

A Review of Dominant Information Technology Adoption Frameworks and their Relevance to Digital Library Adoption and Usage Studies

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Abstract

Context: Information technologies adoption and usage have been studied in great detail by scholars from various fields, especially from information systems. This has led to various theories and models aimed at explaining factors that influence the adoption and usage of technologies. **Objective:** This study, systematically reviewed major theories and models of adoption and usage of technologies and their application in the study of Digital Libraries (DL). **Method:** An extensive review of five of the major theories and models (Theory of Reasoned Action, Theory of Planned Behaviour, Technology Acceptance Model, Motivational Model, Diffusion of Innovation) was carried out. The strengths and weaknesses of each of the reviewed theories and models were highlighted. **Results:** Of all the theories and models that attempt to explain factors responsible for individuals' decision to either adopt or reject technology, only Diffusion of Innovation (DOI) provided a comprehensive theory that captured DL adoption and usage scenario through its innovation-decision process model. **Conclusion:** Based on the outcome of the review, the paper recommended an innovation-decision process model for an in-depth understanding of factors responsible for the use and non-use of DL services.

Keywords: adoption, digital library, information technology, usage studies, theories

1. Introduction

Understanding the adoption and usage of emerging technologies has been the focus of scholars in the recent past, this has led to various theoretical models developed to study user acceptance and usage behaviour of emerging Information and Communication Technologies (ICT). Digital Libraries (DL) being a by-product of ICT have also attracted the attention of scholars and may be investigated through the lens of the established theories and models from information sciences and related fields. Therefore, the focus of this paper is to systematically review major theories and models of adoption and usage of technologies and their application in the study of DL.

Information technologies adoption and usage have been studied in great detail by scholars from various fields especially from information systems (Agbo, 2015; Roztock, & Weistroffer, 2016; Roztock, Soja, & Weistroffer, 2019). This has led to various theories and models aimed at explaining factors that influence the adoption and usage of technologies. Scholars have classified adoption and usage studies into various categories. Some identified two lines of research approaches, "Intention-based approach" and "diffusion-based approach". Theories and models that fall under the intention-based approach employed intention-based models (such as Theory of Reasoned Action (TRA), Theory of Planned Behaviour (TPB), Technology Acceptance Model (TAM), Unified Theory of

Acceptance and Use of Technology (UTAUT)) to predict factors affecting adoption and usage of technology; while the diffusion-based approach used diffusion of innovation perspectives which examined adoption and usage from individual user characteristics, information sources and communication channels and innovation (Taylor & Todd, 1995; Masrom & Hussein, 2008; Oliveira & Martins, 2011).

Another categorization of adoption studies equally grouped adoption studies into "adoption" and post-adoption studies (Kim & Crowston, 2011). Kim and Crowston (2011) further classified adoption and post-adoption into three different stages: pre-adoption, adoption, and post-adoption, thus: "At the pre-adoption stage, people may examine new technology and consider adopting it. At the adoption stage, they form an intention to adopt the technology, and they eventually purchase and use it. At the post-adoption stage, people can either continue to use the technology or abandon it. If they abandon a technology, they may start to examine another technology at the same time to substitute their old technology". These stages of adoption as presented by Kim and Crowston (2011) have been investigated over the years for a better understanding of factors responsible for the adoption and usage of technology.

Kim and Crowston (2011) reviewed major adoption-focused theories and argued that rather than addressing post-adoption problems most of the theories were more concerned with pre-adoption and adoption stages. They

identified seven major adoption models: TRA (Fishbein & Ajzen, 1975), TPB (Ajzen, 1991), TAM (Davis, 1989), TAM2 (Venkatesh & Davis, 2000), IDT (Rogers, 2003), UTAUT (Venkatesh, Morris, Davis & Davis, 2003), Social Cognitive Theory (SCT) (Bandura, 1986), and two post-adoption models: (Expectation Confirmation Theory and IS Continuance Model).

