# THE INFLUENCE OF AUGMENTED REALITY FEATURES ON CONSUMER PURCHASE DECISION IN ONLINE SHOPPING IN MELAKA

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UNIVERSITI TEKNIKAL MALAYSIA MELAKA

# FACULTY OF TECHNOLOGY MANAGEMENT AND TECHNOPRENEURSHIP UNIVERSITI TEKNIKAL MALAYSIA MELAKA (UTeM)

# THE INFLUENCE OF AUGMENTED REALITY FEATURES ON CONSUMER PURCHASE DECISION IN ONLINE SHOPPING IN MELAKA

ii

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This Report Submitted in Partial Fulfilment of The Requirement for The Award of Bachelor Of Technology Management (High Technology Marketing)

With Honors

# UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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# DECLARATION

"I hereby admit that this is my own work except for summary of except of which I had mentioned the source." I declare that this thesis entitled "The Influence Of Augmented Reality Features On Consumer Purchase Decision In Online Shopping In Malacca" is the result of my own research except as cited in the references. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

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## APPROVAL

# 'We hereby admit that we have read this thesis and in our opinion this thesis meet the scope and quality for the purpose of awarding Bachelor of Technology Management (High Technology Marketing).'



SIGNATURE:

NAME OF PANEL: ASSOC. PROF TS. DR. FAM SOO FEN

DATE: 15 / 02 / 2025

### **DEDICATION**

I want to thank God for granting me life, intelligence, comprehension, and creativity. I would like to thank my family for their education and encourage me to continue my studies until I obtain a bachelor's degree. In addition, I would like to thank my supervisor for my final year project, Ts.Dr. Norhafizah Binti Mohamad Dasuki as well as my seniors .Without their assistance, this investigation cannot be completed in a brief period of time.



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## ABSTRACT

The study aims to determine the relationship between AR features as a factor that can influence consumer purchase decision in online shopping. The research framework is formed by the integration of using S-O-R framework. The quantitative method was adopted in this study by using an online survey form by Google Form and distributed randomly to the individuals who is familiar to AR technology in online shopping that are from diverse demographic backgrounds. SPSS (Statistical Package for the Social Sciences) is often used for preliminary data analysis, such as data cleaning, descriptive statistics, and initial hypothesis testing. The research findings indicate that AR technology significantly affects consumer trust and satisfaction, thereby influencing their purchase decisions. By reducing uncertainty and providing a more immersive shopping experience, AR features help consumers make more informed and confident purchasing decisions. Furthermore, the finding serves as a reference for online retailers and AR developers in the knowledge that can inform strategic decisions in fostering innovations and designing the best AR features that can optimize customer retention and loyalty.



## ABSTRAK

Kajian ini bertujuan untuk menentukan hubungan antara ciri-ciri realiti terimbuh (AR) sebagai faktor yang boleh mempengaruhi keputusan pembelian pengguna dalam pembelian dalam talian. Kerangka penyelidikan dibentuk melalui integrasi penggunaan kerangka S-O-R. Kaedah kuantitatif telah diterapkan dalam kajian ini dengan menggunakan borang tinjauan dalam talian melalui Google Form dan diedarkan secara rawak kepada individu yang biasa dengan teknologi AR dalam pembelian dalam talian dari latar belakang demografi yang berbeza. SPSS (Pakej Statistik untuk Sains Sosial) sering digunakan untuk analisis data awal, seperti pembersihan data, statistik deskriptif, dan ujian hipotesis awal. Penemuan penyelidikan menunjukkan bahawa teknologi AR memberi kesan yang ketara kepada kepercayaan dan kepuasan pengguna, dengan itu mempengaruhi niat pembelian mereka. Dengan mengurangkan ketidakpastian dan menyediakan pengalaman membeli-belah yang lebih imersif, ciri-ciri AR membantu pengguna membuat keputusan pembelian yang lebih terinformasi dan yakin. Tambahan pula, penemuan ini berfungsi sebagai rujukan untuk peruncit dalam talian dan pembangun AR dalam pengetahuan yang boleh memaklumkan keputusan strategik dalam memupuk inovasi dan merancang ciri-ciri AR terbaik yang boleh mengoptimumkan pengekalan dan kesetiaan pelanggan.

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

# **TABLE OF CONTENT**

CHAPTER	CONTENT	PAGES
	DECLARATION	····· III
	APPROVAL	······ IV
	DEDICATION	·····V
	ACKNOWLEDGEMENT	····· VI
	ABSTRACT	····· VII
	ABSTRAK	······ VIII
	LIST OF TABLES	XIV
	LIST OF FIGURES	······XVI
	LIST OF ABBRIEVATIONS	·····XVII

# UNIVERSITI TEKNIKAL MALAYSIA MELAKA

# CHAPTER 1 TITLE

<b>1.0 INTRODUCTION1</b>
1.1 BACKGROUND OF STUDY ······1-3
1.2 PROBLEM STATEMENT ····································
1.3 RESEARCH QUESTION ······ 5
1.4 RESEARCH OBJECTIVE ······ 5-6
1.5 SCOPE OF STUDY ······6
1.6 LIMITATION OF STUDY6-7
1.7 SIGNIFICANCE OF STUDY ······7-9
<b>1.8 IMPORTANCE OF STUDY9-10</b>

	1.9 THESIS OUTLINE ······ 10
CHAPTER 2	TITLE
	<b>2.0 INTRODUCTION</b> 11
	2.1 AUGMENTED REALITY (AR) ······ 11-12
	2.1 HISTORY OF AR 12-13
	2.2 TYPE OF AR
	2.2.1 Marker-based AR 13-14
	2.2.2 Marker-less AR 14-15
	2.3 DECISION MAKING EXPERIENCE ······ 15-17
	2.4 ONLINE SHOPPING ······17
	2.5 AFFECT-AS-INFORMATION THEORY AND
	S-O-R FRAMEWORK ······ 17-19
	2.5.1 Affective responses to AR 19-20
	2.5.2 Cognitive responses to AR ·····20
	2.5.3 Conative responses to AR 20-21

# 2.7 PROPOSED RESEARCH FRAMEWORK

•••••	
2.7.1 3D VISUALIZATION IN I	REAL ENVIRONMENT
2.7.2 VIRTUAL TRY-ON·······	
2.7.3 CUSTOMIZATION AND I	PERSONALIZATION ·23
2.7.4 PURCHASE DECISION ···	
2.8 HYPOTHESIS ······	
2.9 SUMMARY	

CHAPTER 3	TITLE
	3.1 INTRODUCTION26
	3.2 RESEARCH DESIGN ····· 26-27
	3.2.1 DESCRIPTIVE RESEARCH DESIGN ······ 27
	3.3 METHODOLOGICAL CHOICE ······ 28-29
	3.4 SOURCES OF DATA ····· 29
	3.4.1 Primary Data Sources 29-30
	3.4.2 Secondary Data Sources 30
	3.5 RESEARCH STRATEGY ······30
	3 5 1 Questionnaire Design
	2.5.2 Pil-4 Test
	3.5.2 Pilot Test
	3.6 SAMPLING DESIGN ····· 36
	3.6.1 Sampling Technique ······ 36-37
	3.6.2 Sampling Size 37-38
	3.7 RESEARCH LOCATION
	3.8 TIME HORIZON38-39
	3.9 RELIABILITY AND VALIDITY
	3.10 DATA ANALYSIS METHOD 40
	3.10.1 Descriptive Analysis 40
	3.10.2 Pearson's Correlation Analysis 40-41
	3.10.3 Multiple Regression Analysis ······41-42
	3.11 SUMMARY

4.0	<b>INTRODUCTION43</b>
4.1	PILOT TEST 43-44
	4.1.1 Reliability of Pilot Test ······ 44
	4.1.2 Pilot Test Reliability for Each Variables
4.2	2 DEMOGRAPHIC BACKGROUND 45
	4.2.1 Gender 45-46
	4.2.2 Race
	4.2.3 Age 47-48
	4.2.4 Education
	4.2.5 Have Respondents Heard About AR Before?
	49-50
	4.2.6 Have Respondents Used AR Technology Before while
	Online Shopping?
	B DESCRIPTIVE STATISTICS ON INDEPENDENT
	VARIABLE
	4.3.1 Virtual Try-on
	4.3.2 3D Visualization in Real Environment 53-54
	4.2.2 Customization and Danson direction 54.55
	4.3.3 Customization and Personalization
4.4	Pearson's Correlation Coefficients Analysis55-57
	4.4.1 Virtual Try-On ·····57
	4.3.2 3D Visualization in Real Environment 58
	4 3 3 Customization and Personalization
	4.5.5 Customization and refsonalization 50-55
4.5	5 MULTIPLE REGRESSION ANALYSIS 59-60
4.6	5 COEFFICIENTS ······ 60
4.7	ANALYSIS OF VARIANCE (ANOVA)61

	4.8 SUMMARY61
CHAPTER 5	TITLE
	5.0 INTRODUCTION
	5.1 DISCUSSION
	5.2 HYPOTHESIS TESTING ······ 63-65
	5.3 DISCUSSION OF OBJECTIVE 65-68
	5.4 LIMITATION OF STUDY68-69
	5.5 RESEARCH IMPLICATION
	5.5.1 Theoretical Implication
	5.5.2 Practical Implication
	5.6 RECOMMENDATION FOR FUTURE STUDY 72-73
	5.7 CONCLUSION
<b>REFERENCE</b> ···	75-84
APPENDIX ·····	

# LIST OF TABLES

FIGURE	TITLE	PAGE
Table 3.1	Likert Scales	31
Table 3.2	Questionnaire Design	31-34
Table 3.3 Table 3.4	Krecjie and Morgan Table Cronbach's Alpha Coefficient Range	37 39
Table 3.5	Pearson's Correlation Coefficients.	40
Table 4.1	Case Processing Summary	44
Table 4.2	Reliability Analysis of Pilot Test	
Table 4.3	Pilot Test Reliability for Each Variables	45
Table 4.4	Gender of Respondent	45
Table 4.5	Race of Respondent	46
Table 4.6	Age of Respondent	47
Table 4.7	Education Level of Respondents	48
Table 4.8	Have Respondents Heard About AR Before?	49

Table 4.9	Have Respondents Used AR Technology Before while	
	Online Shopping?	50
<i>Table 4.10</i>	Demographic Profile of The Respondent	51-52
Table 4.11	Virtual Try-On Preferred by Respondents	53
Table 4.12	3D Visualization in Real Environment Preferred by	
	Respondents	54
Table 4.13	Customization and Personalization Preferred by	
	Respondents	55
Table 4.14	Pearson's Correlation Coefficients	56
Table 4.15	Correlation Analysis for All Variables	
		56
Table 1 16	Correlation Between Virtual Try-on and Consumer	
10010 4.10	Bunchase Desision in Online Shonning	57
	RSITI TEKNIKAL MALAYSIA MEL	AKA
Table 1 17	Correlation Between 3D Visualization in Real	
10010 4.17	Eminormont and Consumer Durchase Desision in	
	<i>Environment and Consumer Purchase Decision in</i> Online Shopping	58
Table 4.18	Correlation Between Customization and Personalization	n
	and Consumer Purchase Decision in Online Shopping	59
Table 4.19	Model Summary of Multiple Regression Analysis	59
Table 4.20	Coefficient's Table	60
Table 4.21	ANOVA Table	61

# LIST OF FIGURES

FIGURE	TITLE	PAGE
Figure 1.1	Sustainable Development Goal 8	8
Figure2.1	History of AR	13
Figure 2.2 Figure 2.3 Figure 2.4	Marker-based AR Marker-less AR Theoretical Framework of S-O-R	14 15 19
Figure 2.5	Proposed Framework of the influence of AR feature on consumer decision making in online shopping	ونيو
UNIVER Figure 4.1	<b>RSITI TEKNIKAL MALAYSIA MEL</b> Gender of Respondent	AKA 46
Figure 4.2	Race of Respondent	47
Figure 4.3	Age of Respondent	48
Figure 4.4	Education Level of Respondent	49
Figure 4.5	Have Respondents Heard About AR Before?	50
Figure 4.6	Have Respondents Used AR Technology Before while Online Shopping?	51

# LIST OF ABBRIEVIATIONS

ABBREVIATIONS	MEANING
DOSM	Department of Statistics Malaysia
SPSS	Statistical Package for Social Sciences
S-O-R	Stimulus, Orgasm, Response
WOM	Word of Mouth
VTO	Virtual Try-On
VRE	3DVisualization in Real Environment
CP	Customization and Personalization
PD	Purchase Decision
AR AR ALL A	Augmented Reality
VR UNIVERSITI TE	Virtual Reality

## **CHAPTER 1**

#### **INTRODUCTION**

# **1.0 INTRODUCTION**

In Chapter 1, the researcher provide the overview of the study by discussing the background of Augmented Reality (AR). The discussion aims to provide a better understanding for the readers with information of this topic. The researcher explain the research problems in problem statement section where there are certain issues related to Augmented Reality which involve some research gaps that need to be addressed. The issues of Augmented Reality were highlighted to show the importance of conducting the study in the problem statement section. Not only that, this study also shows there are research gaps that are significant enough to be conducted. The researcher had form three research questions and three research objectives based on the research problems. The data collected is aligned with the research questions and objectives and this chapter outline the scope of the study which indicates the focus and limitation of the study.

## **1.1 BACKGROUND OF THE STUDY**

These days, Augmented Reality (AR) apps on smartphones are being used by online shops more and more to showcase their merchandise (Nikhashemi et al., 2021). Online shoppers can virtually "try on" clothing, "place" furniture in a designated area of their house, or scan a product image with their smart device to access more product information with augmented reality product display applications (Smink et al., 2020). Online shoppers can perform pre purchase product inspections with less search expenses thanks to augmented reality during these activities

(Dwivedi et al., 2021). For instance, most businesses have started to provide innovative shopping experiences using augmented reality applications, such as Sephora-to-Go, See by Rimmel, and Makeup Genius by L'Oréal.Consumers may now virtually experience goods and services thanks to modern AR technology, which boosts confidence in the decision to buy (Fan et al., 2020; Hilken et al., 2018; Tan et al., 2022; Wang et al., 2023).

Through the use of gadgets like smartphones, augmented reality (AR) is being defined as an improved real time perspective of the physical environment by fusing virtual, computer generated pictures, such as 3D models, into the actual world (Shin 2019). The technology enables boundless engagement between the digital and real-world domains, augmenting users' sensory experiences and substantially elevating customer support encounters (Kim 2013; Mota et al. 2018).

Moveover, the incorporation of the brand into the "augmented self," ARenabled experiences enhance the bond between consumers and brands (Scholz & Duffy, 2018). This is particularly pertinent to premium businesses because the appearance and fit of the product for the customer are crucial factors (McLean & Wilson, 2019). AR powered three dimensional product representations produce the best possible shopping experiences, lower confusion about product performance, offer customers value added propositions at several touchpoints, and foster great customer engagement (Nikhashemi et al., 2021).

