Acceptance Process: The Missing Link between UTAUT and Diffusion of Innovation Theory

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Abstract The Unified Theory of Acceptance and Use of Technology (UTAUT) has been widely used in research involving adoption and acceptance of technologies. The theory considers factors that influence behavioural intention and use behaviour of technology. The authors of UTAUT combined eight competing theories of technology acceptance including the Diffusion of Innovation theory. Despite the involvement of the characteristics that affect technology adoption from the Diffusion of Innovation theory, the authors of UTAUT did not include the process that technology progresses through to be adopted. This paper argues conceptually that technology adoption processes should be included in UTAUT to better predict technology acceptance and that future information systems research should endeavour to include the environment and process in which technologies are used.

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1. Introduction

Information systems research concerning adoption and acceptance dates back many years ago. Some scholars have made a difference between adoption and acceptance whereas others have used the terms interchangeably. Reference [1] defined adoption as the use of a technology for the first time whereas acceptance as the continuous use of technology. Reference [2] viewed adoption as awareness, embracing and utilizing technology fully and acceptance as an attitude towards technology that is affected by many factors. The definitions given by the authors show that there is no universally accepted definition and usage of the terms despite the fact that they are continuously used in information technology research. For the purpose of this paper, we have taken on the definitions of [1] because they give a better picture of the progress towards full adoption of technologies. Reference [1] went ahead to suggest the process through which technology acceptance progresses to include three phases: attitude, adoption and acceptance.

Analysis has considered two main theories which are Unified Theory of Acceptance and Use of Technology (UTAUT) developed by [3] and Diffusion of Innovation Theory developed by [4]. The Innovation Decision Process of the Diffusion of Innovation theory considers five communication channels through which technologies have to go through in order to be adopted. The channels are knowledge, persuasion, decision, implementation and confirmation [4]. UTAUT considers performance expectancy, effort expectancy, social influence and facilitating conditions as the main constructs that affect usage intention and use behaviour [3]. Although [3] argued that they incorporated

Diffusion of Innovation theory in UTAUT, they did not consider the innovation decision process, that is, the stages through which an innovation progresses to be adopted. The communication channels or stages through which an innovation progresses are also termed as Innovation Decision Process [4].

2. Technology Adoption and Acceptance Theories

Theories and models are important in directing the research process [5] and scholars have reviewed the different theories of adoption and acceptance over the years. Many researchers have used Technology Acceptance Model (TAM) to explain adoption and acceptance of information technology and information systems. However, it is debatable whether it can be used to investigate all cases of information technology or information systems adoption and implementation [6]. Although TAM was one of the initial theories that were widely used in information systems research, it has some limitations. For instance, TAM does not consider social influence among the factors that influence technology acceptance [7]. Other scholars who have discussed the limitations of TAM include [8,9,10].

Reference [11] argued that it is essential to use at least two theories to attain a better understanding of multifaceted novel information technology adoption due to the limitations that one theory or model may have. Currently, there exists no universally accepted theory to explain information technology and information systems adoption. This situation leaves researchers in a "state of methodological vacuum and theoretical confusion" [9]. Thus, scholars

have developed their own theories or extended the existing ones to cater for their research problems. This analysis has focussed on Diffusion of Innovation theory, UTAUT and the acceptance phases as put forward by [1]. Diffusion of Innovation theory has been chosen because [12] argued that the perceived characteristics of innovation diffusion account for between 47 and 87 percent of the differences in adoption of innovations. Likewise, UTAUT has been considered because it is argued by [3] that it predicts more than 70 percent of the likelihood to adopt technology.

