Understanding Digital Technology Adoption: A Review of the Technology Acceptance Model

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Abstracta

As digital technologies increasingly reshape service use across sectors such as education, finance, healthcare, and hospitality, understanding technology acceptance and continued usage remains a central issue in information systems research. The Technology Acceptance Model (TAM) and its extensions have been widely applied in digital contexts; however, growing model complexity and construct proliferation have raised concerns regarding theoretical coherence and cumulative knowledge development. This study presents a structured narrative review of TAM and its foundational theories—the Theory of Reasoned Action (TRA) and the Theory of Planned Behavior (TPB)—based on empirical studies published between 2021 and 2025. Drawing on applications in digital banking, online learning, social media, artificial intelligence, and service automation, the review synthesizes how core acceptance constructs, including perceived usefulness, perceived ease of use, attitude, subjective norms, and perceived behavioral control, have been operationalized and extended. The findings show that while extended models such as TAM2, TAM3, and UTAUT improve predictive performance, their increasing complexity often results in limited theoretical advancement and inconsistent findings. This review highlights enduring core acceptance mechanisms and identifies key tensions between explanatory power and conceptual clarity, offering an integrated framework for future technology acceptance research in digital and educational contexts.

Keywords: Technology Acceptance Model (TAM), Digital Technologies, Narrative Review, Educational Technology, Information Systems

Introduction

When digital technologies are increasingly embedded in several sectors: From the healthcare and finance sectors, retail, hospitality sector – the approach people take to using services has been radically altered. However, as service interactions become mediated increasingly in the digital world, understanding drivers of acceptance and long-term usage remain a prominent concern in information systems and consumer behavior research. This question provides a

foundation for a string of theoretical frameworks to explain individual behavioral intentions toward innovative technologies (Fishbein & Ajzen, 1975; Ajzen, 1991).

The early conceptual models (e.g. Theory of Reasoned Action (TRA) and Theory of Planned Behavior (TPB) emphasized the significance of attitudinal evaluations, social norms, and perceived behavioral control in developing behavioral intentions. Based on these, Davis (1989) originated the Technology Acceptance Model (TAM) whereby a participant's acceptance can be mainly understood as a result from perceived usefulness and perceived ease of use; as such, individuals' intention to use a technology stem largely from two cognitive assessments.

Acknowledged for its theoretical rigor and empirical soundness, TAM has become one of the most used constructs in research on technology adoption and its effect on online and service use (Venkatesh & Davis, 2000; Venkatesh et al., 2003). As the nature of digital ecosystems increases in complexity, research has since tried to broaden TAM to incorporate new types of constructs. Subsequent versions (i.e., TAM2, TAM3 and Unified Theory of Acceptance and Use of Technology (UTAUT)) have expanded upon factors such as social influence, facilitating conditions, hedonic motivation and habit (Venkatesh et al., 2012). The extensions of UTAUT have shown substantial explanatory power in various contexts of digital services, for example mobile health, internet banking, e-commerce, and digital record management.

However, the widespread use of constructs and moderators in these extended models has raised questions about theoretical coherence and interpretive clarity specifically in consumer-facing space as general perceptions of system performance and convenience frequently influence adoption decision making (Benbasat & Barki, 2007). However, two important issues should remain in the scholarly agenda, despite significant progress in literature. First, despite the increased model-scale prediction, their increasing complexity may compromise theoretical clarity and impede progression of knowledge. New reviews consequently challenge the importance of core acceptance mechanisms – particularly in mature digital platforms that reflect platform convergence and information bloat. A primary gap exists in the increasing complexity and construct proliferation within technology acceptance research. Second, empirical contributions are siloed in different application domains, and only weak agreement is obtained on whether these foundational adoption mechanisms generalize to other digital service contexts. This lack of cross-contextual validation represents a significant gap for researchers seeking a universal understanding of technology acceptance. In this study, we intend to present a review of related Technology Acceptance theory based on digital technology context.

