.

Variable	Type	Definition
Performance Expectancy (PE)	Independent	The degree to which an individual believes that using the system would help him/her to attain gains in job performance
Effort Expectancy (EE)	Independent	The degree of ease associated with the usage of the system
Social Influence (SI)	Independent	The degree to which an individual perceives that other important persons believe that he/she should use the system
Facilitating Condition (FC)	Independent	The degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system.
Behavioral Intention (BI)	Dependent	An indication of an individual's readiness to perform a given behavior

684 mobile chat service users in Norway were being studied and found that perceived usefulness in using mobile chat services is stronger for men than women [15]. Venkatesh and Morris (2000) used Technology Acceptance Model (TAM) amongst 342 employees in a workplace and found that females tend to use the technology that requires less effort and thus, effort expectancy is stronger for women than men. They have also said that women were having lower perceived ease of use because they were having higher levels of computer anxiety as compared to their male counterparts [16]. Constantiou and Manhke (2010) studied 232 people in Austria comprising of mainly young adults working in the private sector and students, on the consumption pattern of Mobile TV services, it has been concluded that men are more interested in sports and women in daily soaps, lifestyle news and weather status [17]. Venkatesh *et al*. (2003) found that females are more sensitive to the suggestions of the

peers and hence the effect of social influence will be stronger when forming the intention to use Information Technology [13]. Venkatesh *et al*. (2003) also revealed that females are more anxious than men when it comes to IT utilization and this nature of the females reduced their self effectiveness which in turn led to increased perceptions of the effort required to use IT [13].

Amongst 630 Anglo American undergraduates, Jackson *et al.* (2001) found that emails are used more by women than men whereas men use Web more than women [18]. By surveying 220 Chinese and 245 British students', Li & Kirkup (2007) concluded that men in both the countries tend to use emails and "chat" rooms more than women do; men play more games on computer; men are more confident on their computer skills than women. However, the gender inequality is stronger in the British group than in the Chinese one [19]. Jackson *et al.* (2001) found that females are more prone to computer nervousness, are less effective in terms of handling computers and have unfavourable attitudes towards using computers [18]. Utilizing the UTAUT Model, Nysveen *et al.* (2005) indicated that social influence has a greater impact on females in using mobile chat services [15]. Similarly, in Portugal, Afonso *et al*. (2012) studied 2175 users of Electronic Document Management System (EDMS) and found that gender only moderates Performance Expectancy (PE) towards Behavioural Intention (BI) as males are more result oriented than females [20].

Calvert *et al.* (2005) had interviewed 1065 parents to know about the media habits of children aged 6 months to 6 years, in the U.S and found that at younger ages there was no difference between boys and girls in using computer but however the interest level of the girls diminished at later stages [21]. In a cross country comparative study in USA and Japan on gender differences, Ono and Zavodny (2005) revealed that during 1990s there were radical gender gap in both the countries in Information Technology usage but situation had reversed by 2001 in the US, while in Japan the situation remained unchanged [22]. In the context of adopting technological innovation, Mazman *et al*. (2009) indicated that females are more induced to adopt technological innovation through social influence rather than by a personal decision whereas in case of males the personal decision to adopt innovation is much stronger than social influence [23].

3.2. e-Learning

Gender differences have been studied in diverse range of disciplines. By implementing extended Technology Acceptance Model (TAM), Okazaki and Santos (2012) studied 446 faculty members in Brazil with respect to adoption of e learning tools. They used Structural Modelling Analysis and found that statistically significant differences exists between male and female with respect to three relations i.e. between ease of use and perceived usefulness, between perceived usefulness and attitude and between intention of use and actual behavior [24]. The authors have also revealed that gender influence the causal relationship *i.e*., the path from perceived usefulness to attitude is much much stronger for males as compared to females and the result is same for the path from ease of use to perceived usefulness [24]. Ong and Lai (2006) surveyed 67 female and 89 male employees from six different international companies in Taiwan and found that females being more challenged by computer illiteracy attach more importance to the ease of use of e-learning tools as compared to men while males give more emphasis on perceived usefulness in determining behavioural intention towards e learning adoption [25]. Islam *et al*. (2011) have noticed gender differences in Malaysia by studying 80 students from higher learning institutions and revealed that females face technical barriers in understanding e learning system [26]. Liaw and Huang (2011) studied 424 university students in Singapore and concluded that male students are more positively inclined towards e-learning than female students [27]. Milis *et al.* (2008) surveyed 200 undergraduate students to understand the acceptability of Virtual Learning Environment (VLE) and observed that females found the new system to be complicated and learning of the new technology widely relied on perceived usability [28].