Venkatesh *et al.* (2003) had earlier reviewed information technology acceptance research and tested a total of 32 constructs from eight theoretical models to determine the constructs that had had the most influence on information technology use. The eight theories from which a unified model called UTAUT was developed consist of TRA, TAM, Motivational Model (Davis *et al.* 1992), TPB, a model combining TAM and TPB (Taylor & Todd, 1995), the Model of PC Utilization (Thompson *et al.* 1991), SCT, and IDT. The major models and theories that have been used over the years to study the adoption and usage of technologies revolve around the eight models and theories identified by Venkatesh *et al.* (2003). These major theories and models were reviewed by Kim and Crowston (2011) who found several similarities between the constructs used to explain individual users' technology adoption and use. In the same vein, Maull, Saldivar, and Sumner (2011) contended that much of the theoretical work on technology adoption focused on understanding the cognitive and affective, and contextual factors that influence a potential user's decision-making process

2. Review of Literature

In order to archive the goal of this study, systematic review of both conceptual and empirical literature on information technology and adoption theories and models was carried out. The review process involves general search for the following key words either separately or in combination: information technology adoption models digital library adoption frameworks; digital library studies. This process generated 123 articles, covering more than 15 years period. Based on abstracts from the 123 search reports articles, the search was lessened to quite a few studies, i.e., 64 articles that are relevant to the research topic. The 64 relevant articles were further grouped into five (5) major dominant theories. *The strengths and weaknesses of each of the reviewed theories and models were then highlighted. Through this approach, Diffusion of Innovation (DOI) was identified as have explanatory power that captured*

DL adoption and usage scenario through its innovation-decision process model.

3. Theories and Models of technology adoption and usage

This section reviewed some of the major theories of technology adoption and usage as identified in the previous section for a better understanding of their relevance to DL adoption and usage studies.

3.1 Theory of Reasoned Action

The Theory of Reasoned Action (TRA) is a well-used theoretical model from social psychology as depicted in figure 1. The theory focuses on a person's *intention* to behave in a certain way. TRA was developed by Fishbein and Ajzen (1975). It embraces four general concepts: actual behaviour, behavioural intention, attitude, and subjective norm. According to TRA, Behaviour Intention (BI) refers to "an individual's subjective probability that he or she will perform a specified behaviour. Attitude refers to an individual's evaluation of performing the behaviour." Subjective norm refers to "the person's perception that most people who are important to him think he should or should not perform the behaviour in question" (Fishbein & Ajzen, 1975:302).

According to TRA, an individual's behaviour either to use or reject technology is determined by one's intention to perform the behaviour, and this intention is influenced jointly by the individual's attitude and subjective norm. TRA has been found to have demonstrated a strong predictive ability for behaviour in a variety of settings (Sheppard *et al.*, 1988; Hagger, 2019). For example, Sheppard *et al.* (1988) reported that more than half of the studies up to 1988 demonstrated that despite TRA being used outside its intended boundaries, it still showed consistent and strong predictive power. Recently, Hagger (2019) asserted that TRA "demonstrated effectiveness in predicting variability in people's behaviour across many contexts, populations, and behaviours". Researchers have employed TRA to investigate adoption and usage of technologies including digital libraries (Zheng, 2012; Mishra, Akman & Mishra, 2014). For example, Zheng (2012) examined the Chinese digital library system's acceptance through the framework of the theory of reasoned action. The results revealed that attitude and subjective norm have a significant effect on acceptance intention, and also that there is a negative interaction between attitude and subjective norm.

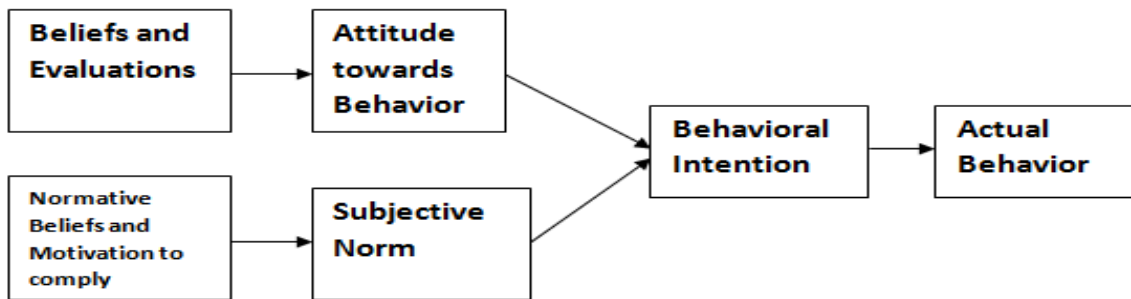


Figure 1. The Theory of Reasoned Action (Source: Fishbein and Ajzen, 1975)

