Analysis of the Use of Augmented Reality (AR) in Increasing the Purchases of Indonesian Cosmetic Brands

Aisha Salvira Aria Putri
Information Systems Department,
School of Information Systems
Bina Nusantara University
Jakarta, Indonesia 11480
aisha.putri@binus.ac.id

Adele B L Mailangkay
Information Systems Department,
School of Information Systems
Bina Nusantara University
Jakarta, Indonesia 11480
adele.mailangkay@binus.ac.id

Abstract—With the advent of augmented reality (AR) technology, the cosmetics sector has drastically changed the way consumers engage with products by providing virtual makeup try-ons and tailored interactions. This study examines the effect of augmented reality (AR) on driving sales of Indonesian cosmetic businesses. The study examines the mediating impact of technology attributes— perceived interactivity, perceived ease of use, perceived enjoyment, satisfaction, and impulsive buying—in influencing customer brand engagement using the Technology Acceptance Model (TAM). The study, which was inspired by the approach used by Hair et al. in 2019, used a quantitative descriptive research method to evaluate a sample of 227 respondents. The study, which used a mobile AR cosmetic application, verifies that AR features have a beneficial impact on brand engagement. Additionally, the indirect impacts that are mediated by perceived utility, usability, and enjoyment highlight the value of AR technology and its practical implications for marketers looking to employ it effectively. Knowing how augmented reality (AR) may improve sales/purchases is becoming increasingly important for business success as it continues to transform the cosmetics industry.

Keywords—Augmented Reality (AR), Perceived Interactivity, Perceived Ease of Use, Technology Acceptance Model (TAM).

I. INTRODUCTION

During the COVID-19 pandemic, consumer purchasing behavior towards cosmetic products has been negatively impacted. Consumer purchasing preferences may have shifted in favor of personal healthcare and other preventative items, which may have had an impact on this. The market recovered quickly in 2021, despite a drop in sales during the top of the pandemic's. Beyond the pre-pandemic market value, Indonesia's beauty and personal care sector reported yearly sales growth of about 14% in 2022 [1].

In those days, customers used to try out cosmetic products in physical stores before making a purchase. However, the impact of COVID-19 has changed customers' shopping behavior from offline to online. Customers now tend to use online technology to perform various shopping processes, which encourages companies to prioritize online business and seriously consider strategies to use digital technology to seek better growth opportunities [1].

AR technology can be a promising option to enhance the convenience of customers and potential customers, both online and offline. In this study, "Hedonic consumption" leading to impulse buying behavior in the retail context, visual enjoyment, fun activities, and multisensory input and emotions may contribute to the consumption of such experiences. Therefore, interactive retail addresses the joy of shopping by focusing on the overall shopping experience and not just the goods. Experiential elements in shopping can be particularly important for customers purchasing fashion or beauty items, as illustrated by this study, which investigates the impact of cosmetic applications with Augmented Reality (AR) [2]. Additionally, augmented reality (AR) is a strategic approach that integrates digital information or objects into a subject's experience in the real world, sometimes in conjunction with other media, to uncover, express, or show consumer advantages and fulfill a brand's goals [3].

One of the striking developments in marketing and sales tactics currently is the use of augmented reality (AR), which allows firms to offer exceptional customer experiences through mobile platforms. Customers and potential customers can try on different types of cosmetics digitally, frequently, practically, and efficiently. This function makes it easier for customers to apply different types of cosmetics [4]. When purchasing beauty products, there are several key issues. Perception issues include inaccurate or unclear information, color and size variations between online items and actual items, inability to try on products, and inability to find the right color when buying online, to name a few [5]. Augmented reality is more than just a useful technology that provides experiences to customers. More broadly, it can be seen as a source of fun memories that provide hedonic characteristics [6].

The use of Augmented Reality (AR) has been widely applied outside and within Indonesia, such as brands from L'Oréal and Sephora [7]. Some e-commerce in Indonesia also provide JD.ID Makeup sample-On feature, Somethinc, Studio Tropik, and Shopee Beautycam to try out some famous cosmetic products [8].

