AUGMENTED REALITY TECHNOLOGY ADOPTION IN TOURISM USING STRUCTURAL EQUATION MODEL

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ARTICLE INFO	ABSTRACT
	Purpose: Less attention has been given to the barriers that prevent consumers from using augmented reality in tourism (ART). Therefore, this research objective to propose a model that examines a study adopting innovativeness (i.e., service innovation and technology innovation) to use ART as the mediating role of attitude and word of mouth (WOM) in Thailand's tourism industry. **Theoretical framework:** To identify individual characteristics that influence the use of augmented reality in tourism (ART), despite the technology's growing popularity in the country. We propose a conceptual model derived from studies on innovativeness, attitude, WOM and intention to use (ART). **Design/Methodology/Approach:** A total of 551 responses were considered for research analyses. Both confirmatory and exploratory factor analyses (CFA and EFA) were employed during the preliminary stages of the development of the measurement model. The significant impact that innovativeness has on ART in Thailand was subsequently identified through the use of the structural equation modeling (SEM). **Findings:** The findings of this study provide the tourism sector with recommendations for developing facilities that allow tourists to utilize ART. This study also lays the groundwork for future research, as the use of augmented reality (AR) has become an increasingly valuable tool for travelers. Furthermore, ART developers can use the outcomes of this research to design and implement this service effectively and promote user adoption. **Research, practical & social implications:** This study has outlined the primary indicators that encourage travelers to utilize AR-based applications. Travelers engage in a more dynamic and enhanced tourism activities if ART is utilized in a way that enhances their enjoyment of the city and stimulates their desire to explore new places. This study demonstrated that utilitarian motivation has the greatest effect on travelers' attitudes toward AR applications. **Originality/Value:** To create a digital tourism experience in Thailand. This relatively new technology is a unique application that goes beyond the use of mobile devices to access relevant ART applications. It also has the potential to function as an AI tour guide that helps consumers save money without sacrificing the quality of their travel experience.

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ADOÇÃO DE TECNOLOGIA DE REALIDADE AUMENTADA NO TURISMO USANDO O MODELO DE EQUAÇÃO ESTRUTURAL

RESUMO

Objetivo: Foi dada menos atenção aos obstáculos que impedem os consumidores de utilizar a realidade aumentada no turismo (ART). Portanto, este objetivo de pesquisa para propor um modelo que examina um estudo que adota a inovação (i.e., inovação de serviços e inovação tecnológica) para usar a ARTE como o papel mediador de atitude e boca a boca (WOM) na indústria do turismo da Tailândia.

Estrutura teórica: Identificar características individuais que influenciam o uso da realidade aumentada no turismo (ART), apesar da crescente popularidade da tecnologia no país. Propomos um modelo conceitual derivado de estudos sobre inovação, atitude, WOM e intenção de uso (ART).

Concepção/Metodologia/Abordagem: Foram consideradas 551 respostas para a análise da investigação. Tanto as análises fatoriais confirmatórias como as exploratórias (CFA e AFE) foram utilizadas durante as fases preliminares do desenvolvimento do modelo de medição. O impacto significativo que a inovação tem sobre a TAR na Tailândia foi posteriormente identificado através do uso da modelagem de equações estruturais (SEM).

Conclusões: As conclusões deste estudo fornecem ao setor do turismo recomendações para o desenvolvimento de instalações que permitam aos turistas utilizar a ARTE. Este estudo também estabelece as bases para futuras pesquisas, como o uso da realidade aumentada (RA) tornou-se uma ferramenta cada vez mais valiosa para os viajantes. Além disso, os desenvolvedores ART podem usar os resultados desta pesquisa para projetar e implementar este serviço de forma eficaz e promover a adoção do usuário.

Investigação, implicações práticas e sociais: Este estudo delineou os principais indicadores que incentivam os viajantes a utilizar aplicações baseadas em AR. Os viajantes se envolvem em atividades turísticas mais dinâmicas e aprimoradas se a ARTE for utilizada de uma forma que melhore o seu prazer da cidade e estimule seu desejo de explorar novos lugares. Esse estudo demonstrou que a motivação utilitária tem o maior efeito sobre as atitudes dos viajantes em relação às aplicações de RA.

Originalidade/Valor: Para criar uma experiência de turismo digital na Tailândia. Esta tecnologia relativamente nova é uma aplicação única que vai além do uso de dispositivos móveis para acessar aplicações ART relevantes. Ele também tem o potencial de funcionar como um guia turístico de IA que ajuda os consumidores a economizar dinheiro sem sacrificar a qualidade de sua experiência de viagem.

Palavras-chave: Inovatividade, atitude, WOM, Intenção Comportamental de Usar e SEM.

ADOPCIÓN DE TECNOLOGÍAS DE REALIDAD AUMENTADA EN TURISMO UTILIZANDO EL MODELO DE ECUACIONES ESTRUCTURALES

RESUMEN

Finalidad: Se ha prestado menos atención a las barreras que impiden a los consumidores utilizar la realidad aumentada en el turismo (ART). Por lo tanto, este objetivo de investigación es proponer un modelo que examine un estudio que adopte la innovación (es decir, la innovación en servicios y la innovación tecnológica) para utilizar el ARTE como el papel mediador de la actitud y el boca a boca (WOM) en la industria turística de Tailandia.

Marco teórico: Identificar las características individuales que influyen en el uso de la realidad aumentada en el turismo (ART), a pesar de la creciente popularidad de la tecnología en el país. Proponemos un modelo conceptual derivado de estudios sobre innovación, actitud, WOMe intención de uso (ART).

Diseño/Metodología/Enfoque: Se consideraron un total de 551 respuestas para análisis de investigación. Se emplearon análisis factoriales confirmatorios y exploratorios (AFC y AFE) durante las etapas preliminares del desarrollo del modelo de medición. El impacto significativo que la innovación tiene en la TRA en Tailandia se identificó posteriormente mediante el uso del modelo de ecuaciones estructurales (SEM).

Hallazgos: Los hallazgos de este estudio proporcionan al sector turístico recomendaciones para el desarrollo de instalaciones que permitan a los turistas utilizar la TAR. Este estudio también sienta las bases para futuras investigaciones, ya que el uso de la realidad aumentada (RA) se ha convertido en una herramienta cada vez más valiosa para los viajeros. Además, los desarrolladores de ART pueden utilizar los resultados de esta investigación para diseñar e implementar este servicio de manera efectiva y promover la adopción por parte de los usuarios.

