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A Future Prospect on the Adoption of Augmented Reality E-Commerce in Malaysia

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Abstract: Technological advancements and developments are growing at a fast pace these days. However, there are lack of study that look at the AR e commerce especially from the perspective of consumer adoption. Thus, this study will focus on the foresight study on the adoption of AR e-commerce in Malaysia. There will be two research objectives in this research which is to identify the key drivers of Augmented Reality (AR) e-commerce adoption among online consumers in Malaysia and to determine the future trend of Augmented Reality (AR) e-commerce adoption among online consumers in Malaysia. The research had been conducted among Malaysian consumers; the research had collected 110 responses from respondent with a response rate of 28.95%. This study found that motivates consumers purchasing decisions and consumer data protection and privacy as the highest driver in impact-uncertainty analysis. Four (4) scenarios have been proposed at the end of the study. The four scenarios are stagnant state of AR technology, flourish of AR technology in e-commerce, incapable of AR technology, and destructibility of AR technology.

Keywords: Augmented reality, E-commerce, Foresight, Technology adoption

1. Introduction

Technological advancements and developments are growing at a fast pace these days. Nowadays, everything could be done using advanced technology. This can be said and done in the purchase pattern of a regular consumer these days, most consumers still prefer the traditional way of shopping which is by visiting brick and mortar store since they could use their human senses to see, feel, and test the product before making decisions on buying it. These days, online purchases by using mobile e-commerce platforms continue to grow worldwide (Smink *et al.*, 2019). Malaysian consumers have accustomed themselves to buy online by using e-commerce apps available in Malaysia. This research aims to study the implementation of Augmented Reality (AR) e-commerce in Malaysia. The way the consumers shop now is based on their judgement on the reviews of the products by other consumers online. However, AR is an emerging technology that simulates digital visual elements into the real

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world. As mentioned earlier consumers uses their senses to see, feel, and test the product but consumers are not given the chance, or the availability of product trials is only limited to few products only. Hence, trying before buying is a new experience for the consumers to try when AR technology is available in e-commerce apps.

Online purchases by using mobile e-commerce platforms continue to grow worldwide (Smink *et al.*, 2019). In Malaysia, Shopee is currently the most popular e-commerce website in Malaysia, followed by Lazada, Mudah, Amazon, AliExpress, and Taobao (Tang, 2020). According to The Star (2020) Malaysian households' access to the internet rose by 3.1% to 90.1% in 2019 compared to 87% in 2018. With higher number of internet users in Malaysia there may be some percentages of Malaysian internet users uses e-commerce platforms to shop. According to Globaldata (2020), "Malaysia is among the fastest-growing e-commerce markets in Southeast Asia, driven by rising Internet and smartphone penetration, growing middle class population and tech-savvy millennials. The fear of virus spreading through cash handling and visiting physical stores amid COVID-19 outbreak has further accelerate this growth.". E-commerce itself is groundbreaking, however, by adapting a more robust technology especially in delivering better shopping experience like Augmented Reality (AR) will benefit both consumers and sellers.

The research area for this study is Augmented Reality (AR) e-commerce. AR technology is a technology that enhances the real physical world using digital visual elements like sound or other stimuli delivered through technology (Hayes, 2020). 'Try before you buy' is a shopping experience that enables consumers to virtually try products, for example, trying make-ups, sunglasses, placing furniture by using surroundings in real time or using consumers face by adopting AR technology can bridge the gap between offline and online shopping (Smink *et al.*, 2019). The technology will give a sense of direct product experience without the product being by the customers side. IKEA, one of the most known companies has already been using AR technology in their e-commerce app, IKEA Place is an AR app that will be launched back in 2017 has shown its capability in solving practical problem surrounding furniture shopping (Ozturkcan, 2020). Customers have the freedom to try out furniture in their homes before buying it and the app would use AR to allow the customers to visualize how the furniture they are looking to buy in their homes (Ozturkcan, 2020). However, the usage of AR in e-commerce is not limited to only furniture, one way or another it could be used in apparel e-commerce as well since AR will allow the customers to immediately see how clothes or accessory would look on them (Baytar *et al.*, 2020).

E-commerce is an important role especially in linking business owners to customers these days and it also facilitates the buying and selling of goods to customers. However, most retailers face issues such as high return rates, online shopping cart abandonment, and webrooming (Smink *et al.*, 2019). Webrooming is a phenomenon where customers browse products online, then shop products offline, as mentioned before these issues may partly be attributed to lack of direct product experience like lacking product presentations in sensory information compared to shopping offline (Smink *et al.*, 2019). Consumers' cross-channel shopping behaviors, like showrooming and webrooming have fogged consumers decision making process in the purchase journey (Aw *et al.*, 2021). Webrooming behaviors also often led to price discrepancy where price in physical stores is marginally more expensive than that of online stores (Aw *et al.*, 2021). This behavior is motivated by the need to attain more comprehensive information (Aw *et al.*, 2021). Next, issues that mainly arise in the e-commerce field is abandonment of online shopping cart, abandonment of online shopping cart can be defined as "consumers placement of item(s) in their online shopping cart without making a purchase of any item(s) during that online shopping session." (Kukar-Kinney & Close, 2010). Online shopping cart abandonment can also be closely related to webrooming as both are closely like each other. Online shopping cart abandonment often happens when the consumers are considering their purchase decisions, which brings down to the consumers online shopping process where consumers will maximize information collection, and to narrow down information overload (Kukar-Kinney & Close, 2010). The use of Augmented Reality