II. LITERATURE REVIEW

A. Technology Acceptance Model (TAM)

Many studies examining the acceptance of various digital technologies in education have used TAM [9]. The way that people evaluate and adopt new technology is explained by the Technology Acceptance Model (TAM). The two primary

elements of TAM are perceived usefulness and perceived ease of use. Perceived ease of use in this study refers to an individual's assessment of how simple it is to use a certain piece of technology.[10]. It has been observed [11] that the TAM model can be used in augmented reality settings to understand how people assess and choose to use AR technology. It is evident that people are more likely to embrace and utilize augmented reality (AR) if they believe that it is practical and easy to use.

B. Augmented Reality (AR)

Augmented reality is a technology that aims to combine the physical environment with digital information through additional layers. This integration can be applied to a variety of display technologies, including numbers, letters, symbols, audio, video, and graphics. With AR, information generated by computers can be embedded into a real-world view, enriching human perception and cognition in innovative and extraordinary ways [12] .

Augmented Reality (AR) is not only used for entertainment, but also a useful tool for marketers in creating a better shopping experience. The integration of brands with consumers' physical characteristics through Augmented Reality (AR) applications enables a personalized and familiar environment in the user's home. In this environment, users can interact with brands in a self-expression and experimentation manner. The brand plays a supporting role, while consumer preferences take center stage [13].

C. Impulse Buying

Impulse buying is when a person makes an unplanned and immediate purchase [14]. People who tend to make impulse purchases more often make these spontaneous decisions because they have weaker self-control compared to those who are less inclined to buy spontaneously [15]. When a person is motivated by external things, they often make impulse purchases because these indications make them feel good or interest them and AR has the power to provoke more impulsive actions [16].

D. Perceived Interactivity

The capacity for users to alter a digital environment's appearance and content in real time is known as interactivity. The way clients engage with online goods and services is one such example of it. Customers may alter product characteristics, view angles, and design components using interactive features, for instance, which makes shopping more personalized and interesting for them. It is acknowledged that customer purchasing behavior is positively impacted by interaction. Several studies advise online businesses to include interactive features on their websites or mobile applications in order to improve the customer experience while they purchase [17].

E. Perceived Ease of Use

How simple and straightforward a technology is to use is the main emphasis of perceived ease of use. When it comes to augmented reality (AR), user-friendliness may boost contentment by providing advantages including speed,

convenience, and cost savings. Customers are more likely to value and take pleasure in the beauty brand's offerings if augmented reality technology is simple to use. Consequently, a more useful method of analyzing customer behavior on online retail platforms that employ augmented reality technology is to take into account perceived ease of use [18].

F. Perceived Enjoyment

Enjoyment comes from the interaction between a person's experience and their environment. According to flow theory, people are more likely to repeat activities that they find enjoyable. In online shopping, this means that the more users enjoy using a platform, the more likely they are to make impulse purchases [17]. According to [19], perceived enjoyment is one of the factors that positively affect AR satisfaction.

G. Satisfaction

Satisfaction plays an important role in shaping consumers' attitudes towards purchases and their willingness to buy again. It reflects how customers feel about their experience with a service, whether that feeling is positive, indifferent, or negative. This satisfaction plays an important role in shaping consumers purchasing behavior and their likelihood to make repeat purchases [17].
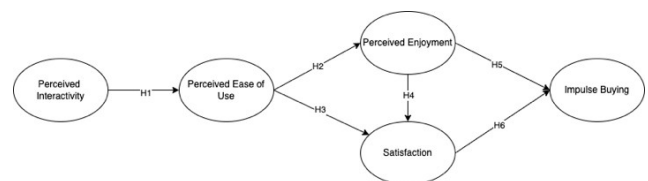
III.   RESEARCH HYPOTHESIS

Fig. 1. Research Model

Hypotheses serve as initial statements that require additional examination for validation. The proposed research hypothesis is as follows:

H1 : Perceived Interactivity has a positive impact on Perceived ease of use.

