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DOES EMOTION MATTER? GEN Z'S AUGMENTED REALITY INTENTION IN TOURISM

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Abstract:

Digital transformation is changing how tourists search for destinations, and one of the most compelling tools is Augmented Reality (AR), which combines the physical with the digital to form the immersion of phygital tourism experiences. However, even with significant technological improvements, AR in tourism has not been widely adopted, and it can be assumed that the current models fail to include the essential emotional aspects that can affect the behaviour of users. Thus, using Technology Acceptance Model as the theoretical foundation, this study incorporates perceived enjoyment as an intermediate emotional factor between cognitive (usefulness and ease of use) and psychological (self-efficacy) antecedents to intention of tourists in using AR. A questionnaire was used to collect data from Generation Z travellers and analysed using Partial Least Squares Structural Equation Modelling. The results indicate that enjoyment is a major facilitator of perceived usefulness, confidence, ease of use, and behavioural intention.

Keyword:

Augmented Reality; Perceived Enjoyment; Phygital Tourism; Self-Efficacy; Technology Acceptance Model



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Introduction

Digital transformation has radically changed tourist experiences, where tourists are no longer passive consumers of destination products but active participants who can experience places by using a digital interface before, during, and after travelling (Gretzel et al., 2020). In this changing environment, the experience of tourism is being influenced more by physical and digital space convergence, which creates phygital tourism where experiential value is created through the smooth interaction of the two (Neuhofer, 2024). One of the technologies that has enabled this transition is augmented reality (AR), which allows superimposing digital content onto the physical world and thus facilitating interactive storytelling, contextualized interpretation, and personalized exploration of the destination (Jung et al., 2020). Although the topic of AR-enabled tourism experiences has become the subject of increasing academic interest, the studies in the field are still facing a number of limitations.

To begin with, the vast majority of the current literature is based on the Technology Acceptance Model (TAM) to describe the adoption of AR by tourists, and most of the studies focus on cognitive beliefs, including the perceived usefulness and the perceived ease of use (Mariani et al., 2021; Dwivedi et al., 2023). Although TAM provides a lean and well-developed theory, its cognitively and functionally based approach might not be adequate in tourism settings that are inherently experiential, hedonic, and emotional. Second, emotional reactions like enjoyment and immersion are generally recognized as the key components of the tourism experiences, yet they are often represented as the direct antecedents of behavioural intention. This method does not give much understanding of how the psychological process of cognitive evaluations and personal confidence being converted into adoption behaviour works, and the mediating position of emotions in AR adoption remains under-theorized (Jung et al., 2020). Third, the existing empirical studies of AR application in tourism are overly focused on developed destinations and experimental settings and less focused on the real-world application in emerging tourism markets, especially in Southeast Asia (Li et al., 2025).

Although there are evident AR activities in Malaysian cultural and heritage sites, there is limited empirical evidence on the intentions of tourists to adopt AR systematically. To fill these gaps, this research builds on the TAM by inserting perceived enjoyment (PE) as a mediating factor between perceived usefulness (PU), perceived ease of use (PEOU), self-efficacy (SE), and the intention of tourists to use (IU) AR in phygital tourism environments. The theoretical basis of this extension is that TAM is under representative of hedonic dimensions, which are at the heart of leisure-oriented technologies, including AR (Bretos et al., 2023; Deng et al., 2025). As a form of experience and feeling, recent research is paying more attention to the role of affective factors in TAM-based models (Salah et al., 2025; Jiang et al., 2025). In the context of intrinsic motivation, PE is an important emotion channel by which cognitive perception and

personal confidence of tourists determine their willingness to use AR technologies (Ngala et al., 2025; Grasse et al., 2022). Combining cognitive, emotional, and personal variables into a single framework and empirically testing it in the framework of Malaysian tourism, this study provides a more holistic and context-specific understanding of the adoption of AR in phygital tourism. By so doing, it contributes to the theoretical knowledge of technology acceptance in the context of experience and offers a useful contribution to destination managers who want to create AR applications, which are not only useful but also emotionally appealing.

Literature Review and Hypotheses Formulation

Augmented Reality and Phygital Tourism

In recent years, the acceptance of digital evolution within the tourism sector is unprecedented following the advancement of technologies such as AR which playing a vital role in reshaping visitors' experience (Stankov et al., 2025; Deng et al., 2025). AR improve the real-world experience by imposing digital content including but not limited to text, audio, photos, or 3D models into the physical world via technology devices such as smartphones, tablets, or wearable technology. With AR technologies, visitors are able to explore the destination even before the trip or access the virtual overlay and listening to the digital storytelling while visiting the tourism spot.

AR adoption in the phygital tourism contexts would differ from general AR adoption. Phygital environments uniquely blend physical presence with digitally enhanced layers, meaning user expectations, engagement patterns, and perceived value are likely shaped by real-world surroundings rather than purely virtual interactions (Liang & Elliot, 2021; Pratisto et al., 2022; Wei et al., 2022). For instance, tourists navigating a physical destination may prioritize contextual relevance, immediacy, and seamless integration with their environment, which are less critical in standalone AR use (Zhang et al., 2024). Through digital contact with physical presence, AR provides more entrancing, customized, and two ways experiences (Yu et al., 2023; Wei et al., 2022). This forms the core idea behind the phygital tourism which is referred to as the blending of physical and virtual experiences of the visitors making the visitation more enlightening and sustainable (Pratisto et al., 2022; Liang & Elliot, 2021).

