JOURNAL OF TOURISM AND SERVICES
Issue 28, volume 15, ISSN 1804-5650 (Online)
www.jots.cz

The Adoption of Mobile Augmented Reality in Tourism Industry: Effects on Customer Engagement, Intention to Use and Usage Behaviour

Song Bee Lian
Asia Pacific University of Technology and Innovation, Kuala Lumpur, Malaysia
Devinder Kaur
Asia Pacific University of Technology and Innovation, Kuala Lumpur, Malaysia
Muthaloo Subramaniam
Asia Pacific University of Technology and Innovation, Kuala Lumpur, Malaysia
Poh Kiong Tee
Asia Pacific University of Technology and Innovation, Kuala Lumpur, Malaysia
Ling Chai Wong
UCSI University, Sarawak, Malaysia and University Malaysia Sabah, Labuan, Malaysia
Nor Azrul Mohd Zin
Asia Pacific University of Technology and Innovation, Kuala Lumpur, Malaysia

Received: 23 October 2023. **Revision received**: 12 April 2024. **Accepted**: 15 March 2024

Abstract
The purpose of this study is to examine the consumer adoption of mobile augmented reality (AR) in the tourism industry in Malaysia. Drawing on the extended Technology Acceptance Model (TAM), interactivity, vividness, and information content factors are examined in relation to perceived usefulness (PU). and perceived ease of use (PEOU). Subsequently, both PU and PEOU are hypothesised towards customer engagement (CE), behavioural intention to use (BIU) and usage behaviour (UB). The study consists of 500 samples from consumers who have experienced the usage of mobile AR in the tourism industry in Malaysia. Using a quantitative approach, structural equation modeling (SEM) was applied to analyse the collected data. The findings revealed that interactivity, vividness, and information content have positive effects on the PU and PEOU. PU and PEOU have positive effects on the CE, BIU, and UB. In theoretical contributions, the study contributes to the extension of TAM by adding interactivity, vividness, and information content as antecedents to PU and PEOU. This research also validated CE as the new dimension for consumer behavioural engagement that affects BIU and UB in the extended TAM. In practical contributions, the findings will assist tourism providers in strategic marketing planning and formulation to enhance mobile AR.

Key Words: Augmented reality, customer engagement, behavioural intention to use, usage behaviour, tourism industry, technology acceptance model

JEL Classification: M30; M31; M39

Reference: Song, B.L., Kaur, D., Subramaniam, M., Tee, P.K., Wong, L.C. & Mohd Zin, N. A. (2024). The Adoption of Mobile Augmented Reality in Tourism Industry: Effects on Customer Engagement, Intention to Use and Usage Behaviour. *Journal of Tourism and Services*, 15(28), 235-252. https://doi.org/10.29036/jots.v15i28.679

1. Introduction

Augmented reality (AR) technology is becoming popular in the tourism industry as it provides tourists with immersive tourism experiences. AR combines real and virtual objects in a real

environment, runs interactively and in real time, and aligns real and virtual objects with each other (Azuma et al., 2001). The applications of AR in the tourism industry involve providing virtual on-site information, pre-booking and purchase of tourism goods and services, and obtaining feedback (Alam et al., 2021). Tourism companies have been utilising mobile AR applications through destination marketing, promotion, and publicity to enhance customer experience and engagement (Li & Jiang, 2023; Dieck et al., 2018). AR provides opportunities for tourism companies to narrate their services more creatively and innovatively to deliver customers with interactive information and engaging experiences (Ghandour et al., 2021). For example, the AR travel applications equipped with digital navigation like arrow guide to locate tourist destinations and provide relevant destination information. Through AR, virtual tour provides real-time tourist guides and help them make better booking decisions. With highly customisable digital content, the AR technology creates more informative and interactive specific points of interest for tourists (Ronaghi & Ronaghi, 2022). The effective usage of mobile AR can contribute to better CE (Diaa, 2022; Dieck et al., 2018), BIU (Ramdani et al., 2022) and UB (Pantano et al., 2017). The AR has achieved remarkable growth with global AR market size valued at USD 42.20 billion in 2022 and is expected to grow to USD62.75 billion in 2023 (Fortune Business Insights, 2023). The AR users are expected to reach 2.4 billion in 2023 (Research and Market, 2023). Hence, tourism providers have leveraged the growth of AR's global market size and users to digitally innovate their services to deliver unique and immersive experiences to their customers.

In the evolving mobile AR, there are various challenges faced by the tourism companies in developing and improvising the AR attributes such as interactivity, vividness, and information to meet the changing customers' preferences (Yim, 2017; Diaa, 2022, Cranmer et al., 2020). The display quality and aesthetic appeal in mobile AR applications that varies can contribute to differences in customers' experience of the usefulness and ease of use of the technology (Pantano et al., 2017). As it is crucial to continuously improve and maintain the efficiency of AR technology, the impact on operating cost is one of the critical factors that require to be given attention by the tourism companies (Alam et al., 2021). It is important for tourism companies to have the adequate knowledge and expertise in planning and implementing of AR in most effective way to achieve business goals and maximise the outcomes. Furthermore, the adoption of mobile AR is still lacking in the tourism industry in most developing countries (Saleem et al., 2022). Research have shown that the adoption of mobile AR is slow in Malaysia which was due to the lack of awareness and technological knowledge of the system (Alam et al., 2022), lack of marketing communications on its usage (Ibrahim et al., 2021), and security concern (Zahari & Salim, 2023).

Interactivity (Yim, 2017), vividness (Diaa, 2022) and information content (Kim & Choo, 2021; Yoo, 2020) in mobile AR are the important attributes that drive attitudinal and behavioural outcomes based on customer responses. Past studies have limitations in exploring the AR attributes of interactivity (Ramdani et al., 2022), vividness (McLean & Wilson, 2019) and information content (Orús et al., 2021). Furthermore, there is a paucity of research in applying BIU and UB of TAM in AR context (Uymaz & Uymaz, 2022), particularly in tourism industry (Jahwari et al., 2022). Based on the TAM application in AR, past studies (Saleem et al., 2022; Faqih, 2022, Elshafey et al., 2020) have examined the direct relationships of PU and PEOU towards BIU. However, a few studies (e.g., McLean & Wilson, 2019; Diaa, 2022) have proposed that CE have effect relationship with PEOU and PU. Also, consumer behavioural engagement was found to have effect on behavioural intentions (Ahmed et al., 2022; Wu, 2022) as evidenced by CE influenced BIU, specifically in social media context (Al-Meshal & Al-Zoman, 2019). Therefore, the present study will be addressing the highlighted research gaps in the AR studies by exploring the important attributes of interactivity, vividness, and information content, as well as the role of CE in the relationships between PU and PEOU, and BIU.

The objectives of this research study are: (a) to examine the effect of interactivity, vividness and information content factors on PU and PEOU, (b) to examine the effect of PU and PEOU on CE (c) to investigate the effect of CE on BIU and UB. Drawing on the extended Technology Acceptance

Model (TAM), the present research will contribute to the extension of TAM by adding interactivity, vividness, and information content as new antecedents to PU and PEOU. This research also will explore CE as the new dimension for consumer behavioural engagement in between the relationships of PU and PEOU, and BIU in the extended TAM. In practical contributions, the findings will assist tourism providers or companies in strategic marketing planning and formulation to enhance the AR.

The subsequent structure of the paper is organised as follows. Section 2 discusses the theoretical perspective of TAM, the variables' relationships and proposes the hypotheses. Section 3 of the paper highlights the research methodology, followed by the validity and reliability assessment. Section 4 presents the result findings. Section 5 covers the discussion of the findings, theoretical and practical implications. Finally, section 6 highlights the limitation and future directions of the research.