Investigación, implicaciones prácticas y sociales: Este estudio ha esbozado los principales indicadores que animan a los viajeros a utilizar aplicaciones basadas en RA. Los viajeros se involucran en actividades turísticas más dinámicas y mejoradas si el ARTE se utiliza de una manera que mejore su disfrute de la ciudad y estimule su deseo de explorar nuevos lugares. Este estudio demostró que la motivación utilitaria tiene el mayor efecto en las actitudes de los viajeros hacia las aplicaciones de RA.

Originalidad/Valor: Crear una experiencia de turismo digital en Tailandia. Esta tecnología relativamente nueva es una aplicación única que va más allá del uso de dispositivos móviles para acceder a aplicaciones de ART

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relevantes. También tiene el potencial de funcionar como un guía turístico de IA que ayuda a los consumidores a ahorrar dinero sin sacrificar la calidad de su experiencia de viaje.

Palabras clave: Innovación, Actitud, WOM, Intención de Uso Conductual y SEM.

INTRODUCTION

In recent years, the tourism sector has become increasingly interested in Augmented Reality (AR), a technology that has been explored and implemented across a number of different industries, such as gaming and retail (Nicas, 2016). Despite multiple attempts to arrive at a single, comprehensive definition of AR, the technology is still considered to be in its early phases of development and has not yet reached its peak performance. As a direct consequence of this, the concept of AR has been subjected to a variety of adaptations, the specifics of which shift depending on the environment or the approach taken to implementing it (Van Krevelen and Poelman 2010). Stone et al. (2009) outlined a set of universally accepted essential characteristics that must be incorporated into AR in order to establish a connection between the virtual and real environments, associate with local environment, and link real with simulated objects. Employing this idea as a base for his definition of AR, Rouse (2015) characterized it as the combination of metadata with the actual footage of the consumer's surroundings. The tourism industry has the capability to integrate location-based information with its immediate surroundings, making it one of the most suited industries to adopt AR (Pang et al. 2006). Moreover, tourism-related mobile applications are among the most downloaded types of application, which can substantially promote the use of AR (Klubnikin 2016).

Since there are a multitude of technology adoption models, researchers require a synthesis of all these theories in order to assess their effectiveness and impact on AR. The importance of conducting research on the many facets of AR applications has already been underscored by marketing experts. (Grzegorczyk et al., 2019). Previous literatures have demonstrated the impact of AR applications on perceived practicability, usefulness, and attitude (Omer Sami & Huseyin, 2019), the way customers' expectations of entitlements influence their propensity to purchase using AR applications (Dacko, 2017), as well as the various ways in which customers can make decisions more quickly through the use of AR applications (Fan et al., 2020 and Yim et al., 2017). Scholz and Duffy (2018) conducted research that resulted in the development of strategies for AR application management, and Feng and Mueller (2019) investigated the methods by which corporations endorse AR. However, there is a lack of information regarding the impact that AR qualities, such as vividness, novelty, interactivity,

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and augmentation, have on consumer behavior. As proposed by McLean & Wilson (2019), research is necessary to determine the correlations between AR features and interactions with shopping applications. Fan and Dong (2020) posited that one of the most significant challenges facing the industry today is the absence of transparency pertaining to the relationship between AR and customers' perception of value and customer engagement. Additionally, research must focus on bridging the information gap relating to the influence of AR adoption on the behavioral and psychological outcomes of consumers (Fan et al., 2020). Recent industry studies claim that 25% of all downloaded AR applications are never utilized once they are purchased (Clement, 2019). This suggests that the operational effectiveness of smart retail must be enhanced by expanding our knowledge of the post-adoption phases that facilitate customers' shopping app engagement (Lee, 2018; Li & Fang, 2019).

Since there is typically a vast quantity of accessible information on historical landmarks, persuasive marketing of this information can be challenging (Kysela and Storkova, 2014) (Ma, S. N. Z., and Mohame, B. B. 2023). To overcome this challenge, data visualizations through AR technologies, such as replacing a demolished building with a virtual one (Heimo et al., 2014), can facilitate understanding (Pejoska et al., 2016), resulting in more personally fulfilling learning experiences. According to Tom Dieck et al. (2016), the use of AR applications in art galleries provides several advantages. Additionally, Cucchiara and Del Bimbo (2014) specified that this (AR) technology has the ability to see beyond what the human eye can see; it offers a variety of information that otherwise would not have been known or easily accessible in any other way. According to a study conducted by Jung et al. (2015), AR offers significant benefits for the travel industry because it enables the creation of an immersive learning experience and raises consciousness of diverse cultures and environments. As a result, this generates beneficial effects for the industry, given that learning theories are typically ignored in a variety of different settings (Pejoska et al., 2016).

This research objective to investigate adoption issues associated with AR in Thailand's tourism industry and to identify individual characteristics that influence the use of augmented reality in tourism (ART), despite the technology's growing popularity in the country. We propose a conceptual model derived from studies on innovativeness, attitude, WOM and intention to use (ART). We test the model among 551 tourists in Thailand and analyze it using structural equation modeling (SEM). The findings offer several contributions to the existing body of knowledge. First, we demonstrate that various social, hedonic, and emotional factors influence attitudes toward the use of ART. Second, the emerging findings from this research

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may be of significant interest to numerous stakeholders in the tourism technology ecosystem, including tourism technology providers, marketers, and policymakers. These findings extend prior enhance previous ART with an innovative framework and provide valuable insights for tourism developers and entrepreneurs.

