A Review of Technology Acceptance and Adoption Models in Consumer Study

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Abstract – User acceptance of technology has been a key area of study for numerous studies. In this technological era, awareness of technology is important in today's fast changing networked society. Businesses could determine the path for future development by understanding user acceptability. A variety of frameworks and models have been created to describe how users embrace new technologies, and these models add variables that may have an impact on user acceptance. An overview of theories and concepts related to user acceptability of technology are given in this study. The growth of each theory, as well as its most important applications, expansion and limitations are summarised in this paper. In addition it provides a summary of the technological acceptance and adoption model in consumer study. Through this review, future researchers will be better able to conceptualise, identify, and appreciate the underlying technological models and theories that may influence future application of technology adoption.

Keywords: technology acceptance, adoption, model, consumer, review

Introduction

Consumer behaviours and activities have changed as a result of Internet-based economic growth. The use of technology has greatly improved both consumer and commercial life. It has changed the lifestyles of consumers as well as their purchasing behaviours. With the information technology rapid development, e-commerce has become one of the main channels for people to shop online (Solomon, 2018). Globally, the use of eCommerce has become a critical factor promoting online purchasing (Ashraf et al. 2019). Understanding what motivates consumer acceptance and use of technology in daily life is crucial since consumer contact with technology is a popular area of study.

The degree to which customers accept the technologies are relies on a number of variables, including technology accessibility, convenience, consumer need, security, many others. As a result, there are now much more studies looking at how people accept new technologies. Researchers Meuter et al. (2000), Dapp et al. (2012), Lai (2016) and Lai and Scheela (2018) have all studied how customers adopt new technology. However, only a small number of research have thoroughly examined the technological acceptance model to better understand its application and adaption, concentrating on the trends. Thus, objective of this study is to review various model and theory available in consumer perspective of technological

acceptance.

Technology related models

Consumer and businesses have prioritised technology as one of their selling methods. The opportunities have connected businesses, consumers and technologies to generate a prevailing interest for both researchers and practitioners. This is due to the fact that it appears that more researchers are looking into how customers use technology. This has led to the creation of many technological acceptability models (Afrasiabi & Benyoucef, 2011; Kim & Park, 2013; Sheikh et al. 2019; Valerio et al. 2019). Based on a survey of the literature, this study discovered a number of ideas and models that are frequently used to comprehend what motivates individuals to accept and use a specific technology in their daily activities. Table 1 highlights this by listing numerous well-known underlying theories and models.

Table 1. Prominent Technology-Related Models

Theory / Model	Acronym	Author(s)
Diffusion of Innovation Theory (DOI)	DOI	Rogers (1962)
Fishbein and Ajzen (1975)	TRA	Fishbein and Ajzen (1975)
Theory of Planned Behaviour	TPB	Ajzen (1991)
Technology Acceptance Model	TAM	Davis (1989)
Technology Acceptance Model 2	TAM2	Venkatesh and Davis (2000)
Technology Acceptance Model 3	TAM3	Venkatesh and Bala (2008)
Unified Theory of Acceptance and Use of Technology	UTAUT	Venkatesh et al. (2003)
Unified Theory of Acceptance and Use of Technology 2	UTAUT2	Venkatesh et al. (2012)

Source. author own compilation, (2023)

Diffusion of Innovation Theory (DOI)

According to Momani and Jamous (2017), the Diffusion of Innovation Theory (DOI) is one of the oldest social science theories that focuses on examining any transformations. In particular, diffusion is a sort of interaction where the primary focus is on the process and activity of new ideas that have been disseminated through time among five social systems through specific networks, with each of these five (5) social systems experiencing its own innovation (Rogers, 1962). Decision, implementation, knowledge, persuasion, and confirmation are the five (5) social systems' instruments of spread.

First off, having knowledge of the social system refers to when a person becomes aware of a development and has unusual insights into how the system works. Second, persuasion occurs when a person's methods have a disadvantageous or favourable mindset towards innovation. Thirdly, the decision process is where the individual involves in any activities that translate to an alternative to reject or accept the innovation. Fourthly, implementation happen when the individual applies innovation. Lastly, validation occur when the outcomes of innovation decision that have already been made-are tested (Rogers, 1962, 2003; Wani & Ali, 2015; Momani & Jamous, 2017).