Not only that, distinctive AR features create a shift in the way people shop by seamlessly superimposing virtual products on consumers real surroundings (Whang et al., 2021). These AR features are designed to augment (by adding graphics, sound, or videos), enhance consumer experiences (Jung et al., 2021), produce the sense that virtual products are present in reality, and give the impression of "being there" (Daassi and Debbabi, 2021). For example, the powerful features of AR allow consumers to see the effects of a virtual wardrobe placed in their bedrooms. Consumers can manipulate and interact with virtual products, such as 360° rotation and zooming in and out. Importantly, implementing and combining 3D interfaces, dynamic animation, sound, video, and graphics allows AR retail companies to display virtual products in more vivid and novel ways (Whang et al., 2021; Yuan et

al., 2021). On the one hand, rich AR features embedded in shopping scenarios provide intuitive cues to facilitate an in depth understanding of products. Other than that, AR creates an exciting, pleasant, and playful atmosphere and provides consumers with a fun online shopping experience (Qin et al., 2021b). Enabled by these novel features, AR retailing enhances consumer engagement and promotes sales in heuristic and effective ways (Arghashi and Yuksel, 2022).

Presently, augmented reality has shifted the focus of buying from traditional methods to immersive ones. Over the past ten years, immersive technologies like Augmented Reality (AR) have grown exponentially and changed the way consumers engage during purchasing (Rajagopal, 2022). Large companies have so hopped on the Augmented Reality (AR) bandwagon in an effort to create a truly immersive AR purchasing experience. In 2020, 94% of respondents are anticipated to continue using augmented reality for purchasing, as they did in the COVID-19 pandemic, per a Deloitte survey.

Finally, as Augmented Reality (AR) technology becomes more widely used in online retailing, businesses and market researchers are confronted with the issues of how customers respond to AR and whether or not using AR in online stores influences customers purchase decisions. Businesses may determine the best course of action to optimize their online stores by gaining insights into how customers behave when buying with augmented reality.Finally, as augmented reality (AR) technology becomes more widely used in online retailing, businesses and market researchers are confronted with the issues of how customers respond to AR and whether or not using AR in online stores influences customers purchase decisions. Insights into the behaviour of consumers in shopping situations with AR help companies to derive measures for action to optimize their online shops.

### **1.2 PROBLEM STATEMENT**

Although (AR) is expanding quickly in the retail industry and has the potential to completely transform the shopping experience, there is still a significant knowledge gap about the precise ways in which AR features affect consumers purchase decision. Previous research has mostly concentrated on the technology

aspects of augmented reality (AR) and its potential advantages in improving the retail experiences and consumer involvement of consumers (Nikhashemi et al., 2021). According to these research (Whang et al., 2021), Augmented Reality (AR) has the potential to increase consumer involvement, reduce purchase uncertainty, and provide immersive and interactive retail experiences. But instead of going into detail on how certain AR features affect consumers' perceptions, assessments, and purchase intentions, these studies frequently offer a general overview of AR technology (Scholz & Duffy, 2018; Rajagopal, 2022).

Despite the increasing adoption of AR in online retailing, there is a lack of comprehensive research exploring how AR features influence consumer perceptions and evaluations of products. Scholz & Duffy (2018) argue that understanding the psychological and cognitive processes underlying consumers interactions with AR features is crucial for leveraging the full potential of AR in online shopping environments. However, there is limited empirical research that examines the specific impact of AR features, such as 3D visualization, interactive product simulations, and virtual try ons, on shaping consumer perceptions and evaluations (Jung et al., 2021; Yuan et al., 2021).Regarding the impact of augmented reality features on consumer purchase intentions, there is still a substantial study gap. While some research has looked at how AR can help consumers feel less uncertain about their purchases by giving them immersive and interactive experiences (Dwivedi et al., 2021; Qin et al., 2021b), little is known about the precise ways that various AR features influence consumers propensity to buy. Finding the AR elements that most effectively influence purchase intentions by lowering perceived risks and uncertainties is critical (Tan et al., 2022; Wang et al., 2023).

Nevertheless, little is known about how customers view and trust particular augmented reality elements, like 3D visualization, interactive product simulations, and virtual try ons, and how this influences their intention to make a purchase (Choi et al., 2021; Lee et al., 2021). In order to design AR features that inspire confidence and make purchasing decisions easier, it is imperative that AR developers and online retailers have a thorough understanding of consumer trust in AR. This understanding can yield valuable insights into the factors that influence consumer trust (Choi et al., 2021; Lee et al., 2021). Choi et al. (2021), for instance, stressed the significance of

confidence in augmented reality elements, like virtual try ons and 3D representation, and its major influence on customers buy intentions in online shopping settings.

Therefore, there is a pressing need for more empirical research to explore the specific dimension of the augmented reality features influence on consumer purchase decision in online shopping. This research will not only contribute to the academic literature but also provide practical implications for AR developers and online retailers to optimize the design and implementation of AR features to enhance consumer trust and facilitate purchasing decisions.

# 1.3 RESEARCH QUESTION

This research aims to provide information about the factors on the influence of augmented reality features on consumer purchase decision in online shopping in Melaka. Additionally, the research aims to analyze the weigh of each factor and identify the first choice selection of people in Melaka based on the weight of each factor.

RQ1: What is the situations in AR that influence consumer during purchase decision in online shopping?

RQ2: What is the factors of AR features which influence consumer purchase decision in online shopping?

RQ3: What is the relationship between AR features and consumer purchase decision in online shopping?

## **1.4 RESEARCH OBJECTIVE**

RO1: To measure the influence of Augmented Reality(AR) technology on consumer purchase decision..

RO2: To analyze the influence of specific AR features on how AR features influence consumer purchase decision.

RO3: To examine the relationship between AR features and consumer purchase decision in online shopping.

#### **1.5 SCOPE OF THE STUDY**

The purpose of this study is to investigate how augmented reality (AR) elements affect consumers purchase decision when they shop online, with a particular focus on Melaka, Malaysia. In order to comprehend the local context and cultural elements impacting customer behavior, the study will focus on Melaka consumers and online shopping platforms. Temporally, the study will highlight current trends and technology in augmented reality, concentrating especially on the last five years to capture the latest developments and rates of consumer uptake. The study will address a number of important topics, such as the use and prevalence of Augmented Reality (AR) technology in online shopping platforms, the kinds and characteristics of AR applications used in online retail, the ways that consumer behavior is currently influenced by AR technology when making decisions, the ways that factors like perceived usefulness, perceived ease of use, and the quality of the AR experience influence consumer behavior, and the ways that particular AR features-like 3D visualization, interactive product simulations, and virtual try ons are evaluated in terms of their ability to reduce purchase uncertainty and influence purchase intentions. Additionally, the study will examine the factors that influence consumer trust in AR technology and the relationship that exists between consumer perception, trust, and purchase intentions in online shopping environments.

However, the study will exclude the influence of AR technology in physical retail stores, focus exclusively on Melaka, and will not delve into other emerging technologies such as virtual reality (VR), unless directly related to the discussion of AR in online shopping.

#### **1.6 LIMITATION OF STUDY**

There are several limitations that should be considered. First, the study's findings may be limited by the sample size and the demographic characteristics of the participants, as the research will focus exclusively on consumers in Melaka,

which may not be representative of the broader population or diverse consumer groups. Second, AR technology is rapidly evolving, and new features and applications are continuously being developed, potentially making the study's findings outdated.

Furthermore, the study's findings may be influenced by the cultural and regional characteristics of Melaka, which may not be applicable to consumers in other regions or countries with different cultural backgrounds.

Not only that, , the study will likely rely on self reported data such as survey and questionnaire received from consumers, which may be subject to biases and inaccuracies, potentially affecting the reliability and validity of the findings. Moreover, the study focuses exclusively on online shopping environments and does not consider the influence of AR technology in physical retail stores, which may limit the comprehensiveness of the analysis.

Lastly, the findings of the study may be influenced by external factors such as market trends, economic conditions, and global events, which are beyond the control of the research. Despite these limitations, the study aims to provide valuable insights into the influence of AR features on consumer purchase decision in online shopping environments, contributing to the existing body of knowledge and offering practical implications for AR developers and online retailers in Melaka.

#### **1.7 SIGNIFICANCE OF STUDY**

The impact of augmented reality (AR) features on online consumer purchase decisions, particularly in Melaka, Malaysia, is a topic of great scholarly interest. It fills in holes in the literature by examining the currently unstudied topic of how augmented reality features affect consumers perceptions and purchase intentions (Shin, 2019; Jung et al., 2021). There are currently insufficient thorough studies on the effectiveness of specific AR features in lowering purchase uncertainty and influencing consumer purchase decisions, despite earlier research emphasizing the technological aspects and advantages of AR in improving consumer engagement (Whang et al., 2021; Dwivedi et al., 2021).

Not only that, the study also holds practical implications for online retailers and AR developers. Insights from this research can guide the design of more engaging and effective AR applications, ultimately enhancing the overall online shopping experience (Hilken et al., 2018; Tan et al., 2022). Moreover, understanding consumer behavior in AR-enabled shopping environments can help companies optimize their online shops, leading to increased sales and customer satisfaction (Rajagopal, 2022). Additionally, the study will shed light on the factors influencing consumer trust in AR technology, which is crucial for designing features that inspire confidence and facilitate purchasing decisions (Choi et al., 2021; McLean & Wilson, 2019).

Furthermore, the study has applications for both AR developers and internet merchants. The creation of more captivating and useful augmented reality applications can be influenced by the findings of this study, which will ultimately improve the general online shopping experience (Hilken et al., 2018; Tan et al., 2022). Additionally, by comprehending how customers behave in AR enabled retail settings, businesses can enhance their online stores and boost revenue and customer satisfaction (Rajagopal, 2022). The research will also provide insight into the elements that impact consumer trust in augmented reality (AR) technology, which is important for developing features that encourage confidence and ease the process of making purchases (Choi et al., 2021; McLean & Wilson, 2019).



Figure 1.1: Sustainable Development Goal 8

The adoption of Augmented Reality (AR) features in online shopping significantly contributes to decent work and economic growth, which align with the Sustainable Development Goal 8. AR technologies, such as virtual try ons and interactive product visualizations, are able to enhance the consumer online shopping experience, by attracting more consumers and increasing e-commerce revenue. This growth stimulates demand for skilled professionals, including AR developers, designers, and digital marketers, to develop and maintain these technologies. Moreover, e-commerce platforms adopting AR often experience a surge in demand, leading to the expansion of logistics and supply chain operations, creating additional job opportunities. For instance, the global adoption of AR and VR is projected to impact up to 23 million jobs by 2030, with significant effects in large economies.

In summary, the research contributes to academic advancement by filling research gaps and providing empirical evidence on the influence of AR features on consumer purchase decision in online shopping environments. It also offers practical implications for optimizing online shops, enhancing consumer engagement, and driving market growth in the rapidly expanding AR market.

### **1.8** IMPORTANCE OF STUDY

This research aims to investigates how Augmented Reality (AR) features influence consumer purchase decision in online shopping, focusing on Melaka, Malaysia. AR blends virtual computer-generated visuals with the real environment, elevating the interaction between the digital and physical worlds. With a swift growth in the AR market and forecasts predicting its continued expansion, more online retailers are embracing AR technologies. They use AR applications to provide engaging experiences such as virtual product trials, with the goal of minimizing purchase hesitations and boosting consumer confidence.

Positive purchase decisions are consequences of the perceived value and the corresponding experiential values concomitant to the brand, as simulated by the application (Liu et al., 2017; Tseng, et al., 2021; Yu & Zheng, 2022). The notion of WOM can be defined as the tendency of the consumer to advocate a product or a brand or, in this case, an AR application, enabled by invested loyalty (Bahri-Ammari et al., 2016; Shin & Jeong, 2022; Song & Kim, 2022). WOM includes both the quality of the information shared, as a cognitive evaluation of the experiences, and the persuasiveness of the recommendation, driven by the emotions with which the information is shared (Sweeney et al., 2012). Both components of WOM should be

prominent if customers have rich experiences with an AR application that enhances the fairness evaluations for the brand, as expected in an offline setting (Christ-Brendemuehl & Schaarschmidt, 2022; Zanger et al., 2022).

Not only that, In regions like Melaka, AR can empower small and medium sized enterprises (SMEs) to compete with larger players by offering innovative shopping experiences, by fostering entrepreneurship, and boosting the local economy. The AR technologies which offer the ability to provide immersive, interactive, and personalized shopping experiences had redefined consumer expectations and also opens new frontiers for online retailers. This technological advancement not only enhances customer engagement but also supports sustainable economic development

#### **1.9 THESIS OUTLINE**

The first chapter starts by introducing the study as well as its problem statement followed by research questions and objectives. It highlights the growing importance of Augmented Reality (AR) in online shopping, its benefits, and gaps in existing research. The study establishes its scope and defines its limitations while emphasizing the relevance of how 3D visualization, virtual try on, and customization aspects of augmented reality elements shape consumer choices. The second chapter provides an extensive review of various resources which explores AR history and types together with purchase decision pathways and uses the S-O-R framework theory. The developed framework identifies virtual try on, 3D visualization, and customization as independent research variables which analyze their correlation with purchase decisions as the dependent variable.

The research design alongside the sampling method and data collection procedures receive a complete explanation in Chapter 3. In chapter 4, the researcher explains how surveys combined with pilot testing help to establish reliability standards. This chapter demonstrates an analysis of data and presents results through statistical methods including Pearson's correlation and multiple regression to study AR feature impacts on consumer conduct. The final chapter discusses findings together with hypothesis examination and explores research limitations before recommending future applications for both AR developers and online retailers.

### **CHAPTER 2**

#### LITERATURE REVIEW

# 2.0 INTRODUCTION

In this chapter, researcher will focused on the factors of augmented reality feature that will influence consumer purchase decision in online shopping in Melaka, Malaysia. This chapter will identify and recognize existing research which is related that explain in the analysis based on reviews by previous researchers and discussions of a specific study. In this chapter, there will be a theoretical framework that related to the independent variables and dependent variables. The researcher also developed some hypotheses which is based on the independent factors from the theoretical framework in order to determine the most related with the dependent variable. Throughout this literature review, the researcher will gain a better understanding of insights into past work that is relevant to the study questions and objectives.