THEORETICAL FREAMWORK

Literature Review

Recently, there has been a resurgence of interest among researchers and scientists in assessing and investigating the potential global adoption strategies of AR users (Dacko, 2017). Using a variety of methods and theoretical foundations, the researchers illustrate how the customer's intent to use these applications is formed (Fan et al., 2020). In the context of tourism, Klubnikin (2016) identified in his qualitative research that consumers' perception and willingness to use mobile AR are influenced by essential factors: the quality of information and information system, expenditures, personal innovativeness, potential threats, perceived ease-of-use, user satisfaction, and facilitating conditions. Similar findings were also reported in a study conducted by Gharaibeh et al. (2021) on the intentions of Malaysian users to adopt AR technologies in preserving UNESCO world heritage sites, and perceived playfulness was added as a new external variable. In a comparative analysis carried out by Heimo et al. (2014) on AR adoption for heritage tourism in South Korea and Ireland, a correlation was found between perceived usefulness and both the aesthetic appeal and user friendliness of the AR application. Aesthetics and enjoyment were capable of predicting usability. Enjoyment was predicted by aesthetics. Intention to use was predicted by utility, enjoyment, social influence, and ease-of-use. As Slade et al. (2015) posited, not all of the constructs comprising the Unified Theory of Acceptance and Use of Technology (UTAUT2) framework have immediate effects on consumers' expressed intent to use any tourism technology, with facilitating conditions, performance expectation, habit and hedonic motivation as substantial factors in describing intention to use tourism-specific technology (Abirami, M., et al., 2023)

Even though these studies offer a theoretical foundation for the existing body of work on the application of ART, the following essential points must be taken into consideration. First, literatures mentioned in this work were carried out in countries that have environments distinct from Thailand, making it difficult to generalize their findings to the travel industry in the country. Since ART is relatively new in Thailand, and in contrast to previous studies where the

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primary emphasis was on users who have already accepted these AR applications, the main interest of this current literature was on the intention of users to make use of such technology.

The Concept of Innovation

According to Schumpeter's (1934) definition, innovation is the process of developing new ideas and putting in place mechanisms that encourage the upheaval of the existing economic order while simultaneously making room for the development of novelties. In Drucker's view (1988), innovation is a motivated and devoted effort to maximize an organization's economic or social potential. Al-Otaibi & Al-Zahrani (2009) defined innovation as the method of creating and introducing a new or substantially modified product or service to the market in order to meet the demands of consumers. In addition, Crossan & Apaydin (2010) defined innovation as the application of new systems of management; the production, integration, and commercialization of specific innovations in economic and social spheres; the creation of revolutionary production methods; and the revitalization and expansion of products and services (Zainal Abidin et al., 2011).

Innovation is also characterized as anything, whether it be administrative or technical, that aids business organizations in identifying consumer and potential consumer demands and satisfying them while generating profit (Škerlavaj et al., 2010; Gopalakrishnan & Damanpour, 1997). According to Hurley and Hult (1998), innovation is a quality that exemplifies a company's guiding philosophy and its willingness to consider novel ideas. They incorporated into their model the concept of a business organization's capacity for innovation, which is described as its ability to successfully integrate or execute creative solutions or methods in the production of products and services. According to Lundvall (1985), innovation is the outcome of the accumulation of information and experience, which can take the form of either an incremental change in technology or a surge in the number of opportunities in technological advancements (Prifti & Alimehmeti, 2017).

In this paper, we defined innovation as the pursuit of, as well as the discovery, development, and adoption of new processes. Behavioral intention is subsequently determined by innovativeness (service innovation and technology innovation), attitude, and WOM (Oliveira et al., 2016). The most powerful factor of influential factor in consumer adoption is service innovation and technology innovation, which is defined as an individual's understanding that technology utilization will help them in enhancing overall employee productivity (Venkatesh et al., 2012).

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Hypotheses Development and Proposed Framework

The conventional model for ART adoption was established by Feng & Mueller (2019), Fan & Dong (2020), and Yim et al. (2017). This concept has been recognized as a direct component of ART adoption constructs, such as innovativeness, attitude, WOM and behavioral intention to use (ART,) and were utilized in this study as direct predictors of the willingness of tourists to accept ART.

Service Innovation and Technology Innovation

There seems to be very little attention given to the characteristics that define service innovation (SI). Based on the theory postulated by Berry et al. (2006), the concept of innovation in service organizations is more complex than the concept of innovation in physical products. For both service and manufacturing industries, the majority of definitions distinguish between "product" and "process." (Tether et al., 2002). Nevertheless, a number of researchers have offered their own interpretation of what this term means. For instance, Flikkema et al. (2010) described SI as a multifaceted process of creating, executing, and advertising clusters of existing services and products to generate value client experiences. Also, Sunbo and Gallouj (2000) characterized SI as a synthesis of replicable innovations and minor adjustments that cannot be replicated to address particular client needs. Moreover, Toivonen and Tuominen (2006) characterized SI as the installation of a brand-new system or the upgrading of an established service that provides value to the business organization. They emphasized that for a system upgrade to be considered an innovation, it must not only be up-to-date, but also, in a broader context, involve an element that can be applied in new settings (Vos, 2010). Thus, the following hypotheses are posited:

H1: Service innovation has a direct impact on user attitudes regarding the behavioral intentions to use ART.

H2: Service innovation has a direct impact on WOM with respect to the behavioral intent to ART utilization.

H3: Technological innovation has a direct influence over the attitudes of users toward the behavioral intent to ART utilization.

H4: Technological innovation has a direct influence on WOM in relation to the behavioral intention to use ART.

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AR Attitude and AR Usage Intention

It has been discovered that a person's attitude toward new information technology (IT) influences their behaviors and decision-making processes (Davis et al., 1989). The correlation between a person's attitude toward a technology and their intention to use it has been the subject of a lot of research in the fields of information systems as well as tourism and hospitality (Chen et al., 2020; Davis et al., 1989; Hoque et al., 2015; Liu & Li, 2011; Ayeh et al., 2013; Cheng & Cho, 2011; Kim et al., 2008). In other words, an individual's attitudes explicitly determine their behavioral intentions. Ayeh et al. (2013), for example, discovered a significant positive correlation between attitude and intention to employ consumer-generated media in tourism. In the context of this research, having a favorable disposition toward AR is referred to as having a positive attitude toward AR. If users have a favorable opinion of AR, then there is a greater likelihood that they will experience the technology again in the future. Therefore, a more positive attitude toward AR may influence the intention to use it. Furthermore, IT technologies, such as AR, are essential mechanisms that establish the tourism industry, and researchers focus on the relationship between IT and tourism due to the impact of IT on experiences and behaviors of travelers (Law et al., 2009). Travelers form positive or negative perceptions toward AR while employing AR at historical sites or attractions. Individuals whose attitudes have been shaped by their AR experiences will create AR-based images of heritage destinations. A tourist's perception of a destination influences travel intention (Nadeau et al., 2008). Moreover, Kaplanidou and Vogt (2006) emphasized that utilizing IT, such as travel websites, is a motivating force for tourists to travel to a specific destination. The utilization of AR is a promotional and persuasive tool for a destination, and it has the potential to be a decisive factor in determining the travel intentions of visitors. Thus, this study proposes an additional hypothesis:

H5: Attitude has a direct influence on the behavioral intent to utilize ART.