2.1. Diffusion of Innovation Theory

Diffusion of Innovation theory has been used to study user adoption of innovation in many sectors including agriculture, sociology, information systems, and manufacturing, among others. According to [4], diffusion is "the process by which an innovation is communicated through certain channels over time among the members of a social system"; while an innovation is "an idea, practice, or object that is perceived as new by an individual or another unit of adoption" [[4], p.11]. Diffusion of Innovation theory considers five constructs that influence technology adoption. The constructs include complexity, observability, compatibility, triability and relative advantage [4]. The theory (as depicted in Figure 1) shows the process of innovation diffusion which includes five stages: knowledge, persuasion, decision, implementation and confirmation. The theory categorises the adopters of a technology into innovators, early adopters, early majority, late majority and laggards forming a bell shaped curve [12]. The theory further puts forward that prior conditions that may affect innovation adoption include innovativeness, norms of social systems, previous practice and felt needs.
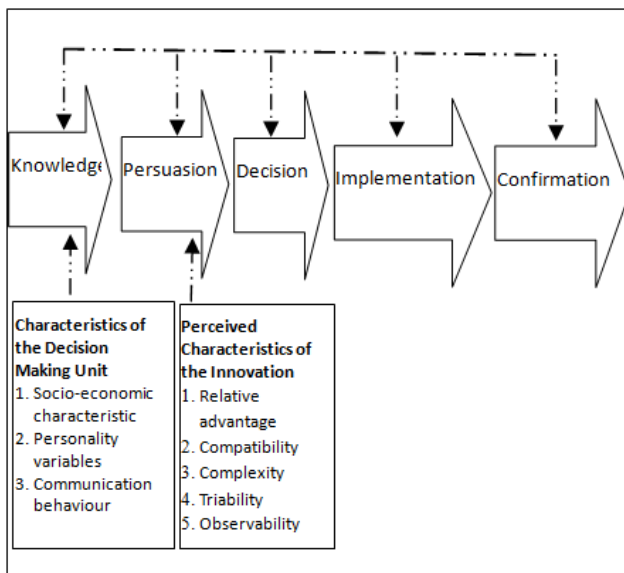

Figure 1. Innovation Decision Process (Adapted from [4])

Some researchers have revealed limitations of Diffusion of Innovation theory. References [13] and [14] noted that Diffusion of Innovation theory does not show the link between attitude and acceptance or rejection of an innovation. Furthermore, the connection between the innovation decision process and the characteristics of innovation is not clear. The theory only indicates that the technology passes through linear stages yet [15] observed that complex technologies do not disseminate in linear

stages. In addition, [16] argued that the constructs of Diffusion of Innovation are not likely to be strong predictors in situations where adoption of technologies is compulsory like in complex organisation settings.

2.2. Unified Theory of Acceptance and Use of Technology

UTAUT (as shown in Figure 2) was developed after considering eight competing theories and models of technology acceptance [3]. The competing theories that UTAUT put into consideration include the Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM), Technology Acceptance Model 2 (TAM2), Diffusion of Innovation theory, Theory of Planned Behaviour (TPB), Model of PC Utilisation (MPCU), Social Cognitive Theory (SCT), and Combined Technology Acceptance Model and Theory of Planned Behaviour [3].
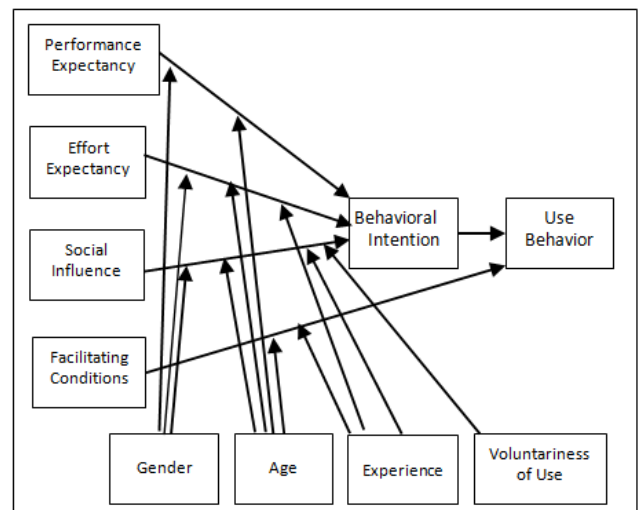

Figure 2. UTAUT Model (Adapted from [3])

According to [3], the four key components that affect technology acceptance are performance expectancy, effort expectancy, social influence, and facilitating conditions. Then, the moderating factors that lead to behaviour intention or use behaviour include age, voluntariness of use, experience and gender. Reference [3] defined performance expectancy as "a degree to which an individual believes that using the system will help him or her to attain gains in job performance". Further, they defined effort expectancy as "the degree of ease associated with the use of the system". Social influence was defined as "the degree to which an individual perceives that important others believe he or she should use the new system". Lastly, they defined facilitating conditions as "the degree to which an individual believes that organisational and technical infrastructure exist to support use of the system" [ibid].