Related Theoretical Foundations
Theory of Reasoned Action (TRA)
The theory of reasoned action (TRA) was developed and introduced by Ajzen and Firshbein in 1977. This theory is the basis of the other two theories, which are the theory of planned behaviour (TPB) and TAM. The Theory of Reasoned Action (TRA) has been widely applied to predict and explain consumer behavior, such as consumers' purchase intentions for sustainable products (Rehman et al., 2024), platform environmental factors (trust, management, motivation, activity, info security) in virtual communities significantly influence users' knowledge-sharing behavior (Xie & Zhang, 2022), consumer behavior in purchasing

halal food products (Wiyono et al., 2022), students' learning attitude and retention behavior in MOOC environments (Wang & Lee, 2024), students' career choice behavior in accounting contexts using TRA (Karlsson & Noela, 2022) .

Table 1.

Recent Extensions and Applications of TRA (2021–2025)

Study	Sample	Field	Objective	Results
(Rehman et al., 2024)	384 responses	Consumer behaviour / Sustainable consumption	Applied the Theory of Reasoned Action (TRA) to examine factors influencing consumers' intention to purchase green products.	Attitude and subjective norms significantly predict green purchase intention, with price sensitivity acting as a moderator.
Xie, R., & Zhang, W. (2022)	751 responses	Virtual communities / knowledge sharing	Examined how platform environmental factors (trust, management, motivation, activity, info security) influence users' knowledge-sharing behavior in virtual communities.	Community trust, management, motivation, activity and information protection significantly predict users' knowledge-sharing behavior, with trust having the strongest effect.
(Wiyono et al., 2022)	Literature review	Consumer behavior	Reviewed TRA-based intention factors in halal food purchasing.	Attitudes and subjective norms are key predictors of halal purchase intention.
((Wang & Lee, 2024)	449 university students	MOOC learning / online course	Integrated TRA and TAM to examine how motivational, contextual, and interaction factors influence students' attitudes and MOOC retention intention.	Motivational and interaction factors predict MOOC retention via attitudes and perceived value, strengthened by tutor intervention.
(Karlsson & Noela, 2022)	228 university students	Students' career choice / Accounting profession	Applied TRA to examine how behavioral and normative beliefs influence students' accounting career choice.	Beliefs influence accounting career intention via attitudes and subjective norms.

TRA is a theory drawn from social psychology and is concerned with the determinants of intended behaviours (Ajzen & Fishbein, 1975, 1980). In TRA, an individual's actual usage or behaviour is best predicted by behavioural intention. The core constructs of TRA are attitude towards behaviour and subjective norm. According to TRA, behavioural intention (BI) is expected to enhance an individual's performance of a target behaviour. Moreover, BI is determined by an individual's attitude towards behaviour (A) and subjective norm (SN) as shown in Figure 1. This relationship can be shown in the equation below:

BI = A + SN
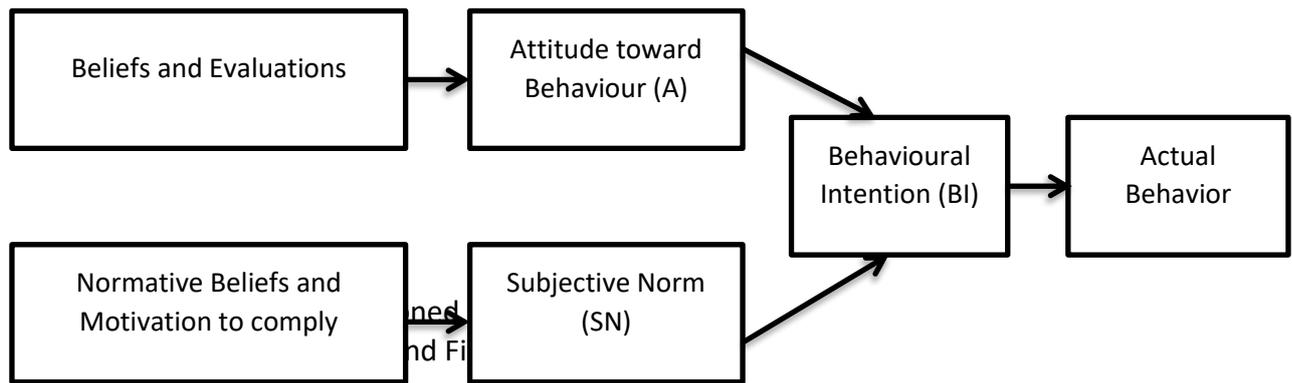
Attitude towards behaviour refers to a positive (or negative) feeling of an individual when performing the target behaviour (Ajzen & Fishbein, 1975). While subjective norm concerns an individual's perception of whether people who are important to him think he should or should not perform the behaviour, such as family and friends (Ajzen & Fishbein, 1975).