The Influence of Attitudes on Behavior

As proposed by the TPB model, the vast majority of prior research has focused its attention on the idea of attitude and the influence that attitude has on the behavioral intentions of individuals. Among other areas of study, the relevance of attitude was examined as a precursor of behavioral intentions in a variety of contexts, including the preference of tourist destinations, (Kaplanidou & Vogt, 2006), digital press (Alaeddin et al., 2018), electronic public services (Suh & Han, 2003), mobile commerce (Scholz & Duffy, 2018), and artificial

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intelligence services (Fan et al. 2020). The term "attitude" refers to the extent to which a person has a positive or negative evaluation of the actions of other people (Nasri & Charfeddine, 2012). It can be understood from this perspective as a reaction to the possibility of a certain action to occur (e.g., purchasing a product), which may be either positive or negative to various extents depending on the context. Attitudes are the result of learning experiences that take place over a period of time. Thus, an individual's behavior appears to be guided by a previously formed attitude when a decision must be made (Nasri & Charfeddine, 2012). In reference to mobile food delivery applications, our definition of attitude is a customer's overall evaluation of their experience. This evaluation may be positive or negative, to varying degrees. For instance, users' perspectives on the effectiveness of the delivery apps can influence the degree to which they hold positive attitudes. A consumer's motivation to utilize mobile applications as well as the spread of WOM will be favorable if the user develops an optimistic response following the use of home delivery apps and intends to use the apps in the future.

The Correlation between Intention to Use and Intention to Spread WOM

An individual's conviction that the value obtained from consuming a product or service is greater than the value obtained from not consuming it is a significant factor in determining whether or not the individual intends to use the product or service in question (Liu & Lee, 2016). Customers who have this perception are more likely to purchase and suggest the product or service (Oliveira et al., 2016). In other words, the consumer is able to support his or her own decision by means of this favorable WOM behavior. Thus, when a customer exhibits favorable WOM behavior, the customer is able to further validate his or her own decision (Cantallops & Salvi, 2014). Consumers make important contributions to socioeconomic understanding by disclosing the significance of a specific product or service; within this frame of reference, intention to use refers to the willingness to revisit a destination. Since the cost of retaining visitors is significantly lower than the cost of attracting new ones, tourism establishments are more concerned with identifying the factors that influence tourists' decisions about whether or not to use the technology (Um et al., 2006). It is common knowledge that marketing through WOM is essential for companies operating in the hospitality and tourism industries (Liu & Lee, 2016). According to a study conducted by Yoon and Uysal (2005), recommendations through WOM play a vital role in tourism advertising. The intent to participate in positive WOM, which may be highly beneficial in bringing in new tourists, arises from the individual's favorable appraisal of a travel destination, and reflects behavioral loyalty (Papadimitriou et al., 2015).

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When customers are satisfied with the services they receive, it is reasonable to assume they will recommend it to others and return to the location where they were served (Cantallops & Salvi, 2014). Travelers who are very pleased with particular services are more likely to recommend the unique aspects of their travel experiences to others, and to return to the same location at some point in the future. Therefore, positive WOM should be associated favorably with an intention to return (Liu & Lee, 2016). In reference to these concepts and findings, the following hypothesis can be postulated:

H6: WOM has a direct influence on the behavioral intention to use ART.

Experimental studies conducted in Thailand have found no evidence to suggest that attitude or WOM mediates the effects of service innovation, technological innovation, and behavioral intention to utilize ART. As a result, the indirect effects of service innovation, technology innovation, and behavioral intention to use ART with attitude of acceptance and WOM as mediating factors (H7, H8, H9 and H10) were assessed in this research. Thus, the following hypotheses are suggested:
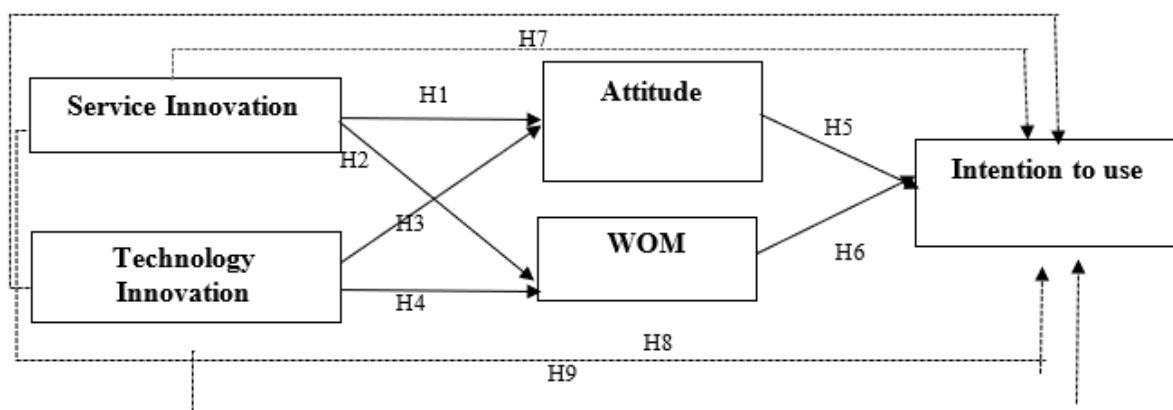
H7: Service innovation has indirect influence on the behavioral intention to use ART, as mediated by attitude.

H8: Service innovation has indirect influence on the behavioral intention to use ART, as mediated by WOM.

H9: Technology innovation has indirect influence on the behavioral intention to use ART, as mediated by attitude.

H10: Technology innovation has indirect influence on the behavioral intention to use ART, as mediated by WOM.

Figure 1. Research model

Source: calculated by the authors

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METHODOLOGY

For the purpose of this investigation, a quantitative survey approach was utilized. Surveillance of latent variables was made significantly simpler as a result of the availability of a large number of validated scales derived from studies related to ART. The questionnaires contained two distinct parts. In the first part of the survey, respondents were questioned about the extent to which they were familiar with ART. The following section of the survey, on the other hand, focused on the respondents' demographic information.

Population, Sampling, and Data Collection

Cochran's formula (1953) was utilized in the process of determining the appropriate sample size for this investigation. As a result, the minimum number of participants needed for this study was 385.