2. Literature review

2.1. Technology acceptance model (TAM)

TAM was introduced by Davis (1989) to predict individual's behaviour on the intention to use a technology. In TAM, the PU and PEOU are the antecedents to the intention to use and usage behaviour of the technology. TAM has been applied in past studies related to AR mobile applications in various sectors such as tourism (Li & Jiang, 2023), education (Cabero-Almenara et al. 2019), cosmetic retailing (Oyman et al., 2022), clothing retailing (Huang & Liao, 2015), computer games (Li et al., 2020), sports (Geobert & Greenhalgh, 2020), construction (Elshafey et al., 2020) and furniture retailing (Zheleva et al., 2021).

Past studies have limitations in exploring the AR attributes of interactivity (Ramdani et al., 2022), vividness (McLean & Wilson, 2019) and information content (Yoo, 2020) in TAM context. Furthermore, there is a paucity of research in applying BIU and UB of TAM in AR context. Based on the TAM application in AR, past studies (Saleem et al., 2022; Faqih, 2022, Elshafey et al., 2020) have examined the direct relationships of PU and PEOU towards BIU. However, a few studies (e.g., McLean & Wilson, 2019; Diaa, 2022) have shown that CE have effect relationships with PEOU and PU. Also, consumer behavioural engagement was found to have effect on behavioural intentions (Ahmed et al., 2022) as evidenced by CE influenced BIU, specifically in social media context (Al-Meshal & Al-Zoman, 2019). As outlined in this research, AR technology has engagement element that is relevant to be investigated in the context consumer behavioural engagement. However, from our understanding, past studies related to AR have weaknesses in examining CE influencing BIU.

In the tourism industry literature context, Li and Jiang (2023) have applied TAM through their empirical study in examining the variables relationship effect of PU, PEOU, customer experience, attitudes toward usage, and BIU. Therefore, we can summarise that past studies related to AR in tourism industry have limitations in TAM applications in examining the AR attributes and CE effects. Therefore, to fill up the research gap that exists in the research context of AR, this study explored CE as consumer behavioural engagement construct that has effect on BIU and UB in the extended TAM.

2.2 Interactivity

Interactivity in AR involves the process of user's participation and involvement with the content (McLean & Wilson, 2019). Jiang et al. (2022) conceptualise interactivity as real-time interactions, control, connectedness, responsiveness, and personalisation. McLean and Wilson (2019) concluded that the novelty of the content displayed through AR is the most important aspect in AR interactivity that effect PU. The interactivity features of controlling navigation, content, and pace to watch products in the AR mobile applications have contributed to increase of PU (Arghashi & Yuksel,

2022). Interactivity function related to controllability and playfulness of mobile AR have positively affected consumer attitudes on the PU of the technology (Park & Yoo, 2020). We concluded that:

H1: Interactivity has a direct positive effect on PU.

AR technology allows combining objects in real and virtual environments in three dimensions (3Ds) that provides effective interactivity to the users (Anifa & Sanaji, 2022). AR with high interactivity features enabled customers to navigate the application and enhance their purchase experience, which contributed to positive PEOU (Do, 2020). For example, the 3D virtual graphics in AR enhances virtual graphic interactions which can navigate easily have provided useful travel information, mapping, and translation for tourists (Ronaghi & Ronaghi, 2022). The interactivity ability of AR to respond fast and efficiently to consumer's specific needs have positive effect on PEOU (Yim, 2017). The subsequent hypothesis is formed:

H2: Interactivity has a direct positive effect on PEOU.

2.3 Vividness

Vividness relates to the ability of a technology to provide a sensorially rich mediated environment (Steuer, 1992). The vividness in AR involves the aesthetic appeal and display quality of products such as pictures, animations, audio visual, colourful exemplars, and artworks (Wypyski et al., 2022). AR technology with the enhanced elements of display quality and aesthetic appeal in the form of 3-D visualisation helps increase the consumers' knowledge, decision-making, experience, and consumption (Yim, 2017). Furthermore, the process, interface and colour that are more aesthetic will attract consumers to the mobile AR. The more vivid product visualisations, the more positive customers' PU of the technology that provide them better decision making (Pantano et al., 2017). Thus, below hypothesis statement is developed:

H3: Vividness has a direct positive effect on PU.

Consumers' PEOU of the AR when the sharpness and clarity of the product presentation translates into the vividness of the display of the real and virtual environment (Mclean & Wilson, 2019). The visual display in AR mobile applications that are clear, sharp, and well-defined have created better consumers' PEOU (Yim, 2017). AR provides users with vivid attributes have improved the ease of use related to users' interpretation and enhanced the comprehension of the visited sites (Jiang et al., 2022; Chung et al., 2015). The subsequent hypothesis is formed:

H4: Vividness has a direct positive effect on PEOU.

2.4 Information content

Information content in AR relates to the content specific information or experiences that are displayed (Liao, 2019). Information content of AR involves the accuracy, ease of product information, personalisation, and relevancy (Yoo, 2020). Information completeness and relevance are the measurement of information content quality (Mittal et al., 2021). AR mobile applications have the attributes of precise, up-to-date, clear, and understandable information that increased its information content quality and improved PU of the technology (Kim et al., 2014). For example, information content covering detailed information on the site (e.g., Tanks in Tiananmen Square) can provide useful information to the tourists when they are planning to visit the site. Information content has positive effect on PU, with accurate and relevance information in AR helps customers' purchase decision-making process (Candraputri & Tjhin, 2021). Thus, the below statement is developed:

H5: Information content has a direct positive effect on PU.

In a comparative study conducted in China and South Korea, Butt et al. (2021) reported that information content in AR have contributed to PEOU of Chinese customers. Information content on tourism site which runs in a good information flow such as started from introduction of the site to

giving more specific details on the sites, and pre-booking or purchase details have improved the ease of use by the customers (Do et al., 2020; Mustapha et al., 2021). Through AR, valuable information on the tourist spots and excursions makes the technology easy to be used and user-friendly for tourists (Abumandil et al., 2022). Hence, we formulate the below hypothesis:

H6: Information content has a direct positive effect on PEOU.

2.5 Perceived usefulness (PU)

PU relates to the perception of individual on a technology as useful for completing a task (Lu & Su, 2009). McLean and Wilson (2019) confirmed that PU has significant effect on CE as the mobile AR technology enable fast and effectiveness in making purchases. In the tourism industry context, the reliable information received through effective interaction using mobile AR applications have contributed to PU of the technology and stimulated better tourists' engagement as they can feel as if they are already at the point of destination (Ghandour et al., 2021). Arghashi and Yuksel (2022) claimed that PU attributes such as interactivity and inspiration that are effective can drive the CE and intention to use the AR. The following is proposed:

H7: PU has a direct positive effect on CE.

2.6 Perceived ease of use (PEOU)

PEOU relates to perception of individual on how a technology can improve its functionality (Abdullah et al., 2016). PEOU positively influenced CE in the aspect of the AR mobile applications have the attributes of easy to use that enhanced cognition, affection, and activation of CE (McLean & Wilson, 2019). In the similar vein, Diaa (2022) also confirmed on the positive effect of PEOU on CE of the brand, supported with the understanding of interactivity in AR facilitates easy interaction and better involvement with content. Thus, the following statement is derived:

H8: PEOU has a direct positive effect on CE.

2.7 Customer engagement (CE)

CE is conceptualised as repeated interactions between a customer and an organisation that strengthen the emotional, psychological, or physical investment a customer has in the organisation (Harrigan et al., 2017). The interconnected cognitive (e.g., feel immersed in the experience) and affective (e.g., enjoyment attained from the experience) engagement can be experienced by the users from the adoption of AR technology (Jessen et al., 2020). CE dimensions of conscious attention, affection, participation, and social connection drives BIU (Paruthi et al., 2023; Song et al., 2023). Through AR, companies can engage customers more effectively and influenced their initial and continuous usage of the technology (Zeng et al., 2023). According to Ahmed et al. (2022), CE can further develop customer BIU on the technology, customer experience and post purchase behaviour. Subsequent hypothesis statement is formed:

H9: CE has a direct positive effect on BIU.