# 2.1 AUGMENTED REALITY (AR)

AR is an 'immersive technology', which "blurs the boundary between the physical and virtual words and enables users to experience a sense of immersion" (Suh & Prophet, 2018). This 'smart' technology helps enhance the customers online service experiences by providing them with an intuitive and context sensitive interface to process information in a natural manner, ultimately improving service quality and make online shopping more effective and enjoyable for the customers (Marinova et al., 2017). AR tools such as Facebook's innovative lenses and filters, Google's ARCore, Apple's ARKit, and cloud-based platforms have led the rapid development of AR content (Petrock, 2018). The transformative and potentially

disruptive nature of AR has gathered significant interest among marketers who seek to leverage its capabilities (Huang & Rust, 2018; Rauschnabel et al., 2019).

AR applications such as the Ikea app, virtual make-up trials, and 'Pokemon Go' are a few examples of how firms increase customer engagement and excitement through AR (Hinsch et al., 2020). By providing simulated physical control and environmental embedding, AR enhances the customer experience (Hilken, 2017), allowing shoppers to augment the physical world with context specific information at or near the point of purchase. This holds the potential to revolutionize the retail sector and transform the shopping experience (Heller et al., 2019; Hilken et al., 2020; Jessen et al., 2020), with AR's ability to provide an engaging and immersive shopping experience, it emerges as a powerful technology that fosters customer satisfaction and loyalty in the retail industry (Riar et al., 2022). Therefore, the AR market has grown drastically where according to Statista (2020a), which the AR projects will be worth 18.8 billion USD in 2020 and will have grown to over 18 billion USD with 2.4 billion users worldwide by 2023.

# 2.2 HISTORY OF AR

UNT The evolution of augmented reality (AR) has its roots in the late 1960s, when Ivan Sutherland developed the first head-mounted display known as "The Sword of Damocles," which allowed users to experience computer generated graphics overlaid on their real world view, marking the inception of AR technology (Sutherland, 1968). The term "augmented reality" was coined in 1990 by Boeing researcher Tom Caudell, who defined it as the integration of digital information with the physical environment (Caudell & Mizell, 1992)

In the 1990s, significant advancements included Louis Rosenberg's "Virtual Fixtures," a complex AR system designed to enhance human productivity by overlaying sensory information onto physical workspaces (Fabio Arena et al., 2022). The early 2000s marked the introduction of mobile AR applications, with Bruce Thomas developing "ARQuake," an outdoor mobile AR game in 2000. The technology gained mainstream attention with the release of "Pokémon Go" in 2016, highlighting AR's potential for engaging users in real-world environments (Cipresso,

P, 2018). Today, AR is widely utilized across various sectors such as healthcare, education, and marketing, showcasing its transformative impact and promising future potential (Fabio Arena, 2022).



**UNI** Marker based Augmented Reality (AR) is a technology that utilizes specific visual markers, such as QR codes or images, to trigger the display of digital content when scanned by a device's camera. When a camera captures an image of the marker, AR software recognizes it and calculates the marker's position and orientation in real time, allowing virtual objects to be accurately overlaid onto the physical environment (Mohamad Basri Nadzeri, 2022). This method is effective because it provides a stable reference point for displaying digital content, ensuring that virtual elements remain anchored to their corresponding markers even as users move their devices (Overly, 2023).

Furthermore, marker based AR finds applications in various fields, including product labeling, gaming, and education. For instance, in product labeling, AR can provide additional information about products, such as instructions or reviews. In gaming, it enables interactive experiences that utilize real world objects as markers, enhancing gameplay through augmented elements. In education, AR creates



such as anatomical models or historical sites (Pedro Quelhas Brito, 2017).

engaging learning experiences by overlaying information onto real world objects,

Figure 2.2: Marker based AR

#### 2.3.2 Marker less AR

Marker less Augmented Reality uses algorithms to identify their corresponding objects in real view and uses the data from the sensors such as a camera, accelerator, Global Positioning System (GPS), and compass to locate and orient itself in order to overlay the wanted content. This type of AR is also known as LBS AR or EA AR. Location based AR determines the position and the altitude of the device, and for example, when the user orients the device in a certain place, place information about restaurants or other points of interests nearby or about historical structures or other points of interest in the area. Environmental AR identifies the environment and reacts to it by creating experiences; for instance, placing virtual furniture on a flat surface to see how it will appear in actual life (Cipresso, 2018).

Thus, marker less AR is widely used in such spheres as navigation, shopping, and entertainment. In navigation it can create real time directions and information about the location of the user, including street name and traffic condition. In shopping, AR provides additional information about the particular product and its reviews when the customer is holding it. In entertainment it fosters fun and engaging augmented reality experiences that incorporate the real surroundings as a stage for an entertainment game or as a living space for an animated pet, (Jasmina Stoyanova, 2017). In general, the proposed approach of marker-less AR brings substantial benefits of flexibility and enthusiasm of user-generated interaction with digital content in real environments without requiring special markers.



Figure 2.3: Marker less AR

### 2.4 DECISION MAKING EXPERIENCE

Decision making is an integral part of modern life with individuals making a daily impact on personal, societal, economic, environmental and countless other matters (JO. Svenson, W.R. Crozier et al,1997), and refers to the process of making a choice or selecting a course of action among various alternative options (R. Azuma, M. Daily et al,2006). Decision making is a complex cognitive process influenced and mediated by numerous factors such as individual motives, mental representations, intentional resources, working memory, strategic thinking and reasoning skills (R. Azuma, M. Daily et al,2006). One of the areas that decision making plays a fundamental role regards consumer behavior in business activities (A. Stankevich,2017). Consumer decision making focuses on purchase behaviors, customer selection strategies, prior knowledge effects, mental categorization influences and more (J. Payne, J. R. Bettman et al,2019). Consumer decision making can lead to mutual benefits for both customers and service or product providers. For example, it can help providers improve their marketing approach in order to be more effective towards consumers (A. Stankevich,2017).

There have been multiple theoretical models describing consumer decision making, such as the Engel, Kollat &Blackwell model, Simon's model, Keeney's four-stage decision making model, and McKinsey's dynamic model (A. Stankevich,2017). Although most models demonstrate a level of resemblance to the traditional five-stage model which includes, the consumer's need recognition, information searching and evaluation of options, the purchase and the post-purchase stage (Stankevich,2017). A few of the main reported factors notably impacting a consumer decision making process include the number of alternative options and the number of variable attributes one has to consider (J. Payne, J. R. Bettman et al,2019). The higher the amount, the more challenging and complex a decision making task becomes (J. Payne, J. R. Bettman et al,2019)(M. Heitmann, D.R. Lehmann, et al,2017).

In literature, it can be seen that there are many approaches to evaluate decision making experience. One way to accurately measure decision making experience is the assessment of decision making performance or quality, which could provide a relatively objective indicator of one's judgment. Decision makers are usually requested to make an optimal choice among different alternatives. Since human decisions are not always rational or optimal, there are several approaches developed aiming to improve their way of thinking ,which are often tested with similar choice formats (W. Edwards)(C. W. Kirkwood). Decision tasks have been used as away to examine an individual's rational ability to distinguish the optimal course of action compared to other available options.

Several studies have focus on their research directly on the various aspects of such choosing tasks, such as the way alternative choices are presented (S. Basu and K. Savani,2017), and effects of uncertainty (J. Banks, L. S. Carvalho et al, 2016). As a result, decision making quality can be measured by a choices' consistency with rationality (S. Choi, S. Kariv, W. Müller et al,2014). Another way to evaluate decision making experience is decision satisfaction which is associated with the consumers subjective feelings and perceptions. Consumer satisfaction has been a central topic for consumer behavioral research and is positively associated with purchases and customer loyalty (S. Choi, et al, 2017). Heitmann emphasized the significance of providing a pleasant decision process to consumers and suggested

that although different, the way consumers experience their decision making process, influences the overall consumer satisfaction (C. W. Kirkwood,2017). As a result, the perception of decision satisfaction plays an integral role in ensuring further consumer satisfaction.

### 2.5 ONLINE SHOPPING

Online shopping, is a process that occurs over the internet where goods or services can be bought including any processes that happen before it and transactions that takes place after the acquisition of products. The first step of the consumer journey is the product finding stage when customers use search engines, advertisements, suggestions, or emails, to find products of their interest. This stage is important as publicity leads to traffic to the e-commerce site which in turn enables product perusal. Consumers obtain full information of products such as the descriptions, images, videos and sometimes 3D models or Augmented Reality applications. These tools assist in creation of a mental picture to do with the product, which is very useful, given that one cannot feel the product or use it physically when making the decision.

Augmented Reality (AR) significantly enhances the online shopping experience by bridging the gap between digital and physical worlds. AR allows consumers to visualize products in their real environment through their devices, providing a realistic preview that can increase confidence in their purchase decisions . For example, AR can show how furniture might look in a consumer's home or how clothes might fit, reducing uncertainty and the likelihood of returns. By offering interactive and immersive experiences, AR not only makes product browsing more engaging but also facilitates more informed comparisons and decisions .

#### 2.6 AFFECT AS INFORMATION THEORY AND S-O-R FRAMEWORK

In order to examine the effect of AR based experiences on consumer outcomes, the current work integrates the affect as information theory with the S-O-R framework. The affect as information theory argues that emotions play an important role in the context of immersive experiences and help consumers form cognitive judgments (Schwarz & Clore, 2003). The theory supports the 'feel-andthink' philosophy and suggests that consumers process what they feel about the experience which subsequently shapes their cognitive evaluations (Zanger et al., 2022). For immersive experiences, consumers ascribe more importance to the affective states, with emotions providing credible informational value (Schwarz, 2012). When emotions are attributed to a specific object, such as the AR application or the product embedded within it, consumers attribute more value to their emotions as sources of information, and the rational processing of the experience becomes an outcome (Pham et al., 2013). Given that a purchase is prominently a hedonic experience, researcher argue that AR experiences are expected to evoke affective responses, which, in turn, should generate cognitive evaluations as well as behavioral outcomes for the product or AR application (Holmqvist et al., 2020). In the S–O–R framework, the internal processing of the organism, an intervention between the stimulus and the response, is characterized by pleasure, emotions, flow, trust, and arousal (Han & Kim, 2020). Such processing strongly influences the willingness to purchase the product and acquire the contextual stimulus/product (Bian & Forsythe, 2012).

**UNI** The SO-R framework has found wide application in retail focused research which investigates the influence of environmental cues on a consumer's emotions and behaviours like purchase or advocacy (Do et al., 2020). In various shopping environments, like physical stores, mobile applications, and online stores, extant research, using this framework, has examined salient attributes of a retail environment that can influence consumer responses (e.g., Do et al., 2020). With the emergence of experiential retail practices, the S-O-R framework enables the exploration of various such retail elements on consumer's attitudinal, emotional, and behavioural outcomes (Lee et al., 2022). Hence, researcher argue that in the context of AR environments, the S-O-R framework as an underpinning is suitable. In the context of AR, the S–O-R framework indicates that the AR application should act as a trigger (S) for a consumer to showcase the 'real world' representation of the product through local presence. In correspondence with the affectas-information theory, as an outcome of the stimulus, consumers or organisms (O) are expected to display affective responses (R) followed by cognitive ones (R) which, in turn, leads

to psychological immersion and resultant behavioural responses (Rauschnabel et al., 2019). The corresponding affective, cognitive, and behavioural responses are discussed next.



2.6.1. Affective responses to AR

This work proposes pleasure, emotional involvement, and flow as three affective responses to AR-enabled purchase experiences (Haavisto & Sandberg, 2015). In an e-commerce environment, consumers who are presented with more vivid product representations derive a more pleasurable experience (Yim et al., 2017). AR, through innovative visualizations, can help consumers create a customized enriching experience. Such virtual trials enabled by AR applications, involving three dimensional digital models of the product, add greater pleasure to the shopping experience, compared to the two- or three-dimensional rotation enabled tools in typical online websites (Kim & Forsythe, 2008). Emotional involvement represents how an individual is emotionally invested in a digital experience. Banos et al. (2004) suggest that digital immersion through AR enabled tools should trigger emotional involvement that affects users feelings of reality. The current research suggests that high emotion involvement is integral to the purchase processes, including those enabled by AR (Javornik et al., 2021). Flow is an affective state when consumers feel a temporal disconnect, especially when the immersive task is novel and challenging
(Huang & Liao, 2017). Previous studies have established the role of flow in explaining technology human interactions and how it shapes consumer evaluations of the technology (Su et al., 2016). Thus, new applications, like AR, involving experimentation, malleability, and upgradability, should immerse users in a state of flow generating rewarding experiences (Lavoye et al., 2021).

#### 2.6.2 Cognitive responses to AR

This work argues that trust and experience satisfaction are key cognitive outcomes of AR enabled experiences. Trust in product quality is a crucial challenge for online product retail (Rosa et al., 2006). Such trust is built due to the credibility of the seller, the product's authenticity, and physical validation, and is difficult to replicate online (Chen et al., 2015). With recent advances in technology, a AR based application that simulates physical presence can allay these fears (Kumar, 2022). Barutçu et al. (2015) argue that applications enabling digital shopping experiences must be designed with the primary aim of satisfying customers to evoke long term consumer brand relationships. Consumer dissatisfaction with new self service technology experiences in retail is quite common (Fan et al., 2020). Hence, AR enabled applications in retail must enrich the customers luxury shopping experiences, and lead to greater satisfaction with the experience (Flavian ' et al., 2021).

#### 2.6.3 Conative responses to AR

This work proffers two behavioural outcomes to AR experiences which is purchase intention and WOM. According to Triandis (1980), intentions are self oriented procedures to achieve certain outcomes or gain benefits. Such intentions are manifestations of the consumers cognitive and affective states, evoked due to rewarding experiences by capable technologies like AR (Huang et al., 2018; Kim & Ko, 2012). Positive purchase intentions are consequences of the perceived luxuriousness and the corresponding experiential values concomitant to the brand, as simulated by the application (Yu & Zheng, 2022). The notion of WOM can be defined as the tendency of the consumer to advocate a product or a brand or, in this case, an AR application, enabled by invested loyalty (Shin & Jeong, 2022; Song & Kim, 2022). WOM includes both the quality of the information shared, as a cognitive evaluation of the experiences, and the persuasiveness of the recommendation, driven by the emotions with which the information is shared (Sweeney et al., 2012). Both components of WOM should be prominent if customers have rich experiences with an AR application that enhances the fairness evaluations for the luxury brand, as expected in an offline setting (Christ-Brendemuehl & Schaarschmidt, 2022; Zanger et al., 2022).

#### 2.7 PROPOSED RESEARCH FRAMEWORK

The proposed framework for research include both dependent and independent variables. 3D visualization in real environment, virtual try on and personalization and customization are independent variables. All of these are the result of the dependent variables, which is the trust and pleasure . The figure 2.2 below depicts the proposed research structure that addresses the research objectives.