H2 : Perceived Ease of Use has a positive impact on Perceived Enjoyment.

H3 : Perceived Ease of Use has a positive impact on Satisfaction.

H4 : Perceived Enjoyment has a positive impact on Satisfaction.

H5 : Perceived Enjoyment has a positive impact on Impulse Buying.

H6 : Satisfaction has a positive impact on Impulse Buying.

IV. RESEARCH METHODS

The methodology employed in this study is the Technology Acceptance Model (TAM), a conceptual framework for comprehending the usage of augmented reality (AR) in boosting purchases of Indonesian cosmetic companies. This study will examine TAM characteristics, such as perceived interaction, perceived ease of use,

perceived enjoyment, satisfaction, and impulsive purchase. Data will be gathered by a questionnaire that asks a sequence of questions aimed at eliciting answers on respondents' views, beliefs, or behaviors concerning the study issue. The survey will be created using Google Forms.

Hair recommends using a minimum sample size of 100. A sample size of 100–200 is suitable for SEM. It is also mentioned that, for each derived parameter, the minimum and maximum sample sizes are five and ten observations, respectively [20]. With 25 indicators in this study, the least number is five times the number of indicators, or 125, and the maximum is ten times, or 250. There were 227 responders among the samples that were collected.

V. RESULT AND DISCUSSION

A. Evaluation of Outer Model

Testing the measurement model or measurement models is the initial step in the PLS-SEM analysis process. Convergent and discriminant validity of the indicators as well as the construct's dependability are the main goals of the measurement model evaluation.

B. Convergent Validity

Testing for convergent validity seeks to determine if the indicator variables are genuinely significant in terms of reflecting the latent variables or concept. If the outer loading / factor loading value is more than 0.7, the reflective indication is considered genuine (Hair, 2019). This indicates that the reflecting indicator will be removed and retested if its outer loading value is less than 0.7. The following table displays the statistical findings from the measurement model validity test:
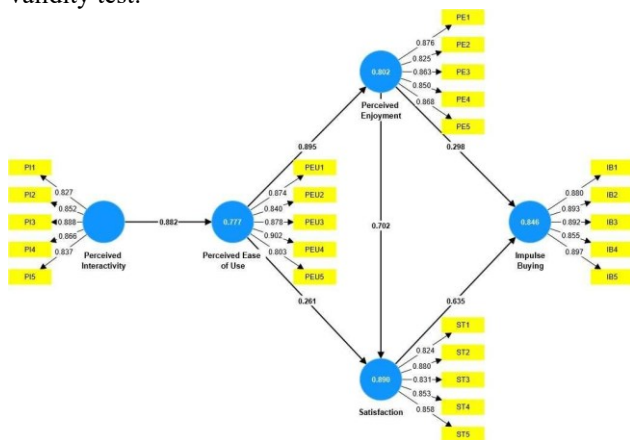

Fig. 2. Outer Model

TABLE I.   EXTERNAL LOADING

Variable	Indikator	*External loadings*	Validity
Impulse Buying	IB1	0,880	Valid
	IB2	0,893	Valid
	IB3	0,892	Valid
	IB4	0,855	Valid
	IB5	0,897	Valid
	PE1	0,876	Valid

	PE2	0,825	Valid
Perceived Enjoyment	PE3	0,863	Valid
	PE4	0,850	Valid
	PE5	0,868	Valid
Perceived Ease of Use	PEU1	0,874	Valid
	PEU2	0,840	Valid
	PEU3	0,878	Valid
	PEU4	0,902	Valid
	PEU5	0,803	Valid
Perceived Interactivity	PI1	0,827	Valid
	PI2	0,852	Valid
	PI3	0,888	Valid
	PI4	0,866	Valid
	PI5	0,837	Valid
Satisfaction	ST1	0,824	Valid
	ST2	0,880	Valid
	ST3	0,831	Valid
	ST4	0,853	Valid
	ST5	0,858	Valid

All indicators have an outside loading or factor loading value of more than 0.7, according to the measurement model findings shown in Figure 1 and Table 1. As a result, convergent validity requirements for the model have been satisfied.

