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Technology Acceptance Model in E-Learning; A Systematic Literature Review



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ARTICLE INFO	ABSTRACT
<p>Received: 15-03-2023 Received in revised form: 14-04-2023 Accepted: 17-04-2023 Available online: 30-06-2023</p> <hr/> <p>Keywords: E-learning; Perceived Usefulness; Perceived Ease of Use; Recent Developments in TAM; Systematic Literature Review; Technology Acceptance Model (TAM).</p>	<p>Technologies be of service to human in his each and every activity. Stem as a psychological theory in 1986, Technology Acceptance Model (TAM) has been the subject of literature among various disciplines like economics, sociology, information technology etc. indicating its prominence in the field of technology acceptance as a whole. The intention of this methodical review of research work is to describe the recent developments in Technological Acceptance Model in E-learning which has matured with the expansion of digital technologies and COVID-19 acting as the catalyst. The study also aims to identify new antecedents to TAM with respect to E-learning. This paper provides a comprehensive concept-centered bibliographical review of the TAM from its introduction in 1986 to the present classifying the works into two categories (a) Recent Developments in TAM (b) Recent Developments in TAM in E-learning by systematically collecting and assessing studies collected from various digital repositories.</p>

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1.0 INTRODUCTION

Numerous models and predictions have been developed over years realising the fact that only those ideas or inventions that can generate a curiosity, interest, assistance, and acceptance among people will attract investment and further development (Taherdoost, 2018). Technology Acceptance Model (Davis, 1989) had an empirical advantage among them (Mathieson, 1991) which predicts an individual's target to use Information Systems. Antecedents to those where "perceived usefulness and perceived ease-of-use". Within a decade empirical evidence was found for new variant of

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technological acceptance model popularised as Modified Technology Acceptance Model which categorised perceived usefulness into short-term usefulness and long-term usefulness (Chau, 1996). The Technology Acceptance Model has been then continuously studied and expanded, with the Technology Acceptance Model 2 (Venkatesh and Davis, 2000; Venkatesh, 2000) and the unified theory of acceptance and use of technology (Venkatesh *et al.*, 2003) representing the two major upgrades. Over its evolution, TAM was tested with various technological inventions ranging from email (Gefen and Straub, 1997), cell phones (Kwon and Chidambaram, 2000), world wide web (Lederer *et al.*, 2000), internet usage (Porter and Donthu, 2006) in the initial period to web based training (Park *et al.*, 2012), ride-sharing services (Wang *et al.*, 2020), wearable technologies (Li *et al.*, 2019) in the present times. Notable number of works can be identified in TAM with respect to electronic learning or e-learning from very older time (Saadé and Bahli, 2005; Roca *et al.*, 2006) to current (Rafique *et al.*, 2020; Pal and Vanija, 2020; Sukendro *et al.*, 2020; Salloum *et al.*, 2019). E-learning and devices and platforms that facilitates e-learning is identified as one of the technological innovations of the present time and hence being the tool to empirically test, modify and to develop Technology Acceptance Model. COVID-19 and an immediate shift to virtual platforms from classroom by the world have played a considerable role for the popularity of the concept of e-learning.

1.1 Objectives of the Study

- To describe the recent developments of Technology Acceptance Model
- To organise studies relating to the concept of TAM in e-Learning

1.2 Significance of the Study

It is crucial to conduct a systematic literature review on the topic of TAM in e-learning since it increases familiarity with and use of e-learning tools. The study identifies and assesses crucial aspects including perceived utility, ease of use, attitude, and social impact that affect technology acceptability in e-learning by conducting a literature review. The results of the research have implications for both policy and practise. As a result, educational institutions and policymakers are better equipped to make informed choices on the infrastructure, training, and instructional design involved in e-learning. In addition, the study highlights blanks in the literature, opening the door for more studies to further our comprehension of how people adopt new technologies and how they interact with e-learning in particular. The research helps improve pedagogical practises and student results in online courses by guiding the creation of successful e-learning interventions and instructional techniques.

