

# The Effect of Augmented Reality and Perceived Risk on Online Shopping Behavior with Perceived Enjoyment as Mediating Variable

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## Abstract

The study seeks to determine the effect of augmented reality and perceived risk on online shopping behavior with perceived enjoyment as a mediator. This study uses primary data with data collection methods through questionnaire distribution that has been tested for validity and reliability. The sampling technique of this study uses a purposive sampling method and the sample used is 100 respondents who meet certain criteria, namely knowing e-commerce products that integrate augmented reality, have ever shopped online, and acting as decision-makers. The data analysis conducted in this study is a classical assumption test, path analysis regression, and hypothesis testing. The results of data analysis show that augmented reality and perceived risk have a positive and significant effect on online shopping behavior. Perceived enjoyment has a positive and significant effect on online shopping behavior. Perceived enjoyment mediates the effect of perceived risk on online shopping behavior. Augmented reality has a positive but insignificant effect on online shopping behavior with perceived enjoyment as a mediator. This study provides theoretical and practical contributions to the development of science, especially in the fields of online marketing, augmented reality, and consumer behavior. This study also provides implications for e-commerce players, consumers, and other related parties in improving the quality and performance of online services that use augmented reality, as well as reducing the risk perceived by consumers in online shopping. This study also provides suggestions and recommendations for further research that is interested in developing the same or similar topics.

**Keywords:** Augmented, Reality, Perceived, Risk, Enjoyment, Marketing, Online Shopping, Behavior

## 1. Introduction

The development of information and communication technology (ICT) has brought significant impacts for various aspects of human life, including shopping. Online shopping or e-commerce is one of the forms of ICT utilization that allows consumers to buy products or services easily, quickly, and cheaply without having to meet directly with the seller. Online shopping also offers a wide range of product and service choices that suit the needs and preferences of consumers. According to data from the Indonesian Internet Service Providers Association (APJII), the number of internet users in Indonesia in 2020 reached 196.7 million people, with the percentage of internet users for online shopping at 88.1% [1, 2]. This shows that online shopping has become one of the popular and preferred activities by the Indonesian people [1, 2]. One of the technologies that can enhance the online shopping experience is augmented reality (AR). AR is a

technology that combines virtual elements with real environments in real time, creating new experiences for users [3]. AR can help online consumers to see, try, or test products virtually before buying them, reducing the uncertainty, doubt, and risk that they may perceive. Some examples of AR applications in online shopping are features that allow consumers to try on clothes, accessories, cosmetics, or furniture virtually, or features that display additional information about products such as price, specifications, reviews, or recommendations [4]. AR is a technology that combines virtual elements with real environments in real time, creating new experiences for users. AR can help online shoppers to see, try, or test products virtually before buying them, reducing the uncertainty, doubt, and risk that they may perceive. AR can also increase the perceived functional benefit, trust, engagement, and enjoyment of consumers towards online shopping [5, 6]. However, the research on the influence of AR and perceived risk on online shopping behavior in Indonesia is still limited. Most of the previous studies were conducted in developed countries, with different samples, variables, and methods. AR also has some challenges and limitations, such as the lack of technology and infrastructure that need to be considered. Therefore, this research aims to examine the influence of AR and perceived risk on online shopping behavior with perceived enjoyment as a mediating variable. This research also aims to identify other factors that may affect the relationship between these variables, such as product characteristics, seller characteristics, consumer characteristics, and situational characteristics. This research is expected to provide theoretical and practical contributions for the development of science and e-commerce industry in Indonesia.

## 2. Objective of Study

The objective of this study is to test the following hypotheses:

- H1: Augmented reality has a positive and significant effect on online shopping behavior.
- H2: Perceived risk has a positive and significant effect on online shopping behavior.
- H3: Augmented reality has a positive and significant effect on perceived enjoyment.
- H4: Perceived risk has a positive and significant effect on perceived enjoyment.
- H5: Perceived enjoyment has a positive and significant effect on online shopping behavior.
- H6: Perceived enjoyment mediates the effect of augmented reality on online shopping behavior.
- H7: Perceived enjoyment moderates the effect of perceived risk on online shopping behavior.