(AR) technology in online shopping or e-commerce will greatly facilitate the consumers purchase journey and help consumers in their purchase decision. AR e-commerce will offer consumers an interactive shopping experience by overlaying real world and virtual world also AR will benefit in terms of direct product experience to customers to bridge the gap between online and offline stores and to combat online shopping cart abandonment and webrooming. Thus, this study tries to identify key drivers of Augmented Reality (AR) e-commerce in Malaysia and to determine how these key drivers could affect the future trend of Augmented Reality (AR) e-commerce adoption among online consumers in Malaysia.

2. Literature Review

In this foresight study, the literature review was used to include a detailed overview of the study's meaning and essential concept. Literature review will also be conducted in ensuring that the literature review can be correlated to the research topic to identify the issues and key drivers, analyze the impact and uncertainty of the most significant key drivers, establish potential scenarios in the adoption of Augmented Reality (AR) technology in e-commerce

2.1 Augmented Reality (AR) Technology

AR is a technology that superposition of virtual objects on the real environment of the user (Yim *et al.*, 2017).AR are usually computer generated images, texts, sounds, and *et. cetera*., these images are mapped often mapped to really fit the user's current environment. AR also aims to enhance user's experience (Yim *et al.*, 2017).

2.2 Augmented Reality (AR) Technology in e-commerce

According to Yim *et al.* (2017), large companies like Snap, Nike, Adidas, Mini, and eBay have been eagerly adopting various forms of AR, it allows consumers to realistically experience their products. In Malaysia, there are currently no brands and e-commerce platforms that is currently adopting AR in their business model, Pokémon Go, a mobile game which AR are overlaid into the consumers' screen (Yim *et al.*, 2017), the game also garnered some demography of consumers in Malaysia. One of the recent adaptations of AR e-commerce is by the furniture company, IKEA, they are known for their "Ready-to-Assemble" furniture, the company launched an AR app that is known as IKEA Place (Ozturkcan, 2020). The app was launched, with an objective in mind which is solving practical problems surrounding furniture shopping, IKEA, has booked its place in the innovation model by making themselves a first mover and the adapter of technology to service provision (Ozturkcan, 2020).

2.3 Benefits of Augmented Reality (AR) Technology in e-commerce

Augmented Reality (AR) has many positive impacts towards the future of e-commerce in Malaysia. One of the biggest positive impact is that AR-based product presentations are generally superior to traditional web-based product presentation (Yim *et al.*, 2017). However, the mixed influence of previous media experience on consumer evaluations speculated that the benefits offered by AR are not as great with certain products like watches, for example, AR users that wears glasses or sunglasses would not see much difference on the screen that reflects the user's face wearing other sunglasses design, but in the case for watches user's need to place their wrist at a certain position to get the watch that the user is trying to match with their wrist, the irritation of needing to hold the wrist to are said to lessen the effect of AR (Yim *et al.*, 2017). With the downside that will be stated, it is not entirely correct that it will lessen the effect of AR, there are some other factors that contributes to the diminishing effect.

Next, AR in e-commerce shows interactivity and vividness generate diverse positive consumer evaluations through increased immersion (Yim *et al.*, 2017). Implementation of AR in e-commerce will

boost consumers shopping experience in terms of increased immersion and this may be the factors that will contribute to purchase decisions of consumers when shopping using e-commerce app. Although in the past the research is only limited to one media environment, personal computers (PC), future research suggest that AR to operate in mobile devices (Yim *et al.*, 2017). Future directions of this research would be to see whether AR is linked to increased product sales or improved company or brand images when positioned as highly competitive in technology adoption and implementation (Yim *et al.*, 2017). Future research also suggests that investigating the relationship between confidence about product information and intent to actually visit retail stores to supplement product information in reducing *webrooming* behavior (Yim *et al.*, 2017).

2.4 Challenges of Augmented Reality (AR) Technology in e-commerce

Augmented Reality (AR) technology is still a fairly new technology in the market. Its emerging factors contributes to many unclear information about AR technology. Hence, there are still challenges which are faced by AR technology.

The challenges faced by AR technology from previous research is that the convenience sample only consisting of college students (Kowalczuk *et al.*, 2021). The reason to this is that maybe the later generations have smaller technology-iterate population than the younger generations, especially college students since they are exposed to a lot of different emerging technologies. Future research should imply research to investigate age-related differences.

Next, challenges faced by AR technology is regarding the product in terms of post-purchase product satisfaction to determine if AR technologies have the potential to decrease return rates in online channels (Kowalczuk *et al.*, 2021). The reason that this is seen as a challenge is that there are no proven rates of product returns based on AR aided purchases. Future research should imply multiple product satisfaction on multiple product category (Kowalczuk *et al.*, 2021).