Although using UTAUT is seen as best practice in measuring user acceptance [17], some limitations of the theory have been cited. UTAUT lacks the aspect of trust as one of the constructs in the theory [18,19]. Besides, it limits the mediating factors of technology acceptance to only four factors: age, gender, experience and voluntariness of use. UTAUT omits an important aspect of attitude of individuals towards the technology [2,20], yet

adoption is strongly influenced by anticipated benefits [21]. In a meta-analytic review of findings from UTAUT studies, [17] found that there is only a strong correlation between performance expectancy and behaviour intention; although other relationships were significant, they were slightly weak.

The original authors of UTAUT expressed their results mathematically so as to validate them empirically. However, over the years, researchers have adopted the theory qualitatively to gain an in-depth understanding of the factors that affect user acceptance of technology. For instance, [22] utilised UTAUT qualitatively to assess factors and barriers that hinder the adoption of robotic-assisted surgery. In a study conducted by [2], the authors used a qualitative approach to UTAUT in the design of a modified model for the acceptance and adoption of mobile technology for the elderly. Reference [23] used a qualitative approach to UTAUT while investigating acceptance of e-health by health professionals in Africa and thus devised a revised model of it. UTAUT was also applied qualitatively by [19] to examine the merits of using motes in monitoring health.

3. Comparison between Diffusion of Innovation Theory and UTAUT

The authors of UTAUT created the model in order to lessen the burden of future researchers in combining constructs from different models [24]. UTAUT integrated the perceived characteristics of innovation as follows: perceived advantage in performance expectancy, triability in performance expectancy, observability in performance expectancy, complexity in effort expectancy, and compatibility in social influence from the Diffusion of Innovation theory [3].

Whereas the constructs that affect acceptance of technology are important, the process through which they pass is equally vital for the success of information systems projects [25]. While [3] asserted to have used Diffusion of Innovation theory in UTAUT, the researchers did not consider Innovation Diffusion Process which involves the communication stages through which technology progresses through to be adopted. Figure 3 shows a diagrammatic representation of how communication stages of Diffusion of Innovation were not included when the authors of UTAUT combined eight competing theories of technology acceptance. Hence the necessity of combining Innovation Decision Process with UTAUT so as to come up with a better understanding of the acceptance process and constructs that affect the process of any innovation.

UTAUT is more applicable to users than organisations. Thus, it is more suitable to understanding studies that are mostly affected by human factors. Diffusion of Innovation theory is more suitable for organisational context and has been applied in a range of fields including agriculture, sociology and information systems [12]. Reference [12] mentioned that adoption in an organisation context is more complicated than at an individual level.
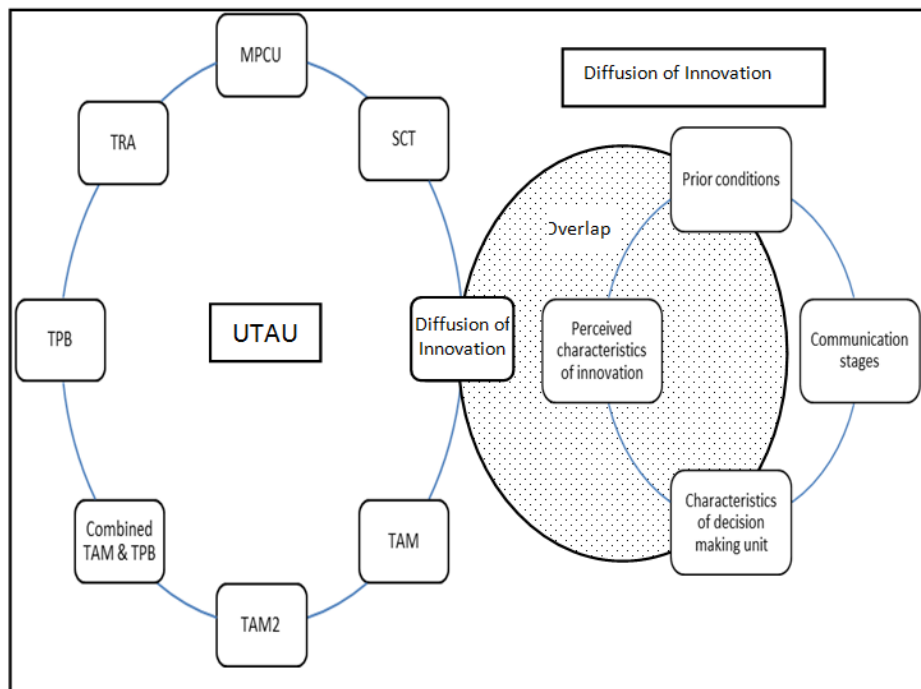