Nevertheless, despite AR's attractive qualities, its acceptance by visitors varies depending on the situation. Compared to the West, emerging nations like Malaysia lack of infrastructure and digital knowledge, which results in a lower adoption rate. Most studies have been carried out to examine AR adoption in advanced markets or urban mega-sites (Deng et al., 2025; Zhang et al., 2024). However, little research has been done on how Southeast Asian local tourists use AR in physical tourism. This paper aims to increase the universality of existing AR adoption models among tourists by studying the adoption behaviour among Malaysians' visitors.

Theoretical Foundation - Technology Acceptance Model

Davis (1989) developed TAM explained the adoption and usage of technologies. According to the concept of TAM, the two main factors that influenced consumers' attitudes toward technology are PU and PEOU. Over the past ten years, TAM has been adapted widely in tourism research to explore travellers' interaction with mobile apps, social media, virtual or augmented reality, and metaverse platforms (Song et al., 2024; Huang & Suo, 2024). It has remained relevant due to its parsimony, explanatory ability, and flexibility in various

technological settings, which is especially applicable to new and experience-based technologies in tourism (Musa et al., 2024; Rosli et al., 2022). Notably, TAM offers a theoretically well-grounded foundation that can be extended in a meaningful manner without compromising its well-tested core framework. This is a particularly useful attribute in tourism research where the adoption of technology is not only determined by functional considerations but also by experience and emotional reaction. In this way, TAM has been expanded more and more to include affective and motivational aspects to the extent that it can more easily reflect the experiential nature of tourism consumption (Or, 2024; Liao et al., 2022).

Recent research indicates a definite change in the direction of studying TAM-based tourism research and incorporating emotional and intrinsic motivation-related variables, which are the hedonic and emotionally oriented features of tourism experiences (Salah et al., 2025; Jiang et al., 2025). In the self-determination theory, enjoyment is one of the main aspects of intrinsic motivation, in which people will perform activities that are inherently good and fulfilling (Ngala et al., 2025; Grasse et al., 2022). Nevertheless, traditional TAM has been criticised to pay little attention to such hedonic aspects, which are core to leisure-based and immersive technologies like augmented reality in tourism settings (Deng et al., 2025; Bretos et al., 2023).

Therefore, a theoretically based way to overcome this limitation is to extend TAM with an addition of perceived enjoyment, which maintains the cognitive basis of TAM. Based on this, the research paper will use TAM as the theoretical framework and expands it with cognitive (PU, PEOU), emotional (perceived enjoyment), and personal (self-efficacy) variables to describe the intention to use AR in phygital tourism settings. The suggested conceptual framework (Figure 1) allows to understand the AR adoption in a more comprehensive and context-specific way through the prism of the functional appraisals and emotional responses that influence the behavioural intentions of the tourists together.

Conceptual Framework for the Study

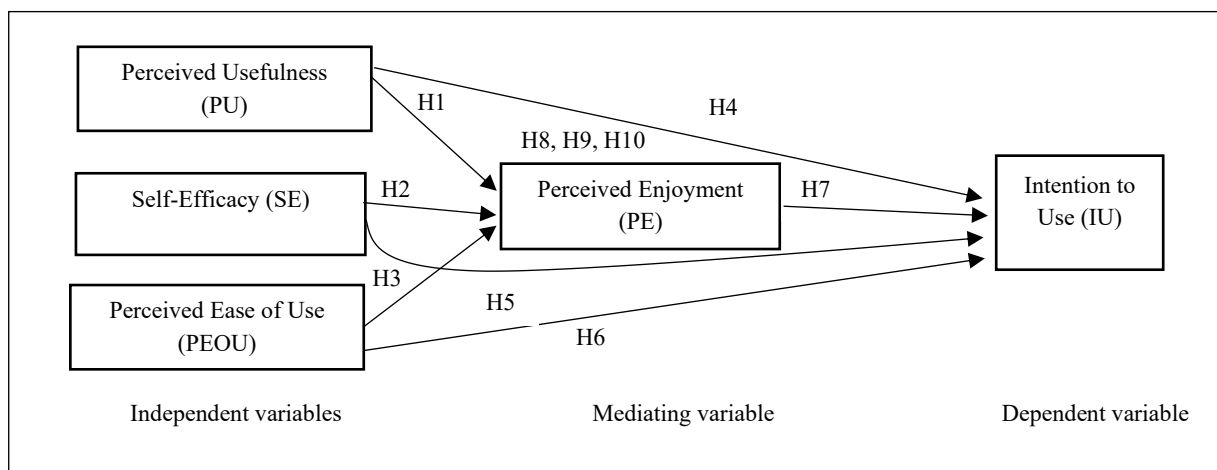


Figure 1: Conceptual Framework for the Study

Source: Author's Illustration

Key Constructs and Hypotheses Development

Perceived usefulness, Self-Efficacy, and Perceived Ease of Use on the Perceived Enjoyment towards AR in Tourism Sector

PU continues to be crucial determinants in technology acceptance models, particularly in the evolving landscape of digital tools and platforms. PU refers to the extent users perceive that the technology will enhance their performance or productivity. Recent studies identify PU as crucial factors influencing the adoption of new technologies (Chellappa, 2025; Al-Adwan et al., 2023). Research based on the TAM posits that tourists' attitudes and PE are significantly impacted by PU while using AR tools (Deng et al., 2025; Salah et al., 2025). Hence, the first hypothesis is developed:

H1. Perceived Usefulness has a positive effect on visitors' Perceived Enjoyment towards AR