2.5 STEEPV Analysis

Change in issues and drivers identified from different sources such as journals, government-related articles, the internet, and non-governmental organizations reports on Augmented Reality (AR) technology and classifying it into social, technological, economic, environmental, political, and values. All issues and drivers from the STEEPV analysis was used to identify the key drivers of AR technology in e-commerce in Malaysia. Table 1 shows the output of the STEEPV analysis:

Table 1: Output of STEEPV Analysis

Factors	Total
Social	15
Technological	20
Economic	11
Environmental	3
Political	4
Values	18

2.6 Table with Merged Issues and Drivers

The STEEPV analysis has identified major issues and drivers for the future trend on the adoption of Augmented Reality (AR) e-commerce in Malaysia. All merged issues and drivers are shown in Table 2.

Table 2: Merging of Issues and Drivers

No.	Key Drivers
1.	Motivates consumers purchasing decisions.
2.	Adequate and increased flow of information for consumers.
3.	Eco-friendly.
4.	Superior spatial presence for consumers.
5.	Government policy and regulation.
6.	Seamless and fun experience for consumers.
7.	Virtual and real-time product view for consumers.
8.	Boost greater enjoyment with perceived information.
9.	Advanced features
10	Curbing the spread of infectious disease among consumers.
11.	Consumer data protection and privacy

3. Research Methodology

This section outlined the methods used during the study. This includes information on the research flow chart, description of the STEEPV analysis method and quantitative method used in the analysis and explains how to interpret the results obtained. This describes the instruments that were used for data collection and specifies the procedures that should be followed. The secondary data were analyzed based of the STEEPV analysis, while the quantitative data was analyzed using descriptive analysis.

3.1 Research Design

The research design of this study was exploratory in nature. Collection of responses from online Malaysian consumers, the questionnaire method was used. The researcher developed the questionnaire based of the STEEPV analysis to determine the relevant drivers of Augmented Reality (AR) e-commerce in Malaysia. The questionnaires were distributed to online Malaysian consumers. The analysis of impact-uncertainty was conducted in developing various scenarios. This study was conducted using two phases

3.2 Data Collection

Data collection is the method in which data is prepared and stored. Both primary and secondary data were used in the foresight study on Augmented Reality (AR) e-commerce in Malaysia. Primary data in this study are mainly collected through a questionnaire which were constructed from the results of the STEEPV analysis. Next, SPSS software was used to analyze data collected and this were used to conduct the impact-uncertainty analysis in facilitating the writing of scenarios for this study, the foresight study on the adoption of Augmented Reality (AR) e-commerce in Malaysia.

Secondary data refers to data that is collected by someone other than the primary user. The use of this existing data offers viable choices to researchers who may have limited time and resources.

3.3 Population and Sampling

Research populations are defined as a specific collection of individuals or objects which is the central focus of a scientific question. It is also known as a well-defined category of persons or objects considered to have comparable characteristics within a population from which the sample is taken. The population of this study were all online Malaysian consumers.

Sampling is the act, method, or technique of selecting an appropriate sample, or a representative part of a population to determine parameters or characteristics of the entire population. Sampling is the process of selecting and matching the number of units of the population. Sampling was used in selecting respondents. A grand total of 384 online Malaysian consumers were involved in this study. The sample size of known population table derived from Krejcie and Morgan (1970).

3.4 Research Instrument

The questionnaire consisted of four parts which are Section A, Section B, Section C, and Section D. Table 3 shows the structure of the questionnaire:

Table 3: Structure of the questionnaire

Section	Item
A	Demographic information of the respondents.
B	The importance of factors/drivers towards the adoption of Augmented Reality (AR) e-commerce among online consumers in Malaysia.
C	The impact of factors/drivers towards the adoption of Augmented Reality (AR) e-commerce among online consumers in Malaysia.
D	The uncertainty of factors/drivers towards the adoption of Augmented Reality (AR) e-commerce among online consumers in Malaysia.

3.5 Data Analysis

Foresight is the only acceptable response to resolve conflicts in prioritizing (Geluyake *et al.*, 2014). STEEPV analysis were used by the researcher to do the foresight study. This analysis type is based on the secondary data. Secondary data as mentioned earlier are existing data and it is publicly available, secondary data can also be known as data that were gathered by previous researchers. It is different from primary data; primary data are data collected directly from the researchers doing the research and is not publicly accessible. Secondary data were used in this study to gather the information needed on the drivers on the adoption of Augmented Reality (AR) e-commerce in Malaysia. The main source of secondary data for this research were mainly from journals of past research and website articles.

The journals and web articles that were used as the secondary data in this research are dated at least within five years from now from its release dates; between May 2016 to May 2021. Articles regarding Augmented Reality (AR) in e-commerce from the developers and experts were also being used as the secondary data. Information on being future-oriented and about emerging technology regarding the future on the adoption of Augmented Reality (AR) and E-commerce in Malaysia were collected in formulation of the STEEPV table. The source(s) of secondary data was shown in the Table 2.1 below:

STEEPV is an acronym for Social, Technological, Economic, Environmental, Political, and Values (Saritas & Proskuryakova, 2017). This approach can be used to gain information from recent innovations. All the drivers that emerged from secondary data were tabulated in STEEPV categories.