There are many academics who have pointed out some DOI restrictions, starting with Paul Attewell (1992) and Clarke (1999). According to Clarke (1999), the traditional DOI in the

context of an information system will work best when it is less effective at forecasting outcomes, has weaker explanatory power, and offers suggestions for accelerating the rate of adoption. Many academics have, however, criticised this for being too specific to the society from where it originated, making it less applicable to other varied cultures (Clarke, 1999). Additionally, this approach did not emphasise how attitudes influence the choice between rejection and acceptance.
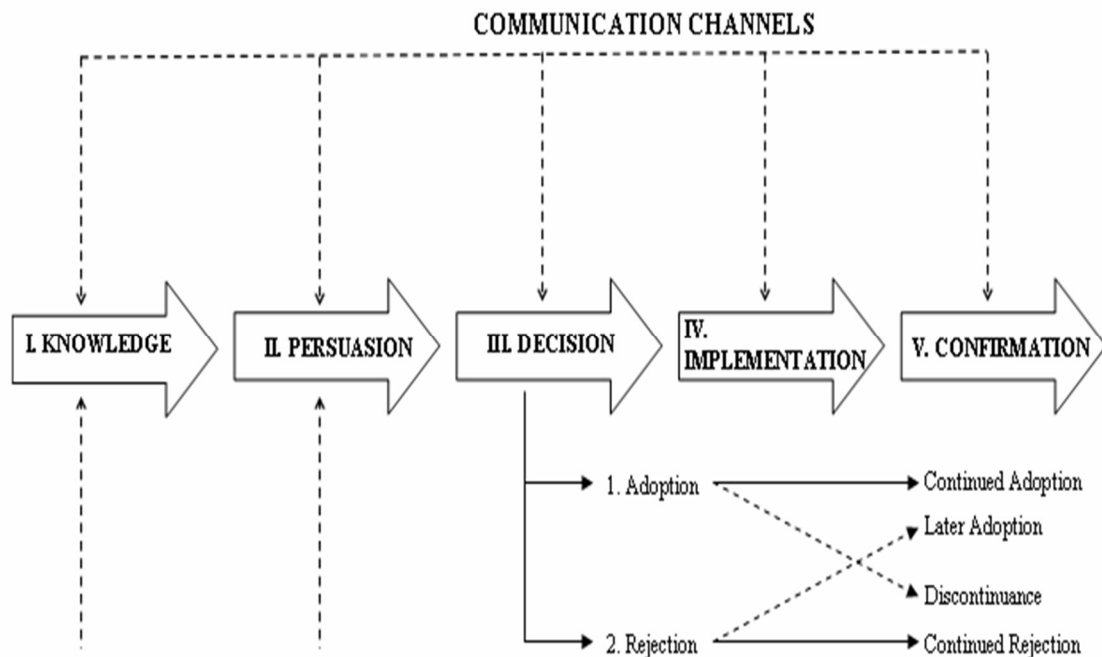

Figure 1. Diffusion of Innovations (Rogers, 1962)

Theory of Reasoned Action (TRA)

Fishbein and Ajzen (1975) first proposed and developed the theory of reasoned action (TRA), primarily to model attitudes, define adaptive behavioral theory, and characterize behavior relationship (see Figure 2). This theory further focusses on the dichotomy in capacity of attitude vis a vis subjective norm to predict behavioural intention of contingent on the context. Considering a scenario, attitude will be the main predictor of behavioural intention when self-influence is stronger than perceived subjective norm. Conversely, subjective norm would be the actual predictor of a behavioural intention for behaviours in which normative implications are dominant. However, subjective norm may be more salient during the early stages of technology diffusion, especially if users does not possess adequate knowledge that forms the attitude toward the use of the technology (Taylor & Todd, 1995).

