Unified Theory of Acceptance and Use of Technology

The Unified Theory of Acceptance and Use of Technology (UTAUT) examines the acceptance of technology, determined by the effects of performance expectancy, effort expectancy, social influence and facilitating conditions.

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Theory Factsheet

Proposed By: Venkatesh et al., 2003

Parent Theory: Theory of Reasoned Action, Technology Acceptance Model, Motivational Model, Theory of Planned Behaviour, Diffusion of Innovation, Social Cognitive Theory

Discipline: Information systems management

Unit of Analysis: Individual

Level: Micro-level

Type: Theory for Explaining and Predicting

Operationalised: Quantitatively

Introduction

The growth of an e-commerce sector, emerging digital technologies, such as big data, Artificial Intelligence, cloud computing and robotics, drive the implementation of new technologies in organisations (Verhoef et al., 2021). The advances in information communication technology (ICT) have dramatically changed the way organisations conduct business. The application of the technologies in the workplace has redefined inter- and intra-organisational communication has streamlined business processes to ensure benefits, such as higher productivity, the wellbeing of employees and the satisfaction of consumers (Papagiannidis & Marikyan, 2020). To achieve such benefits, companies make massive spending on technologies. However, investment in ICT implementation does not guarantee successful deployment and often bring low returns (Davis, 1989; Venkatesh et al., 2003). The results of market research suggest that the success rate of new technology adoption in organisations, whereby technologies bring expected return on investment (i.e. improved performance), is below 30 percent. The number is less optimistic if consider the companies, who could improve performance, but could not sustain the improvements in the long-term (De la Boutetière, Montagner & Reich, 2018). Given the consequences of technology adoption

on organisations' performance and a cost-revenue structure, the technology utilisation-acceptance gap remains one of the major areas of research in the IS literature.

Research community accelerated its interest towards technology acceptance in the private and organisational contexts almost three decades ago (Davis, 1989; Compeau & Higgins, 1995; Goodhue, 1995; Leonard-Barton & Deschamps, 1988). By 2000, technology acceptance research had resulted in a substantial body of evidence on user behaviour related to technology adoption (Hu et al., 1999). Numerous models/theories had been introduced to understand the acceptance of the technology, which cumulatively explained 40% of the variance in technology use intention (Davis, 1989; Davis, Bagozzi & Warshaw, 1989; Taylor & Todd, 1995; Venkatesh & Davis, 2000). The models had roots in different disciplines, which limited the applications of these theories to certain contexts. For example, the Theory of Planned Behaviour and the Theory of Reasoned Action offer a psychological perspective on human behaviour by examining the variables, such as perceived behavioural control, attitude and subjective norms (Ajzen, 2011). The theories provide generic insights into individuals' attitudinal underpinnings, which make them applicable to a wide range of research contexts, not limited to information system management. In contrast, Diffusion of Innovation Theory focuses on innovation-specific factors that determine users' behaviour when it comes to new technology adoption (Moore & Benbasat, 1991). In addition, the models had different perspectives, reflecting the type of variables in the model, such as subjective norm, motivational factors, attitudinal factors related to technology performance, social factors, experience and facilitating conditions (Venkatesh et al., 2003; Taylor & Todd, 1995; Ajzen, 2011; Thompson, Higgins & Howell, 1991; Davis, Bagozzi & Warshaw, 1992; Venkatesh & Speier, 1999). The selection of either of the models constrains research findings to particular scenarios and conditions. Therefore, a unified approach was needed to embrace variables reflecting different perspective and disciplines and increase the applications of the theory to different contexts (Venkatesh et al., 2003).

To provide a holistic understanding of technology acceptance, Venkatesh et al. (Venkatesh et al., 2003) set the objective for developing a unified theory of technology acceptance by integrating key constructs predicting behavioural intention and use. To fulfil this objective, the seminal IS acceptance literature was reviewed to draw up theoretical and contextual similarities and differences among technology acceptance theories originating from three research streams – i.e. social psychology, IS management and behavioural psychology (see (Venkatesh et al., 2003)). Given that the theories stem from different disciplines, they cast diverse perspectives on technology acceptance and adoption. The socio-psychological perspective on research on individual behaviour was represented by the Theory of Reasoned Action (TRA), the Theory of Planned Behaviour (TPB) and Social Cognitive Theory (SCT). Based on TRA and TPB, individuals' behaviour is measured by the effect of attitude toward behaviour, subjective norm and perceived behavioural control on behavioural intention (Ajzen, 2011). The theories are used in IS management to explore the role of a perceived difficulty in performing the task, the effect of group norms and attitude on accepting technology (Karahanna, Straub & Chervany, 1999; Zhang & Mao, 2020). TRA contributed greatly to IS acceptance theories, by providing a theoretical framework that explained human behaviour (Ajzen, 2011; Davis, 1989). SCT is based on the assumption that behavioural, cognitive and environmental factors (i.e. outcome expectations-performance, outcome expectations-personal, self-efficacy, affect and anxiety) have an interactive effect on individuals' behaviour (Bandura, 2001). The theory has been used to investigate human-computer interaction (Compeau & Higgins, 1995; Compeau, Higgins & Huff, 1999). The acceptance of technology from the vantage point of IS management was largely explained by Technology Acceptance Model (TAM), combined TAM and TPB model (C-TAM-TPB), Innovation Diffusion Theory (IDT) and the model of PC utilisation (MPCU). While TAM and C-TAM-TPB stress the importance of cognitive response to IS features in predicting behaviour (Venkatesh et al., 2003; Taylor & Todd, 1995), IDT focuses on system characteristics and properties in determining the adoption of innovation (e.g. relative advantage, complexity, compatibility, image) (Moore & Benbasat, 1991). MPCU has very narrow implications, as the model encompasses the factors

underpinning the utilisation of personal computers (i.e. job fit, complexity, long-term consequences, affect towards use, facilitating conditions and social factors) (Thompson, Higgins & Howell, 1991), unlike other theories examining IS and innovation adoption (Venkatesh et al., 2003; Taylor & Todd, 1995; Moore & Benbasat, 1991). The behavioural psychology perspective on technology acceptance was represented by the Motivational Model (MM), suggesting that technology adoption and use behaviour can be explored through user motivations (Davis, Bagozzi & Warshaw, 1992; Venkatesh & Speier, 1999). Users tend to evaluate the likelihood of engaging in behaviour by the degree to which behaviour stimulates instrumental rewards (extrinsic motives) and/or internal reinforcement, such as enjoyment, satisfaction and fun (intrinsic motives) (Davis, Bagozzi & Warshaw, 1992).

