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The Impact of Augmented Reality-based Product Visualization on Consumer Satisfaction: A Survey of Wall Paint Companies

Fikri Aziz Athoillah[1], Franciskus Antonius Alijoyo[2]
[1,2]*School of Business and Information Technology STMIK LIKMI Bandung - Indonesia*
Jl. Ir. H. Juanda No.96, Lebakgede, Kecamatan Coblong, Kota Bandung, Jawa Barat 40132
20fikri@gmail.com

Abstract– ***This study aims to analyze the impact of Augmented Reality (AR)-based Product Visualization on Customer Satisfaction in the wall paint industry. A quantitative survey method was employed, collecting primary data through questionnaires from customers of wall paint companies. Regression analysis was used to analyze the data and identify the influence of the independent variable (AR-based Product Visualization) on the dependent variable (Customer Satisfaction). The research results reveal that AR-based Product Visualization significantly affects customer satisfaction (t calculated > t critical, 11.155 > 1.980). Approximately 52.6% of the variation in customer satisfaction can be explained by AR-based Product Visualization. These findings indicate that the implementation of AR technology in the wall paint industry can enhance customer satisfaction.***
Keyword : Product Visualization, Augmented Reality, Customer Satisfaction, Wall Paint Industry, Survey Method, Regression Analysis.

Abstrak– ***Penelitian ini bertujuan untuk menganalisis pengaruh Visualisasi Produk berbasis Augmented Reality (AR) terhadap Kepuasan Pelanggan dalam industri cat tembok. Metode survei kuantitatif digunakan dengan mengumpulkan data primer melalui kuesioner dari pelanggan perusahaan cat tembok. Uji regresi digunakan untuk menganalisis data dan mengidentifikasi pengaruh variabel independen (Visualisasi Produk AR) terhadap variabel dependen (Kepuasan Pelanggan). Hasil penelitian menunjukkan bahwa Visualisasi Produk berbasis AR memiliki dampak signifikan terhadap kepuasan pelanggan (t hitung > t tabel, 11,155 > 1,980). Sebanyak 52,6% variasi dalam kepuasan pelanggan dapat dijelaskan oleh Visualisasi Produk AR. Temuan ini mengindikasikan bahwa penerapan teknologi AR dalam industri cat tembok dapat meningkatkan kepuasan pelanggan.***
Kata Kunci : Visualisasi Produk, Augmented Reality, Kepuasan Pelanggan, Industri Cat Tembok, Metode Survei, Uji Regresi.

I. INTRODUCTION

In the wall paint industry, it is crucial for companies to provide a satisfying experience to customers in order to enhance their satisfaction and trust [1]. One of the challenges faced by wall paint companies is how to convey the final product appearance to customers before making a purchase. Buying decisions for wall paint are often based on consumers' perceptions of color, texture, and the expected end result. However, consumers often struggle to imagine or visualize how the wall paint will appear in their spaces [2]. Such limitations can lead to uncertainty and doubt in the purchasing process, potentially reducing customer satisfaction.

The advancement of technology and innovation in the wall paint industry has introduced new opportunities for companies to enhance consumer interactions and experiences. In recent years, augmented reality (AR) has emerged as a promising technology in the realm of product visualization. This concept has the potential to revolutionize how consumers perceive and comprehend products before making purchasing decisions [3]. Hence, there is an urgent need to comprehend the influence of augmented reality-based product visualization on consumer satisfaction within the context of wall paint companies.

The importance of understanding the influence of augmented reality-based product visualization on consumer satisfaction in the wall paint industry is substantiated by several factors. Firstly, contemporary consumers increasingly rely on digital media and mobile devices during the product purchasing process. In this context, the use of AR can serve as an effective tool to aid consumers in visualizing wall paint products within their spaces [3]. Secondly, the high level of competition within this industry demands companies to continuously innovate and create enhanced experiences for consumers. The utilization of AR technology in product visualization can serve as a competitive edge for wall paint companies aiming to fulfill consumer needs and expectations [4].