2.0 METHODOLOGY ADOPTED IN THE STUDY

In order to integrate current knowledge and give facts for informed decision-making, a systematic literature review is required to reduce the unmanageable amount of information (Mulrow, 1994). The study intended to organise works on Technology Acceptance Model was divided into two sections according to the objectives. In the first section, to identify the recent developments derivative works to (Marangunić and Granić, 2015) were selected. In the last section, to identify works of Technology Acceptance Model on E-learning derivative works to (Ong *et al.*, 2004) and (Davis, 1989) were identified and organised. In both sections papers with h index were only collected with the help of the application Publish or Perish 8. Papers were collected from respective databases using doi and organised mostly in chronological order. Extensions of Technology

Acceptance Model like TAM0, TAM1, TAM2, TAM3, UTAUT, UTAUT2, VR-HAM, GETAMEL etc., were also acknowledged. A total of 46 studies were critically examined for the same.

3.0 LITERATURE REVIEW REGARDING RECENT DEVELOPMENTS OF TECHNOLOGY ACCEPTANCE MODEL

- [Marangunić and Granić \(2015\)](#) analysed and provided research on the Technology Acceptance Model from its inception through different advancements up to 2013. Perceived usefulness and perceived ease of use, the two primary measures of TAM, were shown to be significantly affected by a variety of unique qualities that were uncovered in the in-depth concept-centric literature review. Thereafter, TAM became widely recognised as a potent method for boosting businesses' profiles in the marketplace, especially in terms of market dominance, customer loyalty, and competitive advantage ([Oruh, 2019](#)). TAM was also accurate in its business forecasts. Using a model based on the TAM, [Lin and Kim \(2016\)](#) found that privacy and intrusiveness issues are valid predictors of how useful paid advertising is seen to be, but not how easy it is seen to be to use. The use of big data analytics is on the rise, with optimistic predictions for improved social and economic results. According to [Verma et al., \(2018\)](#), the properties of big data analytics systems significantly affect how individuals perceive, feel about, and utilise these platforms. Furthermore, there are mediating influences between system characteristics, benefits, perceived usefulness, and attitude towards the use of big data analytics systems.
- In recent years, researchers have discovered that the perceived utility of a technology is a key determinant in its acceptability, whereas the perceived ease of technology's usage is not ([Hu et al., 1999](#)). [Muk and Chung \(2015\)](#) expanded the technology acceptance model to account for the potential impact of social influence on the attitude of customers towards adopting new technologies. [Kamal et al., \(2020\)](#) added facilitating conditions as an additional positive variable that could affect behavioural intention. He also identified two negative influences, specifically technological anxiety and perceived risk.
- Another discovery of [Rondan-Cataluña et al., \(2015\)](#) with regards to Technology Acceptance Model came into light not long ago was the conclusion that "Unified Theory of Acceptance and Use of Technology (UTAUT2) has a better explanation power than other Technology Acceptance Models namely TRA, TAM0, TAM1, TAM2, TAM3, UTAUT". The assumption drawn was after comparing using Partial Least Squares and WarpPLS.
- Some researchers ([Al-Rahmi et al., 2019](#); [Min et al., 2018](#)) have attempted to merge the TAM with the Diffusion of Innovation Theory. Intention to use technology may be predicted by factors such as perceived compatibility, complexity, observability, trialability, enjoyment, utility, and perceived ease of use. TAM was also combined with the Health Belief Model in the medical area ([Ahadzadeh et al., 2015](#)). This research aimed to integrate the HBM and TAM in order to explain the impact of perceived health risk and health awareness on Internet use for health-related activities. The TAM was also used to examine the mediating role of participants' beliefs about the value of the internet for health information and their attitudes towards using the internet for health-related activities.
- The fast growth in the usage of mobile phones, particularly smartphones, in the current period has motivated researchers ([Keng-Boon and Wei-Han, 2016](#)) to propose "a new Mobile Technology Acceptance Model that includes mobile usefulness and ease of use". In order to account for the complexities of the mobile environment, the MTAM was revised to include

four new mobile constructs: mobile perceived security risk (MPSR), mobile perceived trust (MPT), mobile perceived compatibility (MPC), and mobile perceived financial resources (MPFR). The TAM has been adapted to accommodate Virtual Reality (VR) devices. Perceived pleasure is a major belief variable used in developing the Virtual Reality Hardware Acceptance Model (VR-HAM) (Manis and Choi, 2019). The VR-HAM framework identifies demographic factors, including age, prior experience, willingness to pay, and curiosity as predictors of a product's perceived usefulness and ease of use.