Figure 2.5: Proposed Framework of the influence of AR feature on consumer purchase decision in online shopping

#### 2.7.1 3D Visualization in Real Environment

According to Poushneh and Vasquez-Parraga (2017), the use of 3D visualization in AR can improves consumers understanding and evaluation of

products, leading to higher satisfaction and a greater likelihood of purchase. This enhanced consumer confidence is crucial for reducing the uncertainty and hesitation often associated with online shopping, ultimately driving higher conversion rates and fostering consumer loyalty. 3D visualization in augmented reality (AR) allows consumers to interact with digital representations of products within their physical environment, offering a highly realistic and immersive shopping experience. For example, consumers can place a virtual piece of furniture in their living room to visualize how it fits with their existing decor. This ability to see and interact with products in a real world context helps bridge the gap between online and offline shopping experiences. By providing tangible insights into how products will look and fit in real life, 3D visualization significantly enhances product evaluation. This realistic interaction not only makes the shopping experience more engaging and enjoyable but also increases consumer satisfaction and confidence in the product.

#### 2.7.2 Virtual Try On

Virtual try on technology allows consumers to visualize how clothing, accessories, or makeup will look on them using augmented reality (AR). This can be achieved through mobile apps, providing a seamless and interactive shopping experience. By enabling consumers to see how products fit and appear on their bodies, virtual try ons significantly reduce the uncertainty and hesitation often associated with online shopping. This feature helps consumers make more informed purchase decisions by offering a personalized experience that closely mimics the physical act of trying on products in a store. The ability to virtually try on items ensures that consumers are more confident in their choices, reducing the likelihood of returns and increasing satisfaction with their purchases. virtual try ons not only enhance the perceived value of the shopping experience but also provide a sense of engagement and interactivity that traditional shopping methods lack(Hilken et al.,2017). This personalized and interactive product interaction boosts purchase intentions, as consumers feel more assured and pleased with their potential purchases. The integration of virtual try on technology thus plays a critical role in bridging the gap between digital and physical shopping experiences, ultimately fostering higher conversion rates and higher consumer trust.

#### 2.7.3 Customization and Personalization

Augmented reality (AR) provides powerful tools for product customization and personalization, enabling consumers to tailor products to their unique preferences, such as choosing colors, sizes, and style. Customization options available through AR lead to higher levels of consumer satisfaction and a greater perception of product uniqueness, significantly enhancing the overall shopping experience (Spreer and Kallweit,2014). This high level of engagement significantly increases the relevance of the products to individual consumers, fostering a strong sense of ownership and satisfaction. By allowing consumers to personalize their shopping experience, AR creates a more interactive and enjoyable journey, making the products feel more unique and tailored to their specific needs. This personalized approach not only enhances consumer satisfaction but also promotes a deeper emotional connection to the product, leading to increased loyalty and repeat business. This enhanced experience helps differentiate brands in a competitive market, making AR driven customization a valuable tool for retailers seeking to attract and retain discerning customers.

#### 2.7.4 Purchase Decision

# UNIVERSITI TEKNIKAL MALAYSIA MELAKA

The ultimate consumer response in the augmented reality (AR) shopping experience is the purchase decision, heavily influenced by the pleasure and trust generated by AR stimuli. This decision encompasses not only the immediate act of purchasing but also future behaviors such as repeat purchases and recommendations to others. When consumers have positive experiences with AR features like 3D visualization, virtual try on, and customization, their purchase intentions and loyalty to the brand or retailer increase significantly. These AR features enhance the shopping experience by making it more engaging, enjoyable, and reliable, which in turn fosters consumer satisfaction. Satisfied consumers are more likely to return to the retailer for future purchases and to recommend the brand to friends and family, amplifying the retailer's reach and customer base. Mehrabian and Russell (2020) explains how environmental stimuli impact emotional states and behaviors, providing a solid theoretical foundation for understanding how AR features in online shopping can influence consumer behavior. By leveraging AR to create pleasurable and trustworthy shopping experiences, retailers can effectively drive purchase decisions, enhance customer loyalty.

#### 2.8 HYPOTHESIS

In this study, the proposed framework link between independent and dependent variables will be evaluated. This hypothesis would be examined to see whether it addresses the researchquestions and accomplishes the study's goals.

#### Hypothesis 1

H<sub>0</sub>: There is no significant relationship between virtual try on and consumer purchase decision in online shopping.

 $H_1$ : There is a positive significant relationship between virtual try on and consumer purchase decision in online shopping.

### Hypothesis 2

 $H_0$ : There is no significant relationship between 3D visualization in real environment and consumer purchase decision in online shopping.

 $H_2$ : There is a positive significant relationship between 3D visualization in real environment and consumer purchase decision in online shopping.

#### **Hypothesis 3**

H<sub>0</sub>: There is no significant relationship between personalization and customization and consumer purchase decision in online shopping

H<sub>3</sub>: There is a positive significant relationship between personalization and customization and consumer purchase decision in online shopping

#### 2.9 SUMMARY

The researcher has discussed the influence of AR feature on consumer purchase decision in online shopping. In this chapter, the researcher has described the independent variable (3D visualization in real environment, virtual try on, personalization and customization) and dependent variables (purchase decision) as well as the proposed research framework. The relationship between independent and dependent variables has been determined through verifying the hypothesis. In the next chapter, the research methodology will be discussed.



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

#### **CHAPTER 3**

#### **METHODOLOGY**

#### 3.1 INTRODUCTION

This chapter provides the data that will be useful for the researchers on analysing the data using methodologies for collecting data. The overall strategy for the study will be outlined and elaborated in the research methodologies, including the study design, method choice, primary and secondary data collection sources, the location of the research, the research approach, the time frame, the rationality, and scientific standards, and data analysis techniques. In light of this revelation, the specific outcomes of this investigation could be evaluated and comprehended with more exactitude using these research methodologies and processes.

#### **3.2 RESEARCH DESIGN**

According to McCombes' study in 2021, research design is one of the ways of utilizing empirical data to address research issues. The research design makes it possible for researchers to guarantee that data analysis approaches are employed properly and that the employed methodologies respond to the objectives stated in the research (McCombes, 2021).

Research design can be classified into two major categories; the quantitative research design and the qualitative research design. Quantitative and qualitative research designs can also be categorized more narrowly into descriptive research designs, correlational research designs, experimental research designs, diagnostic research designs and explanatory research designs. In descriptive research design, methodologists offer clear and detailed explanations or descriptions regarding the situations or cases under research. Experimental research is a research design that analyzes data through scientific means and two sets of variables. Causal research designs establish and analyze relationships between variables with no possibility of changing the factors being investigated. A diagnostic research design aims to establish reasons why a certain situation is as it is or why a certain phenomenon occurs. The explanatory research design is a means of studying the things that are quite new in the society and those that have not been fully explained.

After carefully considering the nature of the research objectives, questions and the type of data required to address them, researcher have decided to adopt a quantitative research design. This approach is well suited to the research because it emphasizes objectivity, measurable outcomes, and a structured framework for analysis, enabling to produce results that are both systematic and replicable

#### 3.2.1 Descriptive Research Design

Descriptive research is one where a specific phenomenon is described as it exists in its natural state, as pointed out by Hedrick et al. (1993). This particular research work adopts a descriptive research approach. It may be a purely descriptive one, but it may also contain a normative study in which the results have been benchmarked against those of a previous study (Lee, Kozar, & Larsen, 2003).

Based on the research which is to identify the features of Augmented Reality that influence consumer decision making in Melaka, this study using descriptive method to get the data and information based on the previous research problem and identify the gap of existing study. This research implement to use a questionnaire aimed at the individuals who is familiar to AR tecnology . Then, by using these studies, researcher can get other approach for data collection. For example, a questionnaire can provide the features of augmented reality influencing consumer decision making .

#### 3.3 METHODOLOGICAL CHOICE

Research methodology as a process for solving a problem. It elaborates on how the research will be conducted. In other words, the process of identifying, analyzing, and proposing the reason and its implications to use by researcher in their research is known as a research methodology. It is also defined as the science of methods in acquiring knowledge (Lehmann, 2010)

Quantitative research methods are used in this research. As stated by John W. Creswell in his book, the quantitative research methodology is a way of achieving objectives of the theories to test a hypothesis of the variables. Quantitative data can also be expressed in numbers since the variables, particularly on instruments can be measured. Thus, the final report is composed of a set of structure that covers in this study, which are introduction, literature and theory, method, result and discussion. Similar to the qualitative researchers, those conducting this form of inquiry have the following assumptions in testing of theorized hypotheses which is the use of a deductive approach, an inclusion of mechanisms to minimize bias or confounding variables and being capable of facilitation of generality or replication (Dhanapal et al., 2015)

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Furthermore, quantitative methods are usually defined in relation with an organized theory or hypothesis and they start with data collection. It is followed by a process of using descriptive or inferential statistics. Some of the examples that are prevalent with statistical association include the following, surveys, and observations. Quantitative research is suitable for determining the correlation between the independent variable (IV) and dependent variable (DV).

Based on the study from Manimekalai Jambulingan and Shahryar Sorooshian (2016) citing Leedy and ormrod (2001), the quantitative research method is one of the traditional approaches most applicable to this research. It was applied to determine the level of association between variables and to check the hypothesis of the research. Next, survey questionnaire is employed as an instrument in this research venture because it can aid the researcher to amass data within a short span. It also has large sample and can has accessibility to collect different aspects of data

(Jambulingam et al., 2016).

This research study utilizes quantitative methods to analyze objective numerical data and statistical information to answer research questions. Through survey questionnaires and statistical techniques can obtain and analyze data with valid generalizable results. The chosen methodology is able to match the goals of this research study because it produces findings that enhance existing field knowledge.

#### **3.4 SOURCES OF DATA**

Data collection method is the part of the process of obtaining data that include determining where and how data will be gathered, observing an ongoing event, documenting, gathering, choosing, and sorting data and understanding when this data will be used. This process is superposed; while conducting research, the researchers should go back to the research questions and the research objectives. Therefore, in the process of collecting data, it is much more important to oversee the actions of the researchers than to take data.

Data sources have been divided into two categories namely primary data and secondary data. Primary data is data that has been collected directly from the source by the researcher by using some form of method like questionnaires questions, surveys and observing. Next is secondary data is the method employed by the researcher to get particulars and information through other data or previous research, journal and article.

#### 3.4.1 Primary Data Sources

In this research study, researcher used questionnaires to distribute to the respondents as primary data sources to collect the information that is related to this study. Questionnaire refers to data collection method in which respondents needs to answers to a set of similar question in a predetermined way. There have some advantages of using questionnaire methods which is less expensive. The questionnaire can be sent to respondent by using mail or internet by giving a clear instructions and questions.When compared with in person interviews, it can be less

expensive to reach a sizable sample of the population. Next, the majority of responders are familiar with it. Due to the large number of people who have experience filling out surveys

#### 3.4.2 Secondary Data Sources

Secondary data is interpreted from primary data. Some examples of secondary data are journal article, books, newspaper and magazines. In this research, researcher used secondary data in finding the information and details in literature review. For literature review, researcher used to identify the information from past research such as journal article and books. All this gather information will develop the theoretical framework and hypothesis. Based on this research, the journal that are mostly preferable and use is 'Augmented reality in smart retailing: A Symmetric Approach to continuous intention to use retail brands' mobile AR apps' (Nikhashemi, 2021) and 'Interactivity, Inspiration, and Perceived Usefulness! How retailers' AR-apps improve consumer engagement through flow' (Arghashi and Yuksel, 2022).

# 3.5 RESEARCH STRATEGY

## UNIVERSITI TEKNIKAL MALAYSIA MELAKA

According to Walia& Chetty (2020), a research strategy is a step by step action plan that guides the researchers thought processes. Research strategies allow for the systematic execution of planned research (Walia & Chetty, 2020). In this article, researchers will discuss a crucial step in the research process which is a comprehensive overview of research methods. Methods include experimentation, investigation, archives and literature research, case study, ethnography, action research, grounded theory, and narrative investigation. The researcher chose the method of investigation for this study. By evaluating descriptive and statistics, an investigation strategy can be carry out by collecting quantitative data and propose a possible correlation between variables. A questionnaire will be created and distributed to consumer who shop online between age 20 to 50.

#### **3.5.1** Questionnaire Design

A questionnaire is a list of queries or items used to collect information about the attitudes, experiences, and opinions of respondents (Bhandari, 2021). Before conducting quantitative analysis, this method is used to collect responses from large samples. Researchers conducted an online survey questionnaire. Researchers sent a google form to a subset of respondents and distributed it to individuals for responses. The google form is composed of three sections, which is part A, part B, and part C. The first part of the questionnaire investigates the respondents personal information, including gender, age, level of education, and whether they have use AR before. Then, in part B researcher will construct a questionnaire that included the independent variables of this research which is the virtual try on, 3D visualization in real environment, and customization and personalization will lead to consumer trust and pleasure. Part C is the relationship between the consumer purchase decision in online shopping with the independent variables.

The total number of questions in this questionnaire will be 25 questions and it should be measure by using a likert scale Likert Scale will provide 5 points ranges from 1 (strongly disagree) ,2 (disagree), 3 (neutral), 4 (agree), and 5 (strongly agree). The five point likert scale was shown in Table 3.1 below.

LIKERT S	SCALE				
STAGE	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
SCALE	1	2	3	4	5

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SECTION A			
Items	Label	Question	Reference
		Male	
Gender			
		Female	



SECTION B			
	VTO 1	I feel that virtual try-on provides an accurate representation of how a product would look on me or in my space.	
MALAYSI	VTO 2	I feel more confident in purchasing after using virtual try-on	( Huang, T. L. et al 2014, Hilken, T. et al
IV 1: Virtual Try-On	VTO 3	I think that virtual try-on significantly reduces the risk of buying the wrong product.	2017, Pantano, E. et al 2017)
Fistaninn Station	VTO 4	Virtual try-on reduces my hesitation when making a purchase decision.	
UNIVERSIT	VTO 5	I think that using virtual try-on makes online shopping more enjoyable for me.	/ELAKA
	VRE 1	I think that 3D visualization helps me understand the product's dimensions (e.g., size, shape) better.	
IV 2: 3D Visualization	VRE 2	I feel that using 3D visualization makes me feel more confident in my purchase decision.	(Ana Javornik 2016, Jiyeon Kim et al 2008)
	VRE 3	I find that 3D visualization can reduces my uncertainty about the product's quality.	