The review of the above theories led Venkatesh to identify limitations, which in turn triggered the need to develop the Unified Theory of Acceptance and Use of Technology. The primary limitation was that the literature had not empirically tested and compared dominant technology acceptance models, which left room for speculation on the predictive power of the constructs of each theory. The studies examining technology use behaviour had mainly focused on simple systems (e.g. PC) and overlooked the use of more complex technologies (Venkatesh et al., 2003). The focus on one technology constrains the explanatory power of theories, as individuals' experiences, purchase decisions and use cases vary depending on IT systems and contexts (Brown, Venkatesh & Hoehle, 2015). For example, the motivations of consumers purchasing entertainment technology are not similar to the needs of employees driving the usage of enterprise management systems. The latter technology has a strong utilitarian value and is predominantly used in mandatory settings. Also, there were methodological limitations identified in prior literature. Most studies had used a cross-sectional approach, by measuring variables at pre- or post-acceptance stages (e.g. (Venkatesh et al., 2003; Taylor & Todd, 1995)), although some constructs (e.g. experience) needed to be examined over time. The limitations suggested using a longitudinal approach to fully understand the dynamics of technology acceptance and use. Finally, previous studies had focused on the technology acceptance in a voluntary context (when society does not have an effect on technology use), which put a constraint on the generalisability of the findings. Therefore, to ensure the wider implication of the models, technology acceptance was investigated both in mandatory and voluntary settings. The empirical comparison of the theories enabled authors to develop a unified acceptance model, which embraced and reflected all key acceptance factors (Venkatesh et al., 2003).

Theory

The theoretical model of UTAUT suggests that the actual use of technology is determined by behavioural intention. The perceived likelihood of adopting the technology is dependent on the direct effect of four key constructs, namely performance expectancy, effort expectancy, social influence, and facilitating conditions. The effect of predictors is moderated by age, gender, experience and voluntariness of use (Venkatesh et al., 2003).

Performance expectancy is defined as *"the degree to which an individual believes that using the system will help him or her to attain gains in job performance"* (Venkatesh et al., 2003). Performance expectancy is based on the constructs from Technology Acceptance Model (TAM), TAM2, Combined TAM and the Theory of Planned Behaviour (CTAMTPB), Motivational Model (MM), the model of PC utilisation (MPCU), Innovation Diffusion Theory (IDT) and Social Cognitive Theory (SCT) (i.e. perceived usefulness, extrinsic motivation, job-fit, relative advantage and outcome expectations). It is the strongest predictor of use intention and is significant in both voluntary and mandatory settings (Zhou, Lu & Wang, 2010; Venkatesh, Thong & Xu, 2016).

Effort expectancy is defined as *"the degree of ease associated with the use of the system"* (Venkatesh et al., 2003). Effort Expectancy is constructed from perceived ease of use and complexity driven from TAM, MPCU, IDT, which share a similarity in definitions and scales. The effect of the construct becomes nonsignificant after extended usage of technology (Gupta, Dasgupta & Gupta, 2008; Chauhan & Jaiswal, 2016).

Social Influence is defined as *"the degree to which an individual perceives that important others believe he or she should use the new system"* (Venkatesh et al., 2003). Social influence is similar to the subjective norms, social factors and image constructs used in TRA, TAM2, TPB, CTAMTPB, MPCU, IDT in the way that they denote that the behaviour of people is adjusted to the perception of others about them. The effect of social influence is significant when the use of technology is mandated (Venkatesh et al., 2003). In the mandatory context, individuals might use technology due to compliance requirement, but not personal preferences (Venkatesh & Davis, 2000). This might explain the inconsistent effect that the construct demonstrated across further studies validating the model (Zhou, Lu & Wang, 2010; Chauhan & Jaiswal, 2016).

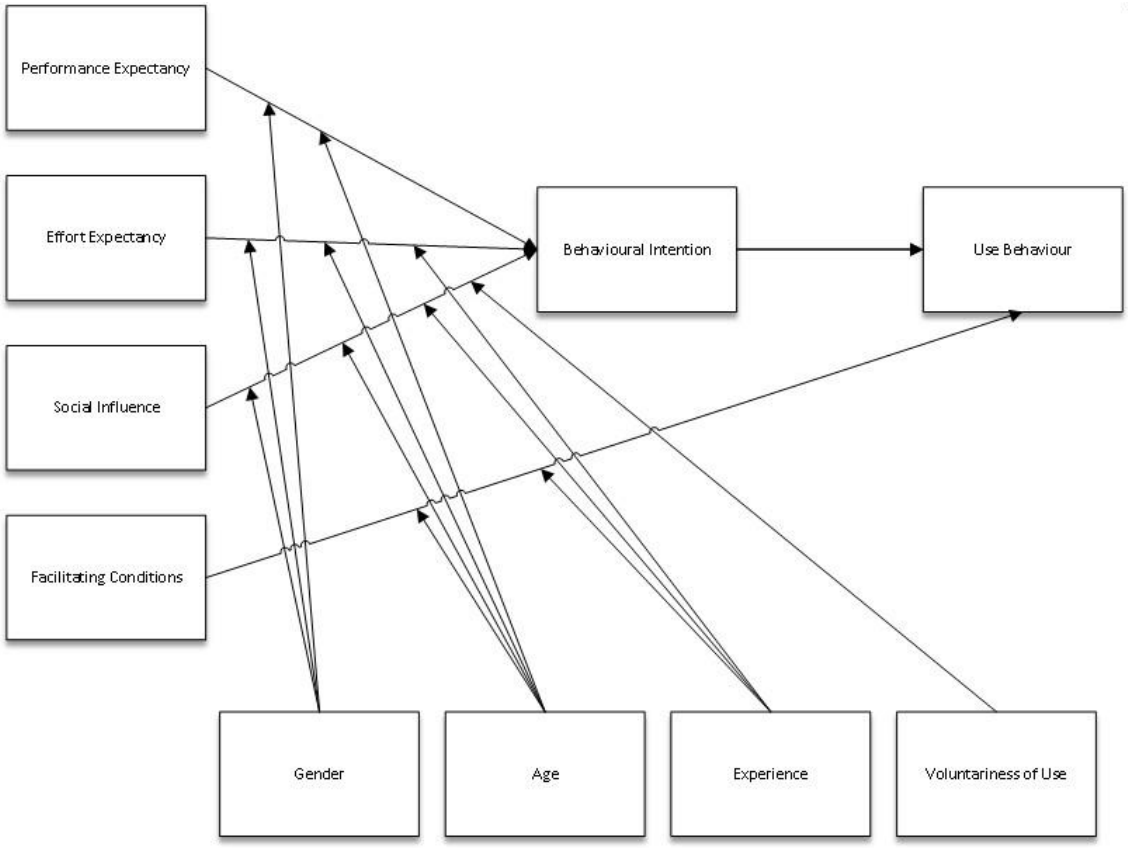
Facilitating conditions is defined as *"the degree to which an individual believes that an organisation's and technical infrastructure exists to support the use of the system"* (Venkatesh et al., 2003). The facilitating conditions construct is formed from compatibility, perceived behavioural control and facilitating conditions constructs drawn from TPB, CTAMTPB, MPCU and IDT. Facilitating conditions have a direct positive effect on intention to use, but after initial use, the effect becomes nonsignificant. Therefore, the model proposes that facilitating conditions have a direct significant effect on use behaviour (Venkatesh et al., 2003).

