

## A STUDY OF BEHAVIORAL INTENTION TO USE AUGMENTED REALITY FOR APPAREL PRODUCTS SHOPPING ON E-COMMERCE PLATFORMS IN THAILAND

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Received 24 March 2022

Revised 27 April 2022

Accepted 11 August 2022

### Abstract

This research aims to investigate the determinants of behavioral intention to use augmented reality (AR) for apparel products shopping on e-commerce platforms in Thailand. Key variables are performance expectancy, effort expectancy, social influence, attitude toward using, perceived enjoyment, innovativeness and behavioral intention. The data (n=450) were collected, applying nonprobability sampling technique; judgmental, quota and convenience sampling. The data were analyzed, using descriptive statistics, confirmatory factor analysis (CFA) and structural equation modeling (SEM) methodology. The result showed that performance expectancy, effort expectancy, perceived enjoyment and innovativeness had significant effects on behavioral intention. Also, innovativeness significantly affected perceived enjoyment. On the other hand, social influence and attitude toward using had no significant effect on behavioral intention. Academic researchers, business leaders and marketers are recommended to improve user interface and user experience of AR technology to raise higher adoption rate among consumers.

**Keywords:** Performance expectancy, Effort expectancy, Perceived enjoyment, Innovativeness, Behavioral intention

## Introduction

Augmented reality (AR) is a novel technology which had arisen for businesses' implementation. The development from virtual reality (VR) and augmented reality (AR) was firstly introduced in 1962 as 3D immersive simulator (Heilig, 1962). In recent years, the technology of VR and AR have gained widely attention among investors and the public, particularly alongside Mark Zuckerberg invested in Oculus for \$2 billion (Castelvecchi, 2016). Numerous research has been conducted on AR technology, but very limited studies have been conducted in the e-commerce industry. Many literatures on AR technology have been increasing despite of the efficacy of this technology in recent years (Saidin et al., 2015). In especially, Singhal et al. (2012) stated that AR provides better visualization and the unified interface between the reality and virtual settings and permits a tangible interaction symbol to be applied for object manipulation. Electronic commerce (e-commerce) is an any type of business transaction that comprises the transfer of information or transaction across digital network channels. It expands rapidly in the past decade and allows consumers to exchange goods and services faster, cheaper and more convenient than the traditional commerce at anywhere and anytime (Baynal & Boyaci, 2016). Electronic commerce market in Thailand has been growing rapidly due to an increasing number of transactions. Therefore, the rising in monetary in 2019 stimulates domestic expenditure and subsidizes household demand. Spending per capita on E-commerce is high in Thailand at \$1,746.20 per head per annual, and rises in private consumption can enhance extra the market growth (J.P. Morgan, 2019).

## Objectives of the Study

This paper investigates the relationship between performance expectancy, effort expectancy, social influence, attitude toward using, perceived enjoyment, innovativeness and behavioral intention to use AR technology for apparel products on e-commerce platforms.

## Research Framework

The conceptual framework was proposed according to previous theories and relevant academic research frameworks based on Technology Acceptance Model (TAM) and Unified Theory of Acceptance and Use of Technology (UTAUT) theories as shown in Figure 1. Independent variables are performance expectancy, effort expectancy, social influence, attitude toward using, perceived enjoyment, and innovativeness. A dependent variable is behavioral intention

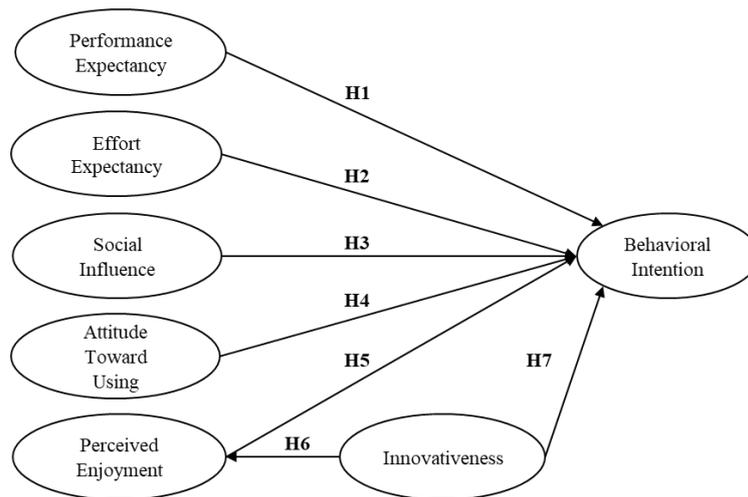


Figure 1 Conceptual Framework

### Significance of the Study

The researchers explore factors impacting users to adopt AR technology in apparel products online shopping. Following the world trend of metaverse, AR technology has been foreseen to play a big role in global online commerce. The AR technology adoption process is in demand and more likely to be expanded the future academic study. AR technology could be one of an option to attract them to engage more and longer time in the platforms as well as reducing their delay purchasing especially in apparel products which usually require try-on to make sure it is perfect fit with the size and look.