Despite its usage in information technology-related studies, the inadequacy of the model to explore the social factors has led to its being used with other models by some scholars (Shareef *et al.*, 2009). The Theory of Reasoned Action is based on the assumption that individuals are rational decision-makers who constantly calculate and evaluate the relevant behaviour beliefs in the process of forming their attitude towards the behaviour. This assertion did not consider the social factors that could hinder an individual from making a rational decision to use or not to use DL. As a result of this, TRA was criticized for neglecting the importance of social factors that in real life could be a determinant for individual behaviour (Grandon & Mykytyn, 2004; Werner, 2004). To overcome TRA's weakness, Ajzen (1991) proposed an additional factor (Perceived Behavioural Control) in determining individual behavior in the Theory of Planned Behavior.

Going by the objectives of this study and the identified limitation of TRA, it is clear that the theory ignored other factors such as social and environmental variables that may be responsible for the adoption and usage of DL. Based on these limitations, the theory in its form may not adequately serve as a lens to investigate the adoption and usage of DL.

3.2 Theory of Planned Behaviour

The Theory of Planned Behaviour (TPB) was developed in 1985 by Icek Ajzen. It is a descendant of the theory of reasoned action (TRA) but adds a third antecedent of intention: perceived behavioural control. The objective of TRA and TPB is to explain the determinants that predict an individual's specific behaviour and the behavioural intention to perform the behaviour in question. According to TPB, behaviours are based on one's intention regarding that behaviour, which in turn is a function of the person's attitude towards the behaviour, subjective norm regarding that behaviour. Attitude refers to the "degree to which a person has a favourable or

unfavourable evaluation or appraisal of the behaviour in question" (Ajzen, 1991:188). Subjective norm is defined as "an individual's assessment of the extent that referent others would desire the performance or non-performance of the behaviour" (Ajzen, 1991), and perceived behavioural control refers to "the perceived ease or difficulty of performing the behaviour and it is assumed to reflect experience as well as anticipated impediments and obstacles" (Ajzen, 1991: 188).

In general, TPB assumes that the more positive the attitude and subjective norm concerning the particular behaviour and the greater the perceived behavioural control, the stronger an individual's intention to perform the behaviour is and consequently the more likely its actual performance should be, this is shown in Figure 2.

In addition to attitude towards the behaviour and the subjective norm, perceived behavioural control can influence intention as well. Perceived behavioural control influences the individual's decision through behavioural intention. In the TPB, behavioural intention is the most influential predictor of behaviour. Behavioural intentions according to TPB are factors that describe how hard people are willing to try to perform a behaviour (Ajzen, 1991). TPB is similar to the TRA. Some of these approaches have their origin in the Theory of Reasoned Action and the Theory of Planned Behaviour (Fishbein & Ajzen, 1975; Ajzen, 1985).

Several studies have shown that TPB has predictive power. The theory has been used and validated by many studies in the prediction of individual intentions and behaviour of technology adoption (Hsu & Chiu, 2004; Liao, Chen & Yen, 2007; Chu, & Chen, 2016). These studies found significant relationships between attitudes, subjective norm, perceived behavioural control, and behavioural intention. Ajzen (1991) presented a review of several studies that successfully used TPB to predict intention and behaviour in a wide variety of settings.