4. Results and Discussion

4.1 Results

(a) Response rate

A total number of 384 of the sample sizes for the target respondent were selected for this study. Multiple social media platforms had been used to distribute the questionnaire. 110 out of 384 required respondents had been collected with a response rate of 28.65%.

(b) Demographic information

The demographic information consists of gender, age, race, education level, respondent shopping pattern on e-commerce app, knowledge on AR technology in e-commerce, readiness on using AR on e-commerce app, superiority of AR technology on e-commerce app, familiarity of AR technology on mobile app, and the intention to implement AR technology on e-commerce app. The demographic information will be further explained from a Table 4 below.

Table 4: Demographic information

Item	Response	Frequency	Percentage (%)
Gender	Male	38	34.5
	Female	72	65.5
Age	Below 20 years old	2	1.8
	20-29 years old	105	95.5
	30-39 years old	2	1.8
	40-49 years old	1	0.9
	50 years old and above	0	0
Race	Malay	45	40.9
	Chinese	50	45.5
	Indian	4	3.6
	Indigenous Sabah and Sarawak	7	6.4
	Others	4	3.6
Education Level	Primary	1	0.9
	Secondary	3	2.7
	Pre-University	11	10.0
	Tertiary Education	95	86.4
Respondent shopping pattern on e-commerce app	Once a week	37	33.6
	Once every 2 weeks	22	20.0
	Once a month	32	29.1
	Around 3-4 times per quarter	13	11.8
	Once every 3 months	6	5.5
Knowledge on AR technology in e-commerce	Yes	60	54.5
	No	50	45.5
Readiness on using AR technology on e-commerce app	Yes	99	90.0
	No	11	10.0
Superiority of AR technology on e-commerce app	Yes	101	91.8
	No	9	8.2
Familiarity of AR technology on mobile app	Yes	88	75.5
	No	27	24.5
Intention to implement AR technology on e-commerce app	Immediately	35	31.8
	4-6 years	58	52.7
	7-9 years	10	9.1
	In 10 years	7	6.4

The tabulated demographic information are as follows. There are 110 valid respondents involved in this study out of 384 sample size respondents. Firstly, majority of the gender for this study were female at 72 (65.5%) respondents while male respondents are at 38 (34.5%). Next, most of the

respondents are of the young adults age group which were the age group of 20-29 years old at 105 (95.5%) respondents while none for the age group of 50 years old and above. Thirdly, majority of the respondents are of Chinese ethnicity at 50 (45.5%) respondents, while the least was Indian and other ethnicity at 4 (3.6%) for both. Next, most of the respondents are still or have finished tertiary education at 95 (86.4%) respondents while the least had finished primary education at 1 (0.9%) respondent. Lastly, for respondents or consumer shopping patterns on e-commerce app, majority of the respondents' shops once a week at 37 (33.6%) respondents while the least were consumers who shops using e-commerce app once every 3 months at 6 (5.5%) respondents.

Next, this part will be explaining on the demographic information on knowledge of AR technology. Firstly, there are equal numbers of respondents that knows about AR technology in e-commerce. Secondly, majority of the respondents are ready to use AR technology on e-commerce app. Next, most respondents thinks that AR technology is more informational superior to text-based or traditional e-commerce. Next, majority of the respondents knows about AR technology being implemented in other mobile app. Lastly, majority of the respondents wants to experience AR technology on e-commerce app in 4-6 years at 58 (52.7%) respondents while the least will think that it would be implemented in 10 years at 7 (6.4%) respondents.

(c) Impact-uncertainty analysis

Impact-Uncertainty analysis had been carried out in this research. The purpose for this analysis is to determine the highest mean between drivers of impact and uncertainty. Table 5 shows the mean of 11 leading drivers for impact and uncertainty. The highest mean of impact and uncertainty can be indicated by the scatter plot where the farthest point from the origin or to the most right were the main drivers. Figure 1 shows the construct of both impact and uncertainty.

Table 5: Mean of 11 leading drivers for level of impact and uncertainty

No	Issues and Drivers	Impact	Uncertainty
1	Motivates consumers purchasing decisions.	4.3000	3.7545
2	Adequate and increased flow of information for consumers.	4.2818	3.6455
3	Eco-friendly.	4.1000	3.6909
4	Superior spatial presence for consumers.	4.2455	3.7091
5	Government policy and regulation.	4.0818	3.7455
6	Seamless and fun experience for consumers.	4.2636	3.6636
7	Virtual and real-time product view for consumers.	4.3545	3.6273
8	Boost greater enjoyment with perceived information.	4.2364	3.7455
9	Advanced features	4.1818	3.6636
10	Curbing the spread of infectious disease among consumers.	4.2273	3.7455
11	Consumer data protection and privacy	4.3182	3.8455