4.0 DEVELOPMENTS OF TAM IN E-LEARNING

Evidence for research addressing the acceptability of e-learning may be traced from the beginning of the 20th century. Perceived credibility is a novel concept proposed by (Ong *et al.*, 2004) to analyse TAM as an explanation for engineers' acceptance of e-learning. Later research by Ong and Lai (2006) found that male students scored better for computer self-efficacy, perceived usefulness, perceived ease of use, and behavioural intent to use e-learning. In addition, men's perceptions of e-utility were a major factor in their use decisions, whereas women's perceptions of computer competence and usability were major factors in their usage decisions. When it comes to e-learning, (Lee, 2006) verified the TAM results and added that one's level of computer self-efficacy affects how easy it is to use, while the quality of the information affects how beneficial it is. He also advocated the necessity of initial mandatory usage. In the same year (Huang *et al.*, 2007) identified perceived quality and perceived usability; not for purchase intention but for continuance intention. Lee (2010) extended continuance intention factors to satisfaction, attitude, concentration, subject norms and perceived behaviour control.

M-learning, sometimes known as mobile learning, is another prominent feature of e-learning at the moment. Its initial popularity was explored by (Huang *et al.*, 2007). The drivers of user approval were perceived fun and perceived mobility value.

It has been shown that the extended version of TAM is called UTAUT2, which has replaced TAM in e-learning (Ain *et al.*, 2016). It showed a strong measurement and structural model fit, showed that performance expectation, social influence, and learning value have the biggest effect on students' intentions towards LMS, and confirmed that enabling conditions and behavioural intentions affect LMS usage. The UTAUT2 enlarged paradigm makes it easier to grasp how much students respect the LMS. Later on, the General Extended Technology Acceptance Model for E-Learning (GETAMEL), which is a TAM model designed exclusively for e-learning, was produced by (Abdullah and Ward, 2016) and revalidated by (Chang *et al.*, 2017). Perceived ease of use and usefulness were affected by factors such as self-efficacy, enjoyment, experience, computer anxiety, and subjective norm. Meanwhile, (Gunasinghe *et al.*, 2020) investigated the effectiveness of UTAUT3 in gaining insight into academics' adoption of e-Learning with the hope of enticing more academics to embrace e-Learning. Performance expectations, effort expectations, enabling circumstances, habits, and hedonistic drives influence user behaviour.

When it comes to online learning, Al-Rahmi *et al.*, (2019) sought to combine the TAM with IDT (Innovation Diffusion Theory). The findings highlight the significance of students' opinions of six creative features when it comes to their willingness to adopt an e-learning system. Considerable attention should be paid to the effects of relative advantages, observability, trialability, perceived compatibility, complexity, and perceived delight on perceived usability. The perceived usefulness is significantly influenced by the relative advantages, complexity, trialability, observability, perceived compatibility, and reported delight.

COVID-19 has pushed learners to use and adapt to e-learning and the intention and acceptance were redefined (Raza *et al.*, 2020; Alfadda and Mahdi, 2021) were the pioneers to extend TAM with respect to it. New variables like social isolation were discussed with regard to it.

5.0 CONCLUSION

Based on the critical analysis of 46 research papers its evident that TAM remains the most accepted model explaining buying and continuing intention of technologies-oriented products. However refining and further addition of variables to TAM can be found over years. Also, certain works deals with antecedents to perceived usefulness and perceived ease of use. E-learning also fits technology acceptance model. GETAMEL model is found extension of TAM exclusively for e-learning. Efforts are identified to integrate TAM with various other models also like with Health Belief Model, Innovation Diffusion Theory etc.

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