Besides, an individual's attitude towards behaviour will be influenced by his (or her) beliefs and evaluation of the consequences of performing the target behaviour. TRA also theorises that subjective norm is determined by an individual's normative beliefs and motivation to comply. An individual's normative beliefs can be referred to as perceived expectations of specific referent persons or groups, and motivation to comply refers to a person's motivation to comply with these expectations (Ajzen & Fishbein, 1975).

Theory of Planned Behaviour (TPB)

The theory of planned behaviour (TPB) was introduced and developed by Ajzen (1985) as an extension of TRA. Ajzen (1985) added a new construct to TRA, which is perceived behavioural control, in developing TPB. This is to overcome the limitation of TRA regarding volitional control as mentioned by Sheppard, Hartwick, and Warshaw (1988). Perceived behavioural control refers to an individual's feeling of performing a specific behaviour as entirely one's own decision. Therefore, the main constructs in TPB include attitude towards the behaviour, subjective norm, and perceived behavioural control. The model is shown in Figure 2.
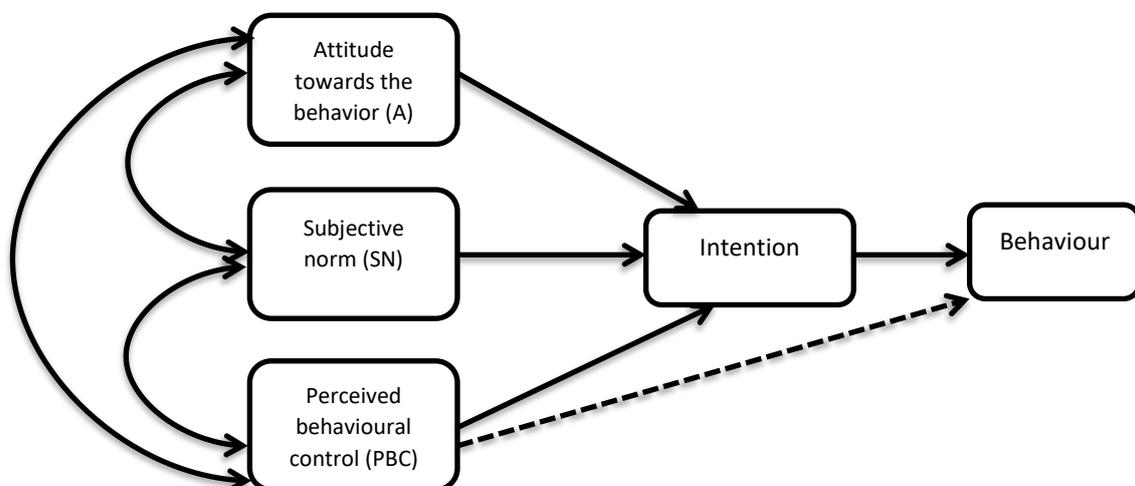

Figure 2 Theory of planned behaviour (TPB)
Source: Adopted from Ajzen (1985)

A person's perceived behavioural control (PBC) means the individual's perception of having certain resources and opportunities to reduce the problems of performing the target behaviour. Therefore, an individual would perceive to have complete control over the target behaviour. Figure 2 shows PBC influences behaviour indirectly through behavioural intention. Besides, PBC also directly influences behaviour. Since TPB is an extension of TRA, therefore, behaviour remains to be influenced by intention directly and the determinants of intention also remain the same (subjective norm and attitude), together with the addition of the new variable of PBC. As for adding PBC as one of the constructs, TPB is applicable in a situation where individuals have low (or no) volitional control (Ajzen, 1991).