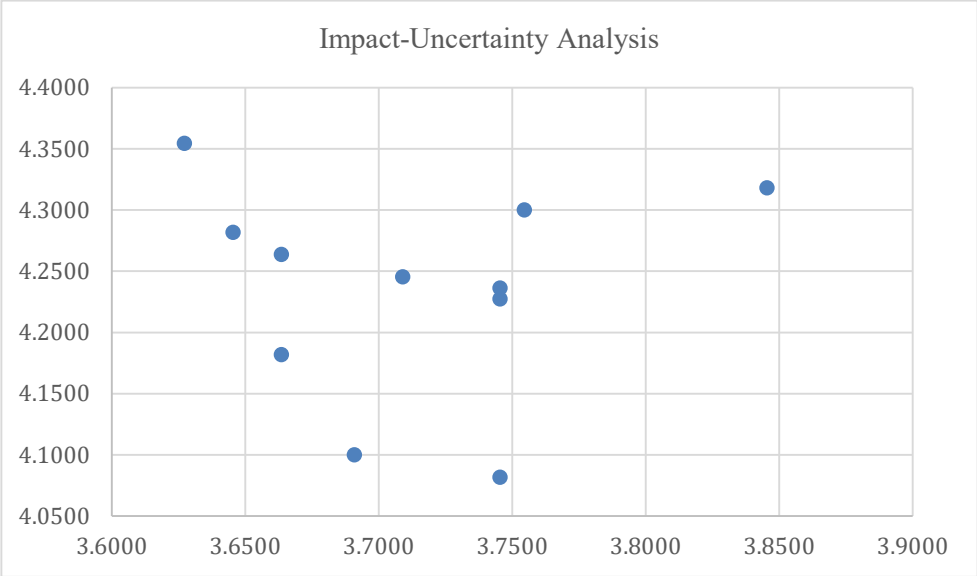

Figure 1: Impact-uncertainty analysis

Based on Figure 1, the highest mean for impact and uncertainty were D11 (4.3182,3.8455) and D1 (4.3000,3.7545). D11 and D1 has been chosen for scenario analysis, which are consumer data protection and privacy and motivates consumer purchasing decision. These two (2) drivers were used in the next section to generate the scenario building for the foresight of AR technology in e-commerce in Malaysia.

4.2 Discussion based on the First Research Objective

The first objective of this study is to identify the key drivers of Augmented Reality (AR) e-commerce adoption among online consumers in Malaysia. This objective has been from the STEEPV analysis. Before identifying the key drivers for AR e-commerce in Malaysia, defining the issue and drivers of AR technology in e-commerce will be essential, especially when defining the key drivers for online consumers. The issue and drivers will shape how the adoption of AR e-commerce among online consumers in the future. Based on STEEPV analysis, Technology has been identified as being the most important driver for AR e-commerce adoption in Malaysia, followed by Values, Social, Economic, Political, and the least important Environmental.

4.3 Discussion based on the Second Research Objective

The scenario analysis is likely to discuss the impact and uncertainty of the adopted technology in the future, scenario writing was used to visualize what it will be like when AR technology are adopted in the future in Malaysia. These scenarios are given insight to four various possibilities that will occur in a future time horizon of 5 to 10 years which will be from year 2026 till 2031. The four possible scenarios had been analyzed and shown in Figure 2. These scenarios were discussed for possible implications of the proposed future trend of AR e-commerce adoption in Malaysia. Figure 2 shows the four possible future scenarios.