Figure 3. Overlap between UTAUT and Diffusion of Innovation Theory

Much as UTAUT is seen as the gold standard in understanding acceptance of information technology [17], it does not consider the phases that lead to adoption of technology that were considered by Diffusion of Innovation theory. In addition, cultural aspects that are crucial for successful adoption of technology are not considered in the UTAUT constructs that affect technology acceptance. Reference [26] added that

UTAUT fails to measure traits of individuals like innovativeness.

Researchers combine UTAUT with external theories and variables [24] in order to address weaknesses of the model. Reference [27] used UTAUT and the acceptance process by [1] to present a framework for the acceptance process of District Health Information System for vertical health programmes. Reference [28] used Diffusion of

Innovation and UTAUT in combination to test whether ICT (cellular phone) acceptability between countries was different. Reference [29] adopted both UTAUT and the five stages of Diffusion of Innovation theory in a qualitative nature to study user adoption of an online learning environment. Since technology adoption occurs in a complex environment and is affected by a multitude of factors, there is a need to study factors that affect the different stages through which technology adoption occurs.

4. Acceptance Process of Innovations

Reference [1] describes acceptance to include three phases i.e. attitude, adoption and acceptance. In the attitude phase, a consumer or user of a technology assess the technology and forms a mental picture of what he expects use and level of the technology. This stage is important before the adoption of any technology. Kollmann's phases are depicted in Figure 4. The process has nine elements which are fused into three phases. The assessment (attitude) phase involves raising awareness and interest and then forming expectations of the technology. Action (adoption) phase involves trying the technology, purchasing or adopting it and implementation. Use (acceptance) phase involves making a decision of whether to use the technology, using it and lastly terminating the use of it. In addition, the acceptance process of Kollmann shows that one might move from the attitude to the acceptance phase, skipping the adoption phase. However, in order to improve the chances of technology acceptance, the adoption phase is important and has to be monitored.