### Literature Review

#### 1. Technology Acceptance Model (TAM)

Technology Acceptance Model or TAM were firstly developed by Davis (1989). The original TAM includes four main factors; perceived usefulness, perceived ease of use, behavioral intention and actual use. Some studies postulated differently by adding attitude toward using in to the model, claiming to be a moderator among perceived usefulness and perceived ease of use, behavioral intention (Alwahaishi & Snasel, 2013).

#### 2. Unified Theory of Acceptance and Use of Technology (UTAUT)

UTAUT is extended from TAM, involving performance expectancy, effort expectancy, social influence, facilitating conditions, behavioral intention and actual use (Venkatesh et al., 2003). However, several researchers stated that perceived usefulness is replaced by performance expectancy and perceived ease of use is substituted by effort expectancy (Alwahaishi & Snasel, 2013).

### 3. Performance Expectancy

Performance expectancy has been defined as “the degree to which a person believes that using the technology will make him or her to achieve performance or goals.” (Mueller-Johnson et al., 2017; Venkatesh et al., 2012; Giovanis et al., 2018; Saprikis et al., 2021). Performance expectancy is examined to have an impact on behavioral intention to use AR technology for online apparel shopping on e-commerce platform. Consequently, the first hypothesis is established.

H1: Performance Expectancy has a significant effect on Behavioral Intention.

### 4. Effort Expectancy

Effort expectancy has been key construct of innovation adoption derived from UTAUT. It has been identified as “the degree of ease related with the use of the technology” (Venkatesh et al., 2012). A significant relationship between effort expectancy and behavioral intention had been proven by many scholars (Ntsafack et al., 2018; Saprikis et al., 2021) and is considered to embed this relationship into the conceptual model of AR feature for online apparel shopping on e-commerce. Hence, it proposes in the next hypothesis:

H2: Effort Expectancy has a significant effect on Behavioral Intention.

### 5. Social influence

Social influence describes “the degree to which a person perceives that other persons’ belief and opinions are importance whether he/she should use a specific system or not” (Fan et al., 2021). Social influence can ground potential users’ attitude in accordance with peers’, family members’ and friends’ opinions which can dominate user’s behavior (Kijsanayotin et al., 2009). Based on the previous studies, individuals who have positive impact from their environment would express an intentional behavior to use AR technology to try on apparel products on e-commerce platform (Baabdullah, 2018). Therefore, a hypothesis is derived:

H3: Social Influence has a significant effect on Behavioral Intention.

### 6. Attitude Toward Using

Attitude Toward Using refers to an acceptance or a rejection of users when using technology or performing certain technologies (Zain et al., 2005). Mailizar and Johar (2021) posted that attitude toward using potentially has an impact on students’ willingness to use AR learning. This study further explains the AR technology on e-commerce platform tends to be more accepted when users have a positive feeling about using it to achieve some expectation. Therefore, the following hypothesis is set.

H4: Attitude Toward Using has a significant effect on Behavioral Intention.

### 7. Perceived Enjoyment

Perceived enjoyment was firstly introduced by Davis (1989) in and extended TAM model to specify an intrinsic motivation of intentional behavior to adopt a system. It was referred as “the extent to which the activity of computer usage is perceived to be enjoyable

and can accomplish user's performance expectation". Concerning AR environment, many researchers have proven the linkage among perceived enjoyment and behavioral intention in an AR application adoption (Haugstvedt & Krogstie, 2012; Ghazali et al., 2019). Likewise, AR technology drives better shopping experience with enjoyment and raise customer's attention to make an online purchase (Kim & Forsythe, 2012). Thereby, a hypothesis is per followed:

H5: Perceived Enjoyment has a significant effect on Behavioral Intention.

#### 8. Innovativeness

Per empirical study of Saprikis et al. (2021), innovativeness has a significant and direct influence on perceived enjoyment. Innovative people will find it fun to use a new technology and will want to be the first to try as seeking for new ideas, products or services. Based on numerous research, it can be postulated AR technology is perceived to be new way to experience buying products or services, integrating real and virtual world (Tariq, 2007). Innovativeness has been widely inspected having a direct impact on intentional behavior to use a system (Escobar-Rodriguez & Carvajal-Trujillo, 2014). To verify the facts, following hypotheses is addressed:

H6: Innovativeness has a significant effect on Perceived Enjoyment.