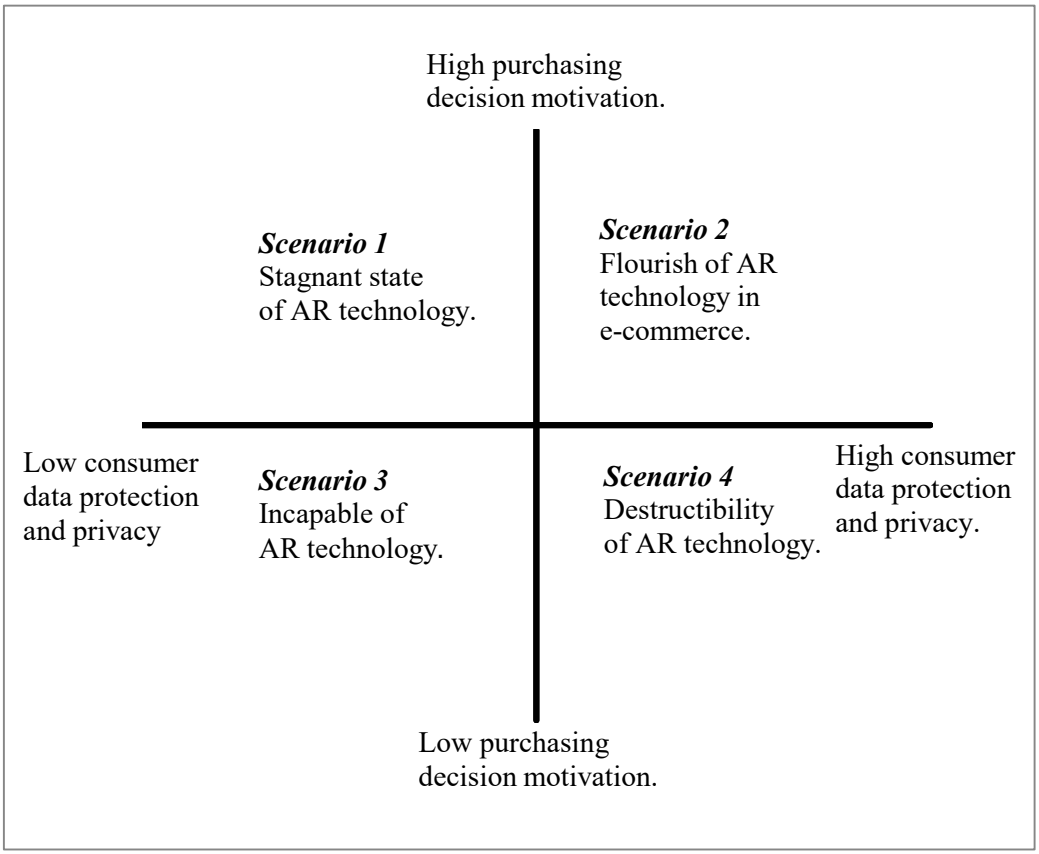

Figure 2: Four Alternative Scenario

(a) Scenario 1 (Stagnant state of AR technology)

First scenario is not a desirable scenario for technology adoption. This scenario portrays a stagnant state of AR technology after its implementation and being adopted in e-commerce.

Stagnant state of AR technology will hinder the development of AR e-commerce in the country, and this will lead to some black-hat organization or individual to exploit the usage of AR to obtain personal information of the consumers and make profit out of the stolen data. Data vulnerability will affect consumers trusts in the long run. According to Hobson (2016), with the development of AR and VR, new concerns regarding issues like passive data collecting, facial recognition, surveillance, and targeted advertising are expected to arise. This will lead to many consumers not trusting the process and services provided by the e-commerce. To reduce concerns regarding data vulnerability, AR e-commerce requires strong privacy policies through encryption and anonymization of data.

AR e-commerce will be more satisfying to use compared to traditional e-commerce as it provides better visual aid and real-time view of the product. According to Barhorst et. al. (2021), AR gives consumers with a richer environment that includes many sensory things, removing the need to imagine how products might seem or to seek further information, not only AR offers visual aid and consumers do not need to go so hard imagining how the product would look like. Since AR is heavily information dependent and with this much information consumers may be motivated to purchase a product after simulating it on AR. However, if consumers have doubts on the security of the mentioned technology, in the end there might be just a few numbers of consumers using this technology and may not be used widely in Malaysia in the future.

(b) Scenario 2 (Flourish of AR technology in e-commerce)

Second scenario will be the best-case scenario for technology adoption. This scenario shows the flourish of AR technology in e-commerce, in which the technology that is adopted has high consumer data protection and privacy and high purchasing decision motivation.

High consumer data protection and privacy will not only attract more consumers into using AR e-commerce, but it will also motivate consumers to have better high purchasing decision. According to Ozturkcan (2020), AR can reduce the means of stress associated with furniture purchasing, however, furniture purchasing can be linked to online purchasing as well. With robust security and data protection embedded in AR e-commerce consumers' confidence to buy online goods using AR technology will increase eventually and will diminish uncertainty to use AR technology in e-commerce.

High purchasing decision motivation may eliminate the ambiguity when choosing to buy products using e-commerce platform among consumers. According to Barhorst *et al.* (2021), AR technology adds new dimensions to experiences by allowing people to interact with the technology, from this statement one of AR intrusiveness is that it very interactable but from its intrusiveness it can be beneficial for users obtain the information needed by them to make them feel convinced on what the consumers are buying. Augmented reality does provide useful visual information that can influence consumer attitudes and buying intentions (Baytar *et al.*, 2020). Visual information will be the most important factor why one chooses to buy that product, with AR adoption into e-commerce, visual representation of the product will determine the consumers buying intention.

According to Hobson (2016), the company's user data privacy policies, including why it collects particular categories of data, what it plans to use with that data, and whether it will only gather data from users who affirmatively opt in. Consumers are free to choose whether they want to share their data to the service provider or not, this adds a layer of relief for consumers when sharing their data online. The implementation of a safer buying experience by setting-up One-Time-Password (OTP) is also a good thing since it can avoid accidental purchase for consumers that usually saves their financial information in the e-commerce app.

With absolute deciding factor for AR e-commerce to be adopted in Malaysia, in 5 to 10 years the e-commerce ecosystem will change and there will be an increased number of service provider to have their main products to be translated to AR.

(c) Scenario 3 (Incapable of AR technology)

This scenario will be the worst-case scenario for the adoption of AR e-commerce. When drivers of technology are both low like it has low consumer data protection and privacy and low purchasing decision motivation, this will lead to a scenario called the incapability of AR technology. The technology will have no means to be implemented whatsoever in e-commerce, AR will become insignificant to users as low consumer data protection and privacy will lead to trust between consumers and the platform provider or the e-commerce app itself.