2.8 Behavioural intention to use (BIU) and usage behaviour (UB)

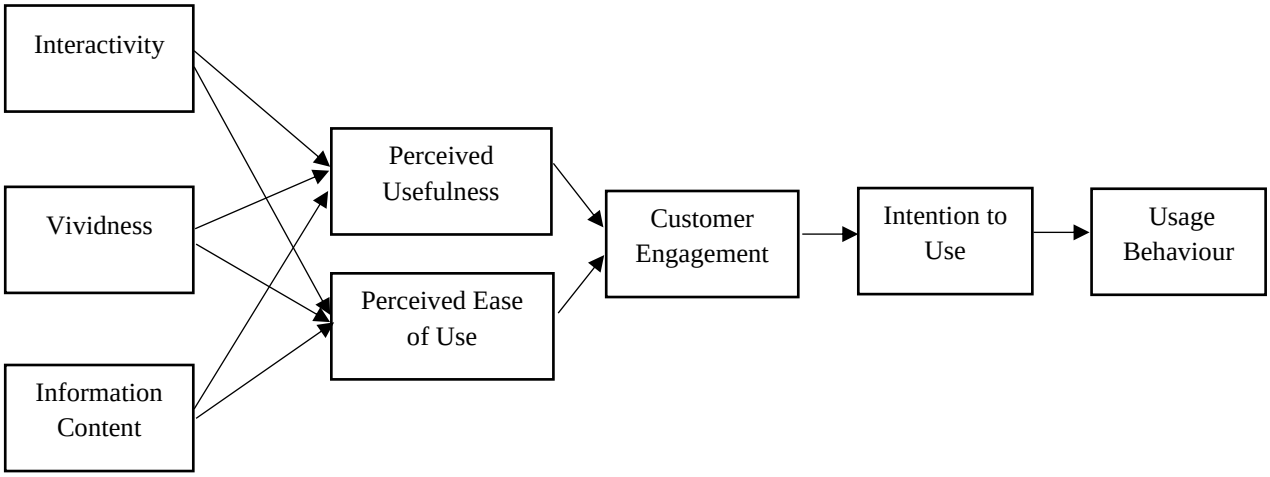
BIU refers to individual willingness to use the technology (Mardiana et al., 2015). Usage behaviour relates to the actual usage of the technology in the aspect of the user's preference, frequency, habit, and comprehensiveness of usage (Limayem et al., 2007). BIU is associated with the individual's perception on AR technology positively or negatively which affected the decision on whether want to use it or not (Uymaz & Uymaz, 2022). Consumers possess positive attitudes and BIU towards AR have

contributed to better customers' UB and purchase experience (Ramdani et al., 2022). Behavioural intention to use AR are categorised into affective, cognitive, and social that effects shopping behavioural and experiences (Riar et al., 2023). Finally, the below hypothesis is developed:

H10: BIU has a direct positive effect on UB.

Figure 1 presents the research model. The model indicated the mobile AR attributes of interactivity, vividness and information content are hypothesised towards PEOU and PU. Subsequently, PEOU and PU are correlated with CE, followed by CE is hypothesised towards BIU. Finally, BIU is correlated with UB.

Figure 1. **Conceptual framework**



Source: own elaboration

3. Methods

3.1 Research design

The present study applied a quantitative approach which involves the utilisation and analysis of numerical data using statistical methods (Apuke, 2017). Quantitative approach is more appropriate for this study as it meet the research objectives that involved testing hypotheses to assess the effects relationship between variables, compared to qualitative approach which presents data in the form of words to produce insights (Ugwu et al., 2023). Based on the quantitiative approach, descriptive research is used to describe and measure the current status of the phenomena to allow greater understanding (Taherdoost, 2022). The descriptive research for this study involved primary data collection through formation of questionnaire design, followed by survey questionnaire and data collection. Subsequently, pretest was undertaken to assess the validity and reliability of the measurement items before proceeding to the next level of descriptive statistics and statistical analysis.

3.2 Sample and data collection

The population of this study consists of individual aged above 18 years in Malaysia and active users of mobile AR applications in the tourism industry. Based on Hair et al. (2010), the requirement of minimum 500 sample size is needed for eight constructs for the research model. Therefore, we have selected the sample size of 500 to meet the minimum sample size requirement. We have applied convenience sampling method to collect the data. Through convenience sampling, customers who

appear at the selected travel and tour companies in Selangor, Kuala Lumpur, Penang, Sabah, Johor, and Pahang states in Malaysia were approached by the researchers to answer the survey questionnaires. The filter question in the survey questionnaires included the customers must have experienced using mobile AR applications for travel and tour services for the past six months.

3.3 Measures

The total measurement items were 33 represented the eight constructs of interactivity, vividness, information content, PU, PEOU, CBE, BIU and UB. We have adapted the measurement instruments from previous studies as shown in Table 1. Likert scale of 6-point from 1 (extremely disagree) to 6 (extremely agree) were adopted for the items. The selection of 6-point scale can eliminate the neutral point and provide more precised responses (Chyung et al., 2017). Data collection was conducted between June and August 2023. The response rate obtained was 97% with a total of 500 responses.

3.4 Validity and reliability assessment

Pretest was implemented to confirm the content validity of the measurement items. Five experienced scholars and three practitioners in the area of mobile AR. Subsequently, the measurement items also confirmed by a pretest with a group of customers who have experienced travel and tour services using mobile AR. Referring to Table 1, the Cronbach's Alpha values achieved between 0.872 and 0.948, above 0.7 benchmark value (Nunnally, 1978). The results further shown that Average Variance Explained (AVE) values were all above the minimum requirement of 0.5, between 0.617 and 0.814 (Fornell & Larcker, 1981) and Composite Reliability (CR) values were all above 0.6, between 0.864 and 0.946 (Bagozzi & Yi, 1988).

Table 1. **Validity and reliability assessment**

Construct (Source)	Item	Measurement	Factor Loading	Cronbach's Alpha	AVE	CR
Interactivity (Jiang et al., 2022)	IT1	Control	0.858	0.940	0.796	0.940
	IT2	Responsiveness	0.898			
	IT3	Connectedness	0.921			
	IT4	Personalisation	0.891			
Vividness (Wypyski et al., 2022)	VV1	Animations	0.835	0.930	0.726	0.930
	VV2	Audio visual	0.858			
	VV3	Colourful exemplars	0.875			
	VV4	Artworks	0.871			
	VV5	Pictures	0.824			
Information Content (Yoo, 2020)	IC1	Accuracy	0.859	0.872	0.617	0.864
	IC2	Ease of product information	0.864			
	IC3	Up-to-date information	0.725			
	IC4	Relevancy	0.676			

Construct (Source)	Item	Measurement	Factor Loading	Cronbach's Alpha	AVE	CR
Perceived Usefulness (McLean & Wilson, 2019)	PU1	Save time	0.853	0.921	0.744	0.921
	PU2	Increase effectiveness	0.876			
	PU3	Useful	0.878			
	PU4	Improve technology skills	0.842			
Perceived Ease of Use (McLean & Wilson, 2019)	PE1	Easy to use	0.878	0.934	0.717	0.909
	PE2	Flexible	0.891			
	PE3	Clear understanding	0.920			
	PE4	Easy to learn	0.844			
Customer Engagement (Jessen et al., 2020)	CE1	Feel immersed in the experience	0.838	0.934	0.778	0.933
	CE2	Positive feeling on AR	0.891			
	CE3	Enjoyment using AR	0.896			
	CE4	Feeling involved in AR	0.901			
Behavioural Intention to Use (Candraputri & Tjhin, 2021)	IU1	Intention to use	0.884	0.948	0.814	0.946
	IU2	Predictive intention	0.913			
	IU3	Intention to recommend	0.906			
	IU4	Willingness to try	0.906			
Usage Behaviour (Uymaz & Uymaz, 2022)	UB1	Usage preference	0.867	0.934	0.779	0.934
	UB2	Frequent usage	0.883			
	UB3	Usage habit	0.902			
	UB4	Comprehensiveness of usage	0.879			