H7: Innovativeness has a significant effect on Behavioral Intention.

#### 9. Behavioral Intention

Behavioral intention is strongly associated with and is a predictor of actual use in many technologies adoption research (Venkatesh & Davis, 2000). Behavioral intention explains "one's subjective possibility that he/she will use a particular information technology" (Tanasapsakul & Vongurai, 2018). In this context, the researcher explains behavioral intention as the use of AR technology among users is impacted by various motivational factors (Saprikis et al., 2021).

### Research Methodology

This study applied quantitative approach, using online questionnaire distribution. The investigation has been divided into three sections including the screening question, five-point Likert scale measurement and demographic characteristics.

#### 1. Population and Sample Size

The target population in this study is based on people who are 18 years old and above, eligible to use credit card (according to Thai laws), living in Thailand and have experience in buying apparel products on top three e-commerce platform by market share in Thailand including Lazada, Shopee and JD Central. A parameter values were calculated by statistical software of Soper (2021) which results minimum sample size of 425. For this study, the questionnaire aims to collect 450 respondents.

## 2. Sampling Technique

This study operates three stages in sampling procedure. Firstly, nonprobability sampling method of purposive sampling were used to selecting top three e-commerce in Thailand from market share which are Lazada, Shopee & JD Central. Secondly, quota sampling was used to target customers form top three e-commerce platform (As of Table 1). Thirdly, purposive sampling and convenience sampling was applied to choosing e-commerce customers who are 18 years old and above, eligible to use credit card, using social media such as Facebook, LinkedIn, Twitter and Line Chat Application via posts and direct messages. to distribute questionnaire. The data collection was between November 2021 to February 2022.

**Table 1:** Sample Units and Sample Size

E-Commerce Platform	Approximate Population Size (Thai Users in Million)	Sample Size
Lazada	35	181
Shopee	47	243
JD Central	5	26
<b>Total</b>	<b>87</b>	<b>450</b>

Source: EcommerceIQ (2018).

## Results and Discussion

### 1. Demographic Information

The questionnaire was distributed to 500 participants during April to June 2022. After screening process, 450 were completed and accepted. The demographic results are including gender, age, occupation, income and educational level. Majority of respondents were female (56.0%) whereas males were 44.0%. For age group, the majority of people were between 21-30 years old (37.3%) while the least group was those who were over 60 years old (2.6%). In occupation, corporate employee was a major group at 41.1%, followed by self-employment (22.4%), government employee (16.2%), student (12.0%), retiree (5.0%) and others (3.3%). For monthly earning, major group was THB 20,000 to 40,000 (39.1%), whereas the least group was below 20,000 (14.4%). Most participant were Bachelor's degree of 68.6%, followed by Master's Degree of 16.0%, High School/ Vocational and Below of 14.4% and Doctor's Degree of 1.0%.

### 2. Confirmatory Factor Analysis (CFA)

Confirmatory factor analysis (CFA) was conducted for model conceptualization, identification and parameter measurement. CFA was used to assess the data-model fit and the factor loading of each observed variable in this research (Mueller & Hancock, 2001). The results derived from SPSS AMOS statistical software were in harmony with empirical data, thus, CFA

has no need to be adjusted. In addition, the results can be validated for convergent and discriminant validity as shown in Table 2.

**Table 2:** Goodness of Fit for Measurement Model

Index	Acceptable Values	Statistical Values
CMIN/DF	< 3.00 (Hair et al., 2006)	291.874/231 = 1.264
GFI	> 0.90 (Hair et al., 2006)	0.949
AGFI	> 0.80 (Sica & Ghisi, 2007)	0.934
NFI	> 0.80 (Wu & Wang, 2006)	0.943
CFI	> 0.90 (Hair et al., 2006)	0.987
TLI	> 0.90 (Hair et al., 2006)	0.985
RMSEA	< 0.08 (Pedroso et al., 2016)	0.024
<b>Modelsummary</b>		<b>Acceptable Model Fit</b>

Source: Created by the author

Table 3 summarizes all the value were accepted at Cronbach's Alpha value higher than 0.70 (Cortina, 1993) and were statistically significant of the factor loading greater than 0.30 (Field, 2013), which confirmed the convergent validity of measurement models with t-value more than 1.98, p-value less than 0.50. Composite reliability (CR) values are confirmed at above 0.70. Average variance extracted (AVE) were accepted at above 0.40 (Fornell & Larcker, 1981). Hence, all estimates were significant.