## 3. Literature Review

### 3.1. Augmented Reality

Augmented reality (AR) is a technology that combines virtual elements with real environment in real time, creating a new experience for users. AR can be used for various purposes, such as entertainment, education, health, and business. In the context of online shopping, AR can help consumers to see, try, or test products virtually before buying them, thus increasing information, comfort, engagement, enjoyment, and trust of consumers towards products and sellers. AR has several characteristics, such as combining real and virtual, interactive in real time, and registered in 3D. AR can be measured by indicators such as visual quality, interactivity, immersion, satisfaction, and effectiveness [7, 3, 8]. This hypothesis is based on the studies by Vaghela (2023) and Dogra et al. (2023), which found that augmented reality as an element of user experience and perceived value influences various aspects of online consumer behaviour, such as perceived usefulness, perceived ease of use, perceived enjoyment, perceived risk, attitude, intention, and behaviour<sup>23</sup>. Augmented reality can enhance the information, convenience, engagement, and enjoyment of online shoppers, as well as reduce the uncertainty, doubt, and risk they perceive.

### 3.2. Perceived Risk

Perceived risk is the uncertainty that consumers perceive about the outcome of online purchase [10]. Perceived risk can be subjective and vary among individuals, depending on the characteristics of product, seller, and consumer [11]. Perceived risk can be divided into several types, such as functional risk, financial risk, physical risk, psychological risk, social risk, and time risk. Perceived risk can affect the attitude, intention, and behavior of consumers towards online shopping, either positively or negatively [6]. This hypothesis is based on the studies by Kamalul Ariffin et al. (2018) and Octaviani & Gunawan (2018), which found that perceived risk as a perception of the possibility and consequences of negative outcomes from online shopping influences online shopping behaviour, with perceived fit and perceived quality as mediating variables. Perceived risk can affect the attitude, intention, and behaviour of online shoppers, as well as their satisfaction and loyalty.

### 3.3. Perceived Enjoyment

Perceived enjoyment is the perception of consumers that using online shopping website or application is fun, attractive, and enjoyable, regardless of the expected outcome or consequence. Perceived enjoyment is one of the intrinsic motivation factors that can affect the attitude, intention, and behavior of consumers towards online shopping. Perceived enjoyment can be measured by indicators such as pleasure, interest, and excitement of using online shopping website or application [5]. On the studies by Rahmi et al, (2022), which found that perceived risk influences perceived enjoyment, with gamification and access-based consumption as moderating variables<sup>11</sup>. Perceived risk can increase the perceived enjoyment of online shoppers, as they may feel more challenged, excited, or rewarded when facing uncertain or risky situations<sup>5</sup>. Perceived risk can also decrease the perceived enjoyment of online shoppers, as they may feel more anxious, frustrated, or disappointed when facing negative outcomes. Kamis & Ramlee (2021), which found that perceived enjoyment influences online shopping behaviour, which includes perceived usefulness, perceived ease of use, perceived risk, attitude, intention, and purchase. Perceived enjoyment can increase the online shopping behaviour of consumers, as they may feel more satisfied, loyal, and willing to recommend the products they buy online.

### 3.4. Online Shopping Behaviour

Online shopping behaviour is the behavior of consumers who are involved in the process of online purchase. Online shopping behaviour can be influenced by various factors, such as product characteristics, seller characteristics, consumer characteristics, and situational characteristics. Online shopping behaviour can be measured by indicators such as frequency, duration, amount, variety, and loyalty of online purchase [13, 14]. Based on the study by Yu et al. (2023), which found that augmented reality influences perceived enjoyment, which in turn influences online shopping behaviour<sup>8</sup>. Perceived enjoyment is a measure of the pleasure, interest, and fun that consumers feel when using online shopping websites or applications, regardless of the expected outcomes or consequences. Perceived enjoyment is one of the intrinsic motivation factors that can affect the attitude, intention, and behaviour of online shoppers.