Raman *et al.* (2014) investigated 65 postgraduate students in Malaysia with respect to the use of Moodle and found that the gender does not influence Performance Expectancy (PE), Effort Expectancy (EE) and Social Influence (SI) towards Behavioural Intention (BI) [29]. Similar kind of conclusion was drawn by Egbo *et al*. (2011) by analyzing 415 undergraduate students in Nigeria, who posited that female students intend to use ICT more than their male counterparts [30]. In India, Suri and Sharm (2013) surveyed 477 students and concluded that no gender difference exists in attitudes towards e learning [31].

3.3. e-Banking Services

With the growth of Internet and intensive penetration of mobile phones, banks have been extensively promoting

the mobile and Internet banking systems. Studies have shown that gender is a significant factor in influencing adoption of mobile banking. Laukkanen and Pasanen (2008) studied 2675 customers of Scandinavian Bank in Finland and by applying backward stepwise method of logistic regression analysis, it has been revealed that men are more likely to use mobile banking services than women [32]. Cruz *et al.* (2010) found that men are more goal oriented but men are also more concerned on the cost of Internet access and other related fees when using mobile banking services [33]. Similarly, in Brazil, Puschel *et al.* (2010) surveyed 666 respondents, it has been concluded that men are using mobile banking services much higher than the women do [34]. In India, Joshua and Koshy (2011) examined 553 consumers who are accessing computers and Internet and concluded similar result [35].

On the contrary, Foon and Fah (2011) surveyed 200 respondents in Malaysia, it has been found that gender difference is not significant in Internet banking adoption [36]. This finding is also similar to Ainin *et al*. (2005) which claimed that gender does not influence the adoption of Internet banking [37].

Yu (2012) utilized the UTAUT Model to study the factors in adopting mobile banking. Through empirical evidence, he revealed that effort expectancy and social influence were not significantly moderated by gender while performance expectancy is the only construct that was controlled by gender [38]. Shergill and Li (2005) studied the Internet banking consumers and found that women are more concerned on privacy issues than men [39].

3.4. e-Commerce

With respect to electronic commerce, Bae and Lee (2011) noticed that women attached more risk to online shopping and are more concerned with privacy issues [40]. In domain of Mobile Commerce, Jaradat and Rababaa (2013) used the Modified UTAUT Model amongst the 447 undergraduate university students in Jordan to study acceptance and use of m-commerce services. They found that performance expectancy and effort expectancy is not controlled by gender [41]. Likewise, in Saudi Arabia, Alkhunaizan and Love (2013) conducted astudy amongst 574 participants which had yield similar result [42]. By studying 2104 Spanish Internet users, Bigne, Ruiz and Sanz (2005) highlighted that gender does not exhibit significant difference when it comes to mobile shopping but rather age, societal status and knowledge of Internet shopping are the main determinants of using M-Commerce [43].

Jones *et al*. (2009) claimed that males are more frequent Internet users and consequently, their usage of e commerce sites is also very high [44]. Bae and Lee (2011) stated that females while making online purchase decisions are more affected by online consumer reviews than males [40]. They have also found that in comparison to males, females are more affected by the negative consumer reviews given online. Garbarino and Strahilevitz (2004) discovered that positive feedback on a product from friends play a stronger effect on females than males and this reduces their observed risk of using e commerce sites for purchasing [45].