	VRE 4 VRE5	I find 3D visualization more useful than regular product images I like that 3D visualization enhances my overall shopping experience.	
IV 3: Customization and Personalization	CP 1	I think that the ability to customize products (e.g., color, size) makes me more likely to purchase them. I feel more satisfied with purchases when I can	
	CP 2	personalize products.	
	CP 3	I find that personalization can helps me find products that better suit my preferences.	A. Kamis et al 2008
	CP 4	I am willing to pay more for a product that I can personalize.	
	CP 5	I like that product customization options make online shopping more engaging for me.	
DV: Purchase Decision	PD 1	I find that AR features helps to make faster decision when purchasing products online.	Poushneh, A. 2018
	PD 2	I feel that AR features give me	

		confidence that I am making the	
		right purchase decision.	
		I think that AR features makes	
	PD 3	online shopping more engaging.	
		I think that using AR features	
		makes me more willingly to	
	PD 4	purchase a product online.	
MALAYSI	a		
AL	1 m	I feel that AR features make me	
		more likely to make repeat	
E	PD 5	purchases from the same	
		retailer.	
E			

#### 3.5.2 Pilot Test

Pilot test can be defined as to show that what our survey or a single point of information in a questionnaire or observation form will mean to our respondents. In some cases the same questionnaires have to be distributed to only a few number of expertise or people with a knowledge related to your study to test if it is appropriate to be used in this survey. The reason for pilot test is to ensure that on to and everyone will have a same perception on the constructed by the researcher questionnaire. Thus, researcher can find out whether there is a problem with the development of the questionnaire and will have time to either correct the type of problems that are present before the questionnaire is administered to other subjects.

In this research, the researcher decides to administer 30 respondents this research on consumer who is familiar to AR technology in online shopping environment in order to ascertain the reliability of the questions. This test will help the researcher to have a better confirmation if there is any issue with the questionnaires and this to ensure that the respondents are able to answer the questionnaires as required without having to confuse them. Not only that, researcher

also has to make sure that the respondents will not only understand the questions but they can have a same way of understanding towards the questions.

#### **3.6 SAMPLING DESIGN**

Sampling design is essential in any research work since it defines the data that a researcher acquires as well as the results that the researcher arrives at after analyzing the acquired data. Through the process of sampling design, the researcher was in a position to spot the sampling technique, the size, place and the time horizon. Sampling techniques also serve the similar purpose of explaining how the researcher provides a focus to the target population and scope for this research.

#### 3.6.1 Sampling Technique

Probability sampling is described by Tashakkori and Teddlie (2003a) as sampling techniques often applied in quantitatively oriented studies and entails identifying a relatively large number of population units or samples from particular sub groups of the population through a procedure in which the probability of sample membership can be calculated. The use of probability sampling technique is aimed at achieving the highest degree of external validity which is the resemblance that the sample has to the total population (Teddlie & Yu, 2007)

Furthermore, the techniques of sampling can be categorized into two which are probability sampling techniques and non probability sampling techniques. Probability sampling techniques comprises of simple random technique, systematic random technique, stratified random technique and cluster random technique while non probability sampling techniques comprise of convenient sampling technique, judgmental sampling technique, quota sampling technique and snowball sampling technique.

In this study, the researcher has chose to use probability sampling method which is known as the simple random sampling method. This technique is fit for this study because the research focuses on one location and the whole population has equal likelihood of becoming the respondent. This will be conducted in Melaka and any individual within the population of below 20 to above 50 years of age can be chosen to be a respondent

#### 3.6.2 Sampling Size

Population size can be defined as the total number of people that researcher can choose to implement the survey. This is the total number of respondents that will help researcher to identifying the results. Sample size is the total number that calculated based on the population number that chooses by researcher and the levels of error occur in this survey. This will show the total number of respondents that researcher needs to complete the questionnaire and order to get the accurate information and results.

According to the Department of Statistics Malaysia(2023), Melaka estimated to have have a population of 1 million. In addition, men represent 47.4% of the population, or 474,000, whereas women represent 52.6% of the population or 526,000. Due to the large number of population , researcher calculate the sample size by using the Krejcie and Morgan Table and had choose only 384 respondents out of overall population to get more precise data. The population choose by researcher are among consumer who is familiar to AR technology during the online shopping. This can be measure by the survey towards their daily lifestyle.

Ν	S	Ν	S	Ν	S	Ν	S
10	10	140	103	420	201	1900	320
15	14	150	108	440	205	2000	322
20	19	160	113	460	210	2200	327
25	24	170	118	480	214	2400	331
30	28	180	123	500	217	2600	335
35	32	190	127	550	226	2800	338
40	36	200	132	600	234	3000	341
45	40	210	136	650	242	3500	346

Table 3.3 Krecjie and Morgan Table (Chua Lee Chuan, 2006)

50	44	220	140	700	248	4000	351
55	48	230	144	750	254	4500	354
60	52	240	148	800	260	5000	357
65	56	250	152	850	265	6000	361
70	59	260	155	900	269	7000	364
75	63	270	159	950	274	8000	367
80	66	280	162	1000	278	9000	368
85	70	290	165	1100	285	10000	370
90	73	300	169	1200	291	15000	375
95	76	320	175	1300	297	20000	377
100	80	340	181	1400	302	30000	379
110	86	360	186	1500	306	40000	380
120	92	380	191	1600	310	50000	381
130	97	400	196	1700	313	75000	382
	152			1800	317	100000	384
Note: "N" is population size							
"S" is sample size							

# 3.7 RESEARCH LOCATION

The research location which the researcher choose is Melaka, where it is located southern location of in Malaysia, is the primary this investigation. The targeted respondents are consumer who shop online. The researchers selected Malacca as research location to comprehend the influence of augmented reality features on consumer decision making in online shopping. Therefore, researchers focus exclusively on Melaka to acquire data more quickly and efficiently.

#### 3.8 TIME HORIZON

The time range in future research typically alludes to the period to be examined or the time level with varying widths (Melnikovas, 2018). The time period can be divided into two categories which is longitudinal and cross sectional research. Longitudinal research involve the acquisition of long term data, whereas the cross sectional study only needs to be conducted once and data acquired, its completion could take months, weeks, or even days. Due to time limitation, cross sectional studies were used in the research. The researcher must conclude the research within ten months and only two months remaining to acquire and analyse data.

#### 3.9 RELIABILITY AND VALIDITY

Reliability and validity are the two core and fundamental concepts which are significantly used to assess any efficient research measurement tool (Mohajan, 2017). According to Middleton (2019), reliability is the way of assessing the stability of something. In other words, it evaluates the extent to which the same method yields a consistent outcome in the same condition. If the measurement is unreliable, then it is impossible to come with a conclusive conclusion since dismissal will be very random and all over the place. On the other hand, effectiveness has been described as the degree to which a method correctly captures what it sets out to capture (Middleton, 2019). It determines whether the measurement research involves interesting structures and concepts and whether the conclusions or findings arising from the measurement are accurate. It is note worthy that high reliability is evidence of measurement effectiveness. When the measurement is invalid, the result may not accurately depict the investigated phenomenon as required.

Cronbach's alpha	Internal consistency
α ≥ <b>0</b> .9	Excellent
0.9 ≥ α ≥ 0.8	Good
0.8 ≥ α ≥ 0.7	Acceptable
0.7 > α ≥ 0.6	Questionable
0.6 > α ≥ 0.5	Poor
0.5 > α	Unacceptable

Table 3.4: Cronbach's Alpha Coefficient Range and Strength of Association

The researchers utilised Cronbach's alpha coefficient to measure the reliability of quantitative research. It demonstrates the degree of correlation between initiatives.

In general, alpha coefficients above 0.7 are deemed acceptable. When the Cronbach's alpha value is greater than 0.7, it is deemed acceptable; when it is greater than 0.9, it is deemed excellent; and when it is equal to or greater than 0.9, it is a deemed exceptional. If less than 0.6, it is considered inadequate, whereas less than 0.5 is abhorrent. The table above displays the Cronbach alpha value table.

#### 3.10 DATA ANALYSIS METHOD

Data analysis is the process of accumulating, modelling, and analysing data using statistical and logical techniques and methodologies (Calzon, 2023). After collecting data through the questionnaire, the social science statistics software programme (SPSS) version 27.0 is use to analyses the respondents data. In this investigation, descriptive analysis, correlation analysis using the Pearson method, and multiple regression analysis were employed.

#### 3.10.1 Descriptive Analysis

Descriptive analysis is a form of statistics analysis whose aim is to help in identifying the basic features, the structure and the trends in a data set (Rawat, 2021). It is usually the first step in dissecting data and is often used as a basis of the statistical test or hypothesis testing. It stresses a qualitative notion of exploring the data rather than suggesting conclusions or hypothesis testing. They tell the quantitative characteristics of the data set which can be mean or median (Frost, 2019). There are three fundamental types of measures that can be used to identify the degree of concentration in a trend, these include the mean, median and the mode. Dispersions are variance, standard deviation, and percentage that are very pertinent in the calculation process. This study uses descriptive analysis to analyze data regarding the gender, age, employment area and education level of the respondents.

#### 3.10.2 Pearson's Correlation Analysis

Pearson's correlation is a measure of the correlation between two variables, where both variables are on the same level of measurement of interval or ratio data.

Pearsons correlation coefficient (R) is the best known measure of Pearson an linear correlation coefficient. A positive value between 0 and 1 or both negative values between 0 and -1 which show the strength and direction between two variables (Turney, 2022). Cohesion by Kenton (2021) specifies that positive relationship means that the two variables vary in the same direction. Similarly, a coefficient of -1 means that the commodities have a perfect negative relationship. This simply means that if one of the variables rises, the other falls, the two are inversely related, and zero means there is no relationship between the two variables. The following figure 3.3 shows the pearson's correlation coefficients.



Multiple linear regression also known as multiple regression is a statistical method of analysis that aims at making predictions of the response variable with several explanatory variables. The differences make it possible for the researcher to evaluate the causal relationship between the three independent variables and the dependent variables. In this research, the researchers need to identify how some independent variables such as 3D visualizations, virtual try on and customization affect dependent variables that include trust and pleasure on consumer decision making in online shopping. In multiple regression analysis, the researchers can determine the independent variables that produce the highest value of the dependent variables in the model. The equation for multiple regression is analysed as follows.

#### Equation of MRA: Y = a + bX1 + cX2 + dX3

Where:

Y = Dependent Variable (Effectiveness of biometric

technology in smartphone)

a = Constant value or Intercept

b = Influence of X1

c = Influence of X2

d = Influence of X3

X1, X2, X3 = Independent variables

#### 3.11 SUMMARY

In conclusion, the researcher describes the collected data for this chapter. In this investigation, researchers will employ a descriptive design and quantitative methods. The questionnaire will be distributed to entrepreneurs and employees in the digital enterprise field using google form as the primary data source and academic papers, the internet, and books as secondary data sources. This research used a method called cross sectional time study whereby data was only collected only at one time. However, before administering the questionnaire, a pilot test will be carried out in order to assess the validity of the measures. Besides the primary sources of information,

In addition to that, researchers also use secondary research information that includes online journals, and articles. This way, to learning, the alpha value of Cronbach is applied. After collecting the relevant data, the researchers will undertake descriptive analysis and the Pearson test of correlation and multiple regression analysis on the data collected.

#### **CHAPTER 4**

#### **RESULT AND DISCUSSION**

#### 4.0 INTRODUCTION

In this chapter, the researcher will explain the data analysis results collected from the respondents using google forms. The researcher is using Statistical Package for Social Science (SPSS) software version 27.0 to analyze the data that are collected. In this chapter, there will be descriptive analysis, Person's correlation analysis, multiple regression analysis, and ANOVA analysis, used to identify the relationship between dependent variable and independent variable. The questionnaire is distributed online to consumer in Melaka through online by using google forms. The questionnaire contains 2 parts (refer to Appendix 1),

According to the questionnaire, section A is the demographic information of the respondents and Section B is about the influence of augmented reality features on consumer purchase decision in online shopping.

#### 4.1 PILOT TEST

As part of the methodological preparation for the survey and prior to the distribution of questionnaires to target respondents, the researchers administered a pre test. A pilot test is a kind of preliminary study that is conducted before embarking on the full scale study to establish the usability and practicability of the research plan (Simkus, 2022). The researcher gathered information from 30 people for pilot testing. By doing the pilot test, it is possible to know the data collected is reliable. The questionnaire will also be adapted, where necessary, depending on the

results of the pilot test. From the result of the pilot test, all the 30 respondents have valid data and all of the data was processed, indicating zero missing data.

		Ν	%
	Valid	30	100.0
Cases	Excluded	0	0
	Total	30	100.0

Table 4.1: Case Processing Summary (Source from SPSS output)

#### 4.1.1 Reliability of Pilot Test

Table 4.2 shows that the reliability analysis of pilot test for all variables analysis in this study. Hence, the table indicates the Cronbach's alpha value of this pilot study test is 0.920. It shows that most of the pilot test respondents understand the questions and they are able to answer it which indicates that the questions can be used to a larger group of respondents.

Table 4.2 Reliability Analysis of Pilot Test (Source from SPSS output)					
	Reliability Statistics				
Cronbach's Alpha	Cronbach's Alpha Based	N of Items			
	on Standerdized Item				
0.920	0.922	20			

#### 4.1.2 Pilot Test Reliability for Each Variables

In this research, Table 4.3 indicates the value of Cronbach's alpha that represents all dependent and independent variables. First, the value of Cronbach's alpha for independent variables, Virtual Try On (VTO) is 0.781, value of 3D Visualization in Real Environment (VRE) is 0.798, and the value for Customization and Personalization (CP) is 0.807. On the other hand, the dependent variable, Purchase Decision (PD) has the value of Cronbach's alpha is 0.810. Based on the value of Cronbach's alpha, all the alpha readings for the independent and dependent

variables are excellent. Therefore, all the questionnaires in the pilot study are acceptable to distribute further to other potential respondents.

Variables	Cronbach's	N of Items
	Alpha	
Virtual Try On (VTO)	0.781	5
3D Visualization in Real Environment (VRE)	0.798	5
Customization and Personalization (CP)	0.807	5
Purchase Decision (PD)	0.810	5

Table 4.3: Pilot Test Reliability for Each Variables (Source from SPSS output)

#### 4.2 DEMOGRAPHIC BACKGROUND

In this study, the researcher used descriptive analysis to analyze the demographic background of the respondents. Research issues include gender, age, education level, have they heard about AR before, and have they used AR technology before while online shopping. The questionnaire was distributed to the target respondents through online Google, with a total of 384 respondents. Percentage and frequency are used to describe the demographic background of the respondents.

#### 4.2.1 Gender

Table 4.4 shows the gender of 384 respondent in this research. From the table , researchers can see that there are 209 male respondents and 175 female respondents. From the figure 4.1, there are 54.4% male respondents and 45.6% female respondents. Thus, the majority of respondents are male.