By comprehending the impact of augmented reality-based product visualization on consumer satisfaction, wall paint companies can take strategic steps to enhance consumer experiences and influence their purchasing decisions. The outcomes of this research are anticipated to offer valuable insights to companies in formulating effective marketing strategies and elevating consumer satisfaction through the implementation of augmented reality technology .

Several fundamental questions posed in the formulation of this research problem include whether the utilization of augmented reality-based product

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visualization holds a significant influence on consumer satisfaction. This research problem serves as the foundation for addressing inquiries that arise regarding the relationship between augmented reality-based product visualization and consumer satisfaction within the context of the wall paint industry.

Building upon the aforementioned research problem, this study aims to investigate the impact of augmented reality-based product visualization on consumer satisfaction within the framework of the wall paint industry. Through this research endeavor, a deeper comprehension of the relationship between augmented reality-based product visualization and consumer satisfaction in the context of the wall paint industry is anticipated to emerge. The findings of this study are expected to be beneficial for wall paint companies in devising more effective marketing strategies and enhancing consumer experiences and satisfaction.

II. LITERATURE REVIEW

Augmented Reality in Marketing Context

Augmented Reality (AR) is a technology that combines the real world with virtual elements, enabling users to interact with virtual objects overlaid onto the physical world in real-time [5].

The utilization of augmented reality has become a significant trend in modern marketing. According to Götz, Höllerer, and Kothgassner (2019), AR can enhance consumer decision-making by providing a more immersive and interactive experience. In marketing, AR allows consumers to virtually interact with products or brands, visualize products in real-world contexts, and deliver captivating experiences. By harnessing this technology, companies can forge stronger connections between brands and consumers, leading to more positive purchasing decisions.

The Use of Augmented Reality as Product Visualization in the Paint Industry

The paint industry has embraced augmented reality (AR) as a powerful tool to enhance consumer experiences. Huang, Cheng, and Li (2020) demonstrated in their study that the utilization of AR in the paint industry can enhance consumers' purchase intention. Through AR, consumers can visualize paint products within their environment, alter colors and textures, and preview the final outcomes. This empowers consumers to make more informed and precise purchase decisions, thereby reducing risks and elevating their satisfaction with paint products.

The Influence of Product Visualization on Consumer Satisfaction

The utilization of Augmented Reality (AR) in the context of product purchasing has a significant positive impact on consumers' purchase decisions and enhances their satisfaction [7]. AR enables consumers to visualize products more accurately and realistically, reducing uncertainties during the purchasing process. It also aids consumers in envisioning how the product will appear or function in their daily lives. Thus, AR provides a more immersive experience and enhances consumer trust in the products they intend to purchase. The application of AR also positively affects consumers' perceptions of the utility and ease of use of this technology. Consumers perceive AR as a user-friendly and beneficial tool in guiding their purchasing decisions.

Consumer Satisfaction in the Wall Paint Industry

Consumer satisfaction is the degree of positive sentiment or evaluation that arises when an individual compares the performance of a product or service to their pre-existing expectations. Consumer satisfaction is the outcome of consumers' perceptions of the quality, value, and experience provided by the products or services they utilize [8].

According to Oliver (1980), consumer satisfaction is formed through a cognitive process that involves comparing the performance of a product or service with the consumer's pre-existing expectations. If the product or service exceeds expectations, consumers will feel satisfied. Conversely, if the product or service falls short of expectations, consumers will feel dissatisfied.

There are several indicators that can influence consumer satisfaction. In a study conducted by Parasuraman, Zeithaml, and Berry in 1988, they identified five main indicators known as the SERVQUAL model, which include the following :

- Reliability: This indicator refers to the service provider's ability to deliver consistent, accurate,

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and timely services. Consumers will feel satisfied if the paint provided by the company delivers consistent, durable, and meets their expectations.