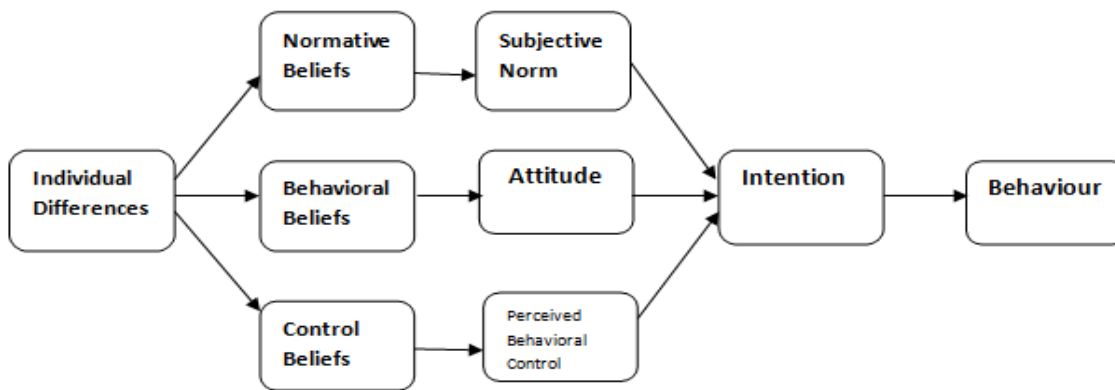


Figure 2. Theory of Planned Behaviour (Source: Ajzen, 1991)

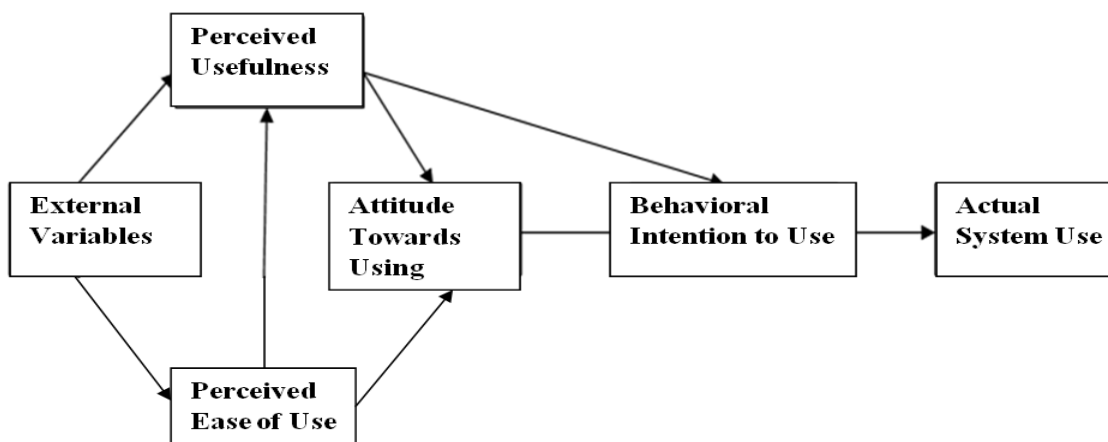


Figure 3. Technological Acceptance Model (Source: Davis, 1989)

TPB like the TRA has been criticized for limiting factors that influence adoption and usage of technology to only three main constructs of attitudes, subjective norm, and perceived behavioural control. Taylor and Todd (1995) criticized TPB and TRA that the models when compared to the technology acceptance model (TAM) did not perform well. Even though the TPB has been applied in a wide range of settings, Mathieson, Peacock, and Chin (2001) argued that the theory and other instruments must be tailored to fit each unique situation or specific behaviour of interest to be effective. In view of this limitation, the theory may not adequately serve as a lens to investigate the adoption and usage of DL

3.3 Technology Acceptance Model (TAM)

Technology Acceptance Model (TAM) is one of the dominant theories used to explain the process of user acceptance of high-tech products, mainly from intrinsic perception factors, rather than extrinsic environmental factors (Feng, 2012). TAM was first proposed by Davis (1986). According to Davis (1989), adoption behaviour is determined by the intention to use a particular system, which in turn is determined by perceived usefulness and perceived ease of use of the system (See figure 3.).

TAM is an extension of Ajzen and Fishbein's Theory of Reasoned Action (TRA). According to the TRA, an individual's behaviour such as use or rejection of technology is determined by one's intention to perform the behaviour, and this intention is influenced jointly by the individual's attitude and subjective norm (Fishbein & Ajezen 1975). TAM posits that perceived usefulness and perceived ease of use determine an individual's intention to use a system and an intention to use serving as a mediator of actual system use. Perceived usefulness is also seen as being directly impacted by perceived ease of use. Researchers have simplified TAM by removing the attitude construct found in TRA from the current specification (Venkatesh *et al.*, 2003). Davis *et al.* (1989) asserted that a key purpose of TAM is to provide a basis for tracing the impact of external factors on internal beliefs, attitudes and intentions.