The data was collected using online and onsite questionnaires. Before distributing the questionnaire, the researcher explained the nature of the study to ensure a representative sample. The questionnaire contained filtered questions that could be accessed via a mobile device. All respondents should have sufficient experience with smartphones to be qualified for final consideration. As a result, they would need at least three months to learn how to use a smartphone (Mclean et al., 2018).

Researchers employed a snowball sampling strategy to continually select study participants through their peers or acquaintances, and a convenient sampling method to collect their responses on their social media platforms. According to Bhattacherjee (2012), the results of a survey involving only student respondents would not be representative of the general population.

The first respondent referred others or distributed online questionnaires to individuals who had previously participated in experience tourism. The questionnaire was sent to approximately 500 tourists, of whom 320 (64%) responded. Twenty responses were eliminated during the data screening process, bringing the total to 300.

Researchers utilized Harman's single-factor test in order to identify instances of common method bias (CMB). In Harman's single factor analysis, the cumulative variance extracted value of 40.17 % was significantly lower than the 50% threshold, indicating an absence of CMB.

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Variable Measurement

Questionnaire surveys were used to collect statistical information for this research. The following methods and tools were utilized in the development of the questionnaire:

• The seven-item scale for measuring service innovation and technology innovations were adapted from Oliver & Bearden (1985); Leavitt & Walton (1975); Darden and Perreault (1976) which consists of 7 items.

• The measurement of attitude, which consists of 4 items, was adapted from Liu & Li (2011) and Hoque et al. (2015) which consists of 4 items.

• The measurement of WOM was adapted from Arpaci (2016) and Liu & Lee (2016), which consists of 3 items.

• Details in behavioral intention to use comprising of 3 items, were adapted from Nasri & Charfeddine (2012); Namahoot & Laohavichien (2018) and Namahoot & Jantasri, (2022).

All of the scales that were included in the survey questionnaire were assessed using a 5-point Likert scale, with 1 representing "Strongly Disagree," 2 representing "Disagree," 3 representing "Neither Agree nor Disagree," 4 representing "Agree," and 5 representing "Strongly Agree." The participants were instructed to indicate how they felt about each survey statement/question by marking the appropriate scale.

Validation of Measurement Methods

Researchers assessed the questionnaire's validity in two steps. Prior to data collection, researchers initially employed professional and pilot testing to identify potential issues. The required completion time for the survey was specified in the questionnaires. A preliminary draft of the survey questionnaire should be disseminated to a panel of experts for the purpose of receiving feedback on its content (Saunders et al., 2007). The professional representative would then be cross-examined to substantiate the accuracy of the questions (Hair et al., 2010). To assess the viability of the survey instrument in Thailand setting, questionnaires were also distributed to tourism technology experts and academics from numerous Thai universities. Following this, a preliminary test was conducted to validate the instrument. Thirty individuals who had previously utilized AR in Thailand's tourism industry participated in the preliminary test. The study participants were requested to provide feedback regarding the overall syntax and structure of the survey instrument. Consequently, the validity of the instrument was confirmed. For the purpose of determining the accuracy of the measurements, the responses of

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30 respondents were analyzed using the IBM SPSS version 20. The reliability test that was performed on the 18-item survey questionnaire resulted in a Cronbach's alpha of 0.880, which was considerably above the minimum value of 0.7. Therefore, the instruments utilized in this study have a high level of reliability (Hair et al., 2010).

An analysis of statistical reliability was carried out for the purpose of determining the instrument's measure of internal consistency. Following the completion of the exploratory factor and correlation analyses with SPSS-22, the confirmatory factor analysis (CFA) and structural equation modeling (SEM) were performed with Amos 22.

DATA ANALYSIS AND RESULTS

To evaluate one-dimensionality, we utilized frequency and descriptive analyses that focused mainly on variability, mean, percentage, and normality test. To validate the hypotheses, we employed CFA, convergent validity or average variance extracted (AVE), discriminant validity, and SEM.

Descriptive Statistics

This study collected 551 usable responses from an online survey questionnaire. Following an initial evaluation of the test samples, 121 responses with z-scores above (-3, 3) were excluded to prevent deviations, resulting in a final test sample of 430 surveys.

Frequency analysis was used to evaluate the demographic profile of the 708 respondents. Sixty one percent of the respondents were female (61%) aged between 31 and 35 years (40.00%), held an undergraduate degree (55.30%), worked in the government (30.50%), and earned monthly incomes in excess of 30,000 Baht (49.7 %). Approximately 40.60% of the study participants had one to three years of experience with digital payment systems.

Bank users viewed service innovation and technology innovation favorably, believing that ART is convenient and practical" (4.430). in service innovation. In Technology innovation terms of technological advancement, they believed that "the platform is user-friendly" (4.284). In terms of attitude and WOM, they perceived online platforms as something that gives them a sense of modernity (3.911 and).

Assessment of Univariate Normality

The following is a description of the three-stage method that the measurement model uses. First, by having skewedness values less than 2 ($\pm$ 2.0) and kurtosis values that were less

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than 7 (± 7.0), all of the model's components were able to validate the assumption of normality (Curran et al., 1996). Cronbach's alpha was then utilized to determine the internal reliability of the scales and the constructs. All values of Cronbach's alpha must be greater than 0.70, which is the recommended threshold value (Hair et al., 2010). The results of Cronbach's alpha on an overall scale are presented in Table 1.

Table 1. Results for Reliability Analysis

Observed Variables	Standardized Loadings
Service Innovation (Cronbach's Alpha (α) = 0.806)	
(SI1) I find ART useful when enjoying the city.	0.562
(SI2) Using ART enables me to obtain information about points of interest and	0.533
receive enhanced city guidance.	0.516
(SI3) Using ART increases my interest to visit new places.	0.552
(SI4) Interaction with ART is user-friendly.	0.552
Technology Innovation (Cronbach's Alpha (α) = 0.791)	
(TI1) I like to explore new information technologies such as ART.	0.832
(TI2) If I discover a new information technology, such as ART application, I would	0.822
seek out opportunities to explore it.	0.768
(TI3) I am typically the first among my peers to utilize innovative information	0.513
technology such as ART.	
Attitude (Cronbach's Alpha (α) = 0.754)	
(ATT1) Using the ART in a travel destination is a good idea.	0.780
(ATT2) Using the ART in a travel destination is a logical idea.	0.856
(ATT3) I like the idea of using ART in a travel destination.	0.742
(ATT4) Using an AR system enhances the learning experience.	
WOM (Cronbach's Alpha (α) = 0.809)	
(WOM1) If asked about this service, I would provide a favorable response.	0.755
(WOM2) If given the opportunity, I would highlight the advantages of this service.	0.852
(WOM4) I would recommend this service.	0.755
Behavioral Intentions to Use (Cronbach's Alpha (α) = 0.701)	0.844
(BI1) I intend to utilize ART in the future.	0.875
(BI2) I intend to utilize ART when I travel to a particular destination.	0.610
(BI3) It is probable that I will utilize ART at a future travel destination.	