Source: compiled by the authors on the basis of the research results

4. Results

4.1 Demographic analysis

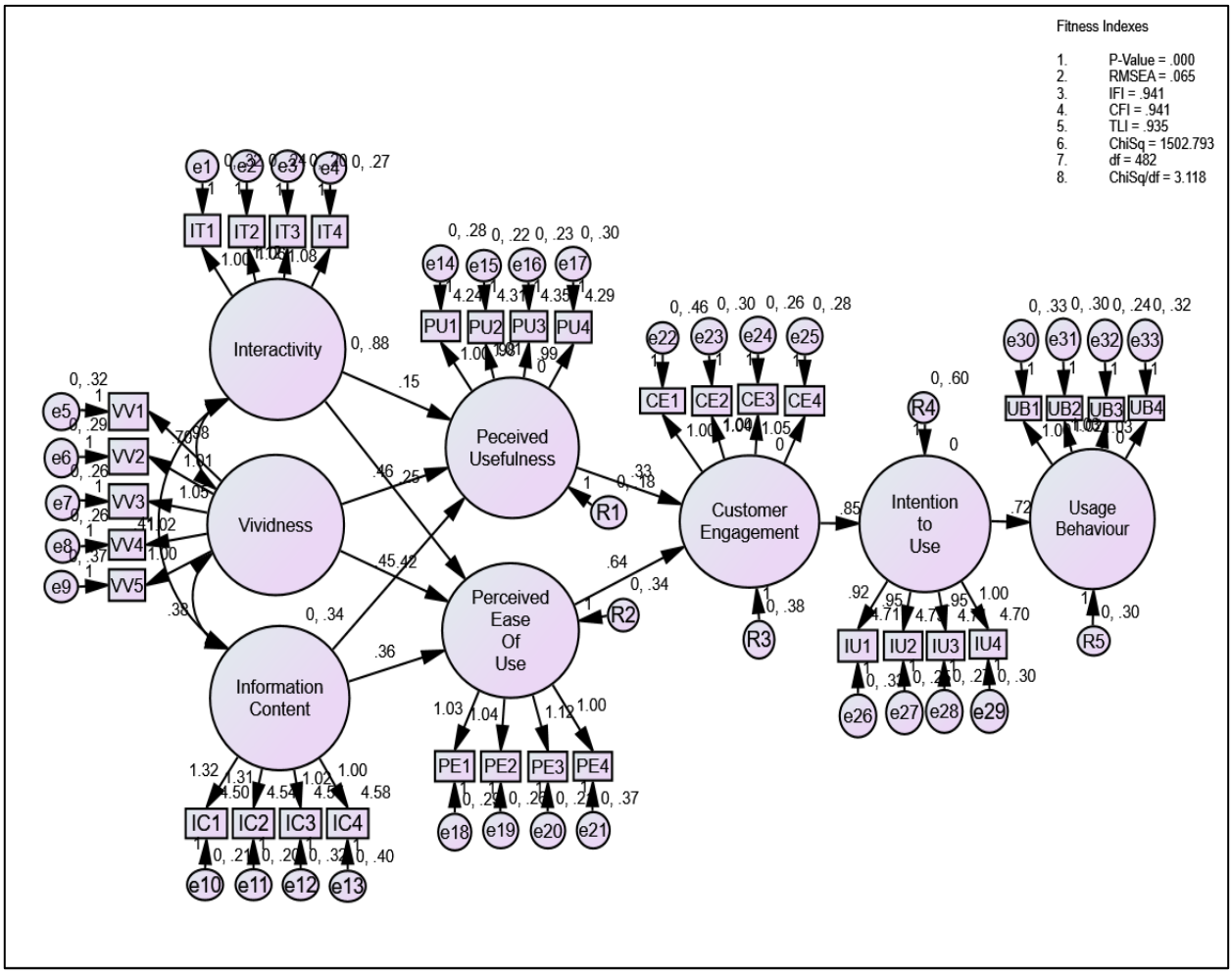
The total respondents of 500 comprises 48% female and 52% male. Average monthly income group of the respondents were 10% for less than RM2,000, 15% for between RM2,000 and RM3,999, 35% for between RM4,000 and RM5,999, and 40% for above RM6000. Majority of respondents were under the age category between 18 and 25 with 35%, followed by between 26 and 35 with 25%, between 36 and 45 with 21%, between 46 and 55 with 15%, and above 56 with 4%. The monthly frequency of using the mobile AR applications for tourism activities were 52% between 1 and 5 times, 38% between 6 to 10 times, and 10% more than 10 times.

4.2 Model compatibility testing

Structural equation modeling (SEM) analysis was performed using SPSS AMOS version 28. Based on the SEM analysis results, the structural model has achieved a good fit with p-value was significant as shown in Figure 2. The incremental fit indices shown IFI of 0.941, CFI of 0.941 and TLI of 0.935. RMSEA achieved 0.065 which was lower than the limit value of 0.08 (Browne & Cudeck, 1993). Subsequently, x2/df was 3.118 and chi-Square was 1502.793. The normality assessment shown the data was normally distributed with kurtosis values were between -3.0 and 3.0 skewness between -10 and 10 (Bai & Ng, 2005).

4.3 Hypotheses testing

Figure 2. **Structural model**



Source: derived by the authors on the basis of the research results.

Table 2. **Hypotheses results**

H	Hypothesised relationships	Estimate	p Values	Results
H1	Interactivity → Perceived Usefulness	0.148	0.010	Supported
H2	Interactivity → Perceived Ease of Use	0.247	***	Supported
H3	Vividness → Perceived Usefulness	0.456	***	Supported
H4	Vividness → Perceived Ease of Use	0.420	***	Supported
H5	Information Content → Perceived Usefulness	0.443	***	Supported
H6	Information Content → Perceived Ease of Use	0.363	***	Supported
H7	Perceived Usefulness → Customer Engagement	0.334	***	Supported
H8	Perceived Ease of Use → Customer Engagement	0.643	***	Supported
H9	Customer Engagement → Intention to Use	0.850	***	Supported
H10	Intention to Use → Usage Behaviour	0.716	***	Supported

Note: ***p < 0.001
Source: compiled by the authors on the basis of the research results.

5. Discussion

The present study emphasises the importance of interaction, vividness, and information content attributes on the consumers' adoption and UB of mobile AR applications in tourism industry. Interactivity is the main attribute in AR technology that is useful for customers to relate to the tourism services through digital innovative ways. Our research findings indicated that interactivity construct had the weakest correlational values towards PU and PEOU. The AR should have fast and effective auto responsive functions, as well as inclusive fun and entertainment elements can enhance participatory experience. Through human–computer interaction of AR, the applications should incorporate more advanced multi-sensory augmentation and effective feedback capabilities. Hence, the interactive digital travel experiences gained by tourists through AR can improve their PU and PEOU of AR.

Vividness has achieved the strongest correlational value towards PU which indicated that the AR mobile applications' attributes of animations, audio visual, colourful exemplars, and artworks have increased customers' PU and PEOU which leads to better CE and usage of the technology for tourism services. Such a result was in line with findings of Pantano et al. (2017) and Yim (2017). To improve on the vividness attributes, the tourism providers should focus on good visual quality for the destination marketing (Song et al., 2021). For example, tourists could experience sensational features and unique visual illustrations of tourism destinations with clear explanations given.

