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The Impact of Augmented Reality Experience on Consumer Behavior: Evidence from Wardah Cosmetics

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Abstract

Purpose: This study aims to examine the effect of Augmented Reality (AR) implementation on consumer behavior in Wardah cosmetic products. The study focuses on understanding how AR-based digital marketing experiences influence consumers' cognitive, affective, and post-purchase responses.

Research Methodology: This study employed a quantitative research approach using a survey method. Data were collected from 35 Wardah consumers who had experienced the Augmented Reality feature available on the Wardah website. The data were analyzed using validity testing, reliability testing, simple linear regression analysis, coefficient of determination (R^2), and t-test using SPSS.

Results: The findings indicate that Augmented Reality has a positive and significant effect on consumer behavior. The regression analysis shows that AR has a positive coefficient of 0.292, with a *t*-value of 3.807 and a significance value of $p < 0.001$. Furthermore, the R^2 value of 0.149 indicates that AR explains 14.9% of variations in consumer behavior, while the remaining variations are influenced by other factors outside the research model.

Conclusions: Augmented Reality contributes to improving consumer experiences by providing more interactive, informative, and engaging product evaluations. AR technology helps consumers understand products better and supports purchasing-related decisions.

Limitations: This study is limited by the small sample size and the focus on a single cosmetic brand, which may restrict the generalizability of the findings.

Contribution: This study contributes to digital marketing literature by demonstrating the role of AR technology in shaping consumer behavior and provides practical implications for cosmetic companies in developing technology-based marketing strategies.

Keywords: *Augmented Reality, Consumer Behavior, Digital Marketing, Technology Acceptance Model, Wardah*

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1. Introduction

The rapid advancement of digital technology has transformed not only how companies deliver product information but also how consumers search for information, evaluate alternatives, and reach purchasing decisions. This transformation is most visible in industries where decisions depend heavily on visual perception and personal preference, such as the cosmetic industry. In this highly competitive market, consumers demand more than functional benefits; they seek engaging experiences that allow them to understand and evaluate products before purchase (Hoyer et al., 2020). Visual appearance, product suitability, and confidence in product selection therefore become decisive considerations, and digital marketing strategies capable of overcoming the limitations of online shopping have become essential.

The growth of electronic commerce has widened market reach for cosmetic companies, yet online cosmetic shopping still constrains consumers' ability to assess color suitability, appearance, and compatibility with personal preferences before purchase (Kim & Han, 2023). This constraint raises consumer uncertainty and lowers confidence in online purchasing decisions, creating a need for digital solutions that restore part of the sensory evaluation available in offline settings.

Augmented Reality (AR) has emerged as one such solution. AR integrates virtual objects into the real-world environment in real time, allowing consumers to interact with digital representations of products before deciding (Hilken et al., 2018). In cosmetics, AR-based virtual try-on features let consumers test lipstick, blush, eyeshadow, and other makeup products digitally without physical application (Wu et al., 2025). In Indonesia, Wardah, one of the leading local halal cosmetic brands, introduced an AR-based Virtual Try-On feature on its official website in partnership with Perfect Corp; the brand has reported more than 250,000 virtual try-on sessions and a 134.41% increase in website traffic following the implementation (Fortune Indonesia, 2024).

From a theoretical perspective, the Technology Acceptance Model (TAM) offers a lens for explaining why AR experiences translate into behavioral responses. TAM holds that perceived usefulness and perceived ease of use shape individuals' acceptance of a new technology (Davis, 1989). When consumers perceive an AR feature as useful, easy to operate, and enjoyable, they are more likely to engage with it and to form positive evaluations of the products presented through it. AR therefore functions not merely as a promotional device but as an interactive marketing mechanism that shapes perceptions, attitudes, and behavioral responses.

Empirical work supports this expectation. Negm (2025) reported that AR marketing significantly influences consumer engagement and purchasing behavior, while Lovendra (2021) found a positive effect of AR marketing on engagement and buying behavior for beauty products. Poushneh and Vasquez-Parraga (2017) showed that AR shapes the retail user experience and, through it, user satisfaction and willingness to buy. Taken together, these studies indicate that the distinctive characteristics of AR, including interactivity, vividness, and novelty, help consumers obtain clearer product information and reduce uncertainty during the purchasing process.

Three specific gaps nevertheless remain. Empirically, most AR studies draw their samples from developed markets or global brands, so evidence on locally owned brands in emerging markets is scarce. Contextually, research on Indonesian cosmetics has concentrated on purchase intention as the outcome of interest, whereas the effect of an AR feature that is already operational on a brand's own website rather than an experimental prototype has rarely been examined. Theoretically, AR studies frequently invoke TAM to justify their models but stop at narrow behavioral outcomes, leaving the broader cognitive, affective, and post-purchase components of consumer behavior untested as a single construct.

This study addresses those gaps by examining the effect of AR usage on consumer behavior among users of Wardah's operational Virtual Try-On feature, and by treating consumer behavior as a composite of cognitive, affective, and post-purchase responses rather than as purchase intention alone. It differs from previous AR research in its setting, namely a live AR feature of a local halal cosmetic

brand in an emerging market, and in the breadth of the dependent construct. Practically, the findings indicate which attributes of an existing AR feature are perceived most favorably, and therefore where a cosmetic company may direct further development of its digital marketing strategy.