Source: calculated by the authors

To determine the level of adequacy, EFA and CFA were employed. Table 1 shows the EFA outcomes utilizing the Varimax rotation and the Cronbach's alpha coefficients for the variables. According to Hair et al. (2010), the value of Cronbach's coefficient alpha should exceed 0.7, whereas Nunnally et al. (1994) recommended a stricter minimum requirement of 0.70. All values on the scale exceeded 0.70, therefore, satisfying the criteria. Individual item factor loadings should be greater than 0.5, as recommended by Hair et al. (2010). After obtaining the desired results, a CFA was conducted and model fitness, convergent validity, and discriminant validity were evaluated. Finally, SEM was used to determine the causal relationships between the variables.

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Convergent Validity

In order to evaluate the convergent validity of the findings of this study, the factor loadings, composite reliability (CR), and AVE were calculated according to the criteria established by Fornell and Larcker (1981). Table 2 provides an illustration of the findings that were derived from the analysis of our research.

The findings of the standardized loadings and validity tests showed that all of the values satisfied the prerequisites, suggesting that the convergent validity was satisfactory. (See Table 2)

Discriminant Validity

To determine the discriminant reliability of the constructs, the square root of AVE was computed and compared to the correlation between each variable.

Table 2. Validity based on the outcomes of standardized loadings

Constructs and Items	Standardized loadings	CR	AVE	Discriminant validity				
				1	2	3	4	5
Word Of Mouth		0.839	0.567	0.753				
WOM1	0.780							
WOM2	0.760							
WOM3	0.704							
WOM4	0.799							
Service Innovation		0.822	0.537	0.742	0.833			
SI1	0.634							
SI2	0.597							
SI3	0.639							
SI4	0.697							
Technology Innovation		0.797	0.568	0.590	0.499	0.753		
TI1	0.729							
TI2	0.760							
TI3	0.740							
Behavioral Intentions to Use		0.747	0.500	0.688	0.648	0.574	0.705	
BI1	0.726							
BI2	0.707							
BI3	0.682							
Attitude		0.805	0.508	0.703	0.648	0.588	0.933	0.943
AT1	0.701							
AT2	0.704							
AT3	0.745							
AT4	0.734							

Source: calculated by the authors

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Standardized loadings and validity test results (as shown in Table 2) demonstrated that the AVE values were significantly greater than the correlation coefficients, suggesting a good discriminant validity score.

Assessment of the Measurement Model

In the second phase, 18 items were used to evaluate the CFA. The goodness-of-fit in SEM was determined based on the degree of replication of the estimated covariance matrix among the indicator variables. The model fit was assessed by reviewing a set of indices, and the results were classified into the following four categories (Hair et al., 2010): The measurement model fits the data satisfactorily (CMIN = 3.176, p-value > 0.000), RMR= 0.028, RMSEA= 0.071, IFI= 0.925, CFI= 0.925, TLI = 0.908, PNFI = 0.657, and AGFI = 0.862), as shown in Table 3 and Figure 3.
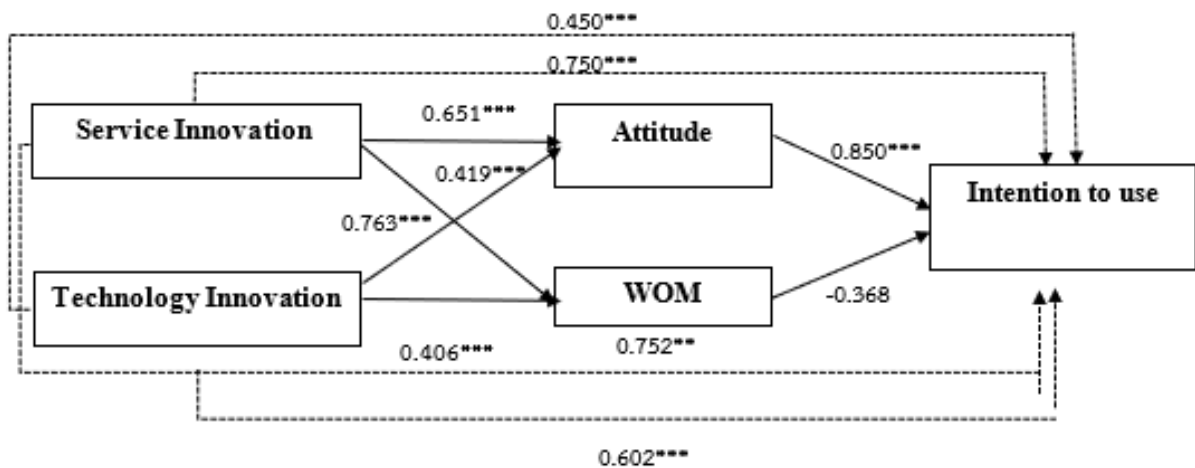
STRUCTURAL MODEL RESULTS

Path Analysis

Table 3 and Fig. 2 illustrate the constructs' path estimates in the final stage. The results indicate that service innovation and technological innovation support the significance of hypotheses H1, H2, H3, and H4. In reference to attitude and WOM, H5 and H6 are found to be statistically significant.

Based on the results, service innovation has the highest impact on attitudes and WOM in the context of ART ($\beta = 0.651$, $\beta = 0.763$, $p \leq 0.000$), followed by the technology innovation ($\beta = 0.419$, $\beta = 0.406$, $p \leq 0.000$).

The findings also show that bank clients often experience difficulties when using cashless payment systems. If you find it difficult to use the service, you can ask others for help. You have sufficient technological equipment to use the services of the Cashless Payment System online platform, a cause encourage the use of Cashless Payment System and usage become Behavioral intentions to use.