The moderation effects of age, gender, experience and voluntariness of use define the strength of predictors on intention. Age moderates the effect of all four predictors. Gender effects the relationships between effort expectancy, performance expectancy and social influence. Experience moderates the strength of the relationships between effort expectancy, social influence and facilitating conditions. Voluntariness of use has a moderating effect only on the relationship between social influence and behavioural intention (Venkatesh et al., 2003).

UTAUT has made several contributions to the literature. The model provides empirical insight into technology acceptance by comparing prominent technology acceptance theories, which often offer competing or partial perspectives on the subject. UTAUT demonstrates that proposed factors account for 70 percent of the variance in use intention (Venkatesh et al., 2003), offering stronger predictive power compared to the rest of the models that examine technology acceptance (e.g. (Davis, 1993; Sheppard, Hartwick & Warshaw, 1988)). The interactive effect of some constructs with personal and demographic factors demonstrates the complexity of the technology acceptance process, which is dependent on individuals' age, gender and experience (Venkatesh et al., 2003).

The model is presented in figure 1.

Figure 1: UTAUT



UTAUT2 and other extensions

The original UTAUT framework was developed to explain and predict the acceptance of technology in an organisational context (Venkatesh et al., 2003), although, later it was tested in non-organisational settings too (Venkatesh, Thong & Xu, 2012; Venkatesh, Thong & Xu, 2016). Over the years, UTAUT showed wide application, which enhanced the generalisability of the theory (Venkatesh, Thong & Xu, 2012; Neufeld, Dong & Higgins, 2007). Given the variance of information communication technologies and the advances in the sector, a number of scholars extended UTAUT to adapt it to the context or improve its predictive power (Venkatesh, Thong & Xu, 2012).

The adaptations of the model were underpinned by four main approaches, reflecting a) the modification of the model to different contexts, b) the alterations of the endogenous variables, c) the addition of attitudinal antecedents, and d) the examination of various moderating variables. The first stream of research extended the model to apply it to new technologies (e.g. enterprise systems, e-health systems), focus on new user segments (e.g. healthcare professionals), and examine it in new geographical and cultural settings (e.g. India, China) (Chang et al., 2007; Yi et al., 2006; Gupta, Dasgupta & Gupta, 2008). For instance, the model was extended by a set of web-specific constructs, including trust and personal web innovativeness to explore how well it predicts the use of web tools (Casey & Wilson-Evered, 2012). Another stream of research extended UTAUT by incorporating additional endogenous variables (e.g. (Sun, Bhattacherjee & Ma, 2009)), such as satisfaction and continuous intention to use (Maillet, Mathieu & Sicotte, 2015). The third stream of research scrutinised additional determinants of use and behavioural intention, such as task-technology fit and personality traits (Zhou, Lu & Wang, 2010; Wang, 2005). Finally, some studies extended UTAUT by introducing new contextual and moderating variables, such as culture, ethnicity, religion,

employment, language, income, education and geographical location, among others (Im, Hong & Kang, 2011; Al-Gahtani, Hubona & Wang, 2007; Riffai, Grant & Edgar, 2012).