**Table 3:** Confirmatory Factor Analysis Result, Composite Reliability (CR) and Average Variance Extracted (AVE)

Latent Variables	Source of Questionnaire	No. of Items	Cronbach's Alpha	Factors Loading	CR	AVE
Performance Expectancy (PE)	Saprikis et al.(2021)	3	0.724	0.674 - 0.695	0.725	0.467
Effort Expectancy (EE)	Saprikis et al.(2021)	3	0.793	0.742 - 0.759	0.793	0.562
Social Influence (SI)	Saprikis et al.(2021)	3	0.770	0.682 - 0.801	0.772	0.531
Attitude Toward Using (AT)	Teo et al. (2011)	4	0.887	0.793 - 0.836	0.888	0.666
Perceived Enjoyment (PN)	Saprikis et al.(2021)	3	0.881	0.830 - 0.859	0.882	0.713
Innovativeness (IN)	Saprikis et al.(2021)	4	0.832	0.678 - 0.822	0.832	0.555
Behavioral Intention (BI)	Cruz et al. (2014)	4	0.764	0.573 - 0.732	0.769	0.457

The convergent validity was confirmed when the value of CR is greater than AVE of higher than 0.40 ((Fornell & Larcker, 1981). The discriminant validity results are presented in Table 4. AVE of each construct was not beyond the association among constructs and the results were not higher than 0.80 which serve as the adequate strength of association among seven pairs of constructs. Therefore, this research has no multicollinearity issue.

**Table 4:** Discriminant Validity

	IN	PE	EE	SI	AT	PN	BI
IN	<b>0.745</b>						
PE	0.155	<b>0.684</b>					
EE	0.105	0.654	<b>0.749</b>				
SI	0.097	0.230	0.213	<b>0.729</b>			
AT	0.148	0.167	0.208	0.644	<b>0.816</b>		
PN	0.271	0.548	0.454	0.335	0.290	<b>0.844</b>	
BI	0.423	0.535	0.434	0.255	0.261	0.581	<b>0.676</b>

Note: The diagonally listed value is the AVE square roots of the variables

Source: Created by the author

### 3. Structural Equation Model (SEM)

Due to the initial structural model did not meet an acceptable criterion of fit indices, the adjusted model was taken to ensure a harmonization of empirical data. The values of structural model after adjustment are overall good fit as summarized in Table 5.

**Table 5:** Goodness of Fit for Structural Model

Index	Acceptable Values	Statistical Values	Statistical Values
		Before Adjustment	After Adjustment
CMIN/DF	< 3.00 (Hair et al., 2006)	991.347/245 = 4.046	612.883/288 = 2.688
GFI	> 0.90 (Hair et al., 2006)	0.849	0.909
AGFI	> 0.80 (Sica & Ghisi, 2007)	0.815	0.880
NFI	> 0.80 (Wu & Wang, 2006)	0.805	0.880
CFI	> 0.90 (Hair et al., 2006)	0.845	0.920
TLI	> 0.90 (Hair et al., 2006)	0.825	0.903
RMSEA	< 0.08 (Pedroso et al., 2016)	0.082	0.061
<b>Model summary</b>		<b>Unacceptable Model Fit</b>	<b>Acceptable Model Fit</b>

Source: Constructed by the author.

#### 4. Hypothesis Testing Result

The research matrix was computed as significance for each variable from the regression weights and  $R^2$  variances. According to each calculated results illustrated in Table 6.

**Table 6:** Hypothesis Result of the Structural Equation Model

Hypothesis	Standardized path coefficient ( $\beta$ )	t-value	Testing result
H1: PE $\rightarrow$ BI	0.167	3.400*	Supported
H2: EE $\rightarrow$ BI	0.136	2.924*	Supported
H3: SI $\rightarrow$ BI	-0.020	-0.408	Not Supported
H4: AT $\rightarrow$ BI	0.081	1.780	Not Supported
H5: PN $\rightarrow$ BI	0.613	9.823*	Supported
H6: IN $\rightarrow$ PN	0.214	4.350*	Supported
H7: IN $\rightarrow$ BI	0.233	4.547*	Supported

Note: \*  $p < 0.05$

Source: Created by the author.

According to the data in Table 6 we could obtain the following extensions.

**H1** was supported and can be implied that performance expectancy had a significant effect on behavioral intention as of standardized path coefficient value = 0.167. Performance

expectancy has been a key construct in UTAUT model (Venkatesh & Davis, 2000). Due to PE is a strong predictor to behavioral intention, the researcher emphasized this variable into the conceptual model to examine AR technology usage for online apparel shopping on e-commerce platform as aligned with many scholars (Venkatesh et al., 2012; Giovanis et al., 2018; Saprikis et al., 2021).