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Figure 2. Final analysis of structural model

Source: calculated by the authors

Figure 3. Results of structural model analysis
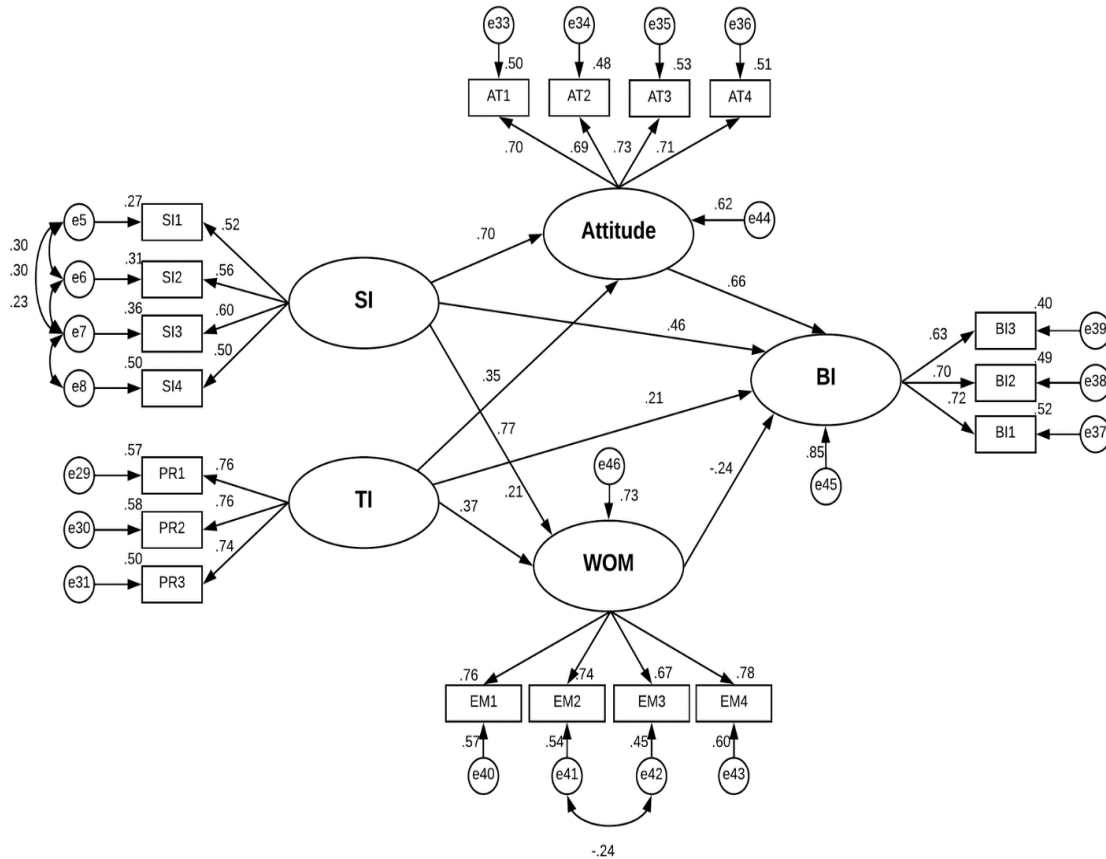
Source: calculated by the authors

Table 4. Evaluation and testing of research hypotheses

Hypothesis	Result	Standardized Estimate
H1: Service innovation positively influences user attitudes toward the use ART.	Supported	0.651***
H2: Service innovation positively influence on user's attitudes towards to use augmented reality in tourism.		0.763***

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H3: Technology innovation positively influences user attitudes toward the use ART.	Supported	0.419***
	Supported	
H4: Technology innovation positively influence on user's attitudes towards to use augmented reality in tourism.	Supported	0.406***
H5: Attitude positively influences the use ART.	Supported	0.850***
H6: WOM positively influences the use ART.	**Not Supported**	**0.368**
H7: Service innovation has indirect influence on the behavioral intention to use ART, as mediated by attitude.	Supported	0.750***
H8: Service innovation has indirect influence on the behavioral intention to use ART, as mediated by WOM.	Supported	0.752**
H9: Technology innovation has indirect influence on the behavioral intention to use ART, as mediated by attitude.	Supported	0.450***
H10: Technology innovation has indirect influence on the behavioral intention to use ART, as mediated by WOM.	Supported	0.602***

Source: calculated by the authors

CONCLUSION AND DISCUSSION

The primary objective of this research was to determine the significant barriers that prevent Thai consumers from utilizing ART. Path estimation revealed that service innovation and technology innovations have a significant and positive influence on the adoption of ART, whereas service innovation has a significant impact on the adoption of ART in Thailand. Identical outcomes regarding the value of service and technology innovations were found by Venkatesh et al. (2012) Transactions in developing countries have resulted in unclear consequences as a direct result of the unpredictability of their environmental conditions (Pang et al., 2006). This implies that if users observe that using technology requires little effort and complexity, they will perceive that it is more more useful and advantageous in performing tasks (Oliveira et al., 2016). This study successfully incorporated service innovation and technology innovations as well as behavioral intention to use variables, with an extracted R2 value of 81.1%. The empirical findings demonstrated that respondents' performance expectations represent the most influential factor in determining their intent to use ART in Thailand.

The dimension of service innovation is the most valuable aspect for ART in Thailand, with the highest factor loadings of 0.651 and 0.763 (as shown in Figure 2). Therefore, ART is useful when enjoying the city, and it increases individual interest for discovering new places, resulting in a positive attitude increased interest and appreciation of the new location. As

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observed in the study conducted by Bailey et al. (2017), the design of ART should be interactive, user-friendly, and easily accessible. This implies that the user's perception of the functionality of the technology is crucial. This observation is supported by the fact that individuals must possess a certain level of skill in order to enjoy a particular application; as a result, the individual uses the technology without assistance from other users. This further suggests that if users do not find much complexity in navigating the technology, then this will cause them to perceive that employing a particular technology is much more favorable when carrying out a task (Venkatesh et al., 2012). The provision of social and communication services facilitates the establishment of a liaison between tourists and the owners of exhibitions and accommodations as well as other stakeholders involved in the delivery of a service (Cheng & Cho, 2011). Moreover, they enable tourists' to share their experiences through a variety of websites (Facebook, Twitter, Trip Advisor, and many other online social networks)

As revealed in the study by Bailey et al. (2017), technology innovation is the second most substantial dimension with significant factor loadings of 0.419 and 0.406. Therefore, ART is a new technology for tourism that is deemed beneficial and creates modern tourism experiences where tourists can acquire historical knowledge and accurate information about local attractions (According to Alaeddin et al. (2018), offering a user-friendly interface that reduces visual barriers and provides convenience. In contrast to traditional tourism, it is important to ensure that users have the highest possible quality of experience expectations. This denotes that the Thai tourism industry places a greater emphasis on the perceptions of various reference groups, such as peers, relatives, and colleagues, in influencing an individual's willingness to accept ART. With regard to the theoretical WOM, related studies in the domain of ART have validated the significance and positive influence of family members, co-workers, reference groups, friends, and elders on a user's intent to adopt a new technology (Cantallops & Salvi, 2014).