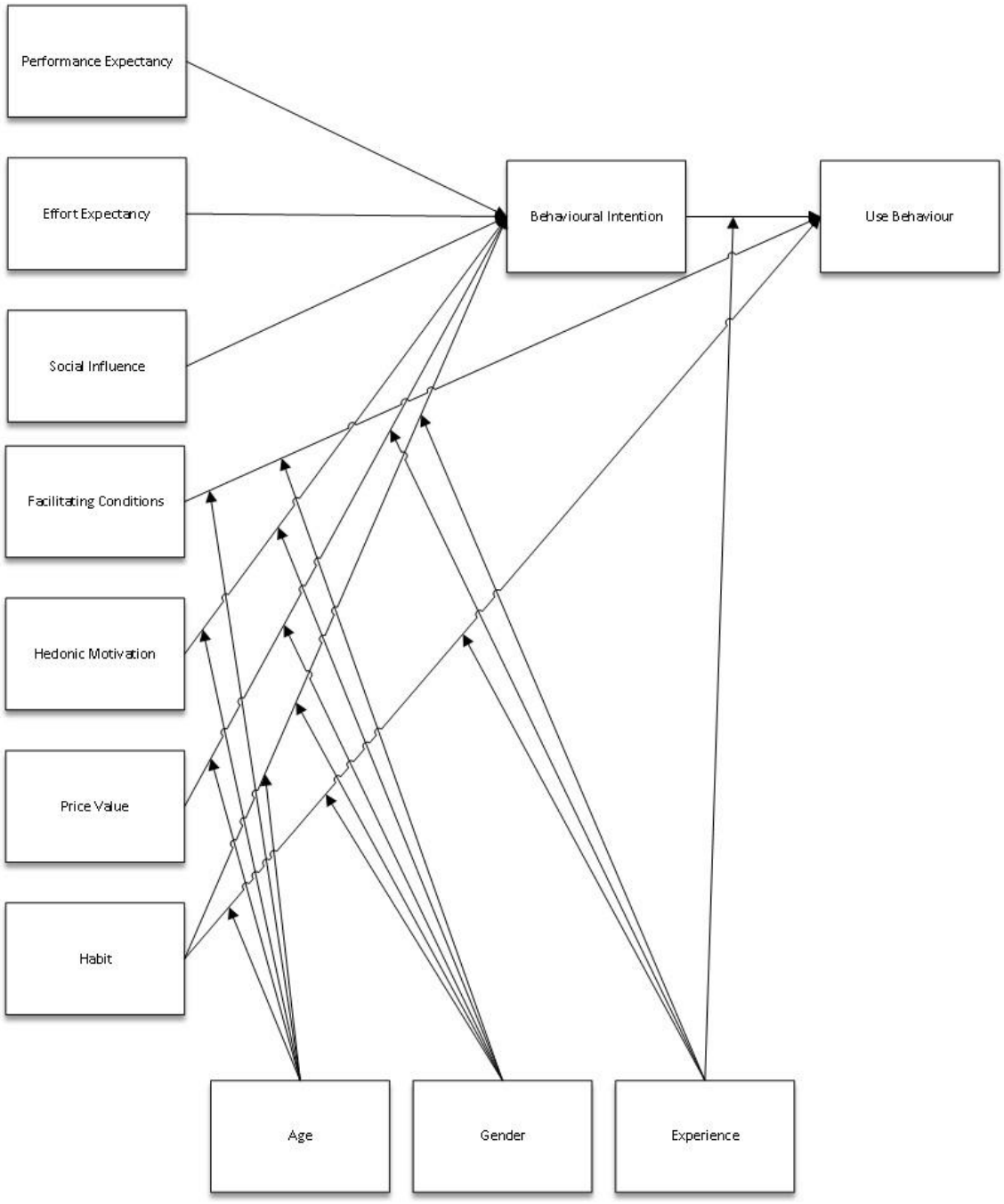
Although the adaptations of the model enriched the understanding of the theory applications, the research was mainly limited to organisational settings (Chang et al., 2007; Yi et al., 2006; Gupta, Dasgupta & Gupta, 2008; Im, Hong & Kang, 2011; Al-Gahtani, Hubona & Wang, 2007). The literature lacked evidence about a user behavioural model, which could explain the utilisation of technology by consumers rather than employees. However, such evidence was important, given arguments in prior studies suggesting that the determinants of acceptance in organisational and non-organisational (i.e. consumer) settings are not the same. It was found that the importance of the factors reflecting the costs and benefits of behaviour varied based on the context (e.g. (Brown & Venkatesh, 2005; van der Heijden, 2004; Brown, Venkatesh & Bala, 2006; Brown & Venkatesh, 2005; Kim, Malhotra & Narasimhan, 2005)).

Given the above limitations, Venkatesh et al. proposed an extension of UTAUT, named UTAUT2 (Venkatesh, Thong & Xu, 2012). The model (Figure 2) set out to address two main objectives. First, compared to all prior attempts to extend the model, UTAUT2 was not designed to have a specific focus (e.g. new technology, geographical location). Instead, the goal of the theory was to represent an overarching framework for examining technology acceptance. The extension was designed to give a higher precision in explaining user behaviour (Venkatesh, Thong & Xu, 2012; Alvesson & Kärreman, 2007). The second objective was to propose a behavioural model of consumer technology acceptance, in contrast to UTAUT, which was developed to examine technology in organisational settings. To fulfil the objective, Venkatesh et al. planned to extend the UTAUT model with new constructs, tackling behavioural and attitudinal determinants of the utilisation of technology in the non-organisational context (Venkatesh, Thong & Xu, 2012). The authors developed UTAUT2 by introducing three new constructs and altering some relationships (e.g. removing the voluntariness) in the original model to adapt it to the consumer technology use context. Such an approach offered a new theoretically justified mechanism for predicting technology acceptance, which was encouraged and endorsed by prior research (Bagozzi, 2007; Venkatesh, Davis & Morris, 2007). In addition to advancing the technology acceptance literature (Venkatesh, Thong & Xu, 2012), UTAUT2 aimed to achieve wider generalisability by addressing the private user segment .

UTAUT 2 postulates that the use of technology by individuals is underpinned by the effect of the three additional constructs, namely, hedonic motive, cost/perceived value and habit, moderated by age, gender and experience. Hedonic motivation is defined *"as the fun or pleasure derived from using technology, and it has been shown to play an important role in determining technology acceptance and use"* (Venkatesh, Thong & Xu, 2012). The inclusion of this construct was justified by the findings of prior studies in the IS and marketing domains which found that the perceived hedonic nature of the outcome (e.g. perceived enjoyment) was a significant predictor of consumer technology use (Brown & Venkatesh, 2005; van der Heijden, 2004). The rationale for integrating cost in the new model was based on the relative importance of the factor in the context of consumer product use compared to the usage of technology in workplace settings. For example, when technology is used by employees in organisations, users do not feel responsible for the cost that is associated with the use of technology, due to the lack of direct financial implications for them (Venkatesh, Thong & Xu, 2012). In contrast, the use of consumer technology implies a higher perception of the responsibility, due to direct costs borne by the use of technology. The lower the costs, the more intensive is the use of technology (Venkatesh, Thong & Xu, 2012; Brown, Venkatesh & Bala, 2006; Brown & Venkatesh, 2005). Since UTAUT and UTAUT2 utilised subjective measures, the cost factor was represented by price value. Price value is defined as *"consumers' trade-off between the perceived benefits of the applications and the monetary cost for using them"* (Venkatesh, Thong & Xu, 2012). A positive relationship between perceived value and intention to use indicates that a user perceives the benefits of technology use as higher and more important than the