Nevertheless, intention behaviour is resulted in the making of behaviour to reject or use it when adopting the use of new technology, or when this intent behaviour has impacted greatly by combining people's attitudes. These behaviours are committed to instinctive norms and strong beliefs of intentional behaviour (Ambali, 2014). Additionally, TRA could be perceive in the context of ascertaining a user who has a conscious purpose of using a resolute information system, derivative from the use attitude may be negative or positive, and followed by instinctive norms, that describe the perception of the user to other people's views (Buabeng-Andoh, 2018).

Even though, TRA is arguably a good model to determine an individual behaviour, yet

there are some distinct limitations. As mentioned by Al-Suqri and Al-Kharusi, (2015), the assumption that the behaviour is under volitional control is one of its main limitations is. As such, it can be concluded that TRA only applies to a careful will, behaviour and thoughts. This means that any different behaviours like habitual actions, irrational decision or any other behaviour that are not carefully considered could not be explained by the Theory of Reasoned Actions (TRA theory) (Al-Suqri & Al-Kharusi, 2015).
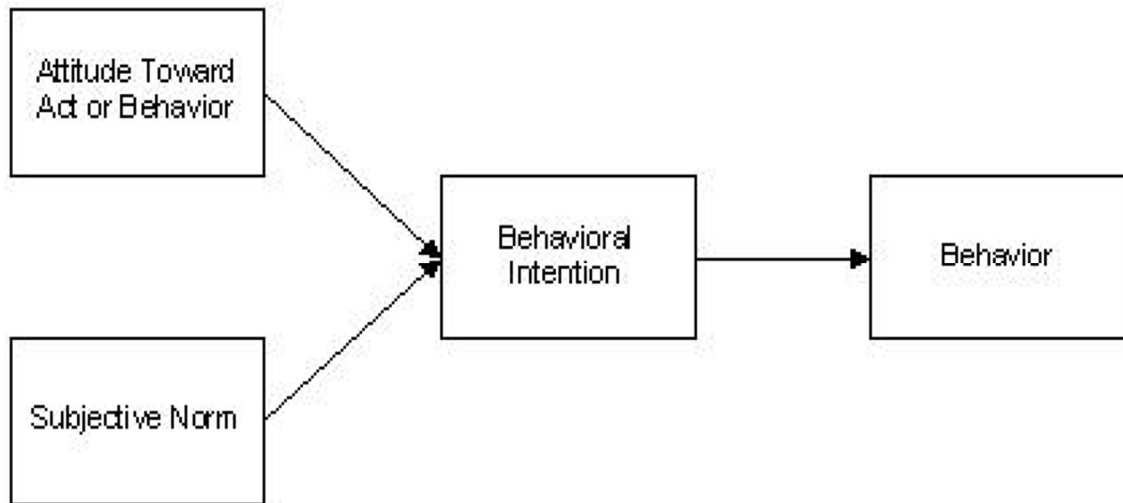

Figure 2. TRA model (Fishbein & Ajzen, 1975)

Theory of Planned Behaviour (TPB)