The idea of SE which is belief in one's ability to perform a task serves as a salient external variable in extended TAM models. Users with higher self-efficacy believes that the AR technology are containable are more likely to feel competent and in control, which in turns enhances their joyful experience with AR (Shamim et al., 2024; Mahmoud et al., 2024). Hamari and Koivisto (2015) posits that this feeling of mastery sparks the internal drive and favourable emotional reactions of the users. Studies also shown that users who are more confident are more likely to delve further into AR features in order to increases their level of happiness and engagement (Ibáñez & Delgado-Kloos, 2018). Collectively, SE can greatly enhance users' PE of AR-based applications. Hence, the second hypothesis is developed:

H2. Self-efficacy has a positive effect on visitors' Perceived Enjoyment towards AR

On the other hand, perceived ease of use (PEOU) refers to how much users consider a given technology will be effortless to use. PEOU is rarely discussed in the context of digital acceptance among the tourist particularly in term of AR (Madi et al., 2024). Researchers generally agreed that digital tourism such as tourism apps for hotel booking required very minimal effort for the tourists to obtain necessary information for their trip (Agag & El-Masry, 2016; Zhuang et al., 2020). A system is perceived to be easy to use if it is convenient and simple to use as well as time saving and hence leading to a positive PE (Yu et al., 2023; Li & Chen, 2019) from the users. Hence, the third hypothesis is developed:

H3. Perceived Ease of Use has a positive effect on visitors' Perceived Enjoyment towards AR

Perceived Usefulness, Self-Efficacy, and Perceived Ease of Use on the Intention to Use towards AR in Tourism Sector

PU indicates the extend that the users having confidence towards a system in which it is genuinely useful. A system that is believed to be able to improve someone's performance is definitely leading to higher intention to use. Studies discovered that elements such as interactivity, striking images, and excellent content increase PU and motivates users' participation (Ganesan and Kumar, 2024). Besides, Nikou (2024) suggested that PU serves as a link between AR features and users' behaviour and that higher levels of happiness and enjoyment are frequently associated with favourable perceptions of AR's utility. Therefore, the fourth hypothesis is developed:

H4. Perceived Usefulness has a positive effect on visitors' Intention to Use towards AR

Past studies which examine the influence of SE toward AR in tourism highlights its significant role in shaping user experiences and adoption intentions. In mesmerizing tourism contexts, higher AR self-efficacy boosts PEOU and PU, fostering favourable attitudes and greater behavioural intention (Li et al., 2022). For instance, studies focusing on disabled tourists find that strong technology SE correlates with increased PU and usability of AR systems (Gharibi et al., 2022). On top of that, in e learning applications tourism, SE significantly predicts positive attitudes and intention to adopt AR (Alsomali, 2023). Generally, literature confirms that individuals who are confident in their ability to handle AR are more likely to perceive it favourably and hence enhancing attitudes to use AR during tourism experiences. Therefore, the fourth, fifth, and sixth hypotheses are developed:

H5. Self-efficacy has a positive effect on visitors' Intention to Use towards AR

PEOU is defined as the extent to which a user believe that it is easy to use a technology. Previous studies have indicated that when a technology is assumed to be easy to navigate and understand, users are motivated to engage with it and develop a stronger IU (Hussain et al., 2025; Hasmiana & Syamsuddin, 2025). Therefore, an easy-to-use system such as AR definitely encourage users' IU (Şimşek et al., 2025; Zubir & Latip, 2023;). Hence, the sixth hypothesis is developed:

H6. Perceived ease of use has a positive effect on visitors' Intention to Use towards AR

Perceived Enjoyment on Intention to Use towards AR in Tourism Sector

Based on the definition given by Davis et al. (1992), perceived enjoyment is referred as the degree to which using a technology is regarded as “valued for the pleasure it offers rather than for its impact on performance”. PE was not originally included in TAM but was introduced in the extended TAM as the initial TAM was found to be lack of hedonic element. Technologies adoption supposed to be fun and enjoyable, and enjoyment enhances consumers' willingness to engage with it. Past literature validates the effect of PE on IU in various fields like food and beverage, usage of artificial intelligent tools, and online learning platforms (Figueiredo et al., 2025; Abdalla, 2024). Nevertheless. The effect of PE on IU is less discussed when it comes to tourism sector and in particular the application of AR. Tourism is a pleasant activity full of joy and satisfaction. If the joy and satisfaction from tourism can be uplifted by the application of AR, it would surely improve the adoption of AR in tourism sector. Hence, the seventh hypothesis is developed:

H7: Perceived Enjoyment has a positive effect on visitors' Intention to Use towards AR

The Mediating Role of Perceived Enjoyment

It is highlighted in the recent studies on the adoption of AR the importance of both cognitive evaluations and emotional responses in influencing user behaviour. A vital emotional component that influences the relationship between cognitive beliefs and the intention to use a technology is perceived enjoyment, or the intrinsic gratification that comes from using it. Users prefer to feel more positive when a system is advantageous and easy to use, hence it has been consistently demonstrated that perceived utility and ease of use affect satisfaction (Oyman et al., 2021). Likewise, people who have strong SE—that is, who believe they can utilize AR—

are more likely to find the experience enjoyable, which increases their desire to use the technology (Nikou, 2024; Hamari & Koivisto, 2015).

There are presently few relevant studies, especially on AR in tourism, despite the significance of reported enjoyment as a mediator between PU, SE, IU, and PEOU. Thus, enjoyment plays a critical role in converting cognitive evaluations into behavioural intentions, especially in hedonistic and interactive situations like augmented reality. Users are more likely to interact with AR applications when they feel them to be both entertaining and helpful, according to empirical data (Arghashi & Yuksel, 2021). Therefore, incorporating PE as a mediator provides a more comprehensive understanding of AR acceptance, especially where user motivation is driven by both utility and experiential satisfaction. Therefore, the hypotheses developed are:

H8: Perceived enjoyment mediates the relationship between Perceived Usefulness and Intention to Use towards AR.