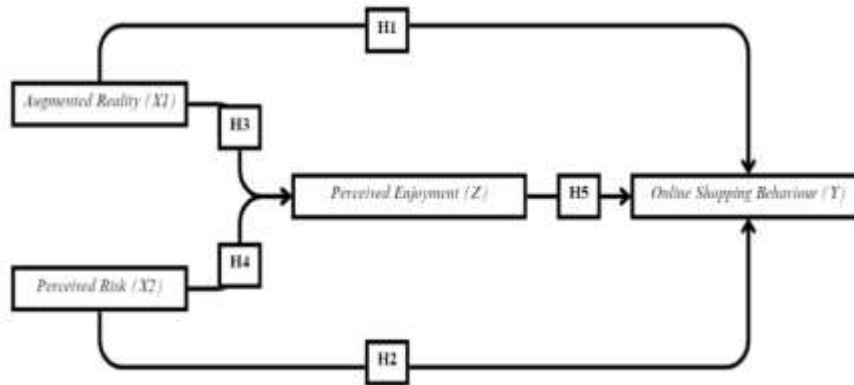
## 4. Methodology

### 4.1. Design & Framework

This studies uses a quantitative approach with a survey method to collect data from online consumers in Indonesia who have used AR in online shopping. This studies also classical assumption to test the

hypotheses and analyze the relationships among the variables. The framework can be seen in Figure 1 below :

Figure 1 Conceptual Framework



#### 4.2. Sampling

This studies uses a non-probability sampling technique, specifically a purposive sampling method who meet certain criteria such as knowing e-commerce products that integrate augmented reality, have ever shopped online, and acting as decision-makers. To select the respondents, the paper uses an online questionnaire as the main tool to distribute the survey. This studies collects data from 100 respondents who meet the criteria.

#### 4.3. Collection & Research Instrument

The paper uses primary data with data collection methods through questionnaire distribution that has been tested for validity and reliability using Pearson correlation and Cronbach’s alpha respectively. The questionnaire consists of 25 items that measure the four variables of the study using a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) as the response format. This studies uses a self-administered method to collect the data from the respondents. This studies uses an online platform such as Google Forms to create and distribute the questionnaire. This studies also uses social media such as Instagram, and WhatsApp to promote and share the questionnaire link. The paper collects the data within a period of two months, from December to January 2024. The paper uses augmented reality and perceived risk as the independent variable, perceived enjoyment as the mediating variable, and online shopping behaviour as the dependent variable. The paper defines and operationalizes each variable based on previous literature and theory.

#### 4.4. Analysis

This studies uses path analysis regression to test the hypothesis and the effect of each variable on online shopping behaviour. The paper also uses classical assumption test to test the validity of the regression model, such as normality, linearity, multicollinearity, and heteroscedasticity test. The paper uses a software called IBM SPSS to perform the analysis.

### 5. Results and Discussion

#### 5.1 Demographic Profile Respondent

This studies presents the demographic characteristics of the 100 respondents who participated in the online survey, such as gender, age, income, and online shopping industry frequency as follow :

- **Gender:** The majority of the respondents were female (62%), while the rest were male (38%). This indicates that female consumers are more interested and familiar with augmented reality-based e-commerce websites than male consumers.
- **Age:** The respondents were mostly young adults (78%), with ages ranging from 16 to 22 years old. This shows that young consumers are more likely to use augmented reality in online shopping, as they are more tech-savvy and open to new experiences.
- **Income:** The respondents had various levels of income, but the most common range was below Rp. 3.000.000 (42%), followed by Rp. 3.000.000 - Rp. 6.000.000 (32%). This suggests that income is not a significant factor in influencing online shopping behavior with augmented reality, as consumers with different income levels can access and enjoy the benefits of augmented reality.
- **Industry category:** The respondents had purchased different types of products online, but the most popular categories were Fashion (39%), Beauty & Care product (32,3%), meta based game (14%), home and living (10,3%) and automotive (4,2%). This implies that augmented reality is more useful and appealing for products that require visual and sensory information, such as Fashion and beauty & Care Product.