The Theory of Planned Behaviour (TPB) initially known as the Theory of Reasoned Action (TRA). Historically, TPB was developed by Ajzen in 1991 as an extension of the border condition of pure volitional control defined by the TRA (Alam & Sayuti, 2011; Ketabi et al., 2014; Kiriakidis, 2017). The theory main focus is to forecast peoples objectives to interfere in a behaviour at a certain period and place (Ajzen, 2002). Literature has it that TPB have three (3) distinct embedded core constructs such as constructs of attitude and subjective norm (Glanz et al. 2008). However, the key dichotomy that exist between the TPB and TRA is the inclusion of the third deciding element of behavioural intention, which is mostly seen as perceived behavioural control (Lee & Lina, 2018). Fischer et al. (2019) stated that TPB has a conceptual problem which does not reveal the strong influence of norms between attitude and behaviour.
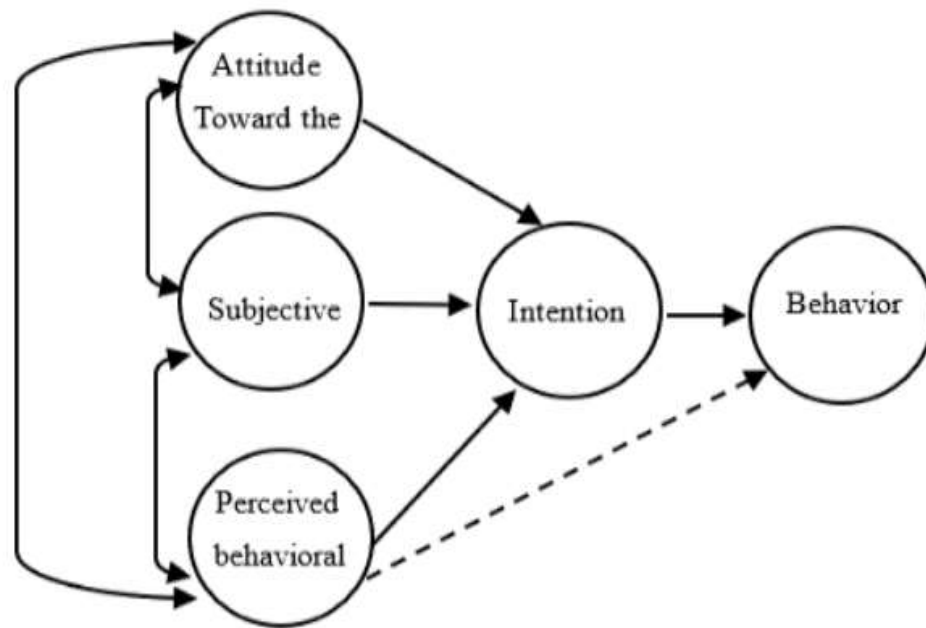
Figure 3. TPB model (Ajzen, 1991)

Technology Acceptance Model (TAM)

The original Technology acceptance model (TAM) (Figure 4) developed by Davis (1989) explained the determinants of computer acceptance and user behavior (Rondan-Cataluña et al., 2015; Abdullah & Ward, 2016). The theory originally believed that TRA describe several factors that influence the decisions of individual as to how and when individuals use new breed of technology when provided. Two main variables, perceived ease of use and perceived usefulness had an impact on individual's attitude towards using a new technology, which in turn impacted the individual's behavioral intention to use it. Intention was then positively linked to actual use of an information system. Davis (1989) also predicted that perceived ease of use impacted perceived usage. Lastly, it is believed in the TAM model that a user actual attitude is capable of been decided by considering his or her primary motives along with beliefs that the individual initially possess prior to actual behaviour (Davis, 1989; Marangunic & Granic, 2015).

Although the model is considered to be the most widely applied means of measuring the degree of acceptance of technology by users (King & He, 2006). They also suggest that one of the main reasons for its widespread acceptance stems from the fact the model is simple and easy to understand, and not necessarily because of its suitability in a practical context (King & He, 2006).
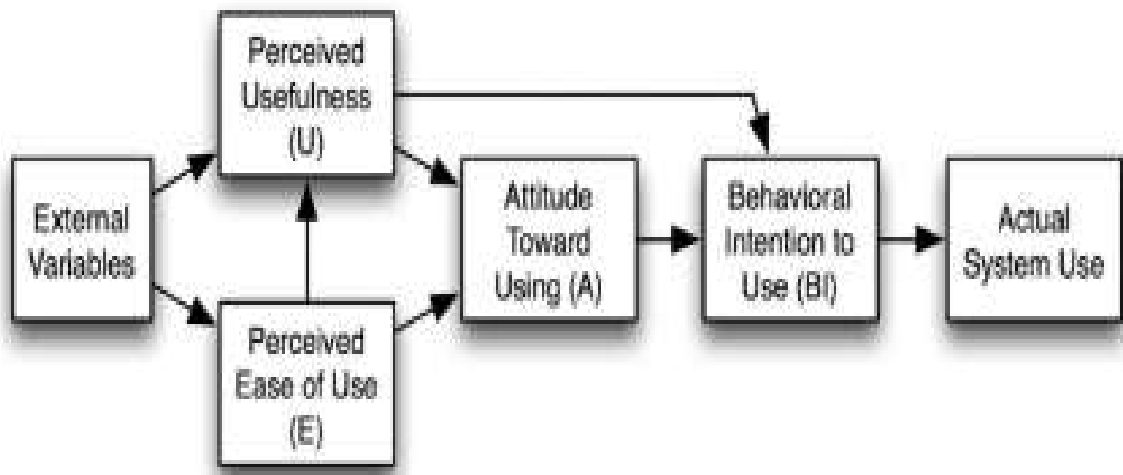
Figure 4. Original TAM (Davis, 1989)