associated monetary costs. The third variable included in UTAUT2 is habit, which is defined as *"the extent to which people tend to perform behaviours automatically"* (Venkatesh, Thong & Xu, 2012). The construct was operationalised based on prior studies which had brought the automaticity perspective into the research. In contrast to a reason-oriented framework (e.g. TRA and TPB), which states that behavioural intention results from deliberate evaluations, the automaticity perspective considers technology use to be an automatic and unconscious behaviour (e.g. (Limayem, Hirt & Cheung, 2007; Kim, Malhotra & Narasimhan, 2005)). Habit was hypothesised to have a direct and indirect effect on actual use through behavioural intention (Venkatesh, Thong & Xu, 2012). However, the effect of either of the paths is dependent on the degree to which people rely on routinised behaviour in accepting/using technology (Venkatesh, Thong & Xu, 2012; Ajzen, 2011). The extended version of UTAUT resulted in a number of theoretical contributions. The model explains 74 %of the variance in behavioural intention and 52 % of the variance in technology use, which suggests that the model has high predictive validity when applied to the consumer segment. The supported effects of price value, hedonic motivation and habit indicate three significant drivers of consumers' intention to use or actual use of technology (Venkatesh, Thong & Xu, 2012). Specifically, the introduction of the habit factor demonstrated the alternative theoretical mechanism in examining technology use (Bagozzi, 2007). Such an approach challenged the role of intention (Venkatesh, Davis & Morris, 2007), which was commonly used as a proxy for behaviour (e.g. (Venkatesh et al., 2003; Ajzen, 2011)). The inclusion of hedonic motivation in the model was found to be more important than performance expectancy and was significant across a wide range of studies (Alalwan, Dwivedi & Rana, 2017; Megadewandanu, Suyoto & Pranowo, 2016). In addition, the integration of price value in UTAUT2 addressed the need to measure the costs of IS use in the consumer context. Finally, extended UTAUT determines the role of personal factors (gender, age, and experience) in moderating the effect that hedonic motivation, price value and habit have on behavioural intention and/or use (Venkatesh, Thong & Xu, 2012).

Figure 2: UTAUT2



Applications

UTAUT and UTAUT2 have been tested in different geographical contexts to understand the role of culture in technology adoption and solidify the generalisability of the theory tenets (Gupta, Dasgupta & Gupta, 2008; Im, Hong & Kang, 2011; Venkatesh, Thong & Xu, 2012). The majority of findings showed that the role of UTAUT constructs was significant irrespective of the difference in cultures. For example, the employment of the model in a comparative study on technology acceptance in the USA and China demonstrated the high explanatory power of the model across the two geographical settings. However, the model accounts for a greater variance in the behavioural intention when fewer moderators are tested (Venkatesh, Thong & Xu, 2012). When UTAUT was examined in Korea

and the USA, the strength of the relationships slightly varied, although the significance was invariant across the two samples (Im, Hong & Kang, 2011). Similar results were observed when the UTAUT model was tested cross-culturally in individualistic vs. collectivistic nations. The model was shown to be viable in both types of cultures, but the strength of the relationships was different, suggesting a strong moderating role of culture on the model paths (Udo, Bagchi & Maity, 2016). UTAUT2 was also validated in different countries with contrasting cultures, economies and level of technology penetration. In Jordan, mobile banking adoption was not affected by social influence (Alalwan, Dwivedi & Rana, 2017). When comparing the adoption of education technology in Korea, Japan and the US, both the strength of the relationships and the significance of the effects were different across samples. For Korean users, the intention to use e-learning correlated with habit and perceived efficacy. For Japanese users, the behavioural intention was underpinned by habit, price value and social influence, while US users stressed only the habit and price value factors. Surprisingly, effort expectancy was not significant for any country, which might indicate that the technology being tested did not demand any effort to operate it (Jung & Lee, 2020). UTAUT2 applications demonstrate that insight into the conditions associated with culture is required, such as nations' socio-economic status or norms.

The original and extended UTAUT models have been used to examine technology acceptance in a number of different sectors, such as healthcare (Chang et al., 2007), e-government (Gupta, Dasgupta & Gupta, 2008; Chan et al., 2010), mobile internet (Venkatesh, Thong & Xu, 2012; Thong et al., 2011), enterprise systems (Chauhan & Jaiswal, 2016; Ling Keong et al., 2012) and mobile banking and apps (Zhou, Lu & Wang, 2010; Mütterlein, Kunz & Baier, 2019). The applications of UTAUT demonstrated a strong dependence of behavioural intention on the two perception factors, namely perceived performance and perceived ease of use. For example, the technology acceptance framework was used to understand the acceptance of a pharmacokinetics-based clinical decision support systems. All constructs had significant effects on intention, except for facilitating conditions, which influenced only the actual utilisation of the technology (Chang et al., 2007). The investigation of the factors driving the adoption of e-government by employees in a state organisation in a developing country demonstrated the significant influence of all the UTAUT variables moderated by gender, while performance and effort expectancy showed the strongest effects (Gupta, Dasgupta & Gupta, 2008). When the model was used to explore the acceptance of ERP software training, three out of four predictors of use intention were found to be significant. While effort expectancy, performance expectancy and facilitating conditions influenced employees' intention to adopt training tools, the effect of social influence was not supported. Such findings were probably due to the instrumental nature of ERP software and the high contingency of its use on utility factors that overshadow the role of social influence on users' decisions (Chauhan & Jaiswal, 2016). The applications of UTAUT2 showed that the significance and the strength of behavioural determinants differed across cases. The utilisation of UTAUT2 to investigate the antecedents of mobile app adoption confirmed the role of performance expectancy, social influence, hedonic motivation and habit (Mütterlein, Kunz & Baier, 2019). However, in two other studies investigating mobile banking adoption, the role of social influence was not confirmed (Ajzen, 2011; Baptista & Oliveira, 2015). The strongest observed effects were demonstrated by performance expectancy, hedonic motivation and habit (Baptista & Oliveira, 2015).