Low consumer data protection and privacy for this scenario may build up around the existence of malicious e-commerce app that could potentially lead to personal information theft and leaks. E-commerce uses Big Data Analytics (BDA), one of few advantages of BDA is that it can identify the optimal price of a product, and most importantly it can identify the most loyal and profitable consumers (Stock, 2018). The potential harm of shady e-commerce app is that video data and voice data are collected, and this could be very harmful for consumers as it increases their potential to get calls from an unknown number.

Next, low purchasing decision motivation is probably due to unappealing visual images being displayed on screen which in turn creates less immersion and interactivity. According to Yim et. al.

(2017), through greater immersion, interactivity, and vividness provide a variety of positive consumer assessments, but the part of immersion generated in novel ways generates a different set of positive consumer evaluations. The immersion part while using AR e-commerce also comes from how the product provides additional information and how product description can be turned into an interactive tool for consumers in the long run. Without interactivity AR buying experience in e-commerce becomes less fun and without mentioning more less interactive and less fun.

With both drivers being low there will be a hiccup in implementing AR e-commerce in Malaysia, therefore, AR is incapable to be implemented. For AR e-commerce to be successful, an interesting and fun measure must be taken into consideration before the implementation. Next, policy makers like the government should test and approve the AR technology before implementing it into e-commerce app and protection of Intellectual Property (IP) must be given to developers that wished to implement AR soon, protection of IP can both protect developers and consumers in the long run.

(d) Scenario 4 (Destructibility of AR technology)

The last scenario is similar to scenario 1 where the outcome is neither good nor bad, but it is not as desirable as scenario 2. The last scenario has high consumer data protection, however, low purchasing decision motivation which may lead to destructibility of AR technology. Destructibility in this matter means that the technology will be implemented but it is not that effective to encourage buying behavior or influence purchase decision for end consumers of e-commerce.

High consumer data protection and privacy is enough for consumers to be able to share their personal information and enable seamless buying experience throughout the e-commerce buying process. According to Smink *et al.* (2019), AR prompted a decision on whether to purchase the goods and share personal information. Additionally, depending on the precise purpose for using AR e-commerce apps, which could be a more hedonic or utilitarian goal, AR e-commerce apps may have more affective versus behavioral consequences (Smink *et al.*, 2019). Data protection and privacy in AR will affect how consumers distinguish between traditional and AR e-commerce.

However, low purchasing decision motivation will affect consumers buying pattern in AR e-commerce. Webrooming behavior as mentioned in the earlier chapters states that it is a phenomenon where consumers browse online and shop offline. In this case, when AR is implemented in the future, probably most consumers will be trying on the products online, this includes products like furniture, clothing, glasses, and makeups. However, in the case of makeups, most makeups have been pre-applied and pre-programmed by developers how it would look on someone and this is without any reference to any other skin types and only focuses on only one skin type. According to Kowalczuk *et al.* (2021), AR itself is not primarily intended to improve buying efficiency, but rather to boost interaction with goods and companies. Destructibility of AR does not mean that AR will be completely useless in the future to motivate purchase decision among consumers, but AR will still fall behind the normal way of e-commerce shopping where text-based information is still preferred.

5. Conclusion

To conclude, the aim of this study was to identify the issues and key drivers of the future trend of AR e-commerce adoption in Malaysia. A foresight study on the adoption of Augmented Reality (AR) e-commerce in Malaysia has provided insights on how e-commerce shopping change in 5 to 10 years. This study also provides new knowledge and information as well as perception of respondents on how AR e-commerce will benefit consumers in hedonic and utilitarian way in Malaysia especially with new normal. For analysis, top two drivers that were identified through impact-uncertainty analysis had been used to construct the scenario building. Four scenarios had been constructed in the analysis and the scenarios are built to determine the proposed future trend of AR e-commerce adoption among

consumers in Malaysia. Lastly, new and emerging technology will face more challenges than existing technologies and most likely very low adoption rate, hence, to increase public interest on the particular emerging technology policy makers, developers, and investors have to support the development of the technology to be adopted and implemented in Malaysia in the future.

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References

Aw, E.C., Basha, N.K., Ng, S. & Ho,J. (2021), Unraveling determinants of webrooming behavior: a qualitative inquiry*, International Journal of Business and Society*, 22 (3), 1550-1568

Baytar, F., Chung, T., & Shin, E. (2020). Evaluating garments in augmented reality when shopping online. *Journal of Fashion Marketing and Management*, *24*(4), 667–683. https://doi.org/10.1108/JFMM-05-2018-0077

Barhorst, J.,B McLean, G., Shah, E., & Mack, R. (2021). Blending the real world and the virtual world: Exploring the role of flow in augmented reality experiences. *Journal of Business Research*, *122*(September 2020), 423–436. https://doi.org/10.1016/j.jbusres.2020.08.041

Chai, W., Holak, B., & Cole , B. (2020, December). *e-commerce*. Retrieved from TechTarget: https://searchcio.techtarget.com/definition/e-commerce

Chiu, C. L., Ho, H.-C., Yu, T., Liu, Y., & Mo, Y. (2021). Exploring information technology success of Augmented Reality Retail Applications in retail food chain. *Journal of Retailing and Consumer Services*, *61*(April), 102561. https://doi.org/10.1016/j.jretconser.2021.102561