There have been an extensive used of TAM by many scholars and developed to TAM2 as highlighted in Figure 5 (Venkatesh & Davis, 2000). Fundamentally, there are two (2) TAM2 theoretical processes, such as cognitive instrumental and social influence processes respectively that describe the effects of multiple determinants on behavioral intention and perceived usefulness (Venkatesh & Davis, 2000; Venkatesh & Bala, 2008). There are further suggestion that subjective standard in TAM2 determines perceived usefulness thereafter reflect the process of social influence. Lastly, The introduction of cognitive instrumental processes was mainly to provide job relevance, result demonstrability and output quality (Venkatesh & Davis, 2000).
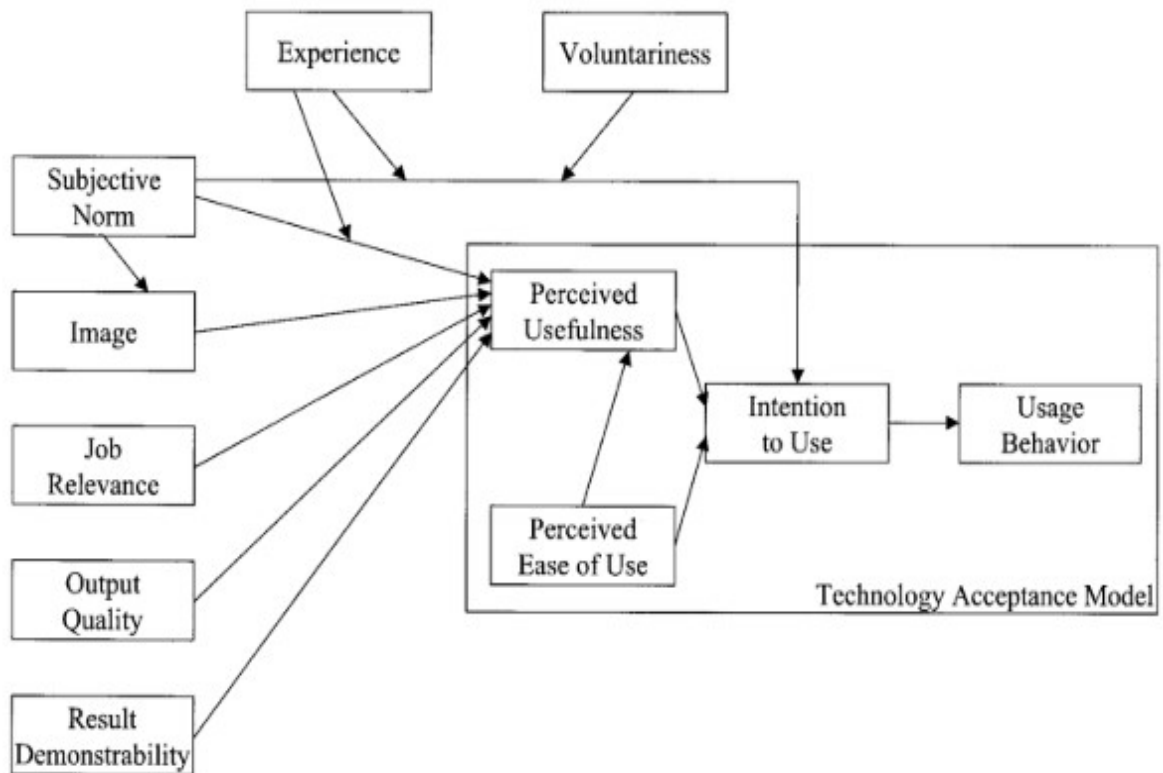