H9: Perceived enjoyment mediates the relationship between Self-Efficacy and Intention to Use towards AR.

H10: Perceived enjoyment mediates the relationship between Perceived Ease of Use and Intention to Use towards AR.

Method

Research Design

In this study, a quantitative approach has been used, and a cross-sectional online questionnaire has been distributed to Malaysian Generation Z who are underage between 19 and 28 years old in 2025. Cross-sectional research and the quantitative method yield more objective and reliable results with less personal bias. They can serve as a foundation for developing more complex future studies (Gatto & Bundi, 2025).

Target Population and Sample Size

The study is to investigate the variables that have an impact on the intention of the Malaysian Generation Z to use AR in the Malaysian tourism industry. Digital natives make up Generation Z, which was born between 1997 and 2012 (Salam et al., 2024). Those in younger generation Z (born 2007-2012), ages 13-18, are still under their parents' control, but those older generation Z (born 1997–2006, aged ≥ 19 in 2025), this influence lessens, and they can start traveling independently (Sukmayasa, et al., 2025). Their travel choices are greatly influenced by technology platforms, and they will be the primary market to tourism in the years ahead (Sarawak Tribune, 2025). Therefore, this study targeted Malaysian Generation Z aged 19 to 28 in 2025 who have AR awareness and have prior travel experience. According to Toh et al. (2025), Generation Z in Malaysia made up about 9.927 million (29% of Malaysia's population) of the country's 34.2 million. Based on Department of Statistics Malaysia (2025), there are roughly 8.948 million members of Generation Z (born 1997–2006, aged 19–28 in 2025) in Malaysia. Total 384 sample size is needed for 8.948 million population as per Krejcie and Morgan's (1970) Table. Since the actual number of Malaysian Generation Z members aged 19 to 28 with AR awareness and travel experience is estimated to be 8.948 million/fewer, a sample size of 384 is sufficient and adequately represents this group in this study.

Sampling and Data Collection

The non-probability purposive sampling technique (without Gen Z traveler list) was employed in this study. With this sampling technique, the researcher uses their own judgment to choose a sample that fairly represents the target population (Hair et al., 2023). By using social media and university channels, the online survey was distributed from April to August 2025 via Google Form in this study. Prior to participation, informed consent was acquired. There are two categories within Generation Z, however, only those born between 1997 and 2006 (ages 19 to 28) were chosen as the most suitable respondents because they better fit the traits and requirements relevant to this study. Therefore, the online questionnaire has first questioned about age range, AR awareness and travel experience as the filtering questions to ensure that all respondents can meet the requirements. Due to respondents with AR awareness and recent travel experience being given priority in this study, this resulting sample does not have proportionate representation reflecting the racial and regional (urban or rural) makeup of Malaysia. A total of 397 sets of usable questionnaires has been received, which is adequate to represent the entire population and meet the minimum sample size of 384 as per Krejcie & Morgan's (1970) Table.

Measures

In this study, closed-ended questions were applied in the questionnaire. The questionnaire has four parts. Demographics questions (including three filtering questions) are covered in Section A. Every independent variable in this study is covered in Section B, while the mediating variable and dependent variable are covered in Section C and D respectively. All the variables of the study were measured using a Likert scale of five points which varied between 1-strongly disagree and 5-strongly agree. Nominal & ordinal scales were used for the demographic's questions. The items used to measure each of the five variables (PU, SE, PEOU, PE, and IU) are modified from the questionnaires used in earlier relevant research. The sources listed in the Table 3.1.

Table 3.1: The Construct Measurement

Section	Variable	Items no.	Adapted from
B Independent variables	Perceived usefulness (PU)	5	Cranmer et al. (2020), Papakostas et al (2021)
	Self-efficacy (SE)	4	Compeau & Higgins (1995)
	Perceived ease of use (PEOU)	5	Rese et al (2021) Papakostas et al (2021)
C Mediating variable	Perceived enjoyment (PE)	5	Moon & Kim (2001)
D Dependent variable	Intention to use AR in tourism industry (IU)	5	Alam et al. (2022) Khlaif Gharaibeh et al. (2021)

Every item associated with each variable is positive question and categorized under a reflective indicator, making it interchangeable with any other item. The content validity was verified by conducting survey pre-testing, in which expert review consisted of three academics and two industry experts. In addition, the reliability of the questionnaire in this study was evaluated during the pilot study. A reliability test typically requires a minimum Cronbach's alpha of 0.6 (Legowo et al., 2025; Nunnally, 1967) with at least 30 respondents (Bujang et al., 2024). In this study, a pilot study was carried out before full study with 30 respondents, which was adequate to ensure the items' reliability prior to full distribution. The Cronbach's coefficient alpha for all the variables (PU, SE, PEOU, PE and IU) in this study are more than 0.6. Therefore, it can be said that every measurement used in this study has enough reliability.