Table 2 shows that TPB is widely used in different situations in predicting behaviour and intention, for instance, digital payment adoption intention predicted by TPB constructs (Usman et al., 2025), social media continuance intention predicted by TPB constructs (Mehrabioun, 2024), users' continuance intention in mobile banking contexts (Nguyen & Dao, 2024), metaverse/online gaming intention predicted by TPB constructs (Mandal et al., 2024), and technology adoption driven by personal innovativeness and policy incentives (Cudjoe et al., 2024).

Table 2
Recent Extensions and Applications of TPB (2021–2025)

Study	Sample	Technology	Objective	Results
(Usman, Rianto, & Aujirapongpan, 2025)	263 respondents	Digital payment / financial technology adoption	Applied TPB to examine determinants of digital payment adoption intention.	Attitude, subjective norms, and perceived behavioral control significantly predict adoption intention.
(Mehrabioun, 2024)	425 respondents	Users' social media continuance behavior	Applied TPB to examine determinants of users' intention to continue using social media platforms.	TPB constructs significantly predict continuance intention, showing attitudes, subjective norms, and perceived behavioral control shape social media use intention.
(Nguyen & Dao, 2024)	523 respondents	Mobile banking continuance behavior	Examined determinants of users' continuance intention using an extended TPB and expectation-confirmation model.	Perceived usefulness, self-efficacy, and satisfaction significantly predict continuance intention.
(Mandal et al., 2024)	564 online gamers	Online / metaverse gaming behavior	Applied TPB to predict metaverse/online gaming intention.	Attitude, subjective norms, and perceived control significantly predict gaming intention.
(Cudjoe et al. (2024)	571 responses	Technology adoption / app usage	Extended TPB–TAM with personal innovativeness and incentive policies to explain app adoption intention.	Personal innovativeness, incentive policies, and TPB constructs significantly predict adoption intention.

Technology Acceptance Model (TAM)
TAM was introduced by Davis et al. (1989) using the TRA (Ajzen and Fishbein (1980) as the foundation for developing TAM. The purpose of developing TAM was to predict the

information technology (IT) usage. The objective of TRA and TPB is to explain human behaviour while TAM is aimed at investigating the factors for users' computer acceptance, which can relate technology with users' behaviour (Davis et al., 1989). Moreover, TAM is focused on values and attributes approach where individuals form the intention to use a technology based on own beliefs on the attributes of the technology and their evaluation of the consequences of adopting the technology. TAM can also be referred to as *"...the effect of system characteristics on user acceptance of computer-based information systems"* (Davis et al., 1989).

The original TAM consists of two core constructs, which are perceived usefulness (PU) and perceived ease of use (PEOU). In this model, PU and PEOU are assumed to have an impact on technology acceptance behaviour. PU refers to the degree that a user believes that using a particular system will help to increase his/her job performance within an organisational context. PEOU is defined as the degree of the user's belief that using the technology or system will be free of effort, which means it is easy to use. In TAM, behavioural intention to use is determined by the attitude towards using and PU. Moreover, PU and PEOU impact the attitude towards using, and external variables are assumed to have an impact on both PU and PEOU. Besides, PEOU is assumed to have an impact on PU. The original TAM assumed that behavioural intention to use is influenced by the attitude towards using, but the new TAM has eliminated the attitude construct from the model. Figure 3 shows the original TAM model.
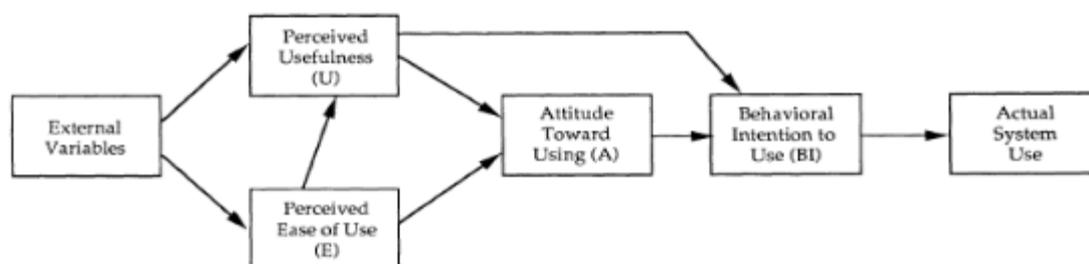