2. Literature Review and Hypothesis Development

2.1 Augmented Reality in Marketing

Augmented Reality (AR) has emerged as one of the most innovative digital technologies that enables marketers to create interactive and immersive experiences by integrating virtual elements into real-world environments. AR technology combines digital information, such as images, objects, and product simulations, with consumers' physical surroundings in real time, thereby creating a hybrid experience between the virtual and real worlds (Javornik, 2016; Dargan et al., 2023). Unlike conventional marketing approaches that mainly provide static product information, AR allows consumers to visualize, interact with, and evaluate products before making purchasing decisions.

In the marketing context, AR has shifted from being primarily used for entertainment purposes into a strategic marketing tool that enhances consumer experience and engagement. Bonetti et al. (2018) explain that AR technology provides opportunities for retailers to develop innovative shopping experiences by allowing consumers to interact directly with products in virtual environments. This capability reduces uncertainty during the decision-making process because consumers can obtain more realistic product representations before purchase.

Qin et al. (2021) define Augmented Reality Marketing as a strategic approach that integrates digital information or virtual objects into consumers' perceptions of the physical world to communicate product benefits and achieve organizational objectives. The effectiveness of AR marketing can be assessed through several dimensions, including virtual presence, convenience, enjoyment, usefulness, and Word-of-Mouth (WOM) factors. Virtual presence refers to consumers' perception of realistic product visualization through AR features (Sun et al., 2022). Convenience reflects the ease and comfort experienced when interacting with AR applications. Enjoyment represents the pleasure and emotional satisfaction generated during the AR experience, while usefulness describes the extent to which AR helps consumers understand product attributes. Furthermore, WOM factors indicate consumers' willingness to share AR-based experiences with others (Khasawneh & Rabata, 2023).

Previous studies demonstrate that AR provides significant benefits in improving consumer responses. Heller et al. (2019) found that AR helps consumers visualize products more effectively by allowing them to examine different variations, styles, and features before purchase. Similarly, Javornik (2016) emphasized that AR characteristics, such as interactivity, vividness, and novelty, influence consumer perceptions and behavioral responses. Therefore, AR is considered an important technological innovation that can strengthen consumer involvement and influence purchasing-related behavior.

2.2 Consumer Behavior

Consumer behavior refers to the dynamic process through which individuals or groups search for, select, purchase, use, evaluate, and dispose of products or services to satisfy their needs and expectations (Astuti, Ramli, & Kirana, 2025). Consumer behavior is influenced by various psychological, social, and technological factors that shape how consumers respond to marketing stimuli. In the digital era, consumer behavior has become increasingly influenced by interactive technologies that provide personalized and engaging experiences (Chen, Ha, & Vu, 2023).

According to Nnanna-Ohuonu, Chikwesiri, Okudo, and Chinwe (2026), consumer behavior is continuously changing because consumers are exposed to various sources of information, technological developments, and changing market conditions. Therefore, understanding consumer behavior has become essential for organizations to design effective marketing strategies. Edy, Ihalauw, Kusuma, and Kriestian (2021) explain that consumer behavior consists of three main components: cognitive, affective, and behavioral aspects. The cognitive component relates to consumers' knowledge and perceptions obtained from information and experiences. The affective component reflects consumers' emotional responses toward products, while the behavioral component

represents actions taken after evaluating and purchasing products (Sungkawati, Mere, Hernanik, & Rokhmawati, 2026).

In the context of digital marketing, consumer behavior is not only determined by product quality and price but also by the experience provided during the purchasing process (Syahnadin, Karunia, Apriadi, Loong, Madli, Gulabdin, & Haibo, 2025). Interactive technologies such as AR can influence consumer perceptions, emotions, and behavioral intentions by creating more meaningful interactions between consumers and products. Therefore, AR implementation has the potential to modify consumer behavior by improving product understanding, reducing purchase uncertainty, and increasing consumer engagement.

2.3 Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM), introduced by Davis (1989) and developed from the Theory of Reasoned Action (TRA), explains how individuals accept and adopt new technologies. TAM proposes that technology acceptance is primarily influenced by two key factors: perceived usefulness and perceived ease of use. Perceived usefulness refers to the extent to which individuals believe that technology can improve their performance, while perceived ease of use refers to the extent to which individuals perceive that technology can be used without significant effort.

Within this study, TAM is used as an explanatory lens rather than as a measurement model. The five AR attributes examined here virtual presence, convenience, enjoyment, usefulness, and word-of-mouth factor correspond conceptually to the evaluations that TAM identifies as antecedents of technology acceptance, such as convenience reflects perceived ease of use and usefulness reflects perceived usefulness, while virtual presence and enjoyment capture the experiential value that later extensions of TAM add to the original model. Because these attributes are combined into a single Augmented Reality construct, this study does not test perceived usefulness and perceived ease of use as separate latent variables. TAM is therefore used to explain the mechanism, not to validate the model itself.