- Assurance: This indicator encompasses the competence, confidence, and security demonstrated by the service provider to the consumers. Consumers will feel satisfied if they are confident that the wall paint they purchase is of good quality and safe to use.
- Tangibles: This indicator refers to the physical aspects of the service provider's environment or facilities that can influence consumer perceptions. Physical factors such as product packaging appearance, clear usage instructions, and accurate colors can also affect customer satisfaction in the wall paint industry. Consumers will feel satisfied if the wall paint product has an appealing appearance, is easy to use, and its color matches their expectations.
- Responsiveness: This indicator depicts the extent to which the service provider responds promptly and effectively to customer needs, requests, or issues. Customers will feel more satisfied if they receive quick and adequate responses from the service provider when facing specific situations or requests.
- Empathy: This indicator reflects the service provider's ability to understand and respond to individual customer needs with attention and understanding. Customers are more likely to be satisfied if they feel treated individually and valued by the service provider. Providing appropriate advice or recommendations, as well as support in choosing and using wall paint, will enhance customer satisfaction.

Theoretical Framework

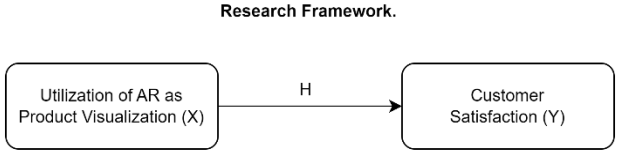

Figure 1 Theoretical Framework Chart

Explanation:
X : Independent Variable (Augmented Reality-based Product Visualization)
Y : Customer Satisfaction
Research Hypothesis:
H : It is hypothesized that the usage of Augmented Reality as a Product Visualization significantly influences the customer satisfaction of Wall Paint Company.

III. RESEARCH METHODS

This study employs a survey method with a quantitative approach using a non-experimental/survey causal design. The data utilized are primary data obtained through questionnaires filled out by respondents who are consumers or customers of paint companies, specifically those who have previously used Augmented Reality applications in purchasing wall paint. The questionnaire will encompass inquiries related to augmented reality-based product visualization and consumer satisfaction levels, aiming to gain a deeper understanding of consumer experiences with augmented reality-based product visualization and their satisfaction levels.

Data analysis will be conducted using statistical analysis techniques. Firstly, descriptive analysis will be employed to provide a general overview of the observed variables, including augmented reality-based product visualization and consumer satisfaction levels. Subsequently, regression analysis will be carried out to identify the relationship between augmented reality-based product visualization and consumer satisfaction levels. The main variables in this study are augmented reality-based product visualization and consumer satisfaction. However, there are also potential control or explanatory variables that may be included in the analysis, such as consumer characteristics, prior experience with augmented reality technology, and other factors that might influence consumer satisfaction. The following is a flowchart illustrating the research process that will be undertaken.

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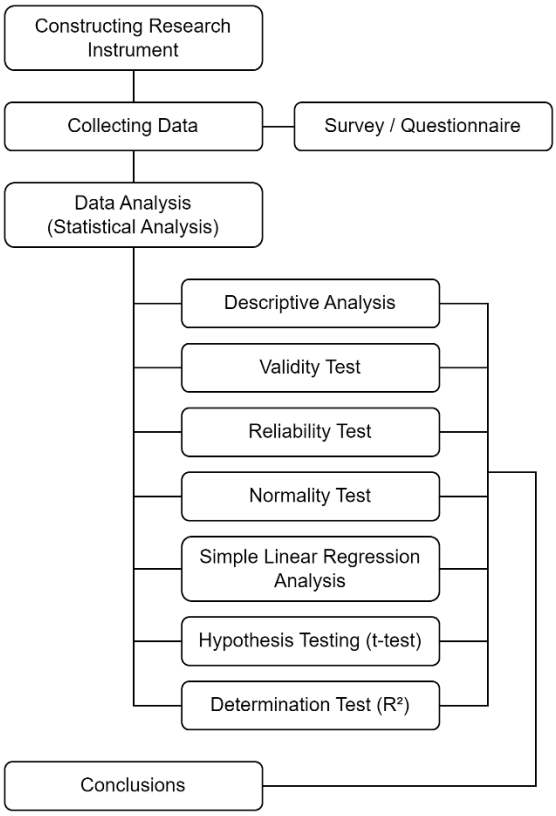