C. Discriminant Validity

The behavior and perception variables have an AVE value larger than 0.5, according to Table 2's convergent validity test findings. As a result, every variable satisfies discriminant validity.

TABLE II.   AVE

Variable	AVE	Validity
Impulse Buying	0,781	Valid
Perceived Enjoyment	0,733	Valid
Perceived Ease of Use	0,740	Valid
Perceived Interactivity	0,729	Valid
Satisfaction	0,722	Valid

D. Composite Reliability

A reliability test is used to assess how well indicators measure certain structures or latent variables internally. If the Composite Reliability rating is more than 0.6, the questionnaire utilized as a research instrument has good reliability or is consistent and dependable.

Variable	Composite Reliability	Reliability
Impulse Buying	0,947	Reliable
Perceived Enjoyment	0,932	Reliable
Perceived Ease of Use	0,934	Reliable
Perceived Interactivity	0,931	Reliable
Satisfaction	0,928	Reliable

Every study variable has a Composite Reliability value of higher than 0.6, as Table 3 demonstrates. Thus, it can be said that every construct or variable in this study satisfies the necessary reliability requirements, allowing the analysis to go on to the next phase, which is the evaluation of the inner model.

E. Cronbach Alpha

A reliability test is used to assess how well indicators measure certain structures or latent variables internally. When the Cronbach's Alpha score of a research questionnaire is more than 0.7, it is considered to have good reliability.

TABLE IV.   CRONBACH ALPHA

Variable	Cronbach's Alpha	Reliability
Impulse Buying	0,930	Reliable
Perceived Enjoyment	0,909	Reliable
Perceived Ease of Use	0,912	Reliable
Perceived Interactivity	0,907	Reliable
Satisfaction	0,903	Reliable

Every research variable has a Cronbach's Alpha value of higher than 0.7, as Table IV demonstrates. Therefore, it can be said that every construct or variable used in this study satisfies the necessary dependability standards.

F. Evaluation of Inner Model

The structural model's goodness of fit and the path coefficient's significance level are assessed in the second section of the PLS SEM analysis, which is devoted to the structural model evaluation. Structural model evaluation looks at a number of indicators, such as the Goodness of Fit test using the R-Square (R2) coefficient of determination, to make sure the structural model constructed is reliable and correct. In addition, the significance level of the path coefficient—which is used to forecast the association between latent variables—used in hypothesis testing is also examined in the structural model evaluation. One-way hypothesis testing with a 5% significance threshold was used in this investigation. If the path coefficient is positive and the significance value (p-value) is less than 0.05 and the T-Statistic value is more than 1.645, then the PLS-SEM analysis for the one-way hypothesis with a 5% significance test

proceeds. The graphic below provides a description of all of the structural or inner model test findings.
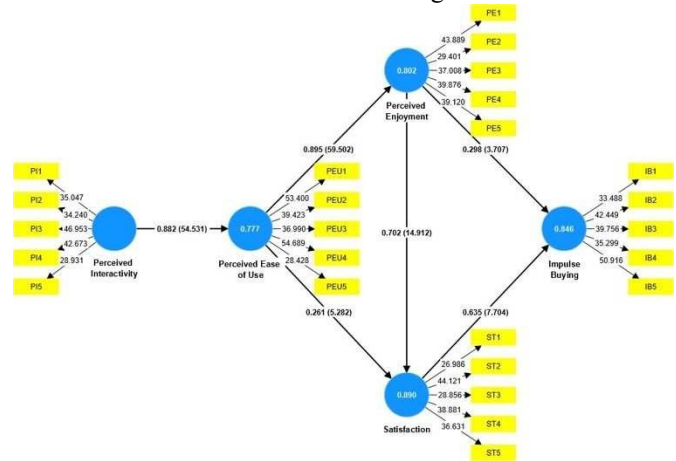

Fig. 3. Inner Model

G. Path Coefficient Test

Utilizing the bootrapping approach, the significance level of the path coefficient in PLS-SEM is analyzed with the goal of identifying the direction and importance of the association between exogenous and endogenous latent variables. The t-statistic value or the consequent significance value (p-value) are used to assess the connection between exogenous latent variables and endogenous latent variables. A 5% significance threshold was used for one-way hypothesis testing in this investigation. The influence of perceived interactivity on perceived ease of use has a very high t-statistics value (54.531) based on the study's findings. The lowest t-statistics value (3.707) is seen in the relationship between subjective enjoyment and impulsive purchases.