Attempts to extend TAM have generally taken one of three approaches: introducing factors from related models, introducing additional or alternative belief factors, and examining antecedents and moderators of perceived usefulness and perceived ease of use (Wixom & Todd, 2005). This development has led to two major

upgrades TAM 2 (Venkatesh & Davis 2000), and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh *et al.* 2003). In addition, Venkatesh and Bala (2008) extended TAM2 by proposing TAM3 to address issues of IT implementations. Scholars have used these technology acceptance models to predict IT usage. However, research on technology acceptance has largely focused on the enablers or the positive antecedents that drive technology adoption (Cenfetelli & Schwarz, 2011). Determinants of technology usage can be characterized by the rate of use and the variety of use. The rate of use is defined as how often a piece of technology is used in a given period (day, week, etc.), while the variety of uses depends on the different applications for which that technology is used (Shin & Venkatesh, 2003). The rate and variety of uses are the most common dependent measures in TAM studies (Shin & Venkatesh, 2003).

Despite its development in terms of various extended versions, TAM cannot explain the adoption and usage of DL behaviour in academic environments. Legris *et al.*'s (2003) critical review revealed numerous studies where TAM failed to predict the behavioural intention to use technology. The two constructs introduced as the main antecedent of acceptable behaviour are limited to technical attributes of the usefulness of computer technology and ease of use of technology. By merely measuring these two constructs, a lot of information is lost – in particular, the reasons *why* the technology is perceived to be useful or not (Van Ittersum *et al.*, 2006).

3.4 Motivational Model (MM)

Studies have shown that various motivational theories have been developed and applied by various researchers. Kirstein (2010) quoting Armstrong (2007) gave a clear and useful summary of the major motivational theories. According to him, 'Taylor's theory of motivation to work is related to rewards and penalties which are directly connected to performance. Maslow's concept of the hierarchy of needs is a less instrumental approach as it defines motivation as a result of people's unsatisfied needs. Herzberg focused on a distinction between extrinsic and intrinsic motivators' (Kirstein, 2010).

The Motivational Model purports that individual behaviour is based on two central constructs - extrinsic and intrinsic motivation (Davis *et al.*, 1992:). Extrinsic Motivation is "the performance of an activity because it is perceived to be instrumental in achieving valued outcomes that are different from the activity itself, such as improved job performance..." while intrinsic motivation is "the performance of an activity for no apparent reinforcement other than the performance of the activity, per se, such as enjoyment". The difference between these two motivational constructs has been researched by scholars over the years (Deci, 1975;

Devis *et al.*, 1992; Cameron & Pierce, 1994). According to Deci (1975), intrinsically motivated behaviours are ones for which there is no apparent reward except the activity itself. Extrinsically motivated behaviours refer to behaviours in which an external controlling variable can readily influence the behaviour such as reward. In other words, intrinsic motivations manifest when people engage in an activity for its own sake and not because of any extrinsic reward. The result of such behaviour is an experience of interest and enjoyment. On the other hand, extrinsically motivated actions are characterized by pressure and tension and result in low self-esteem and anxiety (Deci *et al.*, 1991).

In a meta-analysis of the effects of reinforcement and reward on intrinsic motivation, Cameron and Pierce (1994) examined 96 experimental studies that used between-groups designs to compare rewarded subjects to non-rewarded controls on four measures of intrinsic motivation. The findings indicate that, overall, the reward does not decrease intrinsic motivation. When interaction effects were examined, findings show that verbal praise produces an increase in intrinsic motivation. The only negative effect appears when expected tangible rewards are given to individuals simply for doing a task.

Davis *et al.* (1992) applied motivational theory to understand new technology adoption and use. They operationalized intrinsic and extrinsic constructs to measure their effects on behavioural intention. Intrinsic motivation measured the use of technology in terms of its enjoyment. The extrinsic motivation was measured in terms of perceived usefulness. The study participants (college students) were initially introduced to software applications. The introduction of the software to students was followed by a questionnaire with items measuring the usefulness and enjoyment constructs as well as the intention to use the application (behavioural intention). Analysis of the study revealed that usefulness had a large effect on behavioural intention to use. In addition, the effect of enjoyment on behavioural intention was significant; but weaker than the effect of usefulness. The study suggests that the motivational construct of enjoyment has a relatively weak effect on the intention to use technology. In another study, Igbaria *et al.* (1996) found that perceived complexity had a small, negative effect. In addition, it had a strong indirect effect on use through other variables. Based on this it shows that the Motivational Model makes only limited contributions to the information system.