The research findings on information content had positive significant effect on PU and PEOU, have supported the past studies from Kim et al. (2014), Candraputri and Tjhin (2021), Do et al. (2020), Mustapha et al. (2021) and Abumandil et al. (2022). As highlighted by Alam et al. (2022), the lack of awareness and technological knowledge on the mobile AR hinder consumers' adoption and usage of the technology. Therefore, information content should be comprehensive, recent and focus in meeting the requirements of the different segment of customers. Information content can be enhanced by providing comprehensive knowledge to enhance knowledge experience for tourists and more personalised content to meet the needs of specific customer. The information system quality in giving reliable performance and prompt response is important to drive customers to use AR in the tourism industry.

PU and PEOU have enhanced CE through stimulate interest and liking towards the AR brand. However, the correlational value of PU on CE is slightly weak, and based on this finding, this can be the possible reason for consumers' low adoption of mobile AR in the tourism industry in most developing countries (Saleem et al., 2022). Hence, it is critical to improve PU by enhancing the features of interactivity, vividness, and the quality of information content. The user-friendly functions of purchasing in mobile AR should provide more effective processes for choosing, comparing and purchase of the tourism services. The hands-on exposure on using AR should be given to potential and existing customers of the tourism services, whereby promoting the use of AR can be demonstrated at the special booth located at the tourism service outlets and during the travel and tour promotional fairs or exhibitions. These marketing strategies are crucial to stimulate customers' awareness and interest towards the usage of AR technology.

5.1 Theoretical implications

This research provides theoretical contributions in the aspect of extended TAM in the application of adoption of mobile AR in the tourism industry. Based on the review on past studies on the application of original TAM, several researchers (e.g., Ramdani et al., 2022; McLean & Wilson, 2019; Orús et al., 2021) have raised its limitations in the aspect of determinants and consumer behavioural outcomes, as well as its application in various industries. Therefore, this research has addressed these limitations and gaps. The structural model has confirmed the extended TAM with the important attributes of interactivity, vividness and information content that have significant positive effect on PU and PEOU.

In addition, CE role as consumer behavioural engagement was found to have impact on behavioural intentions of BIU and subsequently, UB. This research also validated CE as a new dimension for consumer behavioural engagement in between the relationships of PU and PEOU, and BIU in the extended TAM. Hence, we conclude that the extended TAM can be applied by the tourism providers to enhance the AR attributes to drive positive PU and PEOU, which leads to better CE, BIU and UB. The extended TAM can be examined in the future research related to the customers' usage of other new technologies (e.g., mobile technologies or digital marketing technologies) or industries (e.g., online retailing, healthcare, education, or entertainment industry).

5.2 Practical implications

In practical implications, the tourism companies or providers can leverage on the proposed marketing planning and implementation strategies to enhance the consumers' adoption and usage of mobile AR applications to drive their business goals and objectives. The lack of awareness and knowledge on AR technology (Alam et al., 2022) and lack of marketing communications on the AR usage (Ibrahim et al., 2021) have contributed to low consumers' adoption and usage of the technology. As claimed by Saleem et al. (2022), the adoption of mobile AR is still lacking in the tourism industry in most developing countries, however this study has given different insights through samples obtained from a developing country, Malaysia. The present findings concluded that the AR attributes of interactivity, vividness, and information content have significant effect on PU and PEOU, subsequently leads to CE, BIU and UB. Hence, it has shown the contemporary application of mobile AR in a developing country such as Malaysia is growing steadily in the tourism industry and is projected to further develop in the future. The similar study can be applied in other developed and developing countries context as comparative studies.

The tourism companies can improve the adoption and effectiveness of AR technology by ensuring more comprehensive and integrative attributes of interactivity, vividness, and information content to be given to their targeted consumers. The tourism companies should implement more effective marketing communications and promotions to attract potential customers to use the mobile AR applications. Collaboration between the tourism companies and AR technology specialists are required to explore new innovative methods to enhance interaction, vividness, and information content to create new features in the AR software. In addition, the allocation of adequate resources in developing the AR technology should be emphasised by the companies. Policymakers can contribute to important roles in encouraging innovation and accelerating adoption of AR technology through security, content policies and regulations to protect users' safety, reduce risk and encourage responsible usage of the technology.

6. Conclusion

The present study focuses on the adoption of mobile AR in the tourism industry and contributed to significant theoretical implications through the extension of TAM by confirming important AR attributes of interactivity, vividness, and information content as the antecedents to PU and PEOU, as well as added CE as a new dimension for consumer behavioural engagement. Therefore, the developed research model in this study has provided more holistic coverage on the consumer adoption of mobile AR in behavioural usage context in the tourism industry. The present research has addressed the theoretical gaps related to TAM on the limited AR attributes applied in the tourism industry studies, limited research coverage on BIU and UB of TAM in the AR context and CE in consumer behavioural engagement. As AR is evolving rapidly, future research can explore the similar study on other industries such as furniture retailing. fashion and beauty. In addition, other attributes of mobile AR such as novelty (Diaa, 2022), reality (Wang et al., 2022), customisation (Kumar et al., 2024),

shareability (Chylinski et al., 2020), and assortment (Kumar et al., 2024) can be explored. This study has validated the CE construct as the new dimension for consumer behavioural engagement in between the relationships of PU and PEOU, and BIU in the extended TAM. Future studies may consider focusing on other dimension of consumer attitude (Schultz & Kumar, 2024), in between the relationships of PU and PEOU, and BIU.

The sample data was obtained from a single country, Malaysia, and future research can explore on cross-national research with the similar study to strengthen and validate the research. The sample size is limited to 500 respondents in this study, and future studies may consider increasing the sample size to achieve better representative of the population (Andrade, 2020). Subsequent research should also consider specific samples such as young or female consumers. In view that young consumers are generally tended to be early adopters of new technology (Song et al., 2021), exploring this segment of consumers can provide more focused marketing strategies to influence their usage behaviour towards the mobile AR technology in the tourism industry. As this study has applied quantitiative method, we further recommend the application of mixed methods research integrating the quantitative and qualitative methods to allow researchers widen their inquiry with sufficient depth and breadth (Dawadi et al., 2021).

As earlier outlined several practical challenges and issues related to the customer adoption of mobile AR in the tourism industry, the findings of this study have suggested for more innovative strategies in enhancing interactivity, vividness, and information content to meet the changing customers' preferences in utilising AR. The ultimate focus is given on building effective CE through PU and PEOU to achieve positive BIU and UB. The developed research framework which is exclusively tailored from the mobile AR context provides insights and valuable information for businesses and policymakers in designing their AR marketing strategies, as well as the development and provisions of mobile AR services with effective technological designs targeting the consumers.

References

1. Abdullah, F., Ward, R., & Ahmed, E. (2016). Investigating the influence of the most commonly used external variables of TAM on students' perceived ease of use (PEOU) and perceived usefulness (PU) of e-portfolios. *Computers in Human Behavior*, 63, 75-90. doi: 10.1016/j.chb.2016.05.014.
2. Abumandil, M., Alkhawajab, M. I., Younusc, A. M., & Patwary, A. K. (2022). Mobile Augmented Reality Elements and Social Media Usage on Smart Tourism in Penang: Malaysian. *Electrochemical Society Transactions*, 107(1) 10935-10943. doi: 10.1149/10701.10935ecst.
3. Ahmed, B., Zada, S., Zhang, L., Sidiki S. N., Contreras-Barraza, N., Vega-Muñoz, A., & Salazar-Sepúlveda, G. (2022). The Impact of Customer Experience and Customer Engagement on Behavioral Intentions: Does Competitive Choices Matters?. *Frontiers in Psychology*, 13, 1-14. doi: 10.3389/fpsyg.2022.864841.
4. Alam, S. S., Masukujjaman, M., Susmit, S., Susmit, S., & Aziz, H. A. (2022). Augmented reality adoption intention among travel and tour operators in Malaysia: mediation effect of value alignment. *Journal of Tourism Futures*, Vol. ahead-of-print No. ahead-of-print. doi: 10.1108/JTF-03-2021-0072.
5. Alam, S. S., Susmit, S., Lin, C. Y., Masukujjaman, M., & Ho, Y. H. (2021). Factors Affecting Augmented Reality Adoption in the Retail Industry. *Journal of Open Innovation: Technology, Market, and Complexity*, 7(2), 142. doi: 10.3390/joitmc7020142.
6. Al-Meshal, S. A., & Al-Zoman, A. S. (2019). The Influence of Consumer Brand Engagement in Social Media and Information Search Intention on Brand Usage Intention and Positive E-WOM: An Empirical Study on Saudi Context. *British Journal of Marketing Studies*, 7(2), 15-28.