Taken together, the literature suggests a single conceptual framework for this study. AR attributes act as the marketing stimulus, TAM explains why that stimulus is accepted and processed, and consumer behavior understood as the cognitive, affective, and post-purchase components identified by Edy et al. (2021) represents the response. Each AR indicator is theoretically linked to at least one component of that response: virtual presence and usefulness supply the product information that feeds the cognitive component; convenience and enjoyment generate the affective evaluation; and the word-of-mouth factor corresponds to the post-purchase stage at which consumers share their experiences with others. This framework guides the hypothesis developed below.

2.4 The Relationship Between Augmented Reality and Consumer Behavior

The relationship between AR and consumer behavior can be explained through the ability of AR technology to provide interactive, informative, and immersive experiences. AR enables consumers to experience products virtually, which can enhance product evaluation and strengthen emotional connections with brands. Through realistic visualization and direct interaction, consumers are able to obtain better information about products, resulting in improved confidence in decision-making (Novianti, Priyambada, & Albart, 2025).

Empirical evidence supports the positive relationship between AR implementation and consumer behavior. Negm (2025) found that AR usage significantly influences buying behavior through increased consumer engagement. Lovendra (2021) demonstrated that AR marketing has a significant effect on consumer engagement and buying decisions in the beauty product industry. Poushneh and Vasquez-Parraga (2017) also demonstrated that AR shapes the retail user experience and, through it, user satisfaction and willingness to buy. Futhermore, Hita (2026) revealed that AR positively affects online shopping behavior through perceived enjoyment as a mediating mechanism. These findings indicate that AR does not merely function as a technological feature but also acts as a marketing stimulus that shapes consumers' cognitive, affective, and behavioral responses.

The causal mechanism implied by this framework runs as follows. An AR feature supplies contextualized, self-controlled product information that is otherwise unavailable in online settings; this raises the diagnosticity of the information consumers hold, which is the cognitive component, and lowers the perceived risk of an unsuitable choice. The ease and enjoyment of the interaction then produce a favorable affective evaluation of the brand, which consumers carry into the post-purchase stage as satisfaction and willingness to recommend. Following TAM, this sequence is expected to occur because consumers accept the feature as useful and easy to use, rather than because of the novelty of the technology alone. Accordingly, this study proposes the following hypothesis:

H_1: Augmented Reality usage positively affects consumer behavior

3. Research Methodology

3.1 Research Object and Design

This study examines the effect of Augmented Reality (AR) on consumer behavior in the context of Wardah cosmetic products. Wardah is one of the leading Indonesian halal cosmetic brands produced by PT Paragon Technology and Innovation. The brand was introduced in 1995 and became one of the pioneers of halal cosmetic products in Indonesia after obtaining halal certification from the Assessment Institute for Foods, Drugs and Cosmetics of the Indonesian Council of Ulama (LPPOM MUI). Wardah offers various cosmetic categories, including skincare, makeup, and body care products.

Wardah was selected as the research object because the brand has implemented digital marketing strategies through technology-based consumer experiences, including Augmented Reality features on its website. The use of AR allows consumers to visualize cosmetic products virtually and obtain a more interactive shopping experience before making purchase decisions. This research was conducted on Wardah consumers in Indonesia during November 2024 to March 2025. The study employed a quantitative approac using a survey method to examine the relationship between Augmented Reality and consumer behavior.

3.2 Consumer Behavior

Consumer behavior refers to the processes and actions undertaken by individuals when identifying needs, searching, purchasing, using, evaluating, and disposing of products or services to achieve satisfaction (Khegay & Aubakirov, 2021). In this study, consumer behavior represents consumers' cognitive, affective, and behavioral responses after interacting with the Augmented Reality features provided by Wardah. Consumer behavior was measured using three indicators, namely cognitive component, affective component, and post-purchase behavior by Edy, Ihalauw, Kusuma, and Kriestian (2021). The cognitive component refers to consumers' knowledge, beliefs, and perceptions toward products obtained through information and direct experiences. The affective component reflects consumers' emotional responses, feelings, and evaluations toward products. Meanwhile, post-purchase behavior refers to consumers' evaluation, satisfaction, and behavioral responses after experiencing or purchasing products (Deny, Rahayu, & Hendrayati, 2026; Zhang, Li, Li, & Ren, 2023).

3.3 Augmented Reality Marketing

Augmented Reality Marketing refers to a strategic marketing approach that integrates digital information or virtual objects into consumers' perceptions of the physical environment to communicate product benefits and achieve organizational objectives (Chylinski et al., 2020). In this study, Augmented Reality represents the digital shopping experience provided through Wardah website, allowing consumers to visualize and interact with cosmetic products virtually before making purchasing decisions. The measurement of Augmented Reality was adapted from Rauschnabel et al. (2019), consisting of five indicators: virtual presence, convenience, enjoyment, usefulness, and WOM factor. Virtual presence refers to the ability of AR features to provide realistic and clear product visualization. Convenience describes the perceived ease and comfort experienced by consumers when using AR technology. Enjoyment represents the positive emotional experience generated during AR interactions. Usefulness refers to the extent to which AR assists consumers in understanding product information and characteristics. Meanwhile, WOM factor reflects consumers' willingness

to share their AR experiences and product-related information through word-of-mouth communication.