3.5 Diffusion of Innovation (DOI)

Rogers' (1962, 2003) theory of Diffusion of Innovation (DOI) originated from agricultural innovation in the late 1950s. The theory has been widely used by several professionals in a variety of settings, ranging from the diffusion of rural technology among farmers through

marketing, communication, and sociology to the adoption of innovations in educational settings (Berger, 2005; Kebritchi, 2010; Martins, Steil & Todesco, 2004).

The DOI is a theory of how, why, and at what rate new ideas and technology spread through cultures, operating at the individual and firm-level. Rogers (2003:5) defines diffusion as “the process in which an innovation is communicated through certain channels over time among the members of a social system”.

As reflected in this definition, innovation, communication channels, time and social system are the four key components of the diffusion of innovations. These are discussed below:

Rogers (2003:12) defines innovation as “an idea, practice or project that is perceived as new by an individual or other unit of adoption”. The characteristics of innovations, as perceived by individuals, tend to influence their rate of adoption and are associated with the persuasion stage of the innovation-decision process. Rogers (2003) lists five characteristics of innovations which according to him influence the rate of innovation by individuals and organizations. These factors are: (a) relative advantage - the degree to which an innovation is perceived as being better than the idea it supersedes; (b) compatibility – degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters; (c) complexity – the degree to which an innovation is perceived as relatively difficult to understand and use; (d) trialability – the degree to which an innovation may be experienced with on a limited basis; and (e) observability – the degree to which the results of an innovation are visible to others. Moore and Benbasat (1991) added *voluntariness* of use and *image* to Rogers’ attributes. Innovation is most likely to be adopted if individuals perceive that the adoption enhances their images within the social system.

These characteristics of innovation can be used to understand the individual perception of innovation and how these characteristics influence their attitude towards innovation. The innovation in the present investigation is DL,

The second element of the diffusion of innovations is communication channels. For Rogers (2003), communication is “a process in which participants create and share information to reach a mutual understanding”. This communication occurs through channels between sources. Rogers states that “a *source* is an individual or an institution that originates a message, while “a *channel* is how a message gets from the source to the receiver” (Rogers, 2003). According to Rogers (2003) mass media channels such as radio, television and newspapers are the

most rapid and efficient means of informing an audience of potential adopters about the existence of innovation. In the present study, DL is the innovation whose awareness has been communicated using a variety of communication channels. The most common channels used in the context of the present study to create awareness in the academic environment are library orientation programmes, workshops, and online tutorials on how to navigate DL resources. Another recent trend is the use of social media to create awareness. The recent white paper released by Taylor and Francis emphasized the opportunities of using social media in the library as “its low cost, its ability to take the library service to users in their preferred spaces, the opportunity to build a sense of community between the library and its users, to support co-development of collections and help keep librarians updated on industry news and initiatives” (McCallum, 2015:3).

Time is the third element in the diffusion process. It can be divided into three components: (a) the innovation-decision process by which a person passes from first knowledge of an innovation to forming an attitude towards the innovation; (b) the innovativeness of a person's relative earliness/lateness of adopting the innovation; and (c) the adoption rate in a system measured as the number of members of the system adopting the innovation in a given period (Rogers, 2003).

1. The innovation-decision process: this is the process through which an individual passes when encountering innovations or ideas. As depicted in figure 4, the process is mostly information seeking and information processing activities over some time and can be divided into five distinct stages: knowledge, persuasion, decision, implementation, and confirmation. .

The *knowledge* stage of the innovation-decision process as depicted in figure 4 is basically an awareness stage in which an individual (or another decision-making unit) is exposed to innovation. At this stage, the potential adopter gains knowledge and understanding of how the innovation functions (Rogers, 2003). There are three types of knowledge about an innovation: (a) awareness-knowledge - information about the existence of an innovation; (b) how-to-knowledge- information necessary or skills required to use an innovation properly; and (c) principles-knowledge, information dealing with the functioning principles underlying how an innovation functions. This stage is relevant to the present study in the sense that studies have shown that knowledge and awareness of DL determine the rate of usage (Rehman & Ramzy, 2004; Popoola, 2008). The present study will further look at how individual knowledge of the DL affects its rate of adoption.

