The Evolution and Applications of the Technology Acceptance Model

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Abstract: This paper explores the Technology Acceptance Model (TAM), a framework widely used to predict the acceptance and adoption of new technologies across various industries. Originating in 1989, TAM has undergone several evolutions, including TAM2, TAM3, UTAUT and UTAUT2 to address its initial limitations. By focusing on core constructs such as Perceived Usefulness (PU) and Perceived Ease of Use (PEOU), TAM continues to play a significant role in understanding user behavior in relation to technology. This paper also discusses recent trends in TAM research, particularly in healthcare, education, consumer technology, and enterprise systems.

Key words: technology acceptance model, TAM, perceived usefulness, perceived ease of use, technology adoption

1. Introduction

The Technology Acceptance Model (TAM), first introduced by Fred Davis in 1989, has emerged as a powerful framework for understanding user acceptance and adoption of new technologies. Since its inception, TAM has been applied in various fields, including information technology, e-commerce, healthcare, education, etc. [1]. At its core, TAM advises the use of the primary constructs Perceived Usefulness (PU) and Perceived Ease of Use (PEOU), which identify a user's attitude toward a technology and impact their intention to use it [1]. As the digital landscape has evolved, researchers have sought to expand and refine the TAM to address its limitations and incorporate additional factors. Because of this, TAM has evolved through multiple iterations, such as TAM2, TAM3, the Unified Theory of Acceptance and Use of Technology (UTAUT), and UTAUT2 [2]. Each version sought to address the weakness of the original model by embedding additional variables, such as social influence and facilitating conditions [2, 3]. This review aims to provide a contemporary perspective on the versatile applications and advancements of the TAM, drawing insights from research across various domains.

2. Material and Methods

This paper utilizes an extensive literature review methodology to assess the evolution of TAM, from its original inception to its most recent extensions.

Peer-reviewed journal articles published in the past 24 years were retrieved from databases such as IEEE Xplore, Google Scholar, ProQuest, and ScienceDirect. These articles include research by other authors who have conducted similar studies, which informs and supports my own work, ensuring the inclusion of current and credible sources. The focus was on research related to TAM and its successors, as well as their application in various sectors like healthcare, education, and enterprise systems, where technology adoption is critical for success and where a comprehensive understanding of the determinants of technology acceptance is essential [4, 5].

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3. Results and Discussion

3.1 Core Constructs of the Technology Acceptance Model

The primary constructs of TAM are two - PU and PEOU [1]. They remain central to predicting user behavior toward new technologies. PU refers to the belief that using a specific technology will enhance job performance, while PEOU is described as the ease with which users can adopt the technology [1]. These constructs shape users' attitudes toward the technology, which then influences their behavior intention to use it. Over time, they have evolved through additional external influences, leading the TAM model to become increasingly precise in newer editions.

3.2 Development of the Technology Acceptance Model

TAM has evolved from a simple model focusing on usefulness and ease of use to a more comprehensive framework that includes cultural, social, and gender factors, primarily due to contributions from researchers like Adams, Venkatesh, Straub, and Gefen [5]. It was first introduced by Fred Davis in 1986 as part of his doctoral research but was officially published in 1989, gaining broader recognition [1, 5]. In 1992, Adams, Nelson, and Todd confirmed TAM's consistency across various applications [5], in 1994 Straub expanded TAM by exploring cultural differences in technology adoption. In 1996, Davis and Venkatesh refined the model, ruling out biases in measurement. By 2000, Venkatesh and Davis introduced TAM2, incorporating external factors like social influence, subjective norms and cognitive instrumental processes in technology adoption providing a better understanding of the determinants of technology acceptance [5-7]. That same year, Gefen and Straub examined gender differences, revealing distinct emphases on PU and PEOU between men and women [5].

The significant development in TAM research has been the introduction of TAM2 and UTAUT. The UTAUT and UTAUT2 models have gained traction in the literature, integrating various theories and factors to explain technology adoption [8].

TAM2 introduced social influence (e.g., subjective norms) and cognitive processes (e.g., job relevance and output quality) to account for external pressures and task-specific evaluations [7]. This extension has been effective in organizational technology settings, particularly in cloud computing and collaborative technologies [9]. These constructs continue to play a key role in understanding both voluntary and mandatory adoption in modern workplaces.

TAM3 focused on perceived ease of use by integrating variables like computer self-efficacy and perceived playfulness [10, 11]. By acknowledging external factors like technical support, TAM3 offers a deeper understanding of how interventions such as training impact user adoption. TAM3 has proven relevant in mobile application adoption, Artificial Intelligence (AI) and e-learning environments [12], [13]. TAM3 is also used in the healthcare sector for the adoption of telemedicine, electronic health records, and mobile health applications [14].

UTAUT is an attempt to create a more unified and comprehensive framework that takes into account a broader range of factors, while TAM remained more specific and focused on the key constructs of usefulness and ease of use. This model introduced four key constructs that influence user behavior: effort or performance expectancy, effort expectancy, social influence, and facilitating conditions [3, 15, 16]. It explains approximately 70% of the variance in the intention to use technology, which is a significant increase compared to TAM3, and has been widely applied across healthcare (medical records and telemedicine), education, and enterprise systems, demonstrating robustness in understanding organizational technology use, particularly in fields like wearable technology and smart health systems [15-17].

UTAUT2 expanded UTAUT constructs by including hedonic motivation (pleasure from technology use), price value, and habit, targeting consumer behaviors [18]. This extension is particularly useful in understanding the adoption of consumer technologies such as smart homes and autonomous vehicles and mobile banking [2, 18]. Hedonic motivation and price value have proven crucial in consumer-oriented tech adoption studies [2].

4. Conclusion

TAM has proven to be a versatile framework that evolves alongside technological advancements. As new extensions (TAM2, TAM3, UTAUT, UTAUT2) have been developed, the model's application has expanded into more complex technological environments, particularly those involving social influence and personal innovativeness [2]. However, TAM has limitations, such as its reliance on rational decision-making and its underestimation of external variables like organizational culture. Future research could further explore these factors, especially in rapidly changing fields like artificial intelligence and machine learning.

TAM continues to be a valuable tool for understanding user adoption across various sectors, from healthcare to consumer technology. Its core constructs PU and PEoU remain highly relevant. However, its evolution suggests that the model will continue to adapt to the complexities of modern technology, because these models remain essential for understanding both enterprise and consumer adoption in an increasingly digital world.

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