3.4 Data Collection Method

Data were collected using an online questionnaire distributed through Google Forms. The questionnaire consisted of two sections: respondent demographic information and measurement items related to the research variables. All measurement items were developed based on previous studies and measured using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Before conducting the main analysis, the questionnaire was tested to ensure that respondents understood the measurement items. The collected data were analyzed using descriptive statistical analysis, validity testing, reliability testing, and regression analysis.

3.5 Population and Sample

The population in this study consisted of Wardah cosmetic consumers who had used the Augmented Reality feature available on the Wardah website during November 2024 to March 2025. The total population identified in this study was 175 consumers. According to Arikunto (2017), when the population size exceeds 100 respondents, researchers may determine the sample size by taking approximately 10–20% of the population. Based on this guideline, this study used 20% of the population as the sample size 1:

$$Sample = 175 \times 20 \quad (1)$$

Therefore, the final sample consisted of 35 respondents. Respondents were selected on the basis of stated criteria rather than at random, so the sampling technique applied is criteria-based (purposive) sampling. The eligibility criteria were being a consumer or prospective consumer of Wardah cosmetic products, and having interacted with the AR-based Virtual Try-On feature on the Wardah website immediately before completing the questionnaire, so that every evaluation was based on direct experience rather than on recall.

3.6 Data Analysis Method

The collected data were analyzed using several statistical procedures, including data quality testing and hypothesis testing. Data analysis was performed to ensure that the measurement instruments met the required validity and reliability criteria before testing the research hypothesis. Furthermore, the hypothesis was tested using simple linear regression analysis to examine the effect of Augmented Reality on consumer behavior.

3.6.1 Validity Test

Validity testing was conducted to determine whether the questionnaire items accurately measured the intended variables. A measurement item was considered valid when the correlation value between each item score and the total score showed a significance level below 0.05. In this study, the validity test was performed by comparing the calculated correlation value (R-count) with the *R*-table value. An item was considered valid if the *R*-count value exceeded the R-table value, indicating that the item appropriately represented the measured construct.

3.6.2 Reliability Test

Reliability testing was performed to examine the consistency of measurement instruments. This study used Cronbach Alpha coefficient to evaluate reliability. A variable was considered reliable when the Cronbach Alpha value exceeded 0.60. A higher Cronbach Alpha value indicates that the measurement items have greater internal consistency and are capable of producing stable measurements.

3.6.3 Simple Linear Regression Analysis

Simple linear regression analysis was applied to examine the effect of Augmented Reality on consumer behavior. According to Sugiyono (2017), simple linear regression is used to analyze the linear relationship between one independent variable and one dependent variable. The regression

analysis was conducted to determine the direction and magnitude of the influence of Augmented Reality on consumer behavior.

The regression equation 2 used in this study is:

$$Y = a + bX + e \quad (2)$$

Where:

Y = Consumer Behavior (dependent variable)
a = Constant value
b = Regression coefficient
X = Augmented Reality (independent variable)
e = Error term

The regression analysis was further evaluated using the coefficient of determination (R^2) and partial significance test (t-test). The coefficient of determination was used to measure the explanatory ability of Augmented Reality in predicting variations in consumer behavior, while the t-test was conducted to determine whether Augmented Reality had a statistically significant effect on consumer behavior.

3.6.4 Coefficient of Determination (R^2)
The coefficient of determination was used to measure the extent to which the independent variable explains variations in the dependent variable. The R^2 value ranges from zero to one. A higher R^2 value indicates that the independent variable provides greater explanatory power regarding changes in the dependent variable.

3.6.5 Partial Significance Test (t-Test)
The t-test was conducted to examine whether Augmented Reality significantly influences consumer behavior. The hypothesis testing was performed using a significance level of 5% (α = 0.05). The hypothesis is accepted when the probability value is less than 0.05, indicating a significant relationship between variables.

4. Results and Discussions

4.1 General Description of Respondents

The respondents in this study were consumers and potential consumers of Wardah cosmetic products. Thirty-five respondents agreed to participate in the treatment and participated in this study. The treatment provided to respondents was through the use of Wardah's Augmented Reality- based website. Respondents in this study met the research sample criteria. Based on the treatment and questionnaires distributed during the experiment, a general overview of the respondents' identities was obtained. The description of the general picture of the respondents that has been collected can be explained as follows.

4.1.1 Respondents Based on Age
Based on the research results obtained through experiments and questionnaire distribution to 35 respondents consisting of consumers and potential consumers, the classification of respondents based on age was determined using a frequency distribution approach. The calculation was conducted by identifying the highest and lowest values, calculating the range, determining the number of classes using the Sturges formula, and calculating the class length. The highest value obtained was 40, while the lowest value was 20, resulting in a range of 20. Furthermore, the number of classes was calculated using the formula 1 + 3.3 log N, resulting in 6.09, which was rounded to 6 classes. The class length was then calculated by dividing the range by the number of classes (20:6), resulting in 3.33, which was rounded to 4. The results of these calculations are presented in Table 1.