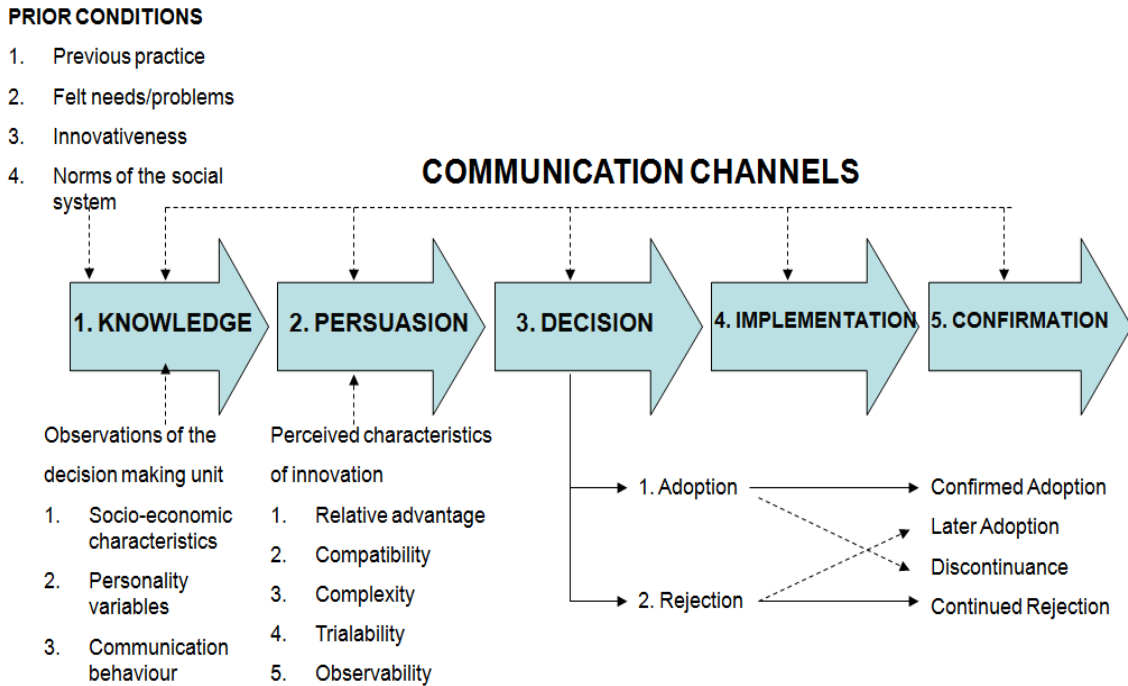


Figure 4. Diffusion of Innovation Model (Source: Rogers, 2003, p. 170)

The next stage of persuasion occurs when an individual forms a favourable or unfavourable attitude towards the innovation. According to Rogers (2003) perceived characteristics of innovation which include relative advantage, compatibility, complexity, trialability, and observability influence the decision of an individual in the adoption decision process.

At the *decision* stage, an individual engages in activities that lead to either adopt or reject the innovation. An individual at the adoption stage may decide to continue using the system based on different factors ranging from the relative advantage compatibility of the new system. And at the same time, an individual may decide to reject the innovation or discontinue adoption either due to system complexity or other factors. Rogers (2003) referred to these types of rejection as active rejection and passive rejection. In an active rejection, an individual tries an innovation and thinks about adopting it, but later he or she decides not to adopt it. This is also known as the discontinuance decision, which is to reject an innovation after an earlier adoption. In a passive rejection (or non-adoption), the potential adopter does not think about adopting the innovation at all. These changes in the behaviour of potential adopters have been the concern of researchers in the field of information systems (Lim, 2002; Sultan & Kanwal, 2017). The present study also looks at this issue from different points of view, which is trying to find out the causes of low adoption and usage of DL by academic staff in Nigerian universities.

In the *implementation* stage, an individual puts the innovation into use when selecting the choice to adopt the innovation. The confirmation stage is the final stage of the innovation-decision process. At this stage, an individual seeks reinforcement or revision of the decision being made. The decision may be reversed if exposed to conflicting messages about the innovation.