Results

Respondents Profile

Based on a total of 397 respondents, all the respondents (100%) were born between 1997 and 2006. Besides, all of them (100%) have AR awareness and have prior travel experience, which means all respondents fit the traits and requirements relevant to this study. They all are able to provide reliable responses. The majority are between the ages of 22-24 (53.9%). This is followed by respondents who are between the ages of 25-28 (45.3%) and respondents who are between the ages of 19-21 (0.8%). Furthermore, 54.4% of responders are female, compared to 45.6% who are male. Besides, the majority of respondents (98.5%) are enrolled in tertiary education. Merely 1.0% completed secondary school. Other educational levels make up 0.5%. Additionally, 96.5% of respondents are Chinese, 3.0% are Malay, and 0.5% are Indian, making up the individual races. None of them were classified as "Others" (0%). Moreover, most respondents (68.8%) are from Malaysian urban states with higher levels of technological exposure in tourism, namely Selangor, Penang, and Johor (23.9%, 22.7%, and 22.2%, respectively). However, only 10.3% of respondents are from Kedah and 7.6% are from Perak. The other respondents are from the other states, including Terengganu, Melaka, and Sabah (1.5% for each); Perlis, Kelantan, and Sarawak (1.8% for each); Pahang (2.5%); and Negeri Sembilan (1.0%). Consequently, rather than representing the complete diversity of all Malaysian Gen Z, the results are representative of urban Chinese Gen Z digital behaviors in Malaysia.

Measurement Model Assessment

The constructs' quality can be made sure of by evaluating the measurement model. The measurement model's internal validity and reliability must be established before evaluating the structural model (Hair et al., 2017). In this study, all of the variables' indicators are interchangeable, and their measurements are reflective (Davis, 1989; Diaz-Guzmán Verástegui et al., 2025; Jarvis et al., 2003; Mohd Dzin & Lay, 2021; Yan et al., 2024). Indicator reliability, internal consistency, convergent validity and discriminant validity assessments are necessary to evaluate the reflective measurement model to make sure the model is a good fit (Hair et al., 2014).

Indicator Reliability

To assess the indicators' reliability, their loadings must first be examined. The preferable indicator loading level is a value larger than 0.70 (Hair et al., 2019b). The factor loadings for all five PU items and four SE items are higher than 0.7, as shown in Table 4.1. PU values range

from 0.730 (PU1) to 0.805 (PU3). The range of SE scores is 0.730 (SE2 & SE4) to 0.809 (SE3). With the exception of items PE5 (0.662) and IU4 (0.689), all four items for PE and IU had factor loadings above 0.7, with values between 0.705 (PE2) to 0.754 (PE1) and 0.705 (IU5) to 0.797 (IU1), respectively. However, aside from PEOU1 (0.665), PEOU3 (0.665), and PEOU5 (0.675), only two PEOU items have factor loadings higher than 0.7. They are PEOU2 and PEOU4, and their respective values are 0.762 and 0.724. The outer loading values for PEOU1, PEOU3, PEOU5, PE5 & IU4 are 0.665, 0.665, 0.675, 0.662, and 0.689, respectively. These values fall below 0.7, but they can still be retained because they fall between 0.4-0.70 and still meet the 0.4 minimum threshold level (Sujit & Rajesh, 2016).

Table 4.1: Factor Loadings

	PU	PEOU	SE	PE	IU
PU1	0.730				
PU2	0.742				
PU3	0.805				
PU4	0.747				
PU5	0.787				
PEOU1		0.665			
PEOU2		0.762			
PEOU3		0.665			
PEOU4		0.724			
PEOU5		0.675			
SE1			0.786		
SE2			0.730		
SE3			0.809		
SE4			0.730		
PE1				0.754	
PE2				0.705	
PE3				0.745	
PE4				0.741	
PE5				0.662	
IU1					0.797
IU2					0.730
IU3					0.737
IU4					0.689
IU5					0.705

Internal Consistency Reliability

According to Joreskog (1971), the composite reliability test and the Cronbach's alpha test can be used to evaluate internal consistency reliability. Reliability improves with greater Cronbach's coefficient alpha values (Sekaran & Bougie, 2019). Hair et al. (2015) state that the coefficient alpha can be anywhere between 0 and 1. A reliability test typically requires a coefficient alpha of 0.7 (Fornell & Larcker, 1981; Hair et al., 2019a). For composite reliability test, according to Fornell and Larcker (1981), the constructs with composite reliability higher

than 0.70 are likely to remain consistency. However, Nunnally (1978) states that a value of 0.8 or above is preferred.

Based on Table 4.2, the Cronbach's alpha values for PU is 0.820 (above the value of 0.8), the internal consistency reliability can be considered very good. For the values of Cronbach's alpha for SE, PEOU, PE and IU are 0.764, 0.740, 0.771, 0.785 respectively, which can fulfil the minimum threshold of 0.7, indicating a satisfactory level of internal consistency (Fornell & Larcker, 1981; Hair et al., 2019a). Nonetheless, the composite reliability test results indicate that all 24 reflective items have composite reliability values more than 0.8, indicating good/excellent reliability. All 24 reflective items can therefore pass the internal consistency reliability test with the Cronbach alpha threshold of 0.7 (Fornell & Larcker, 1981; Hair et al., 2019a) and 0.8 for composite reliability (Nunnally, 1978)

Table 4.2: Cronbach's Alpha and Composite Reliability

Variables	Cronbach's Alpha	Composite Reliability
PU	0.820	0.874
SE	0.764	0.849
PEOU	0.740	0.827
PE	0.771	0.845
IU	0.785	0.852

Convergent Validity

Based on Table 4.3, the AVE values for PU, SE, PE, and IU are larger than 0.5, which meets the minimum requirement. Nevertheless, in the case of PEOU, the AVE value is 0.489, indicating that it is less than the 0.5 cutoff point suggested by Hair et al. (2019a). Even while an AVE of 0.5/above is preferable, the value of AVE as low as 0.4 can still be considered acceptable (Mansoor et al., 2024). In addition, Fornell and Larcker (1981) also claims that if composite reliability is greater than 0.6, convergent validity can be demonstrated even in cases when AVE is less than 0.5. Consequently, PEOU's composite reliability of 0.827, which is greater than 0.6, suggests that even though its AVE value of 0.489, which is below 0.5, is generally acceptable, it may still exhibit sufficient convergent validity (Fornell & Larcker, 1981). As a result, this shows that every reflective indicator is adequate for measuring every construct in this study.