Table 1. Description respondents based on age

No	Age (Years)	Amount Respondents (People)	Percentage (%)
1	20-23	12	34
2	24-27	7	20
3	28-31	5	14
4	32-35	6	17
5	36-40	5	15
Total		35	100

Table 1 presents the characteristics of respondents based on age. The results indicate that the majority of respondents were in the age group of 20-23 years, consisting of 12 respondents (34%). Meanwhile, respondents aged 24-27 years accounted for 7 respondents (20%), followed by those aged 32-35 years with 6 respondents (17%), and respondents aged 28-31 years and 36-40 years with 5 respondents each (14% and 15%, respectively). These findings indicate that most Wardah consumers who participated in this study were young adults, particularly those aged 20-23 years and 24-27 years. This suggests that Wardah digital marketing strategy through Augmented Reality features is more attractive to younger consumers who are generally more familiar with technology-based shopping experiences.

4.1.2 Respondents Based on Occupation

Table 2. Description respondents based on work

No	Work	Number of Respondents (People)	Percentage (%)
1	Civil servant	7	20
2	Employee	12	34
3	Self-employed	9	26
4	Mother Household	7	20
Total		35	100

Table 2 presents the characteristics of respondents based on occupation. The results show that the largest proportion of respondents were female employees, accounting for 12 respondents (34%). Meanwhile, entrepreneurs represented 9 respondents (26%), while civil servants and housewives each accounted for 7 respondents (20%). These findings indicate that Wardah consumers in this study came from diverse occupational backgrounds, with female employees representing the dominant group. This suggests that Wardah digital marketing strategy through Augmented Reality features has the potential to reach consumers with various professional backgrounds, particularly working women who actively engage with digital platforms for cosmetic product exploration and purchasing decisions.

4.1.3 Respondents Based on Income

Table 3. Description respondents based on income

No	Income per Month (Rp)	Amount Respondents (People)	Percentage (%)
1	< 3,000,000	7	20
2	3,000,001 - 7,400,000	19	54
3	7,400,001 - 11,800,000	8	23
4	11,800,001 - 16,200,000	1	3
5	16,200,001 - 20,600,000	-	-
Total		35	100

Table 3 presents the characteristics of respondents based on monthly income. The results indicate that the majority of respondents had a monthly income ranging from IDR 3,000,001 to IDR 7,400,000, consisting of 19 respondents (54%). Meanwhile, 8 respondents (23%) had an income between IDR 7,400,001 and IDR 11,800,000, followed by 7 respondents (20%) with an income below IDR 3,000,000. Only 1 respondent (3%) had a monthly income between IDR 11,800,001 and IDR

16,200,000, while no respondents were identified in the income category of IDR 16,200,001-20,600,000.

These findings indicate that most respondents were consumers with moderate income levels, particularly within the IDR 3,000,001-7,400,000 range. This suggests that Wardah products are accessible and attractive to consumers with various purchasing capacities. Furthermore, the income characteristics indicate that respondents have sufficient purchasing power to evaluate and adopt digital shopping experiences, including the use of Augmented Reality features provided by Wardah.

4.2 Descriptive Results of the Augmented Reality Variable

The descriptive analysis was conducted to identify respondents' perceptions regarding the implementation of Augmented Reality on the Wardah website. The Augmented Reality variable was measured using five indicators, namely virtual presence, convenience, enjoyment, usefulness, and word-of-mouth factor. Respondents' assessments were collected using a five-point Likert scale, consisting of STS (Strongly Disagree), TS (Disagree), N (Neutral), S (Agree), and SS (Strongly Agree). The descriptive results of the Augmented Reality variable are presented in Table 4.

Table 4. Results descriptive questionnaire variables use augmented reality

No.	Statement	STS	TS	N	S	SS	Total	Index
1	AR provides clear product realization through Augmented Reality features	0	2	24	64	50	142/35	4.05
2	Consumers feel comfortable when using Augmented Reality	0	2	12	76	55	145/35	4.14
3	Consumers feel happy and enjoy using Augmented Reality	0	4	15	80	40	139/35	3.97
4	Augmented Reality helps consumers understand the products offered	0	4	18	60	60	142/35	4.06
5	Augmented Reality content is distributed through word of mouth	0	2	12	81	45	140/35	4.00
	Mean Use of Augmented Reality							4.04

Table 4 shows that the average score of the Augmented Reality variable was 4.04, indicating that respondents perceived the implementation of AR on the Wardah website as good. The highest score was obtained by the convenience indicator (4.14), followed by usefulness (4.06) and virtual presence (4.05). Meanwhile, enjoyment obtained the lowest score (3.97). These results indicate that AR provides consumers with a comfortable, useful, and interactive experience in exploring Wardah products.

4.3 Descriptive Results of the Consumer Behavior Variable

The consumer behavior variable was analyzed based on three dimensions, namely cognitive component, affective component, and post-purchase behavior. The measurement results were obtained from respondents' assessments using a five-point Likert scale, ranging from strongly disagree to strongly agree. The descriptive results of respondents' responses regarding consumer behavior are presented in Table 5. The response categories used in this study are explained as follows STS = Strongly Disagree, TS = Disagree, N = Neutral, S = Agree, and SS = Strongly Agree.