7. Andrade, C. (2020). Sample Size and its Importance in Research. *Indian Journal of Psychological Medicine,* 42(1), 102-103. doi: 10.4103/IJPSYM.IJPSYM_504_19.
8. Anifa, N., & Sanaji, S. (2022). Augmented Reality Users: The Effect of Perceived Ease of Use, Perceived Usefulness, and Customer Experience on Repurchase Intention. *Journal of Business and Management Review*, 3(3), 252-274. doi: 10.47153/jbmr33.3462022.
9. Apuke, O.D. (2017). Quantitative Research Methods A Synopsis Approach. *Arabian Journal of Business and Management Review*, 6(10), 40-47. doi: 10.12816/0040336
10. Arghashi, V., & Yuksel, C. A (2022). Interactivity, Inspiration, and Perceived Usefulness! How retailers' AR-apps improve consumer engagement through flow. *Journal of Retailing and Consumer Services*, 64, 102756. doi: 10.1016/j.jretconser.2021.102756.
11. Azuma, R., Baillot, Y., Behringer, R., Feiner, S. Julier, S., & MacIntyre, B. (2001), Recent advances in augmented reality. *IEEE Computer Graphics and Applications*, 21(6), 34 - 47. doi: 10.1109/38.963459.
12. Bai, J., & Ng, S. (2005). Tests for Skewness, Kurtosis, and Normality for Time Series Data. *Journal of Business & Economic Statistics*, 23(1), 49–60. doi:10.1198/073500104000000271.
13. Bagozzi, R., & Yi, Y. (1988). On the evaluation of structural equation models. *Journal of the Academy of Marketing Science*, 16(1), 74-94. doi:10.1007/BF02723327.
14. Browne, M. W., & Cudeck, R. (1993). The impact of electronic word-of mouth: the adoption of onlineopinions in online customer communities. *Internet Research*, 18(3), 229-247.
15. Butt, A., Ahmad, H., Muzaffar, A., Ali, F., & Shafique, N. (2021). WOW, the make-up AR app is impressive: a comparative study between China and South Korea. *Journal of Services Marketing*, 36(1), 73–88. doi: 10.1108/jsm-12-2020-0508.
16. Cabero-Almenara, J., Fernandez-Batanero, J. M., & Barroso-Osuna, J. (2019). Adoption of augmented reality technology by university students. *Heliyon*, 5(5), 1-9. doi: 10.1016/j.heliyon.2019.e01597.
17. Candraputri, A. M., & Tjhin, V. U. (2021). Analysis of Factors Affecting the Intention to Use Augmented Reality Technology in Indonesia's Online Retail Customer. *Journal of Theoretical and Applied Information Technology*, 99(17), 4376-4388.
18. Chylinski, M., Heller, J., Hilken, T., Keeling, D. I., Mahr, D., & de Ruyter, K. (2020). Augmented Reality Marketing: A Technology-Enabled Approach to Situated Customer Experience. *Australasian Marketing Journal*, 28(4), 374-384. doi: 10.1016/j.ausmj.2020.04.004.
19. Cranmer, E. E., Dieck, M. C. t, & Fountoulaki, P. (2020). Exploring the value of augmented reality for tourism. *Tourism Management Perspectives*, 35, 100672, doi: 10.1016/j.tmp.2020.100672.
20. Chung, N., Han, H., & Joun, Y. (2015). Tourists' intention to visit a destination: The role of augmented reality (AR) application for a heritage site. *Computers in Human Behavior*, 50, 588-599. doi: 10.1016/j.chb.2015.02.068.
21. Chyung, S. Y., Roberts, K., Swanson, I., & Hankinson, A. (2017), Evidence-Based Survey Design: The Use of a Midpoint on the Likert Scale. *Performance Improvement*, 56(10), 15-23. doi.org/10.1002/pfi.21727.
22. Davis, F. (1989) Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*, 13, 319-340. doi: 10.2307/249008.
23. Dawadi, S., Shrestha, S., & Giri, R. A. (2021). Mixed-Methods Research: A Discussion on its Types, Challenges, and Criticisms. *Journal of Practical Studies in Education*, 2(2), 25-36. doi: 10.46809/jpse.v2i2.20.
24. Diaa, N. M. (2022). Investigating the effect of augmented reality on customer brand engagement: The mediating role of technology attributes. *The Business and Management Review*, 13(2), 356-375.

25. Dieck, M. C. T, Jung, T. H., & Rauschnabel, P. A. (2018). Determining visitor engagement through augmented reality at science festivals: An experience economy perspective. *Computers in Human Behavior*, 82, 44-53. doi: 10.1016/j.chb.2017.12.043.
26. Do, H. N., Shih, W., & Ha, Q. A. (2020). Effects of mobile augmented reality apps on impulse buying behavior: An investigation in the tourism field. *Heliyon*, 6(8), e04667. doi: 10.1016/j.heliyon.2020.e04667.
27. Elshafey, A., Saar, C. C, Aminudin, E. B., Gheisari, M., & Usmani, A. (2020). Technology Acceptance Model for Augmented Reality and Building Information Modeling Integration in the Construction Industry. *Journal of Information Technology in Construction*, 25, 161-172. doi: 10.36680/j.itcon.2020.010.
28. Faqih, K. M. S. (2022). Factors influencing the behavioral intention to adopt a technological innovation from a developing country context: The case of mobile augmented reality games. *Technology in Society*, 69(1), 1-15. doi: 10.1016/j.techsoc.2022.101958.
29. Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39-50. doi: 10.2307/3151312.
30. Fortune Business Insights (2023). *Augmented Reality (AR) Market*. Retrieved October 10, 2023, from https://www.fortunebusinessinsights.com/augmented-reality-ar-market-102553.
31. Ghandour, A., Kintonova, A., Demidchik, N., & Sverdlikova, E. (2021). Solving Tourism Management Challenges by Means of Mobile Augmented Reality Applications. *International Journal of Web-Based Learning and Teaching Technologies*, 16(6), 1-16. doi: 10.4018/IJWLTT.293280.
32. Goebert, C., & Greenhalgh, G. P. (2020). A New Reality: Fan Perceptions of Augmented Reality Readiness in Sports Marketing. *Computer Human Behaviour*, 106, 106231. doi: 10.18060/24227.
33. Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate Data Analysis: A Global Perspective*, Pearson Education Inc., NJ.
34. Harrigan, P., Evers, U., Miles, M., & Daly, T. (2017). Customer Engagement with Tourism Social Media Brands. *Tourism Management*, 59, 597–609. doi: 10.1016/j.tourman.2016.09.015.
35. Huang, T. L., & Liao, S. (2015). A model of acceptance of augmented-reality interactive technology: the moderating role of cognitive innovativeness. *Electronic Commerce Research*, 15, 269–295. doi: 10.1007/s10660-014-9163-2.
36. Ibrahim, F. A., Boying, W., Abdul Rahim, N. S., Mohd Shafiei, M. W., & Zainol, N. Z. (2023). The Influence of Augmented Reality on Purchase Intention in the Housing Industry. *Human Behavior and Emerging Technologies*, 9, 1-11. doi:10.1155/2023/5728088.
37. Jahwari, S. A., Jantan, M. D. B., & Pulparambil, S. (2022). Technology Acceptance in Tourism Sector: A Systematic Review. *International Journal of Infrastructure Research and Management*, 10(1), 29–43.
38. Jessen, A., Hilken, T., Chylinski, M., Mahr, D., Heller, J., Keeling, D. I., & Ruyter, K. d. (2020). The playground effect: How augmented reality drives creative customer engagement. *Journal of Business Research*, 116, 85-98, doi: 10.1016/j.jbusres.2020.05.002.
39. Jiang, Q., Sun, J., Yang, C., & Gu, C. (2022). The Impact of Perceived Interactivity and Intrinsic Value on Users' Continuance Intention in Using Mobile Augmented Reality Virtual Shoe-Try-On Function. *Systems*, 10(1), 3. doi: 10.3390/systems10010003.
40. Kim, K., Hwang, J., Zo, H., & Lee, H. (2014). Understanding users' continuance intention toward smartphone augmented reality applications. *Information Development*, 32(2), 161–174. doi: 10.1177/0266666914535119.
41. Kim, T. H., & Choo, H. J. (2021). Augmented reality as a product presentation tool: focusing on the role of product information and presence in AR. *Fashion and Textiles*, 8, 29. doi:10.1186/s40691-021-00261-w.