Practical Implications

UTAUT and UTAUT2 could have a number of applications in practice. UTAUT can be used to examine the anticipated acceptance rate of a product and ensure sufficient stock to satisfy the consumers' demand. Evidence that the model provides can be used by practitioners to design more user-

oriented products. UTAUT underscores the role of social influence and facilitating conditions, thus highlighting the importance of contextual analysis in strategies for technology implementation and promotion (Venkatesh, Thong & Xu, 2012). The application of UTAUT2 enables technology producers and vendors to measure how the trade-off between monetary price and the value of the product influences the utilisation of their technology. Companies have the opportunity to reconsider cost-structures to adjust the pricing policy to the relative value attached to the product, because the benefits that users get from the purchase of technology may not justify the price that they pay. By investigating the effect of habit on users' intention, technology producers and distributors are able to define the marketing communication strategies that may address the beliefs that fuel automatic behaviour (e.g. advertising the utility of the product in various scenarios). By measuring the effect of hedonic motivation, product developers and managers can adjust the offering in such a way as either to enhance the hedonic value of technology or augment hedonic cues for marketing the product. Finally, the moderation effects in UTAUT2 enable practitioners to identify which user segment demands more marketing effort to address habits, deliver hedonic value and demonstrate better value for money (Venkatesh, Thong & Xu, 2012).

Limitations

The Unified Theory of Acceptance and Use of Technology provides a holistic tool to measure technology acceptance and technology use (Venkatesh et al., 2003; Venkatesh, Davis & Morris, 2007). However, despite the rigorousness of the model, UTAUT has some theoretical and methodological limitations that were not addressed in further studies (Venkatesh et al., 2003; Venkatesh, Davis & Morris, 2007). UTAUT faced critique with regards to its inability to explain behavioural intention in different settings. Limited external validity of the model motivated further studies to extend the model by adding additional determinants of behaviour, such as trust, self-efficacy, computer self-efficacy, innovativeness, perceived threats, perceived risk (Martins, Oliveira & Popovič, 2014; Slade et al., 2015). Also, the model was extended by introducing new moderating effects, such as income, location, culture, technology readiness (Im, Hong & Kang, 2011; Borrero et al., 2014) (for a more comprehensive insight see the review by (Venkatesh, Thong & Xu, 2016)). Still, some key factors, like computer self-efficacy, remained under-researched. Although it was confirmed that this factor plays a role in behavioural intention (Bandura & Locke, 2003), only an indirect effect of self-efficacy on intention was tested while developing UTAUT (Venkatesh et al., 2003).

The concern over the wide application of UTAUT was noted by Dwivedi et al. (Dwivedi et al., 2019), who stated that the majority of studies in the IS context cite the original UTAUT paper without using the model. Those surprising findings lead to the conclusion that UTAUT might not be as robust as it claimed to be, given overrated citations compared to the actual implication of the theory. Thus, based on the analysis of MASEM (Combined meta-analysis and structural equation modelling), a revised version of UTAUT was proposed, which included attitude construct as a partial mediator of the effects of exogenous constructs on behavioural intentions (Dwivedi et al., 2019).

The major methodological limitation of UTAUT concerns the development of the scales that were used to measure the core constructs. For the final measurement development, the study used the highest loading items for each scale. While this approach was supported by the literature (Hevner et al., 2004), there was debate as to whether it may be useful to validate the measurements or even develop new ones to eliminate potential content validity issues (Venkatesh et al., 2003). In addition, the intention to use and use behaviour scales were adopted from prior studies (e.g. (Davis, 1989)), but alternative measurements should be developed and validated in future studies (Venkatesh et al., 2003).

UTAUT2 also has some limitations inherent in the methodology. The model utilises a self-reported scale to measure intention to use (Venkatesh, Thong & Xu, 2012), which jeopardises the accuracy and validity of the research conclusions. UTAUT2 shares this limitation with many other technology acceptance models (e.g. TAM, original UTAUT) (Venkatesh et al., 2003; Davis, 1989)). In addition, similar to other technology acceptance models, UTAUT 2 can face a threat of common method variance (Straub & Burton-Jones, 2007; Sharma, Yetton & Crawford, 2009). To reduce the potential of common method bias, different methodological approaches need to be used (e.g. using experimental settings that can make manipulation checks possible).

Concepts

Performance Expectancy (Independent): The degree to which an individual believes that using the system will help him or her to attain gains in job performance. (Venkatesh et al., 2003)

Effort Expectancy (Independent): The degree of ease associated with the use of the system. (Venkatesh et al., 2003)

Social Influence (Independent): The degree to which an individual perceives that important others believe he or she should use the new system. (Venkatesh et al., 2003)

Facilitating Conditions (Independent): The degree to which an individual believes that an organisations and technical infrastructure exist to support use of the system. (Venkatesh et al., 2003)

Behavioural Intention (Independent/Dependent): A person's subjective probability that he will perform some behavior. (Fishbein & Ajzen, 1975)

Use Behaviour (Dependent): The actual use of the system/technology (Venkatesh et al., 2003)

Experience (Moderator): The passage of time from the initial use of a technology by an individual. (Venkatesh, Thong & Xu, 2012)

Voluntariness of Use (Moderator): The degree to which use of the innovation is perceived as being voluntary, or of free will (Moore & Benbasat, 1991)

Hedonic Motivation (Independent): The fun or pleasure derived from using a technology, which has been shown to play an important role in determining technology acceptance and use (Venkatesh, Thong & Xu, 2012)

Price Value (Independent): A consumer's trade-off between the perceived benefits of the applications and the monetary cost of using them. (Venkatesh, Thong & Xu, 2012)

Habit (Independent): The extent to which people tend to perform behaviours automatically. (Limayem, Hirt & Cheung, 2007)

References

Ajzen, I. (2011). The theory of planned behaviour: Reactions and reflections. *Psychology & Health*, 26 (9), 1113-1127.