Table 5. Results descriptive questionnaire variables consumer behavior

No.	Component	Statement	STS	TS	N	S	SS	Total	Index
Cognitive Component									
1	**Cognitive Component**	Consumers are very knowledgeable about the classification of products sold.	0	2	6	60	85	153/35	4.37
2		Consumers' understanding of the products sold will influence consumers' attitudes in purchasing the products.	0	4	21	72	40	137/35	3.91
3		Consumers' buying experience will influence their evaluation of the products purchased.	0	2	24	72	40	138/35	3.94
Affective Component									
1	**Affective Component**	Consumers will make repeat purchases when they are interested in the products available at Wardah.	0	4	21	72	40	137/35	3.91

No.	Component	Statement	STS	TS	N	S	SS	Total	Index
2	**Affective Component**	Consumers will make repeat purchases when they are interested in the products available.	0	4	18	60	60	142/35	4.06
3		Consumers have their own assessments of the products sold.	0	2	12	76	55	145/35	4.14
Post-Purchase Behavior									
1	**Post-Purchase Behavior**	I will continue shopping through the Wardah application/website even if the offered price increases.	0	2	24	64	50	142/35	4.05
2		I will report complaints to Wardah if I experience problems with the services provided.	0	2	12	81	45	140/35	4.00
	Mean Consumer Behavior							100	4.04

Table 5 shows that the Consumer Behavior variable obtained an average score of 4.04, indicating positive consumer responses toward Wardah products after using the Augmented Reality feature. The highest score was found in the cognitive component regarding product knowledge (4.37), followed by the affective component related to consumer assessment (4.14) and post-purchase behavior (4.05). These results indicate that AR contributes to improving consumer understanding, emotional responses, and purchasing behavior toward Wardah products.

4.4 Data Analysis

4.4.1 Validity Test

Validity testing is used to determine whether a questionnaire is valid or not. A questionnaire is considered valid if the questions are able to reveal what the questionnaire is intended to measure. The R value in this study is 0.2826, obtained from the formula nk-1 (35-1-1 = 33). The results of the variable validity test can be seen in the following table 6.

Table 6. Results test validity of augmented reality variable

Variables	Statement	R-Count	R-Table	Information
Use of Augmented Reality (*X*)	Depiction clear product realization from Feature augmented reality	0.871	0.2826	Valid
	The existence of comfort What consumers feel when Using augmented reality	0.801	0.2826	Valid
	Consumers feel happy and happy when using Augmented Reality	0.871	0.2826	Valid
	Augmented Reality helps consumers Understand about products offered	0.791	0.2826	Valid
	Augmented content distribution Reality Through word of mouth	0.783	0.2826	Valid

Table 6 presents the validity test results for the Augmented Reality variable. The validity assessment was conducted by comparing the calculated correlation value (*R* Count) with the *R* Table value of 0.2826. The results show that all measurement items obtained *R* Count values ranging from 0.783 to 0.871, which are higher than the *R* Table value. Therefore, all indicators of the Augmented Reality variable are declared valid and suitable for further analysis. These findings indicate that each measurement item accurately represents the construct of Augmented Reality, including product visualization, convenience, enjoyment, usefulness, and word-of-mouth factors.

Table 7. Results test validity of consumer behavior variable

Variable	Statement	R-Count	R-Table	Information
Consumer Behavior (*Y*)	Consumers are knowledgeable about the classification of products offered	0.519	0.2826	Valid

Variable	Statement	R-Count	R-Table	Information
Consumer Behavior (*Y*)	Consumers' understanding of the products offered influences their purchasing attitudes	0.456	0.2826	Valid
	Consumers' purchasing experiences influence their evaluation of purchased products	0.586	0.2826	Valid
	Consumers will make repeat purchases when they are interested in Wardah products	0.562	0.2826	Valid
	Consumers will make repeat purchases when they are interested in the products available	0.492	0.2826	Valid
	Consumers have their own evaluations of the products offered	0.593	0.2826	Valid
	I will continue shopping through the Wardah application/website even if the offered price increases	0.568	0.2826	Valid
	I will report complaints to Wardah if I experience problems with the services provided	0.660	0.2826	Valid

Table 7 presents the validity test results for the Consumer Behavior variable. The validity test was conducted by comparing the calculated correlation value (*R* Count) with the R Table value of 0.2826. The results show that all indicators of consumer behavior obtained *R* Count values ranging from 0.456 to 0.660, which are higher than the *R* Table value. Therefore, all measurement items are declared valid and can be used for further analysis. These findings indicate that the indicators representing cognitive, affective, and post-purchase behavior components appropriately measure the consumer behavior construct.

4.4.2 Reliability Test

Table 8. Results test reliability variables users augmented reality

Cronbach Alpha	N of Items
.892	5

Table 8 shows test reliability on variables use augmented reality (*x*) it can be seen that Cronbach's alpha on this variable is higher than the basic value, namely 0.892>0.60. These results prove that all statements in the questionnaire for variable (*X*) are stated to be reliable.