Table 4.4: Gender of Respondent	(Source from SPSS output)	

			Gender		
				Valid	Cumulative
		Frequency	Percent	Percent	Percent
Valid	Male	209	54.4	54.4	54.4
	Female	175	45.6	45.6	100.0
	Total	384	100.0	100.0	



Table 4.5 and figures 4.2 shows the majority of respondents were Malay which consists 168 respondents (43.8%) Besides, respondents who is Indian comprise 131 respondents (34.1%). The next followed by Chinese which only have respondents of 72 (18.8%) and only 13 respondents who is from different race, which is 3.4%

			Race		
				Valid	Cumulative
		Frequency	Percent	Percent	Percent
Valid	Malay	168	43.8	43.8	43.8
	Indian	131	34.1	34.1	77.9
	Chinese	72	18.8	18.8	96.6
	other	13	3.4	3.4	100.0
	Total	384	100.0	100.0	

Table 4.5: Race of Respondent (Source from SPSS output)



Table 4.6 and figure 4.3 shows the amount of 384 respondents were from below 20 years old to 50 years old and above. The majority of respondents were in the age range of 21 to 30 years old, which contains 287 respondents (74.7%) Besides that, respondents who aged below 20 years old accumulated 30 respondents (7.8%). Furthermore, the range of age between 31 to 40 years old contains 40 respondents which is 10.4% and 22 respondents aged between 41 to 50 which is 5.7%. The least respondent is 5 respondent which is aged above 50 years old that has 1.3%.

			Age		
				Valid	Cumulative
		Frequency	Percent	Percent	Percent
Valid	20 and	30	7.8	7.8	7.8
	Below				
	21-30	287	74.7	74.7	82.6
	31-40	40	10.4	10.4	93.0
	41-50	22	5.7	5.7	98.7
	Above 50	5	1.3	1.3	100.0
	Total	384	100.0	100.0	

Table 4.6: Age of Respondent (Source from SPSS output)



Table 4.7 shows the education level of 384 respondents. The education level starts form primary to tertiary level. The majority of respondents have tertiary level which is 316 respondents (82.3%). Then, followed by 67 respondents with 17.4% with secondarylevel while 1 respondents with 0.3% were primary education level.

				Valid	Cumulative
		Frequency	Percent	Percent	Percent
Valid	Primary Education	1	.3	.3	.3
	Secondary	67	17.4	17.4	17.7
	Education				
	Tertiary Education	316	82.3	82.3	100.0
	Total	384	100.0	100.0	

Table 4.7: Education Level of Respondents (Source from SPSS output) Education



Table 4.8 indicate whether respondents have heard about AR before with the total amount of 384 respondents. The amount of respondents that heard about AR before is 236 respondents with the amount of 61.5%. Next the total respondents that may heard AR before is 88 respondents with 22.9%. Meanwhile, the amount of respondents that did not heard about AR before is 60 respondents with the total percentage of 15.6%.

	Table 4.8: Have Res	pondents Heard About AR Be	efore? (Source from SPSS or	utput)
--	---------------------	----------------------------	-----------------------------	--------

			Heard		
				Valid	Cumulative
		Frequency	Percent	Percent	Percent
Valid	Yes	236	61.5	61.5	61.5
	No	60	15.6	15.6	77.1
	Maybe	88	22.9	22.9	100.0
	Total	384	100.0	100.0	

49



#### 4.2.6 Have Respondents Used AR Technology Before while Online Shopping?

Table 4.9 shows whether respondents have used about AR technology before while online shopping with the total amount of 384 respondents. The amount of respondents that had used AR technology before while shopping online is 161 respondents with the amount of 41.9%. Next, the total respondents that may used AR technology before while shopping online is 159 respondents with 41.4%. On the other hand, the amount of respondents that did not used AR technology before while shopping online is 64 respondents with the total percentage of 16.7%.

Table 4.9: Have Respondents Used AR Technology Before while Online Shopping?(Sources from SPSS output)

Use
-----

			0.50		
				Valid	Cumulative
		Frequency	Percent	Percent	Percent
Valid	Yes	161	41.9	41.9	41.9
	No	64	16.7	16.7	58.6
	Maybe	159	41.4	41.4	100.0
	Total	384	100.0	100.0	



Figure 4.6: Have Respondents Used AR Technology Before while Online Shopping?

Demographic Variables	Categories	Frequency (n)	Percentage
2) 10	Male	209	54.4
Gender	Female	175	45.6
JNIVERSI	Malay	168	43.8
D	Indian	131	34.1
Race	Chinese	72	18.8
	Others	13	3.4
Age	20 and Below	30	7.8
	21-30	287	74.7
	31-40	40	10.4
	41-50	22	5.7
	Above 50	5	1.3
Education	Primary	1	0.3
	Secondary	67	17.4

Table 4.10 Demographic Profile of The Respondent (n=384)

	Tertiary	316	82.3
Have user or don'ts	Yes	236	61.5
Have respondents Heard About AR	No	60	15.6
Delore:	Maybe	88	22.9
Have Respondents Used	Yes	161	41.9
AR Technology Before while	No	64	16.7
<b>Online Shopping?</b>	Maybe	159	41.4

#### 4.3 DESCRIPTIVE STATISTICS ON INDEPENDENT VARIABLE

In this research, Descriptive method analysis is used to analyse the independent variables: Virtual Try-on, 3D visualization in real environment and customization and personalization. A centralized trend measure was performed to identify the mean, median and plural of the variables.

#### 4.3.1 Independent Variable: Virtual Try On

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The findings show that respondents have a generally positive attitude about the virtual try on function in online purchasing. Most of the respondents agree, with a mean values of 4 on the likert scale, that virtual try on provide a realistic details of products, increase their confidence in purchase decisions, and greatly lower the chance of purchasing the wrong product. Furthermore, respondents believe that the technology can reduces hesitation while making purchasing decisions and makes the online buying experience more enjoyable. The regularity of responses, with medians and means consistently at 4 and standard deviations at 1, indicates a substantial agreement among respondents. Overall, the findings indicate that augmented reality technology such as virtual try ons improve consumer purchasing decisions by raising confidence, lowering risks, and increasing shopping delight.

		I think that	I feel	I think	Virtual	I feel that
		virtual try-	more	that	try-on	using
		on	confident	virtual	reduces	virtual
		provides an	in	try-on	my	try-on
		accurate	purchasin	significan	hesitation	makes
		representat	g after	tly	when	online
MALAYSIA		ion of how	using	reduces	making a	shopping
		a product	virtual	the risk of	purchase	more
		would look	try-on	buying	decision.	enjoyable
		on me or in		the wrong		for me.
		my space.		product.		
V	alid	384	384	384	384	384
M	lissing	0	0	0	0	0
Mean		4.0599	3.9896	4.0755	4.0755	4.0729
Median		4.0000	4.0000	4.0000	4.0000	4.0000
Mode		4.00	4.00	4.00	4.00	4.00
Std. Deviation		0.89621	0.94214	0.94054	0.90949	0.89378

Table 4.11: Virtual Try On Preferred by Respondents

(Source: SPSS Output)

\*\*Mode: 1 = Strongly Disagree; 2 = Disagree, 3 = Neutral; 4 = Agree; 5 = Strongly Agree

#### 4.3.2 Independent Variable: 3D Visualization in Real Environment

The results reveal that respondents generally view 3D visualization features in online shopping positively. They agree that this feature enhances their understanding of product dimensions, such as size and shape, with a mean score of 3.97. Additionally, 3D visualization boosts confidence in purchase decisions (mean = 4.12) and reduces uncertainty about product quality (mean = 3.96). Respondents also find 3D visualization more useful than regular product images (mean = 4.05) and believe it enhances their overall shopping experience (mean = 4.19). The medians and modes for all statements are consistently at 4, showing a strong consensus among respondents. Although there is moderate variability in responses (standard deviations ranging from 0.94 to 1.01), the results suggest that 3D visualization positively influences consumer purchase decisions by improving product understanding, confidence, and the shopping experience while reducing uncertainty.

MALAYS/4		I think that	I feel that	I find that	I find 3D	I like that
		3D	using 3D	3D	visualizati	3D
		visualizatio	visualizati	visualizati	on more	visualizati
		n helps me	on makes	on can	useful	on
		understand	me feel	reduces	than	enhances
		the	more	my	regular	my
		product's	confident	uncertaint	product	overall
E E		dimensions	in my	y about	images	shopping
		(e.g., size,	purchase	the		experienc
LIS2		shape)	decision.	product's	7	e.
NINE		better.		quality.		
NSYA	Valid	384	384	384	384	384
	Missing	0	0	0 0 0	0	0
Mean		3.9714	4.1224	3.9635	4.0495	4.1927
Median		4.0000	4.0000	4.0000	4.0000	4.0000
Mode		4.00	4.00	4.00	4.00	4.00
Std. Deviation		0.94314	0.94944	1.00064	0.91129	0.91083

 Table 4.12: 3D Visualization in Real Environment Preferred by Respondents

 (Source: SPSS Output)

\*\*Mode: 1 = Strongly Disagree; 2 = Disagree, 3 = Neutral; 4 = Agree; 5 = Strongly Agree

#### **4.3.3** Independent Variable: Customization and Personalization

The results demostrate that respondents have a positive perception of customization and personalization features in online shopping. They agree that the ability to customize products, such as selecting color or size, increases their likelihood of purchasing, with a mean score of 4.04. Personalization also enhances satisfaction with purchases (mean = 3.87) and helps respondents find products that better suit their preferences (mean = 4.08). Additionally, respondents express a willingness to pay more for personalized products (mean = 3.92) and find that customization options make online shopping more engaging (mean = 4.19). With

medians and modes consistently at 4 and low variability in responses (standard deviations between 0.89 and 0.99), these findings strongly suggest that customization and personalization positively impact consumer purchase decisions by improving satisfaction, engagement, and perceived value.

		I find that				I like that
R' MALAYSIA			I feel	I find that		I like that
		the ability			T	product
		to	more	personaliz	1 am	customiza
			satisfied	ation can	willing to	
		customize	with	helps me	pay more	tion
A STATE		products	1		puj more	options
		(e g color	purchases	find	for a	make
		(e.g., color,	when I	products	product	make
-		size)	can	that better	that L can	online
5.		makes me	Can	that better	that I can	shopping
C JA		more likely	personaliz	suit my	personaliz	more
IN		more likely	е	preferenc	e.	more
ليسيا ملاك		to purchase	products			engaging
		them.	products.	2.	ىيەم بىر	for me.
		204	••		204	204
N	Valid	384	384	384	384	384
UNIVE	Missing		AL 0/A	-A1051A		<b>KA</b> 0
Mean		3.8750	4.1484	4.0833	3.9219	4.1979
Median		4.0000	4.0000	4.0000	4.0000	4.0000
Mode		4.00	4.00	4.00	4.00	4.00
Std. Deviation		0.89092	0.89754	0.99257	0.95274	0.90971

 Table 4.13: Customization and Personalization Preferred by Respondents

 (Source: SPSS Output)

\*\*Mode: 1 = Strongly Disagree; 2 = Disagree, 3 = Neutral; 4 = Agree; 5 = Strongly Agree

#### 4.4 Pearson's Correlation Coefficients Analysis

In Chapter 3, the researcher stated that Pearson's correlation is used for data analysis. Pearson's correlation coefficient (r) is a statistical tool to measure the strength of the linear relationship between dependent variable and independent variables. It is used to assess the strength of relationship between the data variables (Saunders et al., 2023). Table 4.12 showed the guidelines of Pearson's correlation coefficients.
Table 4.14: Pearson's Correlation Coefficients
(Source: Saunders, Lewis and Thornhill,2016)

Pearson's Correlation Coefficient (R values)	Interpretation
±0.70 to ±1.0	Very strong relationship
±0.40 to ±0.69	Strong relationship
±0.30 to ±0.39	Moderate relationship
±0.20 to ±0.29	Weak relationship
±0.01 to ±0.19	No relationship

Table 4.15: Correlation Analysis for All Variables

(Source: SPSS Output)						
			Correlatio	ons		
		P	VTO	VRE	СР	PD
	VTO	Pearson	1	.482**	.675**	.553**
		Correlation				
		Sig. (2-tailed)		.000	.000	.000
	1/NN	Ν	384	384	384	384
	VRE	Pearson	.482**	1 40	10(**	55(**
		Correlation	215	<b>Z</b> J,	.480	.336
		Sig. (2-tailed)	.000		.000	.000
			384	384	384	384
	СР	Pearson	.675**	196**		620**
		Correlation		.480	1	.620
		Sig. (2-tailed)	.000	.000		.000
		Ν	384	384	384	384
	PD	Pearson	552**	556**	620**	1
		Correlation	.335	.330	.020	1
		Sig. (2-tailed)	.000	.000	.000	
		Ν	384	384	384	384

\*. Correlation is significant at the 0.01 level (2-tailed).

\*\*Note: VTO - virtual try-on

VRE - 3D visualisation in real environment

CP - customization and personalization

PD - purchase decision

Table above illustrated the correlations between the independent variables an d the dependent variable. The independent variables in this research is virtual try on,

3D visualization in real environment and customization and personalization while the dependent variable is the consumer purchase decision in online shopping. The correlation value for virtual try on was 0.553 with a significant level of 0.000 (p<0.01). This showed that there was a strong relationship between virtual try on and consumer purchase decision in online shopping. Next, the correlation between 3D visualization in real environment was 0.556 with a significant level of 0.000 (p<0.01), this showed that there was a strong relationship between 3D visualization in real environment and consumer purchase decision in online shopping . Lastly, the correlation of customization and personalization was 0.620 with a significant level of 0.000 (p<0.01), this showed that there is a strong relationship between customization and personalization and consumer purchase decision in online shopping.

#### 4.4.1 Virtual Try On

Table 4.16 showed the correlation between virtual try on and consumer purchase decision in online shopping. The Pearson correlation coefficient value is 0.553 which is a strong relationship between virtual try on and consumer purchase decision in online shopping. The correlation is significant at the 0.01 level (2-tailed) and it proved all two perception have efficiency of p<.001. Hence, virtual try on was significantly correlated to consumer purchase decision in online shopping in positive correlation and these two variables have a strong relationship.

Correlations							
	VTO PD						
VTO	Pearson Correlation	1	.553**				
	Sig. (2-tailed)		.000				
	Ν	384	384				
PD	Pearson Correlation	.553**	1				
	Sig. (2-tailed)	.000					
	Ν	384	384				
**. Correlation is significant at the 0.01 level (2-							
tailed).							

 Table 4.16: Correlation Between Virtual Try-on and Consumer Purchase Decision in

 Online Shopping (Source: SPSS Output)

#### 4.4.2 3D Visualization in Real Environment

Table 4.17 showed the correlation between 3D visualization in real environment and consumer purchase decision in online shopping. The Pearson correlation coefficient value is 0.556 which is a strong relationship between 3D visualization in real environment and consumer purchase decision in online shopping in online shopping. The correlation is significant at the 0.01 level (2-tailed) and it proved all two perception have efficiency of p<0.001. Hence, 3D visualization in real environment was significantly correlated to consumer purchase decision in online shopping in positive correlation and these two variables have a strong relationship.