Figure 5. TAM2 (Venkatesh & Davis, 2000)

TAM3 (Figure 6) was developed by Venkatesh and Bala (2008) as an extension to TAM2. This new model replicated TAM2 but added different external variables focused on perceived ease of use only. The model included the original variables from Davis (1989), Venkatesh and Davis (2000), and the determinants of perceived ease of use. These determinants were built on the anchoring and adjustment framing of human decision making from a Venkatesh (2000) study. Venkatesh (2000) developed a model that focused predominantly on determinants for perceived ease of use, naming them as anchoring: computer self-efficacy, computer anxiety, computer playfulness, perceptions of external control and adjustment framing as perceived enjoyment and objective usability (Venkatesh & Davis, 2000; Rondan-Cataluña et al., 2015).
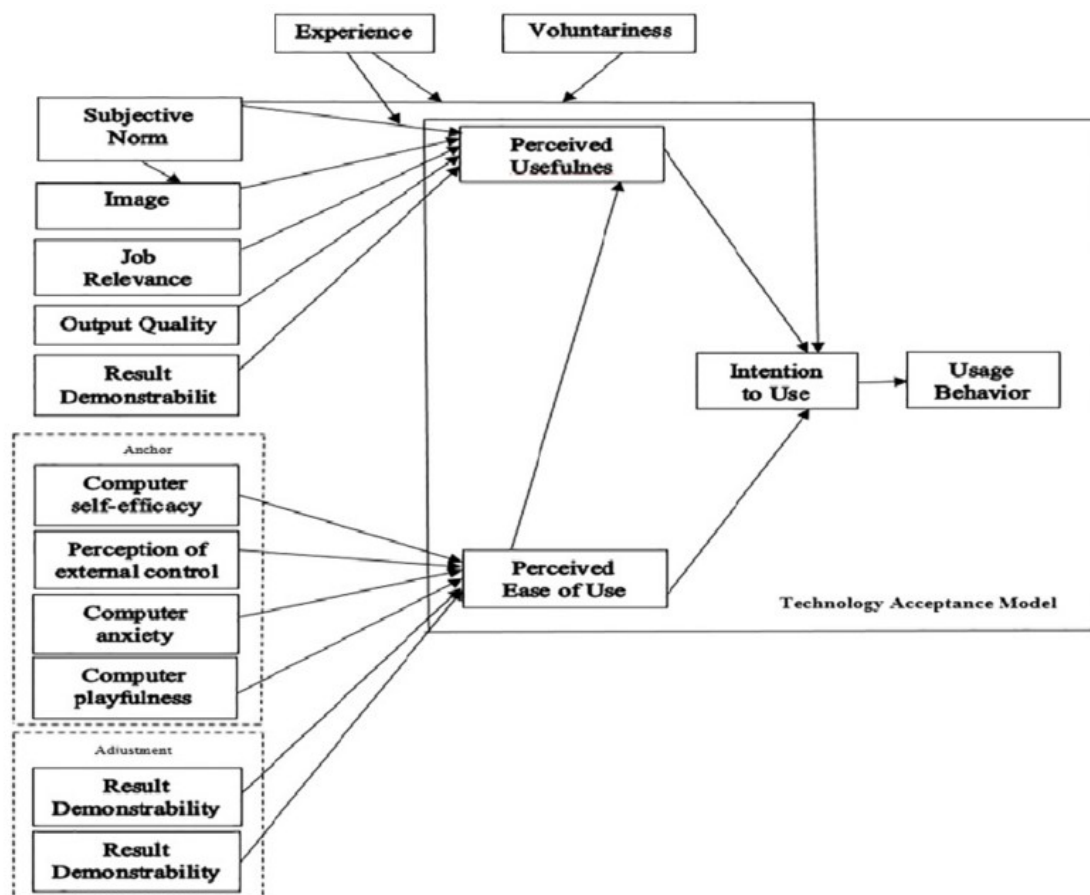