Table 9. Results test reliability variables behavior consumer

Cronbach Alpha	N of Items
.801	8

Table 9 shows the results of the reliability test on the Consumer Behavior variable (*Y*) can be seen that the Cronbach's alpha on this variable is higher than the basic value, namely 0.801 > 0.60. These results prove that all statements in the questionnaire for variable (*Y*) are stated to be reliable.

4.4.3 Simple Linear Regression Analysis

Simple regression analysis is used to determine the linear relationship between these variables and predict the value of the dependent variable based on the known value of the independent variable (Ghozali, 2020).

Table 10. Results simple regression analysis

Model	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constants)	10.264	4.162		2.466	.015
Augmented Reality	.292	.077	.359	3.807	<.001

Table 10 presents the results of the simple linear regression analysis examining the effect of Augmented Reality on consumer behavior. The regression coefficient of Augmented Reality is 0.292 with a positive direction, indicating that an increase in Augmented Reality implementation will lead to an increase in consumer behavior. The t-value of Augmented Reality is 3.807 with a significance value of $p < 0.001$, indicating that the effect is statistically significant at the 5% significance level.

The constant value of 10.264 indicates that when Augmented Reality is assumed to be zero, consumer behavior remains at 10.264 units. The standardized coefficient (Beta) of 0.359 indicates that Augmented Reality contributes positively to changes in consumer behavior. These results confirm that Augmented Reality is an important factor in influencing consumer responses toward Wardah products. Based on results calculation Which There is on Table 10 in the results of the Simple Linear Regression equation 4 are as follows:

$$Y = 10.264 + 0.292X + e \quad (3)$$

Where:

Y = Behavior Consumer
α = Constant
β = Coefficient Regression
X = Augmented Reality

Based on the simple linear regression equation, the constant value (α) of 10.264 indicates that when the Augmented Reality variable is assumed to be zero, the consumer behavior value remains at 10.264 units. Furthermore, the Augmented Reality variable has a regression coefficient of 0.292 with a positive direction. This indicates that every one-unit increase in Augmented Reality implementation will increase consumer behavior by 0.292 units, assuming that other independent variables remain constant. These results demonstrate that improvements in Augmented Reality features can contribute positively to enhancing consumer responses toward Wardah products.

4.4.4 Coefficient of Determination

The coefficient of determination (R^2) was analyzed to determine the extent to which the independent variable explains the variation in the dependent variable. The value of R^2 ranges from zero to one. A lower R^2 value indicates that the independent variable has limited ability to explain changes in the dependent variable, while a higher R^2 value indicates that the independent variable provides greater explanatory power in predicting variations in the dependent variable. In this study, the coefficient of determination was assessed based on the *R* Square value obtained from the model summary generated using SPSS.

Table 11. Results coefficient determination

Model Summary b	Model Summary b	Model Summary b
Model	R	R-Square
1	.386a	.149
Predictors: (Constant), Augmented Reality Dependent Variable: Behavior Consumer		

Based on Table 11, the R Square value was 0.149, indicating that Augmented Reality explains 14.9% of the variation in consumer behavior. Meanwhile, the remaining 85.1% is explained by other factors outside the research model that were not examined in this study. These results indicate that although Augmented Reality contributes to influencing consumer behavior, other variables may also play an important role in determining consumer responses toward Wardah products.

4.4.5 T-Test

The t-test was conducted to examine whether the independent variable has a statistically significant effect on the dependent variable. The hypothesis testing was performed by comparing the calculated *t*-value (*t*-count) with the critical *t*-value (*t*-table) at a significance level of 5% (α=0.05). The decision criteria are determined based on the significance value, where the hypothesis is accepted if the probability value is less than 0.05. A significance value greater than 0.05 indicates that the independent variable does not have a significant effect on the dependent variable.

Table 12. Results t -test

Coefficients a	**Coefficients a**	**Coefficients a**
Model	T	Sig.
Augmented Reality	3,807	<.001
a. Dependent Variable: Behavior Consumer		

Table 12 presents the results of the t-test analysis examining the effect of Augmented Reality on consumer behavior. The results show that Augmented Reality obtained a t-value of 3.807 with a significance value of $p < 0.001$. Since the significance value is lower than 0.05, Augmented Reality has a statistically significant effect on consumer behavior. Therefore, the hypothesis stating that Augmented Reality positively influences consumer behavior is accepted. These findings indicate that improvements in AR features can enhance consumers' responses, particularly in terms of product understanding, engagement, and purchasing-related behavior toward Wardah products.

4.5 Discussion

The results of hypothesis testing using simple linear regression indicate that Augmented Reality usage positively affects consumer behavior. The calculated t-value of 3.807 exceeds the *t*-table value of 1.691 at $p < 0.001$, so H_1 is supported. Because the data are cross-sectional and were collected at a single point in time, this result is interpreted as a statistical association consistent with the proposed mechanism rather than as evidence of causation.

These findings indicate that the implementation of Augmented Reality in Wardah digital marketing strategy can enhance consumer responses by providing more interactive, informative, and engaging shopping experiences. Through AR features, consumers can visualize products more realistically, obtain better product information, and reduce uncertainty before making purchasing decisions. Therefore, AR technology contributes to improving consumer satisfaction, engagement, purchase intention, and positive behavioral responses toward cosmetic products.