Table 4.17: Correlation Between 3D Visualization in Real Environment and Consumer Purchase Decision in Online Shopping (Source: SPSS Output)

	Correlati	ons		
		VRE	PD	
VRE	Pearson Correlation	1	.556**	
	Sig. (2-tailed)		.000	
	Ν	384	384	
PD	Pearson Correlation	.556**	SIA <sub>1</sub> ME	
	Sig. (2-tailed)	.000		
	Ν	384	384	
** 0	1	1 0.0	1 1 1	

\*\*. Correlation is significant at the 0.01 level (2-tailed).

#### 4.4.3 Customization and Personalization

Table 4.18 showed the correlation between customization and personalization and consumer purchase decision in online shopping. The Pearson correlation coefficient value is 0.620 which is a strong relationship between customization and personalization and consumer purchase decision in online shopping. The correlation is significant at the 0.01 level (2-tailed) and it proved all two perception have efficiency of p<0.001. Hence, customization and personalization was significantly correlated to consumer purchase decision in online shopping in positive correlation and these two variables have a strong relationship.

	Correlations					
	CP PD					
	СР	Pearson Correlation	1	.620**		
		Sig. (2-tailed)		.000		
		Ν	384	384		
AYS	PD	Pearson Correlation	.620**	1		
	IA M	Sig. (2-tailed)	.000			
		N	384	384		

 Table 4.18: Correlation Between Customization and Personalization and Consumer

 Purchase Decision in Online Shopping (Source: SPSS Output)

4.5 MULTIPLE REGRESSION ANALYSIS

Multiple regression analysis is used to measure the strength of relationship between independent variables and dependent variable (Saunders et al., 2023). Therefore, the purpose of using multiple regression analysis in this research was to understand the significant relationship between independent variable (virtual try on, 3D visualization in real environment, and customization and personalization) and dependent variable (consumer purchase decision in online shopping).

Table 4.19 Model Summary of Multiple Regression Ana.	lysis
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Model Summary						
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate		
1	.695ª	.483	.479	.44421		
a. Predictors: (Constant), CP, VTO, VRE						

(Source: SPSS output)

The model summary table highlights the relationships between the independent variables (VTO, VRE, CP) and the dependent variable (PD). The

positive R value of 0.695 in Model 1 confirms the existence of a relationship between independent variable and dependent variable in this study. The R Square value for this model is 0.483, indicating that 48.3% of the variance in dependent variables is explained by all the independent variables. While not extremely high, because there is many other factors may influence consumer purchase decision in online shopping.

#### 4.6 **COEFFICIENTS**

The coefficients analysis demonstrates the impact of three independent variables which is virtual try on(VTO), 3D visualization in real environment(VRE) and customization and personalization(CP) on the dependent variable, purchase decision(PD). All three variables significantly influence the dependent variable, as indicated by their p-values (p < 0.05). CP has the strongest effect on PD, with a standardized coefficient (beta $\beta$ ) of 0.365 and the highest t-value which is 7.069, showing its influence towards dependent variable. Follow by is the 3D visualization in real environment with a moderate effect ( $\beta$ =0.300,t=6.902), while virtual try on has the weakest influence ( $\beta$ =0.162,t=3.157). The unstandardized coefficients indicate that a unit increase in CP leads to a 0.300 increase in PD, a unit increase in VRE leads to a 0.248 increase, and a unit increase in VTO leads to a 0.142 increase in PD. This analysis highlights that while all variables significantly contribute to predicting PD, CP has the greatest impact, emphasizing its importance in influencing the outcome.

#### Table 4.20: Coefficient's Table

(Source: Output from SPSS)

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Coefficients <sup>a</sup>						
		Unstand	lardized	Standardized		
		Coeffi	Coefficients			
Model B Std. Error		Beta	t	Sig.		
1	(Constant)	1.433	.153		9.386	.000
	VTO	.142	.045	.162	3.157	.002
	VRE	.248	.036	.300	6.902	.000
	СР	.300	.042	.365	7.069	.000

a. Dependent Variable: PD

#### 4.7 ANALYSIS OF VARIANCE (ANOVA)

ANOVA is used to determine whether there is a difference between the groups. However, it cannot determine which group contributes to the difference. Based on Table 4.20 above, the value of F-test result was 118.282 with a significance p-value of <0.001 which is below 0.05 alpha levels. According to Saunders (2023), there will be a difference between some of the means if the p-value is less than 0.05. The regression sum of squares (70.021) shows that nearly half of the variation in purchase decision is explained by the model. Therefore, there is a statistically significant difference between dependent variable consumer purchase decision in online shopping and independent variables which are virtual try-on, 3D visualization in real environment and customization and personalization.

Table	4.21: A	ANOVA	Table
(Sol	irce: S	PSS Out	mut)

			ANOVA <sup>a</sup>			
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	70.021	3	23.340	118.282	.000 <sup>b</sup>
	Residual	74.984	380	0.197		_
	Total	145.005	383	AYSIA M	ELAKA	
a. Dependent Variable: PD						
b. Predic	tors: (Constant), C	CP, VTO, VRE				

#### 4.8 SUMMARY

In this chapter, reliability analysis, descriptive analysis, Pearson correlation analysis and multiple regression analysis were used to analyze the data collected from 384 respondents by using questionnaires. SPSS Software Version 27.0 was used and the reliability of questionnaires tested was considered high. From the result, it proved that all the independent variables have significant relationships with the dependent variable. The following chapter will be discussed about the conclusion and recommendations of this research.

#### **CHAPTER 5**

#### CONCLUSION AND RECOMMENDATION

#### 5.0 INTRODUCTION

In this chapter, researcher is going to discuss about the conclusion of the overall result and summary of the findings of this research. The summary of the findings is elaborated in the first section of this chapter follow by justification of research objectives explained in the second section. Besides, limitation of research also included in the third section of this chapter. Lastly, researcher will prepare the recommendations for the future research in the last section of this chapter.

#### 5.1 **DISCUSSION**

According to the findings of the correlation research, the link between virtual try on and consumer purchase decision in online shopping has a statistic of 0.553. This demonstrates that there is a significant linear connection between the variables in question. It demonstrates that there is a favorable relationship between virtual try on and consumer purchase decision in online shopping.

According to the findings of the second correlation study, the link between 3D visualization in real environment and consumer purchase decision in online shopping reveals a statistic of 0.556. The results indicate that there is a significant linear relationship between these two variables.

The coefficient of determination is 0.479, which indicates that visual try on, 3D visualization in real environment, and customization and personalization explain 47.9% of the variability in influencing consumer purchase decision in online shopping. If p is less than 0.05 in this study, one may conclude that there is a statistically significant effect of each variable on the purchase decision in online

shopping.

Lastly, according to the findings of the third study of correlation, the link between customization and personalization and consumer purchase decision in online shopping displays a statistic of 0.620. These results shows that there is a significant linear association between both variables. These results suggest that all independent variables (VTO, VRE, and CP) have significant relationships with the dependent variable (PD), with varying degrees of strength.

## 5.2 HYPOTHESIS TESTING

The validity of hypothesis will be defined by using the regression analysis. If the t value exceeds 1.96 and the p-value lower than 0.05, a hypothesis can be accepted. If p-value greater than 0.05 proves that there was no significant impact of independent variables toward dependent variable. All independent variables and dependent variables in this research will be evaluated.

Based on the regression analysis table provided, researcher can evaluate the hypotheses for the independent variables (VTO, VRE, CP) by checking the significance (Sig.) values against the commonly used threshold (e.g., 0.05). Below is the table summarizing the results:

Independent Variable	Unstandardized Coefficient (B)	t- Value	Sig. Value	Hypothesis Result	Explanation
VTO	0.142	3.157	0.002	Not Rejected	The Sig. value is less than 0.05, indicating VTO significantly predicts PD.
VRE	0.248	6.902	0.000	Not Rejected	The Sig. value is greater than 0.05, showing VRE does not significantly predict PD.
СР	0.300	7.069	0.000	Not Rejected	The Sig. value is slightly below 0.05, indicating CP significantly predicts PD.

H1: There is significant relationship between Virtual Try-on and consumer purchase decision in online shopping

**Not Rejected:** The regression analysis shows that Virtual try on has a significant positive impact on consumer purchase decision in online shopping (Sig. = 0.002). This indicates that when consumers adopt AR technology such as virtual try on, their acceptance of the technology increases significantly. The strong t-value is 3.157 highlights the importance of this factor.

# H2: There is significant relationship between 3D visualization in real environment and consumer purchase decision in online shopping.

Not Rejected: The results showed that 3D visualization in real environment has a significant positive impact on consumer purchase decision in online shopping with a data of (Sig. = 0.00). This shows that the AR technology such as 3D visualization can influence consumers purchase decision while online shopping with a t- value of 6.902 which highlights the importance of this factor.

# H3: There is significant relationship between customization and personalization and consumer purchase decision in online shopping

**Not Rejected:** Customization and personalization has a strong and significant positive impact on the influence of AR feactures on consumer purchase decision in online shopping with the number of (Sig=0.000). This can means that consumers are most likely to purchase a product if it has provide AR feature such as personalization for them while shopping online, which comes with the highest t-value which is 7.069, that shows personalization and customization is a key predictor of AR features that influence consumer purchase decision in online shopping.

#### **Summary of Hypothesis Result:**

**H1: Not Rejected** - Virtual try-on significantly impacts consumer purchase decision in online shopping.

**H2:** Not Rejected - 3D visualization in real environment significantly impacts consumer purchase decision in online shopping.

**H3:** Not Rejected - Customization and personalization significantly impacts consumer purchase decision in online shopping.

#### 5.3 DISCUSSION OF OBJECTIVE

# Obj 1: To measure the influence of Augmented Reality(AR) technology on consumer purchase decision.

According to Poushneh and Vasquez-Parraga (2017), Augmented Reality (AR) significantly influences consumer purchase decisions by reducing uncertainty and enhancing satisfaction and confidence. The influence of AR technology on consumer purchase decisions stems from its ability to create immersive, engaging, and informative shopping experiences.

This objective focuses on examining how the the influence of Augmented Reality(AR) technology on consumer purchase decision. The influence of AR technology is measured through constructs such as virtual try on,3D visualization in real environment, and customization and personalization which is from widely accepted models like the S-O-R framework.(Han & Kim, 2020)

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From Table 5.1, Customization and Personalization (Beta = 0.365, p < .001) emerges as the strongest influencing factor in the influence of AR features on consumer purchase decision in online shopping. This suggests that consumers value the ability to tailor products (e.g., selecting colors, sizes, or designs), which enhances their satisfaction and emotional connection to the product. Additionally, 3D Visualization in Real Environment (Beta = 0.300, p < .001) also plays an important role, indicating that consumers who find 3D visualization helpful such as viewing how furniture fits in their space or examining a product's dimensions, are more likely to make confident purchase decisions. Furthermore, virtual try-on (Beta = 0.162, p < .001) shows the weakest influencing towards consumer purchase decision in online shopping which demonstrate that it is less effective in reducing uncertainty and building confidence by allowing consumers to test products virtually, such as trying on clothing or makeup compare to the other two feature.

# Obj 2: To analyze the influence of specific AR on how AR features influence consumer purchase decision.

To investigate how AR features influence consumer purchase decisions, it is essential to examine their specific impacts on decision-making. According to (Poushneh & Vasquez-Parraga, 2017) features such as 3D visualization, virtual try on, and customization and personalization play a important role in shaping consumer behavior which shows that AR features are able to helps consumers understand product dimensions and fit within their environment, reducing perceived risks and improving confidence.

Firstly, the result shows that virtual try on (Beta = 0.162, p < .002) significantly influences consumer purchase decision with a t-value standing at 3.157 with a significance value of 0.002 indicates a relationship between virtual try on and consumer purchase decision in online shopping. The t-value surpassing the threshold of 1.96 and the significance level being below 0.05 provide strong evidence to support this relationship. This AR feature are able to allow consumers to see how products, such as clothing or makeup, will look on them or in their environment, significantly reducing hesitation and enhancing consumer purchase decision (Jung et al., 2021).

Secondly,3D visualization in real environment (Beta = 0.300, p < .000) shows that this feature significantly influence consumer purchase decision with a number of t-value standing at 6.902 which is above 1.96 and with a significance value of below 0.01 which is below 0.05 that can shows there is a relationship between 3D visualization and consumer purchase decision in online shopping. This feature can improved consumer clear understanding by showing the dimensions and color of the products, that will increased their confidence in making purchase decisions which aligns with Poushneh and Vasquez-Parraga (2017), who found that realistic product representations in AR can foster trust and reduce perceived risks in online shopping.

Additionally, the results of customization and personalization (Beta = 0.365, p<.000) emerged as the most impactful with a beta value of 0.365 and p < .001

which the t- value is 7.069 that is above the value 1.96 and with a significance value of below 0.01 that is below 0.05 which can indicate there is a relationship between customization and personalization and consumer purchase decision in online shopping. This is because according to (Rajagopal, 2022), this features offer consumers the ability to tailor products to their preferences, which can help to foster consumer satisfaction which will then influence their purchase decision.

These features address common online shopping uncertainties by providing realistic, interactive, and engaging experiences which further demonstrate the effectiveness of these features in influencing consumer purchase decision (Dwivedi et al., 2021).

# **Obj 3:** To examine the relationship between AR features and consumer purchase decision in online shopping.

The findings from this study reveal that each AR feature like the virtual try on, 3D visualization, and customization and personalization has a significant and positive relationship with consumer purchase decisions, highlighting their collective and individual importance in shaping the consumer online shopping behavior.

First of all, customization and personalization exhibited the strongest relationship with consumer purchase decisions, with a correlation coefficient of r = 0.62 (p < 0.001) which the result shows that the ability to personalize products, such as choosing colors, sizes, or styles, enhances the overall shopping experience by fostering a sense of ownership and emotional connection. This personalization increases consumer satisfaction , as according to Spreer and Kallweit (2014), who mention that customization options make products more appealing and help differentiate brands in competitive markets.

Next, virtual try on technology demonstrated a moderate positive relationship with consumer purchase decisions, with a correlation coefficient of r = 0.553 (p < 0.001). This feature allows consumers to visualize how products will look or fit, significantly reducing hesitation and enhancing decision confidence. For example, consumers can virtually "try on" clothing or see how furniture fits in their homes, providing assurance before making a purchase. According to Hilken et al.

(2017) emphasize that virtual try on improve consumer engagement by offering interactive and realistic previews, making online shopping more enjoyable and reliable.

Lastly, 3D visualization in real environment also showed a moderate positive correlation with consumer purchase decisions, with a correlation coefficient of r = 0.556 (p < 0.001). This is because 3D visualization creates an immersive shopping experience that bridges the gap between physical and digital retail environments, which will increase consumer satisfaction and trust that consumers value the ability to interact with realistic product representations, which enhance their understanding of product dimensions, fit, and quality. The reduction in uncertainty fosters trust and confidence, which leads to a stronger purchase decisions.