Figure 3 Original TAM
Source: Adopted from Davis (1985)

TAM has been widely recognised and applied by many studies over the last few years. Table 3 shows the use of TAM in prior studies in the Internet context, e.g., digital banking adoption, social media continuance intention, AI chatbots in online learning, police body-worn cameras / AI monitoring policies, hotel service robots.

Table 3
Recent Extensions and Applications of TAM (2021–2025)

Study	Sample	Technology	Objective	Results
(Musyaffi et al. 2024)	598 responses	Digital banking adoption	Extend TAM with trust, personal innovativeness, and security to explain digital banking adoption.	Trust, security, and personal innovativeness significantly influence perceived ease and usefulness, which in turn predict adoption intention.
(Mehrabioun 2024)	425 responses	Social media continuance intention	Examine determinants of social media continuance intention using a multi-theoretical model.	Attitude, social norms, and consumption value constructs significantly predict continuance intention.
(Rahman et al. 2025)	429 responses	AI chatbots in online learning	Examine students' adoption of AI chatbots for online learning effectiveness using TAM.	Perceived usefulness, ease of use, and technical competency significantly influence AI chatbot capability and adoption intention.
(Adams 2025)	258 responses	Police body-worn cameras / AI monitoring policies	Examine officers' perceptions of fairness under different digital monitoring policies.	Automatic activation and AI auditing reduce perceived fairness compared to manual controls.
(Ren et al. 2025)	261 responses	Hotel service robots	Examine factors influencing intention to use hotel robots via an extended TAM.	Playfulness, perceived usefulness, attitude, trust, and social presence significantly influence behavioral intention.

Discussion

In the previous section, consumers' acceptance theories and models were discussed, and it revealed that many models have been developed for investigating and predicting consumers' adoption behaviour in digital technology context. All the theories discussed show acceptable explanatory and predictive power, but they still have some common threads and limitations. Therefore, this section presents a comparison of all the theories discussed in the previous section and highlights their common criticisms to choose the most appropriate theory for the current study. Table 4 summarises the main constructs and criticisms for each of the models discussed previously.

Table 4

Summary of Consumers' Adoption Behavioural Theories and Models: Main Constructs and Criticism

Theory	Authors	Main constructs	Criticism
Theory of reasoned action (TRA) TRA has been used widely used in predicting a different range of behaviours. It is drawn from social psychology, and it is one of the most influential and fundamental theories on human behaviour.	(Ajzen & Fishbein, 1980)	Behavioural intention, actual behaviour, subjective norm, and attitude.	It was criticised by Sheppard et al. (1988) as TRA cannot predict the outcomes with individual's behaviour as limiting factors of attitude and subjective norms to predict intentions. Moreover, Ajzen and Fishbein (1980) acknowledged the limitation of the theory regarding the difference between behavioural intention and goal intention. Sheppard et al. (1988) provided an example of the status above which is TRA could only predict an individual's behaviour to go on a diet, but it could not measure whether the individual would achieve the goal of losing weight. Hence, this theory is only applicable to behaviours that are within a person's volitional control. This means when skills and resources are required in performing a specific behaviour, then it would not fulfil the condition of the TRA model. In this situation, even though a person has a strong intention to perform the target behaviour, he or she could not perform the action due to lack of resources or skill.
Theory of planned behaviour (TPB) TPB is derived from TRA with the addition of the variable of perceived behavioural control as an additional determinant of behaviour.	(Ajzen, 1991, 2002)	Behavioural intention, actual behaviour, subjective norm, attitude, and perceived behavioural control (PBC).	Ajzen (2002) stated the problems for measuring PBC. The concept of PBC does not originate from TPB, and it is similar to the concept of other models such as the interpersonal behaviour model (Triandis, 1979). Moreover, PBC is a form of "facilitated conditions" perspective. Besides, he stated that PBC is sometimes misleading to interchangeably with self-efficacy. Besides, TPB disregards the emotional variables such as threats, fears, emotions, and negative or positive feeling to evaluate them in a limited way (Al Oraini, 2014).
Technology acceptance model (TAM) TAM is tailor-made for the context of IS and aims to predict the acceptance and use of information technology at work. Unlike TRA, TAM excludes the attitude construct to explain intentions better.	(Davis et al., 1989)	External factors, perceived ease of use, perceived usefulness, behavioural intention.	As TAM is frequently used in many studies, therefore, it is widely criticised. (Chuttur, 2009) claimed that TAM lacks falsification, has limited explanatory and predictive power, lacks practical value, and is trivial. Besides, Benbasat and Barki (2007) stated TAM is in a "state of theoretical chaos and confusion" as several researchers have tried to expand TAM to adapt it to the dynamic IT context. The essential social process of IS development and implementation is overlooked in TAM as generally, TAM focuses on computer users with the concept of perceived usefulness (Bagozzi, 2007).