The pattern of results is consistent with the reasoning of the Technology Acceptance Model, in that convenience and usefulness were the attributes respondents rated most highly. This consistency should not be read as a confirmation of TAM, however, because perceived usefulness and perceived ease of use were not measured as separate constructs in this study. This finding is consistent with previous studies conducted by Lovendra (2021) and Negm (2025), which found that Augmented Reality has a positive influence on consumer responses, purchase intention, and buying behavior. Thus, the application of AR in cosmetic marketing can be considered an effective strategy to create personalized and interactive consumer experiences that encourage stronger engagement and purchasing behavior.

4.6 Theoretical and Managerial Implications

Theoretically, this study contributes to AR-based consumer-behavior research in two ways. First, it treats consumer behavior as a composite of cognitive, affective, and post-purchase responses rather than as purchase intention alone, and it observes that construct in a brand's live commercial setting

rather than in an experimental prototype. Second, the modest coefficient of determination is itself informative: it indicates that AR attributes alone are a weak predictor of consumer behavior, and that future models should position AR as one stimulus among several alongside brand image, consumer trust, price perception, and perceived risk rather than as a stand-alone determinant.

Managerially, the descriptive pattern of the AR indicators shows where development effort is best placed. Convenience received the highest rating (4.14), followed by usefulness (4.06) and virtual presence (4.05), while enjoyment received the lowest (3.97). For Wardah this suggests that the feature is already easy to operate and informative, and that the remaining gap lies in the experiential quality of the interaction.

Four practical steps follow. For convenience, the Virtual Try-On feature can be made reachable directly from each product page and from the mobile view without a separate menu, so that trying a shade does not interrupt browsing. For visualization, shade rendering can be calibrated across a wider range of skin tones and lighting conditions, since virtual presence is the attribute most closely tied to the cognitive component of consumer behavior. For enjoyment, the lowest-rated attribute, the feature can offer side-by-side comparison of several shades, saveable looks, and shareable results, which would also support the word-of-mouth factor. For product information, each virtual shade can be paired at the point of try-on with the product's finish, coverage, and ingredient details, so that the visual experience and the product knowledge that drives the cognitive component are delivered together.

5. Conclusions

5.1 Conclusion

This study finds that Augmented Reality usage positively affects consumer behavior among Wardah consumers ($t = 3.807$; $p < 0.001$), so H_1 is supported. The effect is statistically reliable but limited in magnitude: Augmented Reality accounts for 14.9% of the variation in consumer behavior, meaning that the greater part of that variation is attributable to factors outside the model. The findings are consistent with the reasoning of the Technology Acceptance Model, since the attributes rated most highly were convenience and usefulness. Because perceived usefulness and perceived ease of use were not tested as separate constructs, this study does not claim to confirm TAM. Within these bounds, an operational AR feature can be regarded as a useful, though not by itself sufficient, component of a cosmetic brand's digital marketing strategy.

5.2 Research Limitations

This study has several limitations that should be considered. First, the research was conducted with a relatively small sample size of 35 Wardah consumers, which may limit the generalizability of the findings to a broader consumer population. Second, this study only focused on one cosmetic brand, namely Wardah, so the results may not fully represent consumer responses toward AR implementation in other cosmetic brands or industries.

Third, this research examined only the direct effect of Augmented Reality on consumer behavior. The coefficient of determination (R^2) value of 0.149 indicates that Augmented Reality explains 14.9% of variations in consumer behavior, while the remaining 85.1% may be influenced by other factors that were not included in this research model. These factors may include perceived risk, brand image, consumer trust, perceived enjoyment, and purchase intention. Fourth, the sample comprised both existing and prospective Wardah consumers, so responses to the post-purchase indicators reflect intended as well as realized post-purchase behavior. Finally, the cross-sectional design permits the identification of association but not of causal order.

5.3 Suggestions and Directions for Future Research

Future research is recommended to involve a larger and more diverse sample size to improve the generalizability of findings. Researchers may also conduct comparative studies involving multiple cosmetic brands or different industries to examine whether the influence of Augmented Reality varies across contexts. Furthermore, future studies are encouraged to expand the research model by

incorporating additional variables, such as perceived usefulness, perceived ease of use, consumer engagement, perceived enjoyment, brand trust, purchase intention, and customer satisfaction. The use of more comprehensive analytical approaches, such as Structural Equation Modeling (SEM), may also provide deeper insights into the mechanisms through which Augmented Reality influences consumer behavior.

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Author Contributions

TM was responsible for conceptualization, methodology, data collection, data analysis, and preparation of the original manuscript draft. I contributed to literature review, validation, theoretical framework development, and manuscript improvement. ARPB contributed to research methodology, statistical analysis, interpretation of findings, and critical revision of the manuscript. D was involved in investigation, data management, visualization, and manuscript editing. RA contributed to supervision, research coordination, validation, and final review of the manuscript. All authors have reviewed and approved the final version of the manuscript and agreed to be accountable for all aspects of the research.

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