H. Goodness of Fit Test

TABLE V.   VALUE OF R-SQUARE

Variable	R Square (R²)
Perceived Ease of Use	0,846
Perceived Enjoyment	0,802
Satisfaction	0,777
Impulse Buying	0,890

Table V indicates that Perceived Ease of Use has an R-Square value of 0.846, meaning that 84.6% of the high variance of the Perceived Ease of Use variable can be explained by the Perceived Interactivity variable, with the remaining 15.4% being explained by variables outside of the model. The R-Square value of perceived enjoyment is 0.802, meaning that 80.2% of the high variation of the perceived enjoyment variable can be explained by the perceived ease of use variable, with the remaining 19.8% being explained by factors outside of the model. With an R-Square value of 0.777, satisfaction indicates that the high variation of the satisfaction variable can be concurrently described by 77.7% by the variables of perceived ease of use and perceived

enjoyment, with the remaining 22.3% being explained by factors outside the model. Impulse Buying's R-Square value is 0.890, meaning that 89% of the high variation of the Impulse Buying variable can be concurrently described by the Satisfaction and Perceived Enjoyment variables, with the remaining 11% being explained by factors outside of the model.

I. Hypothesis Test

With a value of 54.531>1.645, Table 5 demonstrates that the perceived interaction variable positively affects perceived ease of use. With a value of 59.502>1.645, the perceived ease of use variable positively affects subjective satisfaction. With a value of 5.282>1.645, the perceived ease of use variable positively affects satisfaction. With a value of 14.912>1.645, the variable perceived enjoyment positively affects contentment. With a value of 3.707>1.645, the variable perceived enjoyment has a favorable effect on impulse purchase. With a score of 7,704> 1,645, variable satisfaction has a favorable effect on impulsive purchases.

TABLE VI.　　DIRECT EFFECTS

Hypothesis	Effects	Original Sample	T statistics	P values	Results
H1	*Perceived Interactivity -> Perceived Ease of Use*	0,882	54,531	0,000*	Accepted
H2	*Perceived Ease of Use -> Perceived Enjoyment*	0,895	59,502	0,000*	Accepted
H3	*Perceived Ease of Use -> Satisfaction*	0,261	5,282	0,000*	Accepted
H4	*Perceived Enjoyment -> Satisfaction*	0,702	14,912	0,000*	Accepted
H5	*Perceived Enjoyment -> Impulse Buying*	0,298	3,707	0,000*	Accepted
H6	*Satisfaction -> Impulse Buying*	0,635	7,704	0,000*	Accepted

VI. CONCLUSION AND SUGGESTIONS

Perceived ease of use and perceived enjoyment for users of virtual try-ons are positively impacted by augmented reality (AR), according to the results of the analysis presented in the previous point regarding the use of AR to increase the purchase of Indonesian cosmetic brands. Furthermore, there is a positive correlation between perceived engagement and reported simplicity of use, which significantly influences the use of virtual try-on.

Despite the fact that all of the study's variables exhibit excellent circumstances and the research findings support the accepted assumptions, there are a few recommendations that should be made:

1. In order to keep their augmented reality features interesting and user-friendly, cosmetic firms should keep enhancing and innovating their interactivity.

2. Add a feedback system to augmented reality apps to learn more about user preferences and insights. For improving AR features and raising customer satisfaction levels overall, this kind of data is priceless.

3. Providing customers with good AR technology usage guidance helps boost user happiness.

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