Revised technology acceptance model (TAM 2) TAM 2 is an extension of TAM which includes subjective norm as the additional predictor of intention.	(Venkatesh & Davis, 2000)	Determinants of PU including PEOU, subjective norm, image, job relevance, output quality, and result demonstrability. Experience and voluntaries as the moderators.	TAM 2 has determined the external factors that influence PU, but it does not explain how PEOU is developed. Besides, it is more complex than TAM. Although TAM 2 presents a more detailed and clear view of issues that are hidden in TAM, the inherent limitation in TAM was not overcome. As with TAM, the use of self-reports is measured, which may show common methodological biases in the results. In addition, like TAM, TAM2 assumes that behavioural intention implies unlimited freedom. However, in practice, factors such as limited ability, time, environmental or organisational constraints, and unconscious habits limit this freedom (Sharif Abbasi, Hussain Chandio, Fatah Soomro, & Shah, 2011).
Revised technology acceptance model (TAM 3) TAM 3 is a combination of TAM 2 (Venkatesh & Davis, 2000) with the determinants of PEOU to overcome the limitations of TAM 2	(Venkatesh & Bala, 2008)	Determinants of PU including PEOU, subjective norm, image, job relevance, output quality, and result demonstrability. Determinants of PEOU including computer anxiety, computer playfulness, computer self-efficacy, perception of external control, and objective visibility.	TAM 3 is more complex than TAM and TAM 2. Similar to TAM, TAM2 assumes that behavioural intention implies unlimited freedom. However, in practice, factors such as limited ability, time, environmental or organisational constraints, and unconscious habits limit this freedom (Sharif Abbasi et al., 2011).
Source: adapted from (Al Oraini, 2014)			

Conclusions

This study contributes by systematically comparing recent TAM-based extensions across digital service contexts and highlighting the trade-off between predictive power and theoretical clarity. The review suggests that, despite many different extensions and contextual transformations, core features such as perceived usefulness, perceived ease of use, and behavioral intention are still important to comprehend how users adopt technologies. Also, the result demonstrates that the momentum towards enriching TAM with additional factors and moderators has caused complexity without meaningful theoretical advantage. The writers imply that future research should pay attention to theoretical simplicity and conceptual clarity, particularly in well-established digital platforms where user experiences are influenced by algorithmic mediation, platform convergence, and overload of information.

For researchers, the review highlights the importance of developing theoretical models for research contexts rather than simply creating broad extensions of the existing systems and processes. On the other hand for all practitioners and educators, it indicates that improving perceived usefulness alone might not be sufficient to sustain use of technology, as transparency, trust, and cognitive load, among other factors, are now being seen as playing

an important role in acceptance decisions for digital learning and application of technology in the context of digital service/learning.

Future research could benefit from comparative analyses of the results across different contexts, using longitudinal designs to examine after adoption behaviors and investigating when the traditional acceptance factors are still relevant. In sum, this review offers a more theoretical foundation towards advancing technology acceptance literature in the context of digital development and educational development and beyond.

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