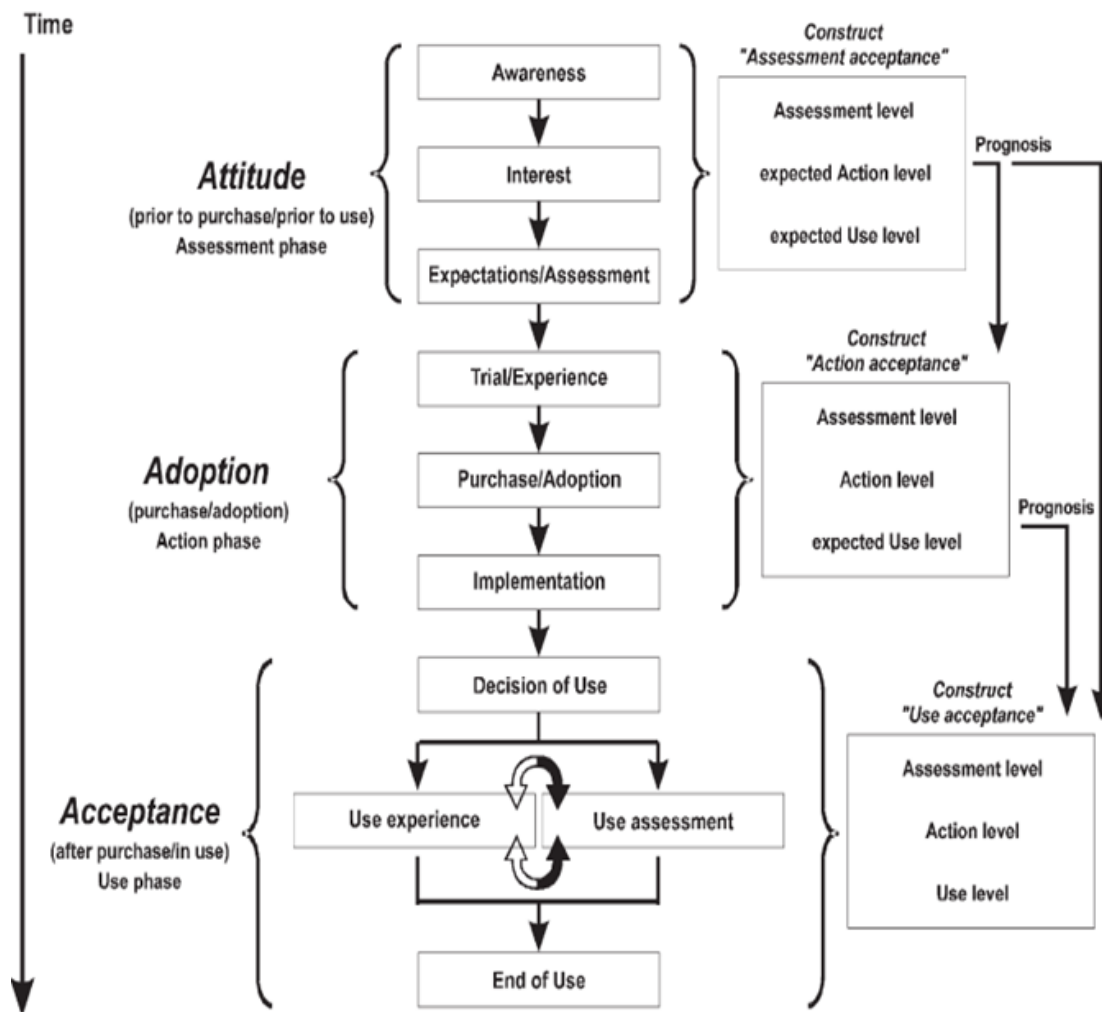

Figure 4. Scheme of Phases in the Acceptance Process [[1], p.140]

Much as some scholars have combined UTAUT with the Innovation Decision Process, the researcher proposes combining UTAUT with the acceptance process of [1]. Thus is because the latter combination addresses the weaknesses of Diffusion of Innovation theory cited by [13] and 14 that Diffusion of Innovation does not show a link between attitude and acceptance or rejection. Another reason why the acceptance phases are favoured over the Innovation Decision Process is that [4] showed innovation adoption to pass through linear stages yet in real life the situation does not occur that way. If someone feels compelled to return to a previous stage, they can do so to rectify any issues that might have occurred.

Combining constructs that affect technology acceptance with the stages through which technology acceptance progresses is important because it explains the environment in which technology adoption occurs. Additionally, the environment affects technology adoption more than the technical factors [30]. When combining UTAUT and the acceptance phases, the constructs of UTAUT can be assessed in the attitude phase to form a baseline, managed within the adoption phase and then

evaluated within the acceptance phase to see whether expectations of stakeholders have been met [27].

5. Conclusion

Many scholars have derived models and theories from UTAUT and Diffusion of Innovation theory. Nevertheless, emphasis is mostly put on constructs and characteristics that affect technology acceptance. Researchers need to consider the phases through which technology acceptance progresses and put emphasis on important constructs in the different phases. Much as the terms diffusion, adoption, and acceptance have been used globally for information systems research, their definitions are yet to become clear. There is a need to show a clear-cut difference of their definitions to guide novel technology and innovation researchers. This paper shows the need to include the process of technology adoption and not just constructs of factors that affect technology adoption. Since many of the current theories lack the process aspect. Future research on information systems should endeavour to include the environment and process in which technologies are used.

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