2. The innovativeness is the degree to which an individual or another unit of adoption is relatively earlier in adopting new ideas than the other members of a system” (Rogers, 2003: 22). Individuals are seen as possessing different degrees of willingness to adopt innovations, and thus it is generally observed that the portion of the population adopting innovation is approximately normally distributed over time (Rogers, 2003). Breaking this normal distribution into segments leads to the segregation of individuals into the following five categories of individual innovativeness (from earliest to latest adopters): innovators, early adopters, early majority, late majority, and laggards (Rogers, 2003).

d) Social system is the fourth component of the diffusion of innovations. It is a set of interrelated units that are engaged in joint problem solving to accomplish a common goal. Rogers (2003) contended that members of all social systems do not accept innovation in the same order and at the same rate. This model can be used to understand which category of academic staff belongs to early adopters of digital libraries and those that are late majority or laggards. Rogers’ DOI (1962) laid the

foundation for several diffusion studies (Moore & Benbasat, 1991; 1996).

DOI identifies factors that facilitate or hinder technology adoption. These factors include characteristics of the technology, referred to as innovation characteristics, characteristics of adopters, and how adopters learn about and are persuaded to adopt the technology (Rogers, 2003). The comprehensiveness of the theory has allowed researchers to study how innovation spreads among groups of people from various dimensions. Rogers (1995) points out that diffusion is not a single, all-encompassing theory. It is several theoretical perspectives that relate to the overall concept of diffusion; it is a meta-theory (Yates, 2001).

However, the diffusion of innovation theory has been criticized for not considering the possibility that people will reject an innovation even if they fully understand it (Waterman, 2004). Also, insufficient consideration is given to innovation characteristics and how these change over time (Wolfe, 1994). As noted by Kingsley and Anderson (1998) some who have used a new technology may later become non-users, given their dissatisfaction with the experience. The reasons for this type of behaviour and others which may be contributing to the record of low adoption are what the present study will be looking at through an in-depth case study of academic staff.

Table 1. Summaries of the Reviewed Models and Theories

Name of Model /Theory	Core Constructs	Strengths of the Model	Weakness of the Model
Theory of Reasoned Action (TRA)	Attitude towards Behaviour, Subjective Norm	It explains relationships between attitude and behaviour.	Neglects social factors that in real life could be a determinant for individual behaviour.
Theory of Planned Behaviour	Attitude towards Behaviour, Subjective Norm,	It predicts relationships between attitudes, subjective norm, perceived behavioural control and behavioural intention.	It limits factors that influence adoption and usage of technology to three constructs.
Technology Acceptance Model (TAM)	Perceived Usefulness, Perceived Ease of Use, Subjective Norm	Dominant theories used to explain the process of user acceptance.	Failed to predict the behavioural intention to use technology
Motivational Model (MM)	Extrinsic Motivation, Intrinsic Motivation	It explains effects of extrinsic and intrinsic motivation on individual behaviour.	Using intrinsic motivation to measure enjoyment has a relatively weak effect on intention to use technology.
Diffusion of Innovation (DOI)	Relative Advantage, Compatibility, Trialability, Observability.	A comprehensive and well developed concept that influences adoption of new innovations.	Insufficient consideration is given to innovation characteristics and how these change over time.

The table 1 presented the summary of the reviewed major models that attempt to explain adoption and usage of technology.

4. Conclusion

This paper reviews theories and models of technology adoption and usage and highlights the strengths and weaknesses of the theories. The study critically examines the applicability of the theories to the study of DL. Of all the theories and models that attempt to explain factors responsible for an individual’s decision to either adopt or reject technology, only DOI provided a comprehensive theory that captured this scenario through its innovation-decision process model (Rogers, 2003). The DOI proposes that innovations that are perceived as having the greater relative advantage, compatibility, trialability, observability, and less complexity will be adopted more rapidly. Compared to other adoption models, the theory has a more mature history and has been broadly applied to the diffusion of

technologies ranging from new ideas to new technologies. Therefore, for a better understanding of factors influencing the adoption and usage of DL services, the present study recommends the use of DOI theories and in particular the Innovation decision process model. The model has the potential to predict factors influencing behaviour of users of innovation. DL being a new development in the library world, can be examined through the lens of Diffusion of Innovation theories.

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