Figure 6. TAM3 (Venkatesh & Bala, 2008)

Unified Theory of Acceptance and Use of Technology (UTAUT)

The Unified Theory of Acceptance and Use of Technology (UTAUT) in Figure 7 was developed by Venkatesh et al. (2003) to progress toward a unified view of user acceptance. The authors of this model combined eight prominent models and their extensions: TRA, TPB, TAM, TAM2, the Motivational Theory (MM), the Model of PC Utilization (MPCU), DOI and Social Cognitive Theory (SCT). The main objective of UTAUT is to describe the motives of the individual to use an information system thereafter the subsequent behavior of users. Based on this, UTAUT was able to further identifies four (4) main factors as well as four (4) moderators connected to predicting behavioral intention to use and actual technology respectively.

According to Venkatesh et al. (2003) and Alwahaishi & Snášel (2013) performance

expectations, effort expectancy and social influence have been out and said to affect the behavioral intention to use technology, while behavioral intention and facilitating environment determines the use of technology. Besides, various combinations of the four moderators were theorized and most likely to moderate various UTAUT relationships. The first three are direct determinants of objective use and behavior, and the fourth is a direct determinant of user behavior. Gender, age, experience, and voluntariness of use was structured to balance the impact of four (4) main factors on usage intention and behavior. However, major limitation of is that it is mainly used in organizational contexts (Venkatesh et al. 2003; Alwahaishi & Snášel, 2013; Al-Qeisi et al. 2014).
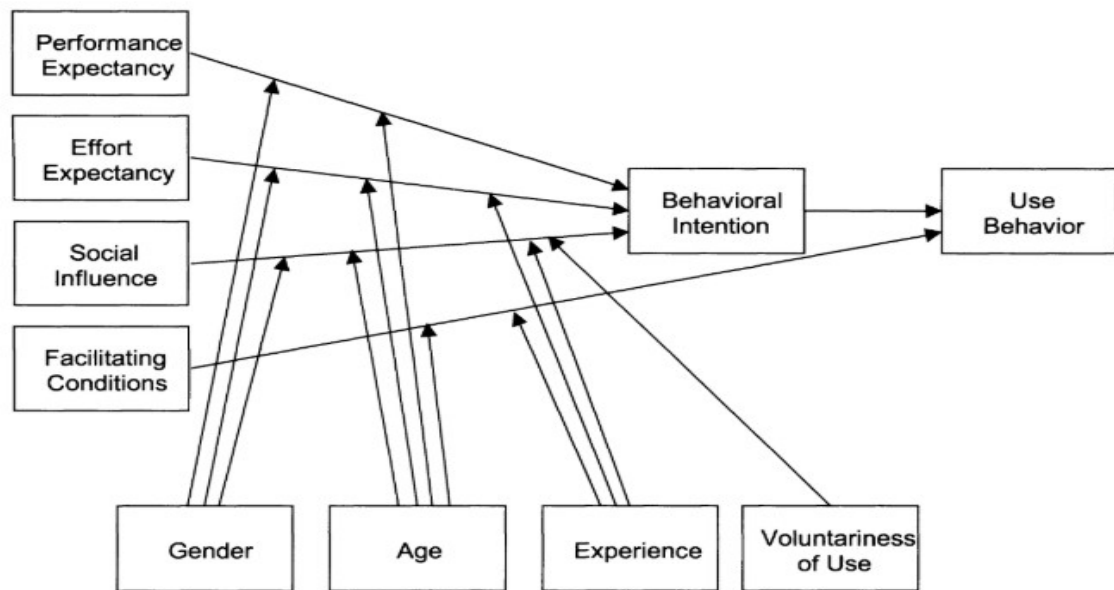

Figure 7. UTAUT (Venkatesh et al., 2003)