42. Kumar, H., Rauschnabel, P. A., Agarwal, M. A., Singh, R. K., & Srivastava, R. (2024). Towards a theoretical framework for augmented reality marketing: A means-end chain perspective on retailing. *Information & Management*, 61(2), 103910. doi: 10.1016/j.im.2023.103910.
43. Li, H., Gupta, A., Zhang, J., & Flor, N. (2020). Who Will Use Augmented Reality? An Integrated Approach Based on Text Analytics and Field Survey. *European Journal Operational Research*, 281, 502–51. doi: 10.1016/j.ejor.2018.10.019.
44. Li, S., & Jiang, S. (2023). The Technology Acceptance on AR Memorable Tourism Experience-The Empirical Evidence from China. *Sustainability*, 15(18), 13349. doi: 10.3390/su151813349.
45. Liao, T. (2019). Future directions for mobile augmented reality research: Understanding relationships between augmented reality users, nonusers, content, devices, and industry. *Mobile Media & Communication*, 7(1), 131-149. doi: 10.1177/2050157918792438.
46. Limayem, M., Hirt, S. G., & Cheung, C. M. K. (2007). How Habit Limits the Predictive Power of Intention: The Case of Information Systems Continuance. *MIS Quarterly*, 31(7), 705-737. doi: 10.2307/25148817.
47. Lu, H. P., & Su, P. Y. J. (2009). Factors affecting purchase intention on mobile shopping web sites. *Internet Research*, 49, 162–175. doi: 10.1108/10662240910981399.
48. Mardiana, S., Tjakraatmadja, J. H., & Aprianingsih, A. (2015). Validating the Conceptual Model for Predicting Intention to Use as Part of Information System Success Model: The Case of an Indonesian Government Agency. *Procedia Computer Science*, 72, 353–360. doi: 10.1016/j.procs.2015.12.150.
49. McLean, G., & Wilson, A. (2019). Shopping in the digital world: Examining customer engagement through augmented reality mobile applications. *Computers in Human Behavior*, 101, 210-224. doi: 10.1016/j.chb.2019.07.002.
50. Mittal, M., Minto, M., & Gupta, S. (2021*). Impact of Augmented Reality on Website Quality and Purchase Intention.* Paper presented at the 5th Advances in Management and Innovation Conference of Cardiff Metropolitan University, UK.
51. Mustapha, F., Ismail, F., Muda, M. K. H., Abdullah, M. N., Yaakob, M. S., & Kadir, M.N. (2021). "New Norm" Conceptual Approach; Augmented Reality (AR) Tourism in Terengganu. *3BIMP-EAGA Journal for Sustainable Tourism Development*, 10(1), 75-83. doi: 10.51200/bimpeagajtsd.v10i1. 3622.
52. Nunnally, J. C. (1978). *Psychometric theory* (2nd ed.). New York: McGraw-Hill.
53. Orús, C., Ibáñez-Sánchez, S., & Flavián, C. (2021). Enhancing the customer experience with virtual and augmented reality: The impact of content and device type. *International Journal of Hospitality Management*, 98, doi: 10.1016/j.ijhm.2021.103019.
54. Oyman, M., Bal, D., & Ozer, S. (2022). Extending the technology acceptance model to explain how perceived augmented reality affects consumers' perceptions. *Computers in Human Behavior*, 128, 107127. doi: 10.1016/j.chb.2021.107127.
55. Pantano, E., Rese, A., & Baier, D. (2017). Enhancing the online decision-making process by using augmented reality: A two country comparison of youth markets. *Journal of Retailing and Consumer Services*, 38, 81-95. doi: 10.1016/j.jretconser.2017.05.011.
56. Park, M., & Yoo, J. (2020). Effects of perceived interactivity of augmented reality on consumer responses: A mental imagery perspective. *Journal of Retailing and Consumer Services*, 52, 101912. doi: 10.1016/j.jretconser.2019.101912.
57. Paruthi, M., Nagina, R., & Gupta, G. (2023). Measuring the Effect of Consumer Brand Engagement on Brand-Related Outcomes in Gamified Mobile Apps: A Solicitation of Technology Acceptance Model. *Proceedings*, 85(1), 10. doi: 10.3390/proceedings2023085010.
58. Ramdani, M. A., Belgiawan, P. F., Aprilianty, F., & Purwanegara, M. S. (2022). Consumer Perception and the Evaluation to Adopt Augmented Reality in Furniture Retail Mobile Application. *Binus Business Review*, 13(1), 41−56. doi: 10.21512/bbr.v13i1.7801.

59. Research and Markets (2023). *AR/VR in Travel & Tourism Market - Global Industry Size, Share, Trends, Opportunity, and Forecast, 2018-2028*. Retrieved October 8, 2023, from https://www.researchandmarkets.com/reports/5821947/arvr-in-travel-and-tourism-marketglobal?utm_source=CI&utm_medium=PressRelease&utm_code=b9gb4n&utm_campaign=1861669++Global+AR%2fVR+in+Travel+%26+Tourism+Market+Research+Report+2023%3a+Trends%2c+Opportunities%2c+and+Forecasts%2c+2018-2023+%26+2023 2028&utm_exec=chdo54prd.
60. Riar, M., Xi, N., Korbel, J. J., Zarnekow, R., & Hamari, J. (2023). Using augmented reality for shopping: a framework for AR induced consumer behavior, literature review and future agenda. *Internet Research*, 33(1), 242-279. doi: 10.1108/INTR-08-2021-0611.
61. Ronaghi, M. H., & Ronaghi, M. (2022). A Contextualized Study of the Usage of the Augmented Reality Technology in the Tourism Industry. *Decision Analytics Journal*, 5, 100136, doi: 10.1016/j.dajour.2022.100136.
62. Saleem, M., Kamarudin, S., Shoaib, H. M., & Nasar, A. (2022). Retail Consumers' Behavioral Intention to Use Augmented Reality Mobile Apps in Pakistan. *Journal of Internet Commerce*, 21(4), 497-525. doi: 10.1080/15332861.2021.1975427.
63. Schultz, C. D., & Kumar, H. (2024). ARvolution: Decoding consumer motivation and value dimensions in augmented reality. *Journal of Retailing and Consumer Services*, 78, 103701. doi: 10.1016/j.jretconser.2023.103701.
64. Song, B. L., Lee, K. L., Liew, C. Y., & Subramaniam, M. (2023). The role of social media engagement in building relationship quality and brand performance in higher education marketing. *International Journal of Educational Management*, 37(2), 417-430. doi: 10.1108/IJEM-08-2022-0315.
65. Song B. L., Liew, C. Y., Sia, J. Y., & Kanesh, G. (2021). Electronic Word-of-Mouth in Travel Social Networking Sites and Young Consumers' Purchase Intentions: An Extended Information Adoption Model. *Young Consumers*, 22(4), 521-538. doi: 10.1108/YC-03-2021-1288.
66. Steuer, J. (1992). Defining Virtual Reality: Dimensions Determining Telepresence. *Journal of Communication*, 42(4), 73–93. doi: 10.1111/j.1460-2466.1992.tb00812.x.
67. Taherdoost, H. (2022). What are Different Research Approaches? Comprehensive Review of Qualitative, Quantitative, and Mixed Method Research, Their Applications, Types, and Limitations. *Journal of Management Science & Engineering Research,* 5(1), 53-63. doi: 10.30564/jmser.v5i1.4538ff.ffhal-03741840
68. Ugwu, Chinyere, N., & Eze Val, H. U. (2023). Qualitative Research. *IDOSR Journal of Computer and Applied Sciences*, 8(1), 20-35.
69. Uymaz P., & Uymaz, A. O. (2022). Assessing acceptance of augmented reality in nursing education. *PLoS ONE*, 17(2), e0263937. doi: 10.1371/journal.pone.0263937.
70. Wang, Y., Ko, E., & Wang, H. (2022). Augmented reality (AR) app use in the beauty product industry and consumer purchase intention. *Asia Pacific Journal of Marketing and Logistics*, 34(1), 110-131. doi: 10.1108/APJML-11-2019-0684.
71. Wu, S.-H. (2022). Minds Think Alike: How Do food delivery mobile applications innovate consumer service. *Journal of Tourism and Services,* 13(25), 137–155. doi: 10.29036/jots.v13i25.384
72. Wypyski, C., Throop, R., & Schofield, D. (2022). No Longer Stuck (IST) in Two Dimensions: Evaluating Augmented Reality Art Experiences. *Journal of Arts & Humanities*, 11(3), 23-35. doi: 10.18533/jah.v11i03.2263.
73. Yim, M. Y. C., Chu, S. C., & Sauer, P.L. (2017). Is Augmented Reality Technology an Effective Tool for E-commerce? An Interactivity and Vividness Perspective. *Journal Interactive Marketing*, 39, 89-103. doi: 10.1016/j.intmar.2017.04.001.