COVID-19 accelerates e-commerce growth in Malaysia, says GlobalData. (2020, September 8). Retrieved from GlobalData: https://www.globaldata.com/covid-19-accelerates-e-commerce-growth-malaysia-says-globaldata/

Geluyake, H. A. P., Moodi, M. M., Afin, M. H., & Rafsanjani, H. K. (2014). Using Foresight to Create Political and Economic Collective Endeavor Based on the STEEPV Analysis. *Journal of Marketing and Management*, *2*(2), 129–137. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.671.5685&rep=rep1&type=pdf

Hayes, A. (2020, December 2). *Augmented Reality*. Retrieved from Investopedia: https://www.investopedia.com/terms/a/augmented-reality.asp

History of Ecommerce. (n.d.). Retrieved from ecommerce-land: https://www.ecommerce-land.com/history_ecommerce.html

Hobson, A. (2016). Reality check: the regulatory landscape for virtual and augmented reality. *R Street Policy Study No. 69*, 1–5. http://www.rstreet.org/wp-content/uploads/2016/09/69.pdf

Jung, T. H., Bae, S., Moorhouse, N., & Kwon, O. (2021). The impact of user perceptions of AR on purchase intention of location-based AR navigation systems. *Journal of Retailing and Consumer Services*, *61*(March), 102575. https://doi.org/10.1016/j.jretconser.2021.102575

Kowalczuk, P., Siepmann (née Scheiben), C., & Adler, J. (2021). Cognitive, affective, and behavioral consumer responses to augmented reality in e-commerce: A comparative study. *Journal of Business Research*, *124*(August 2019), 357–373. https://doi.org/10.1016/j.jbusres.2020.10.050

Krejcie, R.V., & Morgan, D.W. (1970). Determining Sample Size for Research Activities. *Educational and Psychological Measurement*, 30, 607-610

Kukar- Kinney, M. & Close, A. (2010). The determinats of consumers' online shopping cart abandontment, Journal of Academic Marketing Science. DOI:10.1007/S11747-009-0141-5

Lopez, G. (2016, August 5). *Pokémon Go, explained*. Retrieved from Vox: https://www.vox.com/2016/7/11/12129162/pokemon-go-android-ios-game

Malaysian households' access to Internet rose to 90.1% end-2019. (2020, April 10). Retrieved from The Star: https://www.thestar.com.my/business/business-news/2020/04/10/malaysian-households-access-to-internet-rose-to-901-end-2019

McCombes, S. (2019, February 22). *How to write a literature review*. Retrieved from Scribbr: https://www.scribbr.com/dissertation/literature-review/

Ozturkcan, S. (2020). Service innovation: Using augmented reality in the IKEA Place app. *Journal of Information Technology Teaching Cases*. https://doi.org/10.1177/2043886920947110

Poetker, B. (2019, August 22). *A Brief History of Augmented Reality (+Future Trends & Impact)*. Retrieved from G2: https://www.g2.com/articles/history-of-augmented-reality

Qin, H., Peak, D. A., & Prybutok, V. (2021). A virtual market in your pocket: How does mobile augmented reality (MAR) influence consumer decision making? *Journal of Retailing and Consumer Services*, *58*(September 2020), 102337. https://doi.org/10.1016/j.jretconser.2020.102337

Saritas, O., & Proskuryakova, L. N. (2017). Water resources – an analysis of trends, weak signals and wild cards with implications for Russia. *Foresight*, *19*(2), 152–173. https://doi.org/10.1108/FS-07-2016-0033

Secondary Data. (n.d.). Retrieved from Management Study Guide (MSG): https://www.managementstudyguide.com/secondary_data.htm

Smink, A. R., Frowijn, S., van Reijmersdal, E. A., van Noort, G., & Neijens, P. C. (2019). Try online before you buy: How does shopping with augmented reality affect brand responses and personal data disclosure. *Electronic Commerce Research and Applications*, *35*(April), 100854. https://doi.org/10.1016/j.elerap.2019.100854

Smink, A. R., van Reijmersdal, E. A., van Noort, G., & Neijens, P. C. (2020). Shopping in augmented reality: The effects of spatial presence, personalization and intrusiveness on app and brand responses. *Journal of Business Research*, *118*(August 2019), 474–485. https://doi.org/10.1016/j.jbusres.2020.07.018

Tang, L. W. (2020, August 27). *Top 10 E-commerce Sites in Malaysia 2020 | Traffic & Business Models*. Retrieved from Entrepreneur Campfire: https://entrepreneurcampfire.com/ecommerce-website-malaysia/#:~:text=Shopee%20is%20currently%20the%20most,pioneers%20like%20Lelong%2C%20and%20Lazada.

Yim, M. Y. C., Chu, S. C., & Sauer, P. L. (2017). Is Augmented Reality Technology an Effective Tool for E-commerce? An Interactivity and Vividness Perspective. *Journal of Interactive Marketing*, *39*, 89–103. https://doi.org/10.1016/j.intmar.2017.04.001