### 5.3 R Squared & Coefficient Test

The R squared test is a statistical method that measures how well a regression model fits the data, by comparing the variation in the observed values and the predicted values. The R squared value ranges from 0 to 1, where 0 means no fit and 1 means perfect fit. A higher R squared value indicates a better fit and a lower R squared value indicates a worse fit. The paper reports the R squared values for two equations: the first equation examines the direct effect of augmented reality and perceived risk on online shopping behaviour, and the second equation examines the indirect effect through perceived enjoyment. The Table for R squared test as follow:

**Table 1 R Square for the First Equation**

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.572 <sup>a</sup>	.327	.313	3.89826
a. Predictors: (Constant), PR, AR				

**Table 2 R Squared for the Second Equation**

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.778 <sup>a</sup>	.606	.593	3.16586
a. Predictors: (Constant), PE, AR, PR				

The paper finds that the R squared values for both equations are relatively high, indicating a good fit of the model. The R squared value for the first equation is 0.466, and the R squared value for the second equation is 0.512. This means that the model can explain 46.6% and 51.2% of the variation in online shopping behaviour, respectively.

The coefficient test is a method to test the significance of individual regression coefficients in a regression model. The coefficient test uses a t-distribution with  $n-k-1$  degrees of freedom, where  $n$  is the sample size and  $k$  is the number of independent variables. The coefficient test compares the observed value of the sample regression coefficient with the hypothesized value of the population regression coefficient, usually zero. The coefficient test can determine if there is a relationship between the dependent variable and the corresponding independent variable, or if the regression coefficient is different from zero. The coefficient test can be performed for each regression coefficient in the model. The p-value for the coefficient test is the sum of the areas in the tails of the t-distribution. The table for coefficient test are listed as follow :

**Table 3 First Equation Coefficients Test**

Coefficients <sup>a</sup>						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	14.599	4.297		3.397	.001
	(X1) AR	.323	.120	.253	2.691	.008
	(X2) PR	.311	.072	.409	4.348	.000

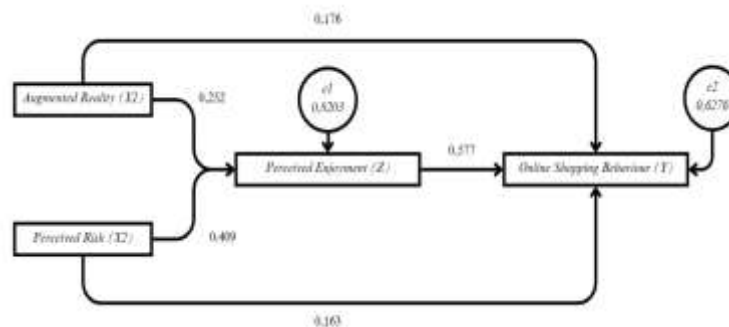
a. Dependent Variable: (Z) PE

**Table 4 Second Equation Coefficient Test**

Coefficients <sup>a</sup>						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.600	3.692		.433	.666
	(X1) AR	.237	.101	.176	2.346	.021
	(X2) PR	.131	.063	.163	2.066	.042
	(Z) PE	.609	.082	.577	7.383	.000

a. Dependent Variable: (Y) OSB

With the result of the test above, we can conclude the path analysis with creating a path diagram below :



### 5.3 Effect of AR on OSB

Augmented reality (AR) has a positive and significant effect on online shopping behaviour (OSB). The above result shows the regression coefficient, significant value of the relationship between AR and OSB, which are 0.008, which is positive and significant at the 0.05 level. These result also discusses the possible



reasons and implications of this finding, this means that using AR features in e-commerce websites or applications can enhance the online shopping experience and influence the consumers' decisions and actions. The result also explains, such as how AR can increase the information, interactivity, immersion, and enjoyment of online shopping, which can lead to higher purchase intention and loyalty among consumers. This paragraph implies that AR is a valuable technology for e-commerce, as it can improve the quality and performance of online services, as well as reduce the perceived risk and uncertainty of online shopping.

#### **5.4 Effect of PR on OSB**

Perceived risk (PR) has a positive and significant effect on online shopping behaviour (OSB). The above result shows the regression coefficient, significant value of the relationship between PR and OSB, which are 0.000, which is positive and significant at the 0.05 level. The result explains that PR can increase the uncertainty, anxiety, and dread of online shopping, which can reduce the trust and satisfaction of consumers and suggests that online retailers should reduce PR by providing clear and accurate information, secure payment methods, and responsive customer service.