In summary, based on the beta values and p-values, it can be concluded that all three independent variables (Virtual Try-On, 3D visualization in Real Environment and Customization and Personalization) significantly influence consumer purchase decision in online shopping. The positive beta values indicate a positive relationship, and the low p-values suggest that these relationships are statistically significant. The results of the analysis suggest that virtual try on, 3D visualization in real environment and customization and personalization significantly influence consumer purchase decision in online shopping and the study provides statistical evidence to support these conclusions.

#### 5.4 LIMITATION OF STUDY

The generalisability of the findings of the study is, therefore, limited because they apply only to consumers in Melaka. Nevertheless, the study findings present interesting findings of the purchase decision of consumers in online shopping in Melaka influence by AR features, the generalization of these results towards the total population or other various consumer segments may pose some limitations. This work is evidence that other cultural, economic, and technological elements specific to the region of Melaka may give a different perspective towards AR technology among the consumers as distinguished from other regions or countries. This geographic restriction also leaves out its diversity of demography and employment of clients in different ages, education, or socioeconomic status that may affect the findings generally. Therefore, these may not be able to reveal how this AR features impacts the consumer purchase decision in a greater perspective.

Secondly, another limitation arises from the use of survey and questionnaire based information, which have their information coming directly from the respondents. Another possible source of method bias is response bias in which participants give 'what they are expected to say' rather than 'what they actually feel or do'. However, when responding to the questions, the respondents may forget the experiences they have undergone or give patchy information. Measurement error is also a threat because the participant's failure to properly comprehend survey questions may lead to wrong responses, and non response bias may occur if the views of the respondents who refused to participate are considerably different from those of the participants. Secondly, surveys may give much data in a relatively short amount of time, but they do not allow for the investigation in depth psychological and emotional characteristics of consumers that can be explored through qualitative methods like interviews or focus groups.

Lastly, one of the limitations of the study is the fast rate at which AR technology is advancing. Computerized AR features and applications are still being developed, meaning that the results may be less representative as new technologies are created. Customer attitudes and buying patterns may also change in the future as technology develops and becomes increasingly integrated into society. In addition, the study does not consider how the other new technologies including VR or MR may cross with AR or impact consumer behavior in ways that are not currently foreseeable. Therefore, the research represents a snapshot of the state of AR technologies in a given period which its body knowledge may get outdated over time due to the evolution of the technologies. These limitations can be overcome in future studies through a broader scope of the research area, a multi method research design, and a longitudinal research design since the behavior of consumers is dynamic and technological changes are fast emerging.

#### 5.5 RESEARCH IMPLICATION

Research implications represent the possible outcomes of the study findings which can produce real world effects or practical applications. The findings exist as the means by which results guide theoretical advancement or practical improvements. A study gains its wider meaning and importance through implications that explain its effects and relevance across multiple theories and practices.

#### 5.5.1 Theoretical Implication

The study extends the Stimulus-Organism-Response (S-O-R) framework which represents a fundamental framework throughout consumer behavior research. This research uses AR specific features such as virtual try ons and 3D visualization as stimuli to demonstrate their impacts on consumer trust and purchase intentions as well as cognitive and affective outcomes. AR features function to act as triggers that cause psychological reactions with emotional effects that transform consumer choice behaviors. The extended S-O-R model enhances our capacity to analyze technology mediated stimuli that interact with consumer inner states to produce purchasing reactions thus enabling better applications of S-O-R in online shopping.

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Not only that, this research fills important knowledge gaps by studying the actual effects of precise AR features on consumer buying decisions instead of investigating general AR technology usage. This research delivers focused information regarding AR retail effectiveness, especially for 3D visualization features alongside personalization which previous studies about retail AR typically left out. This research brings value to academic discussion alongside beneficial advice for businesses working to improve their consumer decision making through AR implementations.

Lastly, the research study also shows the way to upcoming studies about AR's changing effects on online shopping practices and other relevant areas. The analysis of the cultural and geographical environment of Melaka sets the groundwork for researchers who wish to conduct comparative studies regarding how AR influences consumer behavior across various markets. The research establishes a foundation for upcoming studies that will investigate new AR technology developments along with their combination with VR devices. Research directions based on this study lay a solid base for theoretical knowledge in the quickly evolving field of AR enhanced customer experiences.

#### 5.5.2 Practical Implication

First of all, this research can help to enhance online retail strategies, online retailers possess the capacity to transform online shopping through buil in AR features which provide virtual try ons as well as 3D visualization and product customization functionalities. The enhanced product interaction features allow shoppers to handle products effectively which decreases their purchasing uncertainty while building trust in their buying decisions. For example, users can use virtual try ons to see products fitted to their bodies and 3D visualization tools show the product sizes in relation to their environment before making a purchase. Retailers are able to gain greater sales success through immersion technologies which provide shoppers with better experiences and loyal customers who feel confident about their purchasing decisions. AR features distinguish online retailers within intense e-commerce competition through unique interactive shopping experiences thus placing them at the forefront of their industry and pushing up their brand attractiveness. Such features provide competitive advantages when it comes to both customer acquisition and retention in an environment full of online competitors.

Beside that, through AR features, customers can reduce shopping uncertainties by accurately viewing products before buying anything online. Example like tools provide users with experiences to virtually interact with furniture placement in their rooms and dress themselves digitally which lowers the possibility of final product dissatisfaction. The ability to view products accurately through AR improves consumer trust levels which leads to reduced product returns for retailers. Implementing augmented reality leads businesses to decrease their logistics expenses from returns while enhancing their entire operational productivity. In the end, AR features are able to deliver sophisticated shopping experiences that establish beneficial relationships between stores and customers. Last but not least, another practical implication of this study is the need to educate consumers about the benefits and uses of AR technology in online shopping. Many shoppers may still not be unaware of how AR is able to improve their purchase decisions by providing real time previews and reducing uncertainties. For example, retailers should invest in awareness campaigns, tutorials, and user guides to educate consumers about these advanced features. By improving the adoption rate of AR technology, businesses can increase consumer confidence, engagement, and overall satisfaction.

#### 5.6 RECOMMENDATION FOR FUTURE RESEARCH

First of all, for future studies, it is recommended that the geographic coverage be extended to cover respondents from different geographical locations or even from different countries in order to determine the effects of culture, economy, and technology on AR on consumers purchase intentions. Users in various parts of the world have varying attitudes toward this technology since they have not encountered it in their culture, or they are culturally resistant to it. Market factors, ranging from the cost of AR compatible devices to the consumers disposable income, are other key determinants influencing consumers adoption of AR technology, especially in regions with different economic standards. Thus, future research may extend the range of results enhancing the external validity of the presented outcomes and providing better targeted guidelines for applying AR for various regions and segments.

Next, pursuing longitudinal research is another interesting direction for future research as it would offer an understanding of the AR technology's effect on consumers behavior in a consistently changing process. Qualified researchers could follow up with the same group after the short term experiments and finally after a long duration and notice that the consumers attitudes, and preferences would have shifted as they grow with AR. Furthermore, as technological enhancements for AR technology remain extremely progressive, a longitudinal study would assist in evaluating further effects of updates on consumer decision making for example further enhancements such as better 3D rendering or personalization features. It would also outline the impact of market trends and alternations of e-commerce strategies in the influence of AR in online shopping to ensure that the research is sensitive to the various technological and social changes taking place.

Additionally, exploring other factors that may influence the relationship between AR features and consumer purchase decisions could provide deeper insights such as understanding what builds trust such as concerns about data security, app reliability, or visualization accuracy could help address consumer hesitations. Similarly, the overall user experience, including ease of navigation and interface design, plays a significant role in consumer satisfaction and engagement with AR. Future research could also investigate the perceived usefulness of AR applications, as consumers are more likely to adopt technologies they find valuable in improving their shopping experience.

Last but not least, there is a possibility that including qualitative research data collection tools like interviews and focus groups could enrich the numerical data acquired from the surveys. These methods would enable the researcher to investigate how consumers felt when using AR and the nature of the psychology involved when consuming such products, aspects such as excitement, and trust in their purchase decisions. Several focus groups could consider various processes consumers go through when shopping enabled with AR, and exactly what level of comfort (or discomfort) they experience throughout using specific functions such as virtual try ons or 3D visualisation. Besides, qualitative approaches would present practical cases and consumer stories that describe unseen determinants of AR adoption that qualitative research could disregard. Hence, future research could cover these areas, and a broader comprehension of AR impacts on consumer behavior could be reached so as to improve AR technologies and make them more user oriented.

#### 5.7 CONCLUSION

In conclusion, this study aims to provide a deeper understanding of how augmented reality (AR) features such as 3D visualization, virtual try-ons, and customization influence consumer purchase decisions in online shopping. Despite challenges like geographic focus, reliance on self reported data, and the rapid evolution of AR technology, consumers demonstrate adaptability in leveraging AR to enhance their confidence and satisfaction in purchase decisions. Ultimately, the study highlights the influence of AR features on consumer purchase decisions in online shopping, emphasizing their role in driving innovation for AR technology and enhancing the online shopping experience for consumers.



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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# APPENDIX A

# SURVEY QUESTIONAIRE

# SECTION A: DEMOGRAPHIC OF RESPONDENT

1. GENDER
MALE FEMALE
2. RACE
MALAY INDIAN CHINESE OTHERS
3. AGE* 20 AND BELOW 21-30 31-40 41-50 ABOVE 50
UNIVERSITI TEKNIKAL MALAYSIA MELAKA 4. EDUCATION
Primary Education (UPSR) SECONDARY EDUCATION
(PMR,PT3,SPM, STPM, O LEVAL, A LEVEL)
5. Have you heard about AR (augmented reality) before? *
Yes No Maybe
6. Have you heard about AR (augmented reality) before? *
Yes No Maybe

# SECTION B: QUESTIONAIRE

A "5 point Linear scale" was used to evaluate each statement.

1	2	3	4	5
Strongly Disagree	Disagree	Nuetral	Agree	Strongly Agree

#### MALAYSIA

IV	1:	VIRTUAL TRY-ON	

No	Statement	1	2	3	4	5
VTO 1	I feel that virtual try-on provides an accurate representation of how a product would look on					
E.P.	me or in my space.					
5/1	I feel more confident in purchasing after using					
VTO 2	virtual try-on			·		
	I think that virtual try-on significantly reduces	AN	EL	AK	A	
VTO 3	the risk of buying the wrong product					
	Virtual try-on reduces my hesitation when					
VTO 4	making a purchase decision.					
	I think that using virtual try-on makes online					
VTO 5	shopping more enjoyable for me.					

### **IV 2: 3D VISUALIZATION**

No	Statement	1	2	3	4	5
	I think that 3D visualization helps me					
VTO 1	understand the product's dimensions (e.g., size,					

	shape) better.			
	I feel that using 3D visualization makes me feel			
VTO 2	more confident in my purchase decision.			
	I find that 3D visualization can reduces my			
VTO 3	uncertainty about the product's quality.			
	I find 3D visualization more useful than regular			
V104	product images			
, PY	I like that 3D visualization enhances my overall			
VTO 5	shopping experience.			
TEK				

# IV3: CUSTOMIZATION AND PERSONALIZATION

No	Statement	1	2	3	4	5
CP 1	I think that the ability to customize products (e.g., color, size) makes me more likely to purchase them.	•	Ś	زيو	٩١	
UNIV	<b>ERSITI TEKNIKAL MALAYSI</b>	AN	EL	AK	Α	
CP 2	I feel more satisfied with purchases when I can personalize products.					
CP 3	I find that personalization can helps me find products that better suit my preferences.					
CP 4	I am willing to pay more for a product that I can personalize.					
CP 5	I like that product customization options make online shopping more engaging for me.					

DV: PURCHASE DECISION

No	Statement	1	2	3	4	5
	I find that AR features helps to make faster					
PD 1	decision when purchasing products online.					
	ground and produce children					
	I feel that AR features give me confidence that I					
PD 2	am making the right purchase decision.					
	I think that AR features makes online shopping					
PD 3	more engaging.					
	AVS/A					
	I think that using AR features makes me more					
PD 4	willingly to purchase a product online.					
<u>S</u>	×					
Ш.	E Contraction of the second se					
F	I feel that AR features make me more likely to					
PD 5	make repeat purchases from the same retailer.					
64.5						
	INC					



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

# **APPENDIX B**

## **GANNT CHART**

### a) GANTT CHART OF RESEARCH ACTIVITIES FOR FYP I (WEEK 1-WEEK14)

Time / Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Briefing for FYP 1															
Brainstorming for FYP title															
Topic selection				1 1											20
Topic confirmation										<u>,</u>	[]				1
Identification of RQ and RO															
Discussion for Chapter 1 about the content	1	2			1										
Writing on Chapter 1		N.				1				<u>.</u>					<u>.</u>
Checking and marking session for Chapter 1		N.N.													
Discussion for Chapter 2 about the content		8													
Writing on Chapter 2	5 5		5			9					8 - S	N V			5.0
Checking and marking session for corrected Chapter 1 and Chapter 2															
Discussion for Chapter 3 about the content		8		3 3					8		3	8 8			
Briefing about research design		L			2.			3.	S		2		3:	91	3 
Writing on Chapter 3				a – 73			x		. • •			·	2 - X		s
Creating Questionnaire			<b>Z</b> N 1												
Pilot Testing					A L	\$ 1VB		AT	3	<u>e</u>	VIE		<u> </u>	A	s
Checking and marking session for corrected Chapter 2 and Chapter 3						2 0				2)					2)
Correction on final report for 3 Chapters													10		
Submitting hardcopy of Chapter 1,2 and 3															
Preparing slide for Viva presentation															
Presentation 1	i i			1						<u> </u>	1		( l		
Correcting report based on Panel's comments															
Submission of FYP1										0					

Table 1: Shows the gantt chart of FYP1

Time / Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Briefing for FYP 2														
Brainstorming for data														
analysis														
Discussion of questionnaire														
Questionnaire development														
Correction and additional														
Submission of questionnaire	MA													
Data collection (Pilot Test)		2											1	
Discussion of sample size	<u> </u>	A												
Submission of Pilot Test														
Data collection														
Run data using SPSS														
Do analysis					2									
Do findings														
Recheck data analysis	2						2	5	2	4	9, )		2	$\mathbf{b}$
Chapter 5					<b>4</b> 4									
Full report	TE	: 12		Z/		ЛЛ			eı/	<u> </u>	ЛЕ			•
Preparing slide for Viva						IVIA			917					
presentation														
Compiling proposal									0					
FYP 2 Presentation														
Correcting report based on	1		<u> </u>											
Panel's comments														
Submission of FYP 2														

### b) GANTT CHART OF RESEARCH ACTIVITIES FOR FYP II (WEEK 1-WEEK14)

Table 2: Shows the gantt chart of FYP 2