Al-Gahtani, S.S., Hubona, G.S. & Wang, J. (2007). Information technology (IT) in Saudi Arabia: Culture and the acceptance and use of IT. *Information & Management*, 44 (8), 681-691.

Alalwan, A.A., Dwivedi, Y.K. & Rana, N.P. (2017). Factors influencing adoption of mobile banking by Jordanian bank customers: Extending UTAUT2 with trust. *International Journal of Information Management*, 37 (3), 99-110.

Alvesson, M. & Kärreman, D. (2007). Constructing mystery: Empirical matters in theory development. *Academy of Management Review*, 32 (4), 1265-1281.

Bagozzi, R. (2007). The Legacy of the Technology Acceptance Model and a Proposal for a Paradigm Shift. *Journal of the Association for Information Systems*, 8 (4), 244-254.

Bandura, A. & Locke, E.A. (2003). Negative self-efficacy and goal effects revisited. *Journal of Applied Psychology*, 88 (1), 87-99.

Bandura, A. (2001). Social Cognitive Theory: An Agentic Perspective. *Annual Review of Psychology*, 52 (1), 1-26.

Baptista, G. & Oliveira, T. (2015). Understanding mobile banking: The unified theory of acceptance and use of technology combined with cultural moderators. *Computers in Human Behavior*, 50, 418-430.

Borrero, J.D., Yousafzai, S.Y., Javed, U. & Page, K.L. (2014). Expressive participation in Internet social movements: Testing the moderating effect of technology readiness and sex on student SNS use. *Computers in Human Behavior*, 30, 39-49.

Brown, & Venkatesh (2005). Model of Adoption of Technology in Households: A Baseline Model Test and Extension Incorporating Household Life Cycle. *MIS Quarterly*, 29 (3), 399.

Brown, S., Venkatesh, V. & Bala, H. (2006). Household technology use: Integrating household life cycle and the model of adoption of technology in households. *The Information Society*, 22 (4), 205-218.

Brown, S.A., Venkatesh, V. & Hoehle, H. (2015). Technology adoption decisions in the household: A seven-model comparison. *Journal of the Association for Information Science and Technology*, 66 (9), 1933-1949.

Casey, T. & Wilson-Evered, E. (2012). Predicting uptake of technology innovations in online family dispute resolution services: An application and extension of the UTAUT. *Computers in Human Behavior*, 28 (6), 2034-2045.

Chan, F., Thong, J., Venkatesh, V., Brown, S., Hu, P. & Tam, K. (2010). Modeling Citizen Satisfaction with Mandatory Adoption of an E-Government Technology. *Journal of the Association for Information Systems*, 11 (10), 519-549.

Chang, I., Hwang, H., Hung, W. & Li, Y. (2007). Physicians' acceptance of pharmacokinetics-based clinical decision support systems. *Expert Systems with Applications*, 33 (2), 296-303.

Chauhan, S. & Jaiswal, M. (2016). Determinants of acceptance of ERP software training in business schools: Empirical investigation using UTAUT model. *The International Journal of Management Education*, 14 (3), 248-262.

Compeau, D., Higgins, C.A. & Huff, S. (1999). Social Cognitive Theory and Individual Reactions to Computing Technology: A Longitudinal Study. *MIS Quarterly*, 23 (2), 145.

Compeau, D.R. & Higgins, C.A. (1995). Application of Social Cognitive Theory to Training for Computer Skills. *Information Systems Research*, 6 (2), 118-143.

Davis, F.D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*, 13 (3), 319.

Davis, F.D. (1993). User acceptance of information technology: system characteristics, user perceptions and behavioral impacts. *International Journal of Man-Machine Studies*, 38 (3), 475-487.

Davis, F.D., Bagozzi, R.P. & Warshaw, P.R. (1989). User Acceptance of Computer Technology: A Comparison of Two Theoretical Models. *Management Science*, 35 (8), 982-1003.

Davis, F.D., Bagozzi, R.P. & Warshaw, P.R. (1992). Extrinsic and Intrinsic Motivation to Use Computers in the Workplace1. *Journal of Applied Social Psychology*, 22 (14), 1111-1132.

De la Boutetière, H., Montagner, A. & Reich, A. (2018). *Unlocking success in digital transformations*.

Dwivedi, Y.K., Rana, N.P., Jeyaraj, A., Clement, M. & Williams, M.D. (2019). Re-examining the Unified Theory of Acceptance and Use of Technology (UTAUT): Towards a Revised Theoretical Model. *Information Systems Frontiers*, 21 (3), 719-734.

Goodhue, D.L. (1995). Understanding User Evaluations of Information Systems. *Management Science*, 41 (12), 1827-1844.

Gupta, B., Dasgupta, S. & Gupta, A. (2008). Adoption of ICT in a government organization in a developing country: An empirical study. *The Journal of Strategic Information Systems*, 17 (2), 140-154.

Hevner, March, Park, & Ram (2004). Design Science in Information Systems Research. *MIS Quarterly*, 28 (1), 75.

Hu, P.J., Chau, P.Y., Sheng, O.R.L. & Tam, K.Y. (1999). Examining the Technology Acceptance Model Using Physician Acceptance of Telemedicine Technology. *Journal of Management Information Systems*, 16 (2), 91-112.

Im, I., Hong, S. & Kang, M.S. (2011). An international comparison of technology adoption. *Information & Management*, 48 (1), 1-8.

Jung, I. & Lee, J. (2020). A cross-cultural approach to the adoption of open educational resources in higher education. *British Journal of Educational Technology*, 51 (1), 263-280.

Karahanna, E., Straub, D.W. & Chervany, N.L. (1999). Information Technology Adoption Across Time: A Cross-Sectional Comparison of Pre-Adoption and Post-Adoption Beliefs. *MIS Quarterly*, 23 (2), 183.

Kim, S.S., Malhotra, N.K. & Narasimhan, S. (2005). Research Note—Two Competing Perspectives on Automatic Use: A Theoretical and Empirical Comparison. *Information Systems Research*, 16 (4), 418-432.

Leonard-Barton, D. & Deschamps, I. (1988). Managerial Influence in the Implementation of New Technology. *Management Science*, 34 (10), 1252-1265.