Table 4.3: Construct Convergent Validity (AVE)

Variables	Average Variance Extracted (AVE)
PU	0.582
SE	0.584
PEOU	0.489
PE	0.521
IU	0.537

Discriminant Validity

Due to Fornell and Larcker criterion and cross-loading analysis are inadequate for evaluating discriminant validity, Henseler et al. (2015) proposed using the correlation ratio in HTMT instead. The two techniques used to perform HTMT are inference statistical testing and criteria testing. As stated by Kline (2011) and Henseler et al. (2015), the criterion test cut-off value is 0.85 (HTMT0.85). If the HTMT value is more than 0.85, poor discriminant validity is implied. Besides this, the bootstrapping process can also be used to evaluate discriminant validity by using inference statistical testing. The establishment of discriminant validity is confirmed if the confidence interval following the bootstrapping process does not reach 1.00 (HTMT inference - HTMT1) (Franke & Sarstedt, 2019).

According to Table 4.4, the criteria test results show that the values of HTMT are less than 0.85 (HTMT0.85) for each construct. The HTMT has the greatest value (between PU and IU) at 0.439 and the lowest value (between SE and PEOU) at 0.278. In addition, the results of the bootstrapping procedure show that all of the confidence interval (CI) values are less than 1.00 for the statistical test. Since every HTMT value is within the minimal threshold value for both the criteria test (HTMT0.85) and statistical test (HTMT1), the discriminant validity of the study's measurement model is confirmed in this study.

Table 4.4: Discriminant Validity - Heterotrait-Monotrait Ratio (HTMT) with Confidence Intervals (CI)

Items	PU	SE	PEOU	PE	IU
PU					
SE	0.325 CI (0.205, 0.446)				
PEOU	0.393 CI (0.266, 0.520)	0.278 CI (0.164, 0.414)			
PE	0.390 CI (0.251, 0.516)	0.362 CI (0.237, 0.494)	0.429 CI (0.296, 0.552)		
IU	0.439 CI (0.308, 0.553)	0.308 CI (0.187, 0.426)	0.393 CI (0.260, 0.524)	0.419 CI (0.293, 0.536)	

Note: CI = Confidence Interval, HTMT0.85 and HTMT1 are adopted

Structural Model Assessment

If the results are satisfactory after the measurement model has been analyzed, the structural model is assessed by testing the hypothesis and examining its goodness of fit (Purwanto & Sudargini, 2021). The structural model is evaluated using the following standard assessment criteria: i) significance of the structural model relationship; ii) coefficient of determination (R^2); iii) effect size (f^2); iv) prediction relevance (Q^2); and v) predictive power-PLS predict (Chin, 2010; Hair et al., 2019a; Shmueli et al., 2019). However, the multicollinearity diagnostics should be performed prior to assessing the study's structural model.

Multicollinearity Diagnostics

Multicollinearity analysis typically makes use of the variance inflation factor (VIF) (Bary, 2017). Table 4.5 multicollinearity results show that the model has no multicollinearity problems because the values of inner VIF are less than 5.0 cut-off point, falling between 1.097 and 1.237.

Table 4.5: Multicollinearity Statistics (VIF) for Exogeneous Constructs (Inner VIF Values)

	PE	IU
PE		1.237
PU	1.160	1.208
SE	1.097	1.139
PEOU	1.131	1.197

*Significance of the Structural Model Relationship - Direct and Indirect Effects***Table 4.6: Direct Relationship Results**

Hypotheses (Path)	Beta (B)	Standard deviation	T statistics	P values	Results
H1: PU -> PE	0.197	0.052	3.793	0.000	supported
H2: SE -> PE	0.186	0.049	3.774	0.000	supported
H3: PEOU -> PE	0.230	0.048	4.839	0.000	supported
H4: PU -> IU	0.223	0.050	4.428	0.000	supported
H5: SE -> IU	0.093	0.047	1.987	0.047	supported
H6: PEOU -> IU	0.157	0.054	2.917	0.004	supported
H7: PE -> IU	0.186	0.054	3.462	0.001	supported

For H1-H3, according to Table 4.6, the results show that all p-values < 0.05 (all p-values = 0.000). Besides, for H4-H7, the results also indicate that all p-values < 0.05 (p=0.000, 0.047, 0.004, and 0.001 for H4, H5, H6, and H7 respectively). Hence, the results demonstrate that PU, SE, and PEOU have substantial impact on PE and also IU. The results also indicate that PE significantly affects IU. Consequently, all hypotheses are therefore supported.