Later, the Unified Theory of Acceptance and Use of Technology version two (UTAUT2) in Figure 8 developed by Venkatesh et al. (2012) was to be applied in the context of consumer technologies. In this model three new determinants of behavioral intention were added to the constructs of UTAUT. The three determinants were: hedonic motivation, price value, and habit. The habit construct had a direct relationship to usage behavior. The inclusion of new variables are extending the theoretical horizons of the original UTAUT model (Venkatesh et al. 2012; Baptista & Oliveira, 2015; Huang & Kao, 2015; Lai, 2017; Palau-Saumell et al. 2019). UTAUT2 also integrates moderated relationships (age, gender, and experience, per the original UTAUT) with regards to the three new constructs (Venkatesh et al. 2012). One of the major limitations of UTAUT based theories is its complex interactions among the various attributes and moderators resulting in relatively less parsimony hindering its usage as such (Venkatesh et al. 2016).
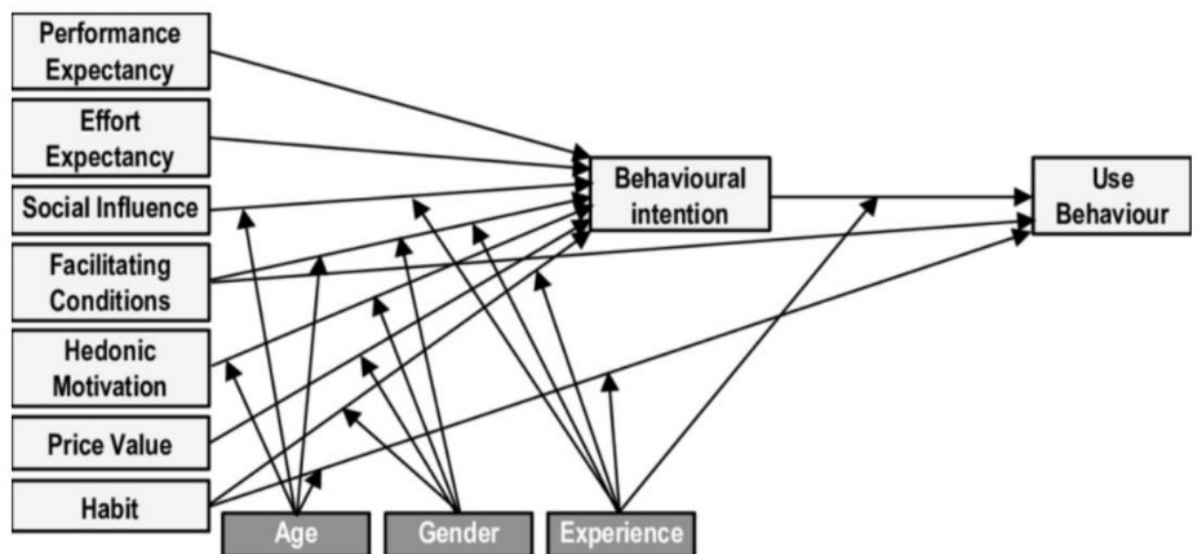
Figure 8. UTAUT2 (Venkatesh et al., 2012)

Conclusions and Recommendations

This research paper reviewed and discussed eight of the most famous and widely used technology acceptance theories and models from psychological, behavioural and technological points of view. It revealed that these theories and models are similar in their structure, but different in their explanation towards the behaviour and usage. Depending on these cases, there is still a need for more development on the technology acceptance theories in order to create the best theory to enable explaining the behavioural intentions to adopt any new technology either through the mandatory or voluntary style of usage. The integration process makes it obvious that different theories and models incorporate various aspects or features that can influence the consumer's behavioral purpose of employing a specific technology in their individual activities. One significant paradigm out of eight theories could be drawn from the conceptual review on theory comparison presented here. Among the eight theories reviewed, UTAUT and TAM seems to be an improved theory that could provide a useful tool to assess the likelihood of success for technology acceptance studies. These review will help future academics conceptualize, identify, and appreciate the underlying technology models and theories that may influence the future application of technology adoption.

Acknowledgements

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