74. Yoo, J. (2020). The Effects of Perceived Quality of Augmented Reality in Mobile Commerce-An Application of the Information Systems Success Model. *Informatics*, 7(2), 14. doi:10.3390/informatics7020014.
75. Zahari, N. H., & Salim, S. A. (2023). A Foresight Study on the Adoption of Augmented Reality in the Entertainment Industry. *Research in Management of Technology and Business*, 4(1), 613-622. doi: 10.30880/rmtb.2023.04.01.042.
76. Zeng, J. Y, Xing, Y., & Jin, C. H. (2023). The Impact of VR/AR-Based Consumers' Brand Experience on Consumer–Brand Relationships. *Sustainability*, 15(9), 7278. doi: 10.3390/su15097278.
77. Zheleva, A., Smink, A. R., Vettehen, P. H., & Ketelaar, P. (2021). *Modifying the Technology Acceptance Model to Investigate Behavioural Intention to Use Augmented Reality*, In M. C. T. Dieck, T. H. Jung & S. M. C. Loureiro (Ed.). Augmented Reality and Virtual Reality (pp. 125-137). Springer. doi: 10.1007/978-3-030-68086-2_10.

Brief description of Authors:

Dr. Song Bee Lian
ORCID ID: https://orcid.org/0000-0001-7480-6224
Affiliation: School of Marketing and Management, Asia Pacific University of Innovation and Technology, Jalan Teknologi 5, Taman Teknologi Malaysia, 57000 Kuala Lumpur, Malaysia, https://www.apu.edu.my.
Email: song.beelian@apu.edu.my
Dr. Song Bee Lian is a senior lecturer at the Asia Pacific University of Technology and Innovation, Malaysia. She has 10 years industrial experiences and more than 11 years' experience in academia. Her research interests include digital marketing, marketing sustainability, consumer behaviour, and corporate social responsibility. She has published various articles in reputable Web of Science, SCOPUS and ABDC indexed journals.

Associate Professor Dr. Devinder Kaur
ORCID ID: https://orcid.org/0000-0002-0226-0039
Affiliation: School of Marketing and Management, Asia Pacific University of Innovation and Technology, Jalan Teknologi 5, Taman Teknologi Malaysia, 57000 Kuala Lumpur, Malaysia, https://www.apu.edu.my.
Email: devinder.kaur@apu.edu.my
Associate Professor Dr.Devinder Kaur is an associate professor at the Asia Pacific University of Technology and Innovation, Malaysia. Associate Professor Dr. Devinder has vast academic and administrative experiences in higher education institutes. Her research interests include human resource management, organisation behaviour, digital marketing and business ethics. She has published various articles in reputable Web of Science, SCOPUS and ABDC indexed journals.

Dr. Muthaloo Subramaniam
ORCID ID: https://orcid.org/0000-0003-1342-4120
Affiliation: School of Marketing and Management, Asia Pacific University of Innovation and Technology
Jalan Teknologi 5, Taman Teknologi Malaysia, 57000 Kuala Lumpur, Malaysia, https://www.apu.edu.my.
Email: mutsgs@yahoo.com.my

Dr. Muthaloo Subramaniam currently serves as an academician in the School of Marketing and Management at Asia Pacific University in Kuala Lumpur, Malaysia. He is a well-experienced professional with over 24 years of experience in the corporate and higher education sectors. He is an associate member of the Malaysian Institute of Accountants, an associate member of the Chartered Tax Institute of Malaysia, a member of the Malaysian Institute of Management, a member of the Institute of Marketing Malaysia, and a member of Malaysian Human Resource Management. Dr. Muthaloo's research interests include human resource management, marketing, and accounting. He has published various articles in reputable Web of Science and SCOPUS-indexed journals.

Dr. Tee Poh Kiong
ORCID ID: https://orcid.org/0000-0002-1874-7714
Affiliation: School of Marketing and Management, Asia Pacific University of Innovation and Technology, Jalan Teknologi 5, Taman Teknologi Malaysia, 57000 Kuala Lumpur, Malaysia, https://www.apu.edu.my.
Email: poh.kiong@apu.edu.my
Dr Tee Poh Kiong is a senior lecturer in School of Marketing and Management at Asia Pacific University in Kuala Lumpur, Malaysia. He has more than 10 years industrial experiences and more than 10 years' experience in academia. His research interests include employability, career management, consumer behaviour, e-commerce and sustainability marketing. He has published various articles in reputable Web of Science and SCOPUS indexed journals.

Dr. Wong Ling Chai
ORCID ID: https://orcid.org/0000-0001-6753-6115
Affiliation: Faculty of Hospitality and Tourism Management, UCSI University, MTLD, Lot 2976, Block 7, Jalan Keruing, 93050 Kuching, Sarawak, Malaysia, https:// https://www.ucsiuniversity.edu.my/kuching-campus
Email:. lingchaiwong10@gmail.com
Dr. Wong Ling Chai is a lecturer at UCSI University, Sarawak, Malaysia. Dr. Wong is an active researcher with a focus on consumer behaviour and sustainable marketing, and he has been recognised as an Outstanding Reviewer for Elsevier's Journal of Cleaner Production. He has published various articles in reputable Web of Science and SCOPUS indexed journals.

Dr. Nor Azrul Mohd Zin
ORIC ID: https://orcid.org/0009-0002-9074-8559
Affiliation: School of Marketing and Management, Asia Pacific University of Innovation and Technology, Jalan Teknologi 5, Taman Teknologi Malaysia, 57000 Kuala Lumpur, Malaysia, https://www.apu.edu.my.
Email: norazrul.zin@apu.edu.my
Dr. Nor Azrul is a lecturer at Asia Pacific University of Technology and Innovation, Malaysia. He has 6 years experiences in academia. The researcher's areas of interest encompass community development, human development, higher education, marketing, and youth development. He has published various articles in Web of Science and chapters in books.