Table 4.7: Mediation Results

	Total Effect		Direct Effect		Indirect Effect					
	Coefficient	P-value	Coefficient	P-value	Coefficient	Standard Deviation	T-value (Bootstrap)	P-value	Results	
PU -> IU	0.259	0.000	0.223	0.000	H8: PU -> PE->IU	0.037	0.015	2.399	0.016	supported
SE -> IU	0.128	0.007	0.093	0.047	H9: SE-> PE ->IU	0.035	0.014	2.500	0.012	supported
PEOU -> IU	0.200	0.000	0.157	0.004	H10: PEOU -> PE ->IU	0.043	0.015	2.895	0.004	supported

Using mediation analysis, PE was examined for its mediating role between PU, SE, PEOU and IU. The findings in Table 4.7 indicate that PE substantially ($p < 0.05$) mediates the links between PU, SE, and PEOU and IU ($p = 0.016$, $p = 0.012$, and $p = 0.004$ for H8, H9, and H10 respectively). The direct effect remains substantial even if the mediator is eliminated ($p = 0.000$, $p = 0.047$, and $p = 0.004$ for PU \rightarrow IU, SE \rightarrow IU, and PEOU \rightarrow IU respectively). Thus, PU, SE, PEOU and IU's relationship are partially mediated by PE. H8-H10 are therefore supported

Assessment of Model Goodness

Coefficient of Determinant (R^2) of 0.26, 0.13 and 0.02 are generally regarded as strong level, moderate level and weak level, respectively (Cohen, 1988). Table 4.8 shows that the R^2 value for IU and PE are 0.212 and 0.192. Based on the three levels of R^2 value proposed by Cohen (1988), 21.2% and 19.2% of the variance in IU and PE can be clarified using the predictors and both are at the moderate level. Even though R^2 values are at a moderate level, they are considered sufficient to explain the endogenous construct because they are still above 0.10, as proposed by Falk and Miller (1992).

Table 4.8: R-squared Value

Hypothesis (H)	Predictors	Endogenous variable	Predictive accuracy (R^2)
H4	PU	IU	0.212
H5	SE		
H6	PEOU		
H7	PE		
H1	PU	PE	0.192
H2	SE		
H3	PEOU		

Table 4.9: F-square

Hypotheses (H)	Path	f-square
H4	PU -> IU	0.052
H1	PU -> PE	0.041
H5	SE -> IU	0.010
H2	SE -> PE	0.039
H6	PEOU -> IU	0.026
H3	PEOU -> PE	0.058
H7	PE -> IU	0.036

There are three levels of effect size (f^2) exist: 0.02 for small level, 0.15 for medium level and 0.35 for large level (Cohen, 1988). The effect sizes (f^2) for the relationship between PU → IU, PU → PE, SE → IU, SE → PE, PEOU → IU, PEOU → PE, and PE → IU are shown in Table 4.9. All effect size values, except for SE → IU, range from 0.02 to 0.15, which is under the

small level. Conversely, the effect size for the SE→IU relationship (Hypothesis 5) is 0.010 less than 0.02 which below the small size level. All the predictors have a small effect on their respective endogenous constructs ($0.02 < f^2 < 0.15$), with the exception of SE → IU, which has a negligible effect ($f^2 < 0.02$). Even with a small effect size, it may carry practical applications, especially in the social and behavioral sciences. Many minor effects from several predictors can build up to a significant overall. A satisfactory R^2 indicates that predictors collectively explain a sufficient percentage of variation as proposed by Falk and Miller (1992), validating the model's overall explanatory impact even when individual effects have small/negligible influence (Bridgwater et al., 2023; Cohen, 1988; Hair et al., 2019a). This suggests that all combined predictors have a significant overall explanatory impact.

Table 4.10: Predictive Relevance Q^2

Hypothesis (H)	Predictors	Endogenous variable	Predictive Relevance (Q^2)
H4	PU	IU	0.107
H5	SE		
H6	PEOU		
H7	PE		
H1	PU	PE	0.094
H2	SE		
H3	PEOU		

Predictive Relevance–Stone-Geisser's Q^2 is a useful method for assessing the predictive relevance of the model (Chin, 2010; Judijanto et al., 2024). According to Hair et al. (2016), endogenous constructs are predictively relevant to exogenous constructs when their Q^2 values are more than zero (Chin, 2010; Fornell & Cha, 1994). Table 4.10 indicates that the Q^2 value for PU, SE, PEOU, and PE on IU is 0.107 when omission distance (D) = 7 is used as the default setting. The Q^2 value for PU, SE, and PEOU on PE is 0.094. Given that both values are higher than zero, the model is predictively relevant for the endogenous constructs.

Table 4.11: Predictive Power-PLS-Predict

	Q^2_{predict}	PLS-SEM RMSE	PLS-SEM MAE	LM_RMS E	LM_MAE
IU 1	0.124	0.697	0.563	0.714	0.578
IU 2	0.08	0.752	0.588	0.762	0.6
IU 3	0.075	0.719	0.551	0.732	0.568

IU	0.077	0.729	0.558	0.747	0.578
4					
IU	0.082	0.731	0.57	0.754	0.585
5					
PE	0.09	0.745	0.576	0.759	0.595
1					
PE	0.076	0.773	0.612	0.796	0.632
2					
PE	0.108	0.75	0.595	0.767	0.619
3					
PE	0.118	0.725	0.565	0.739	0.586
4					
PE	0.048	0.743	0.562	0.753	0.578
5					

As stated by Shmueli et al. (2019), PLSpredict should be included in the assessment of PLS-SEM's predicting power. PLSpredict assesses the model's fit to produce precise predictions for cases that have not yet been observed. Mean absolute error (MAE) and root mean square error (RMSE) are the most frequently used metrics to determine the degree of prediction error (Sharma et al., 2023; Subhaktiyasa, 2024). As suggested by Shmueli et al. (2019), if no indicators have prediction errors RMSE (or MAE) exceeds the LM benchmark, the model's predictive power is said to be strong. Based on Table 4.11, it shows that the model of PLS indicators' RMSE (or MAE) values constantly fall short of the LM benchmarks. This implies a high degree of predictive power for the model of this study.