3.5. Stock Trading

Based on a modified UTAUT Model, Tai and Ku (2013) surveyed 329 stock investors in Taiwan and concluded that the effect of social influence on behavioural intention was significant for males, but non-significant for females. This may be due to the relatively advanced and complex technologies involved in stock trading, thus, reducing the chance of being influenced by the peer groups. They also concluded that people who are having high performance expectancy reveal a strong intention to use mobile stock trading [46]. Teo *et al.* (2004) examined the attitude of both adopter and non adopters of online stock trading and surveyed 208 adopter and 222 non adopters in Singapore and concluded that males are dominantly found to be early adopters in Internet Stock Trading [47]. Similarly, Hou (2015) studied 200 online stock traders and 1479 non traders in U.S. and found that males tend to use online stock trading more than females [48].

In the contrary, Li *et al*. (2002) used sample size of 3759 households in US to study the intention to take up e trading and found that gender inequalities do not exist but young investors are willing to take risk in e-trading [49]. Tai and Ku (2013) also revealed that the influence of effort expectancy on behavioural intention to adopt mobile stock trading technologies is not controlled by gender [46].

3.6. Social Media

Nowadays, social media is a very popular ICT application and also plays an active role among youngsters. After

studying 450 Indian young adults in an urban area, it has been revealed that 6.67% of the females spent more than three hours in social network sites as compared to 6.04% males. Also, with respect to time spent on social network sites for more than two hours, percentage for females was 7.44 as compared to 3.85 for males [50]. Using UTAUT2 Model, a survey was conducted amongst 419 college students in the Bandung city of Indonesia to understand the usage of social media application called LINE and has been found that the behavioural intention towards usage is stronger amongst women as compared to men [51]. Mazman & Usluel (2011) conducted an online survey amongst 870 Facebook users and concluded that females use Facebook more for "maintaining existing relationship", "academic usage" and "following particular agenda" than their male counterpart while males use it more for "making new relationship" [52]. This finding was supported by Tufekci (2008) where he examined 301 college social network site users and concluded that women use social network sites mainly to maintain personal relationships and men use it to find new friends [53].

After studying 22,670 profiles of social media application called MySpace in the U.S, it has been found that this social network site was mainly used by teenagers; with females being keen on making friendship and males being interested in dating [54]. In the US, 935 teens were being surveyed and found that females are more concerned on disclosing their personal information in the social network sites than males are [55]. Likewise, Narasimhamurthy (2014) studied 450 young Indian adults and disclosed that women use social media as a productive tool but male use it as a means of entertainment [50]. By examining 41 students of XI th standard in a high school in the United States, it has been revealed that female students have more accounts in social network sites and they spend more time in those sites than males [56].

4. Conclusions

From the literature review, it can be observed that there are mixed results with respect to the influence of gender on technology adoption. While in few contexts, gender plays a significant role in determining the intention of accepting new technology, there are cases where gender differences cannot be discerned. In the context of usage of Information Technology which includes computers, email services, electronic data management systems etc., gender acts as an influencing factor in technology adoption as men are found to be more technologically adept compared to women. In terms of mobile or Internet banking, there has been a mixed observation from the authors regarding the impact of gender. Similarly, gender difference is not being observed with respect to interaction via social media but the males and females do have different agenda in using social network sites. Females mainly use the social network for "maintaining existing relationships" whereas males use it for "making new friends". In the fields of mobile/electronic commerce, males and females are found to be equally using online shopping but women are more influenced towards consumer reviews than men. Majority of the literature on acceptance of e-learning applications highlighted that gender was a significant factor, which was also the case in online stock trading, where many of the researchers had concluded that females faced technical challenges and risk in using technology.

This review can help the future researchers to identify techniques by which the gender gap in technology acceptance in the above discussed domains can be addressed. Institutions both private and public, can design programmes aimed at enhancing the skills of the females who are more apprehensive about using emerging ICT applications.

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