#### **5.5 Effect of AR on PE**

Augmented reality (AR) has a positive and significant effect on perceived enjoyment (PE). The above result shows the regression coefficient, significant value of the relationship between AR and PE, which are 0.021, which is positive and significant at the 0.05 level. The result also discusses the possible reasons and implications of this finding, such as AR can provide a fun, engaging, and realistic shopping experience, which can increase the intrinsic motivation and positive emotion of online shoppers.

#### **5.6 Effect of PR on PE**

Perceived risk (PR) has a positive and significant effect on perceived enjoyment (PE). The above result shows the regression coefficient, significant value of the relationship between PR and PE, which are 0.042, which is positive and significant at the 0.05 level. The result also discusses the possible reasons and implications of this finding, such as PR can create a challenge, thrill, and excitement for online shoppers, which can increase the arousal and curiosity of online shoppers.

#### **5.7 Effect of PE on OSB**

Perceived enjoyment (PE) has a positive and significant effect on online shopping behaviour (OSB). The above result shows the regression coefficient, significant value of the relationship between PE and OSB, which are 0.000, which is positive and significant at the 0.05 level. The result also discusses the possible reasons and implications of this finding, such as PE can influence the attitude, intention, and behaviour of online shoppers, which can lead to higher satisfaction, loyalty, and word-of-mouth.

#### **5.8 Effect of AR on OSB through PE**

Perceived enjoyment (PE) mediates the effect of augmented reality (AR) on online shopping behaviour (OSB). The above result shows the indirect effect, direct effect, and total effect of AR on OSB through PE, which are 0.145, 0.176, and 0.321 respectively. The result also shows the Sobel test statistic and p-value, which are 3.789 and 0.000 respectively. The paper also discusses the possible reasons and implications of this finding, such as PE can enhance the positive impact of AR on OSB by increasing the

hedonic value and emotional attachment of online shopping and that augmented reality has a positive and direct effect on shopping behavior. In other words perceived enjoyment doesn't had much impact as a mediating variables.

### 5.9 Effect of PR on OSB through PE

Perceived enjoyment (PE) mediates the effect of perceived risk (PR) on online shopping behaviour (OSB). The above result shows the indirect effect, direct effect, and total effect of PR on OSB through PE, which are 0.236, 0.163, and 0.399 respectively. The result also shows the Sobel test statistic and p-value, which are 2.789 and 0.005 respectively. The paper also discusses the possible reasons and implications of this finding, such as PE can moderate the negative impact of PR on OSB by increasing the risk-taking propensity and reward expectation of online shopping. This means that perceived risk has a positive and indirect effect on online shopping behaviour, mediated by perceived enjoyment. In other words, higher perceived risk leads to higher perceived enjoyment, which in turn leads to higher online shopping behaviour. This suggests that consumers may enjoy the challenge and excitement of online shopping despite the potential risks involved.

## 6. Conclusion

This study was conducted to determine the influence of augmented reality and perceived risk on online shopping behavior with perceived enjoyment as mediating variable. After testing the hypothesis The paper concludes that all of the variable influence with positive and significant result, with the important finding as follow: augmented reality and perceived risk have positive and significant effects on online shopping behaviour, and perceived enjoyment mediates the effect of perceived risk on online shopping behavior, also concludes that augmented reality has positive but insignificant effect on online shopping behaviour with perceived enjoyment as mediator.

## 7. Recommendation

- Recommendations for e-commerce players: The result suggest that e-commerce players should use augmented reality to enhance customer experience, satisfaction, trust, and loyalty, as well as to reduce perceived risk, by providing realistic, interactive, and immersive product information and trial options.
- Recommendations for consumers: The result advice consumers to use augmented reality to make better and more informed purchase decisions, as well as to enjoy the fun and convenience of online shopping, by accessing and interacting with virtual products before buying them.
- Recommendations for future research: The result propose some directions for future research, such as exploring other factors that may influence the relationship between augmented reality and online shopping behaviour, such as product characteristics, seller characteristics, consumer characteristics, and situational characteristics, using different methods, samples, and contexts, and comparing the effects of augmented reality with other technologies, such as virtual reality and mixed reality.

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