However, our research indicates that WOM has no significant effect on the adoption of ART. This result contradicts the findings of Liu and Lee (2016), who asserted that WOM plays a significant role in determining consumer behavior toward AR-based tourism applications. As a consequence of this, our findings suggest that the perspectives of customers are extremely important both in terms of the quality of the service and the level of technological advancement when determining whether or not to introduce the service to other potential users. This analysis is consistent with the findings from prior literatures, wherein an individual's sense of responsibility stimulates behavioral responses such as offering suggestions and

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recommendations (Jung et al., 2015). This means that users are willing to take risks for themselves when utilizing ART; however, they will try to avoid putting others in situations where they could be negatively affected by their actions.

Practical Implications

Previous research has focused on the various aspects of AR adoption; however, the motivating factors that lead travelers to use AR-based tourism applications are still unknown. The lack of awareness of the reasons why travelers are interested in ART could result in a failure to attract new technology among travelers, resulting in a decline in tourism revenue. The findings of this research could facilitate the tourism industry in incorporating augmented reality applications to increase tourism. This study demonstrated a significant interaction between the motives of self-presentation and travelers' behavioral outcomes toward AR applications.

Several studies have been conducted to investigate the processes by which new technologies, particularly smart technologies, are adopted. In contrast, this research is based on an innovation which aims to create a digital tourism experience in Thailand. This relatively new technology is a unique application that goes beyond the use of mobile devices to access relevant ART applications. It also has the potential to function as an AI tour guide that helps consumers save money without sacrificing the quality of their travel experience. The study sought to determine the impact of service innovation on the application adoption of prospective travelers to Thailand. The results of this study indicate that there is a distinct connection between the dimensions of innovation in service and technology, as well as the intention to use ART applications in Thailand. This study has outlined the primary indicators that encourage travelers to utilize AR-based applications. Travelers engage in a more dynamic and enhanced tourism activities if ART is utilized in a way that enhances their enjoyment of the city and stimulates their desire to explore new places. This study demonstrated that utilitarian motivation has the greatest effect on travelers' attitudes toward AR applications. The investigation and validation of the mediator effect of attitude helped AR applications in segmenting their target markets and developing appropriate marketing strategies. It is possible that the creators of AR applications will design an advertisement that caters to the desire of prospective tourists to present themselves in a positive light, and then publish the advertisement on a platform where highly innovative inadividuals will be actively participating. Conversely, advertisements that only boost the perceptions of travelers would be appropriate for platforms that are predominantly used by individuals with low levels of innovation. Thus, AR applications will be able to develop

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marketing strategies that are more efficient and better suited to both highly innovative and minimally innovative groups to improve the marketing of these applications.

Theoretical Implications

Although AR has a significant potential to improve tourism experiences, little is known about the underlying motivations of travelers to adopt AR applications. Since technology is unavoidable in tourism industry, it is essential to comprehend why and how travelers adopt technologies. This study has identified the motivations behind user acceptance of ART by utilizing published literatures (service innovation and technology innovation) to a relatively new concept that was applied in tourism applications. As a result, a gap was filled in the current literature, and the scope of tourism research was expanded. In addition, this study has made a substantial contribution to digital technology, specifically in the area of ART, by integrating underlying concepts in both service and technology innovations to comprehend the behavioral responses of travelers in relation to ART. In order to gain a better understanding of the ways in which individuals adopt new technologies, it would be beneficial to take a multidisciplinary approach to recognizing dynamic as well as complex consumption patterns.

This study has identified the significance of service innovation and technology innovations in relation to behavioral outcomes. Through the use of ART, this research investigated the moderating roles of attitudes and WOM in the interaction between service and technology innovations, and behavioral intention to use.

CONCLUSION

This study examined the adoption of ART applications in Thailand by analyzing several behavioral patterns associated with adoption. Based on the research outcomes, service innovation and technology innovation have direct influence on attitude and WOM. Through attitude and WOM as mediators, service innovation and technology innovation have indirect effect on behavioral intention to use ART applications. Additionally, at a significance level of 0.001, WOM has no direct influence on the behavioral intention to use AR applications for tourism. This may be attributed to the fact that tourists prefer to use AR based on their own experiences as opposed to WOM referrals.

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LIMITATIONS AND FUTURE RESEARCH

This research has several limitations. First, the general AR applications available for tourism were utilized in this research rather than a specific device or application. This study utilized the general AR-based tourism applications rather than a specific mobile device or application. Further research on the preferences and acceptance of various AR devices and applications by travelers would be beneficial. Moreover, it is highly recommended that future studies examine the type of AR devices/applications that travelers are most interested in adopting. Since the scope of this study was restricted to the overall tourism context, it is recommended that future research place an emphasis on evaluating the user acceptance of AR applications within the hospitality and the tourism industries to provide enhanced AR adoptions and preferences. In particular, it is strongly recommended that future research investigate AR applications in the context of the hospitality industry and their correlation with the tourism industry. As the primary focus of this study is on a relatively new technology, additional research on AR applications in the tourism context is highly encouraged to reexamine the conceptual model of the current study. Since this study utilized attitude and WOM as mediators, moderating variables should be included in future research to account for its effects.

AUTHORS' CONTRIBUTIONS

K.N. was responsible for conceptualizing the research, as well as participating in its design, performing the research methodology, coordinating and supervising the data collection, and conducting the analysis assessment of univariate normality, convergent and discriminant validity, measurement model, structure model, and hypothesis testing, and carrying out the conclusion and discussion. The data collection, as well as the reading, proofreading, and editing of the manuscript, were all handled by other authors. Each author has reviewed the final version of the manuscript, given their approval, and agreed to take responsibility for every aspect of the work.

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