**H2** confirmed that effort expectancy has a significant effect on behavioral intention, representing standardized path coefficient value = 0.136. Effort expectancy has been key construct of innovation adoption derived from UTAUT (Venkatesh et al., 2012). A significant relationship between effort expectancy and behavioral intention had been proven by many scholars (Giovanis et al., 2018; Ntsafack et al., 2018; Saprikis et al., 2021) and is considered to embed this relationship into the conceptual model of AR feature for online apparel shopping on e-commerce.

**H3** showed standardized path coefficient value = -0.020 which signified that social influence had no significant effect on behavioral intention. The result was contradicted with previous literatures which explained that SI has been one of UTAUT's variable that directly impacts behavioral intention (Kijsanayotin et al., 2009; Giovanis et al., 2018). This result can be that most users' social group has a little knowledge about AR technology. Therefore, they cannot seek influencers in the early stage of AR technology in Thailand.

For **H4**, the relationship between attitude toward using and behavioral intention was not supported as of the standardized path coefficient value = 0.081. In TAM, AT is an influential factor of behavioral intention (Cho & Cheung, 2003). However, the result of this study was opposed with earlier researches have measured attitude toward using on adoption and acknowledged that it can raise wiliness to use a technology (Zain et al., 2005; Mailizar & Johar, 2021). It can be assumed that most users have not been experienced AR technology. So, they do not have a clear picture and attitude towards the use.

**H5** proved perceived enjoyment had a strongest significant effect on behavioral intention in this study, resulting the standardized path coefficient value of 0.613. In AR context, many researchers have proven the linkage between perceived enjoyment and behavioral intention in an AR application adoption. More specifically, Haugstvedt and Krogstie (2012) found a positive impact between perceived enjoyment and the mobile AR app usage for cultural heritage, user's willingness to play 'Pokemon Go' (Ghazali et al., 2019), AR services in shopping malls, an AR feature in teaching programs, online purchase (Kim & Forsythe, 2012).

**H6** confirmed the support relationship between innovativeness and perceived enjoyment, showing standardized path coefficient value = 0.214. Per empirical study of Saprikis et al. (2021),

innovativeness has a significant and direct influence on perceived enjoyment. Innovative people will find it fun to use a new technology and will want to be the first to try as seeking for new ideas, products or services. Subsequently, they are able to cope with risk and assert with a positive attitude toward using a new technology. Based on numerous research, it can be postulated AR technology is perceived to be new way to experience buying products or services, integrating real and virtual world (Tariq, 2007).

H7 indicated that innovativeness significantly affected behavioral intention with standardized path coefficient value = 0.233. Innovativeness has been widely inspected having a direct impact on intentional behavior to use a system (Escobar-Rodriguez & Carvajal-Trujillo, 2014) Innovation is related to a personal innovativeness to experiment with pioneering goods or services (Saprikis et al., 2021; Kim & Forsythe, 2012; Tariq, 2007). As a result, it can be noted that innovators will firstly volunteers to use and express intentional behavior to experience AR technology on e-commerce platform.

## Conclusions and Recommendations

### 1. Conclusions

This study addresses how the AR technology could be applied into apparel products in e-commerce as it could contribute to business leaders, especially in e-commerce firms around the world to have a better understanding of customer's adoption before investing in such technology. Researchers incorporates theories and research models for building the research framework of AR technology adoption for online apparel shopping on e-commerce platforms in Thailand, involving the technology adoption theories including technology acceptance model (TAM) and unified theory of acceptance and use of technology (UTAUT). The result showed that performance expectancy, effort expectancy, perceived enjoyment and innovativeness had significant effects on behavioral intention. Also, innovativeness significantly affected perceived enjoyment. On the other hand, social influence and attitude toward using had no significant effect on behavioral intention.

### 2. Recommendations

Academic researchers, business leaders and marketers are recommended to consider significant determinants of behavioral intention of using AR technology for both research and business development to raise higher adoption rate among consumers by promoting enjoyment, benefits, ease-of-use in considering with innovative level of customers. In practices, marketers and AR developers should enhance public relations, build marketing campaign, develop the user's interface and experience to be attractive, and promote how to use AR technology and its

benefit to consumers and their social groups to increase enjoyment and positive attitude among them.

### Limitation and Further Research

Several limitations were clarified as the further studies should extend more important variables for better contribution to both academic and business development area. The geographic was scoped in Thailand so other countries would have different findings. Additionally, qualitative approach is critically to be considered in order to support the findings with better and deeper insights.

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