Limayem, Hirt, & Cheung (2007). How Habit Limits the Predictive Power of Intention: The Case of Information Systems Continuance. *MIS Quarterly*, 31 (4), 705.

Ling Keong, M., Ramayah, T., Kurnia, S. & May Chiun, L. (2012). Explaining intention to use an enterprise resource planning (ERP) system: an extension of the UTAUT model. *Business Strategy Series*, 13 (4), 173-180.

Maillet, ?., Mathieu, L. & Sicotte, C. (2015). Modeling factors explaining the acceptance, actual use and satisfaction of nurses using an Electronic Patient Record in acute care settings: An extension of the UTAUT. *International Journal of Medical Informatics*, 84 (1), 36-47.

Martins, C., Oliveira, T. & Popovič, A. (2014). Understanding the Internet banking adoption: A unified theory of acceptance and use of technology and perceived risk application. *International Journal of Information Management*, 34 (1), 1-13.

Megadewandanu, S., Suyoto, & Pranowo (2016). *Exploring mobile wallet adoption in Indonesia using UTAUT2: An approach from consumer perspective*.

Moore, G.C. & Benbasat, I. (1991). Development of an Instrument to Measure the Perceptions of Adopting an Information Technology Innovation. *Information Systems Research*, 2 (3), 192-222.

Mütterlein, J., Kunz, R.E. & Baier, D. (2019). Effects of lead-usership on the acceptance of media innovations: A mobile augmented reality case. *Technological Forecasting and Social Change*, 145, 113-124.

Neufeld, D.J., Dong, L. & Higgins, C. (2007). Charismatic leadership and user acceptance of information technology. *European Journal of Information Systems*, 16 (4), 494-510.

Papagiannidis, S. & Marikyan, D. (2020). Smart offices: A productivity and well-being perspective. *International Journal of Information Management*, 51, 102027.

Riffai, M., Grant, K. & Edgar, D. (2012). Big TAM in Oman: Exploring the promise of on-line banking, its adoption by customers and the challenges of banking in Oman. *International Journal of Information Management*, 32 (3), 239-250.

Sharma, Yetton, & Crawford (2009). Estimating the Effect of Common Method Variance: The Method—Method Pair Technique with an Illustration from TAM Research. *MIS Quarterly*, 33 (3), 473.

Sheppard, B.H., Hartwick, J. & Warshaw, P.R. (1988). The Theory of Reasoned Action: A Meta-Analysis of Past Research with Recommendations for Modifications and Future Research. *Journal of Consumer Research*, 15 (3), 325.

Slade, E., Williams, M., Dwivedi, Y. & Piercy, N. (2015). Exploring consumer adoption of proximity mobile payments. *Journal of Strategic Marketing*, 23 (3), 209-223.

Straub, D. & Burton-Jones, A. (2007). Veni, Vidi, Vici: Breaking the TAM Logjam. *Journal of the Association for Information Systems*, 8 (4), 223-229.

Sun, Y., Bhattacherjee, A. & Ma, Q. (2009). Extending technology usage to work settings: The role of perceived work compatibility in ERP implementation. *Information & Management*, 46 (6), 351-356.

Taylor, S. & Todd, P.A. (1995). Understanding Information Technology Usage: A Test of Competing Models. *Information Systems Research*, 6 (2), 144-176.

Thompson, R.L., Higgins, C.A. & Howell, J.M. (1991). Personal Computing: Toward a Conceptual Model of Utilization. *MIS Quarterly*, 15 (1), 125.

Thong, J.Y.L., Venkatesh, V., Xu, X., Hong, S. & Tam, K.Y. (2011). Consumer Acceptance of Personal Information and Communication Technology Services. *IEEE Transactions on Engineering Management*, 58 (4), 613-625.

Udo, G., Bagchi, K. & Maity, M. (2016). Exploring Factors Affecting Digital Piracy Using the Norm Activation and UTAUT Models: The Role of National Culture. *Journal of Business Ethics*, 135 (3), 517-541.

Venkatesh, Morris, Davis, & Davis (2003). User Acceptance of Information Technology: Toward a Unified View. *MIS Quarterly*, 27 (3), 425.

Venkatesh, Thong, & Xu (2012). Consumer Acceptance and Use of Information Technology: Extending the Unified Theory of Acceptance and Use of Technology. *MIS Quarterly*, 36 (1), 157.

Venkatesh, V. & Davis, F.D. (2000). A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. *Management Science*, 46 (2), 186-204.

Venkatesh, V. & Speier, C. (1999). Computer Technology Training in the Workplace: A Longitudinal Investigation of the Effect of Mood. *Organizational Behavior and Human Decision Processes*, 79 (1), 1-28.

Venkatesh, V., Davis, F. & Morris, M. (2007). Dead Or Alive? The Development, Trajectory And Future Of Technology Adoption Research. *Journal of the Association for Information Systems*, 8 (4), 267-286.

Venkatesh, V., Thong, J. & Xu, X. (2016). Unified Theory of Acceptance and Use of Technology: A Synthesis and the Road Ahead. *Journal of the Association for Information Systems*, 17 (5), 328-376.

Verhoef, P.C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Qi Dong, J., Fabian, N. & Haenlein, M. (2021). Digital transformation: A multidisciplinary reflection and research agenda. *Journal of Business Research*, 122, 889-901.

Wang, H. (2005). The Role of Personality Traits in UTAUT Model under Online Stocking. *Contemporary Management Research*, 1 (1), 69-82.

Yi, M.Y., Jackson, J.D., Park, J.S. & Probst, J.C. (2006). Understanding information technology acceptance by individual professionals: Toward an integrative view. *Information & Management*, 43 (3), 350-363.

Zhang, J. & Mao, E. (2020). Cash, credit, or phone? An empirical study on the adoption of mobile payments in the United States. *Psychology & Marketing*, 37 (1), 87-98.

Zhou, T., Lu, Y. & Wang, B. (2010). Integrating TTF and UTAUT to explain mobile banking user adoption. *Computers in Human Behavior*, 26 (4), 760-767.

van der Heijden (2004). User Acceptance of Hedonic Information Systems. *MIS Quarterly*, 28 (4), 695.

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