Discussion and Implications

Theoretical Implications

The paper also provides valuable theoretical contributions to the research of technology acceptance and experience in the tourism sector by extending the Technology Acceptance Model (TAM) to the scope of AR-powered phygital tourism. The majority of the respondents are urban Chinese Gen Z, hence the results might only be applicable to this particular group. The results show that perceived usefulness, perceived ease of use, and self-efficacy have a direct and indirect impact on the intention of tourists to use AR via perceived enjoyment. Furthermore, even when the individual effect sizes (f^2) are modest or negligible, the satisfactory R^2 ($0.10 < R^2 < 0.13$) shows that these predictors have a collective impact that explains a sufficient percentage of variation, validating the model's overall explanatory impact. This suggests that the adoption of AR in the tourism industry is influenced by a mix of both functional and emotional experience, as opposed to cognitive judgment. More to the point, the research contributes to TAM by empirically proving the perceived enjoyment as a mediating psychological process between the cognitive beliefs and behavioural intention. Although in previous TAM-based tourism studies, the role of emotions as direct antecedents of intention is prevalent, this study explains how the role of enjoyment as an internal process takes place in which perceptions and the development of confidence into adoption intentions are converted by the tourists. This is in response to the recent requests of integrating affective mechanisms into technology acceptance models used in experiential and hedonic consumption settings. The results are supported by the theory of intrinsic motivation, which confirms that the perceived enjoyment is the key factor in the process of adopting leisure-related technologies like AR. AR interactions that are perceived as fun and entertaining enhance the intrinsic motivation of

tourists to use the technology, which supports the necessity to incorporate the emotional aspects in tourism technology studies. Lastly, the research contributes to the literature on technology acceptance by empirically testing the extended TAM framework in the Malaysian tourism setting and provides evidence of an emerging tourism market. This way, it improves the contextual strength of TAM and proves that the adoption of AR in phygital tourism is best described using a combination of cognitive, emotional, and personal frameworks.

Managerial Implications

The result shows that the Perceived Ease of Use (PEOU) is the strongest predictor of Perceived Enjoyment (0.421, $p = 0.001$) whereas the Perceived Usefulness (PU) is the best predictor of the Intention to Use (IU) AR applications among tourists (0.347, $p = 0.001$). The role of confidence in the adoption of technology is also important as SE affects both enjoyment and intention positively. Further, PU, PEOU, and SE have a significant and positive effect on IU mediated by PE, which provides support to the emotional maturity of perception into action. The moderate level of R^2 ($0.10 < R^2 < 0.13$) shows that the predictors together explain a sufficient percentage of variation, despite the small (f^2 range from 0.02 to 0.15)/eligible (f^2 less than 0.02) effect sizes of the individual predictors. This implies that their combined impact could have practical relevance. Since urban Chinese Gen Z make up the majority of the respondents, the results may only apply to this specific demographic.

Limitations and Future Research

There are several limitations in this research. First, this study primarily focused on Malaysian Generation Z, particularly the urban Chinese Gen Z. Nonetheless, Moshfeghyeganeh and Hazari (2021) claim that people in different cultures may perceive things differently. Thus, for comparative study, future research could be conducted in different racial groups across different states and also different generations, such as X and Y. This can provide a more comprehensive understanding of how the model can be used throughout generations or racial groups in various culturally diverse states. Second, this study examines whether PE mediates the relationship between PU, SE, PEOU, and IU without considering any possible reasons for PU, SE and PEOU. Thus, future researchers may consider investigating the several possible causes of PU, SE and PEOU in order to build a more comprehensive model for understanding intention to use AR. Third, this study used self-administered survey and cross-sectional design, which only collected data at one time. In-person interviews can improve the clarification (Golam Azam, 2022) and longitudinal research can better capture how factors change over time (Cherry, 2020, Janes & Melendez-Torres, 2025). Hence, future researchers can conduct in-person interviews and longitudinal studies to examine how the variables change over time to get more specific information regarding respondents' intentions and perceptions

Theoretically, the analysis is an extension of Technology Acceptance Model (TAM), taking PE as the only emotional intermediary between cognitive and psychological antecedents and behavioural intention. Such an integration takes TAM to the next level of integration, which is more comprehensive and emotion-based and appropriate in a more experiential and hedonic environment, such as tourism. On the managerial level, the outcomes indicate that ensuring greater enjoyment and user confidence is just as important as embracing usefulness and usability of the system. AR experiences need to be created in an easy to use, gamified and narrative based that is stimulating to enjoy, yet with confidence-driven aspects like guided tutorials or trial modes to enhance self-efficacy by destination managers and AR developers. Practical value can also be emphasized e.g., by incorporating cultural, educational or

navigational content, which may increase perceived usefulness and adoption. As such, Malaysian Gen Z's intention to use AR could be increased by improving all these aspects collectively, even though their individual contributions are modest and have negligible effect sizes (f^2), but the moderate R^2 indicates that the predictors account for a sufficient percentage of variance collectively. In the case of Malaysia, these findings aid the digital transformation of the nation and give the country a route to create emotionally involved, functionally successful phygital tourism packages. However, these findings might mostly relate to urban Chinese Gen Z in Malaysia due to the lack of diversity in the sample. Since rural locations and other ethnic groups may have different intention to use AR than the urban Chinese Gen Z population, different approaches and strategies may be needed for them.

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