Figure 2. Research Flow

IV. RESULT AND DISCUSSION

Descriptive Statistical Analysis

Table 1. Descriptive Analysis Results

	N	Minimum	Maximum	Sum	Mean
Variabel (X)	114	28	35	3515	30.83
Variabel (Y)	114	24	30	3110	27.28
Valid N (listwise)	114				

Source: Primary Data Results

Based on Table 1, it can be observed that all statements provided to 114 respondents who used AR in purchasing wall paint have minimum, maximum, and mean values. Customer satisfaction (Y) has a maximum value of 30.00, a minimum value of 24.00, and a mean of 27.28. The use of AR (X) has a maximum value of 35.00, a minimum value of 28.00, and a mean of 30.63.

Validity Test

Validity testing aims to determine the validity or appropriateness of the questionnaire used in measuring and obtaining research data from the respondents [9].

Table 2. Validity Test Results

		Total
Input 1	**Pearson Correlation**	.452**
	Sig (2-tailed)	<.001
	N	113
Input 2	**Pearson Correlation**	.479**
	Sig (2-tailed)	<.001
	N	113
Input 3	**Pearson Correlation**	.411**
	Sig (2-tailed)	<.001
	N	113
Input 4	**Pearson Correlation**	.462**
	Sig (2-tailed)	<.001
	N	113
Input 5	**Pearson Correlation**	.450**
	Sig (2-tailed)	<.001
	N	113
Input 6	**Pearson Correlation**	.484**
	Sig (2-tailed)	<.001
	N	113
Input 7	**Pearson Correlation**	.566*
	Sig (2-tailed)	<.001
	N	113
Input 8	**Pearson Correlation**	.513**
	Sig (2-tailed)	<.001
	N	113
Input 9	**Pearson Correlation**	.500**
	Sig (2-tailed)	<.001
	N	113
Input 10	**Pearson Correlation**	.417**
	Sig (2-tailed)	<.001
	N	113
Input 11	**Pearson Correlation**	.452**
	Sig (2-tailed)	<.001
	N	113
Input 12	**Pearson Correlation**	.554**
	Sig (2-tailed)	<.001
	N	113
Input 13	**Pearson Correlation**	.562**
	Sig (2-tailed)	<.001
	N	113

Source: Primary Data Results

Based on Table 2, it can be observed that the validity testing of the research instrument or questionnaire for each statement obtains an obtained r value greater than the table r value of 0.1824, with a significance level of 0.001 < 0.005. Therefore, the statements or indicators for both variable (X) and variable (Y) are considered valid as measurement tools for the study.

Reliability Test

Reliability testing aims to assess whether the questionnaire maintains consistency when measurements are repeatedly conducted using the same questionnaire. This is accomplished by comparing the Cronbach's Alpha values obtained from

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the reliability test. A variable is considered reliable if the Cronbach's Alpha value is > 0.70 [9].

Table 3. Reliability Test Results

Variabel	Cronbach's Alpha
X	.727
Y	.702

Source: Primary Data Results

Based on Table 3, it can be observed that all Cronbach's Alpha values for each variable are > 0.70. From these results, it can be concluded that the questionnaires for each variable (X) and variable (Y) are deemed reliable as research measurement instruments.

Normality Test

To determine whether the independent and dependent variables follow a normal or non-normal distribution in the regression model test, a test of normality was conducted [9]. In this study, the Kolmogorov-Smirnov test was employed, with the criterion that if the obtained significance value > 0.05, then the data is normally distributed; conversely, if < 0.05, then the data is not normally distributed.

Table 4. Normality Test Results

			Unstandardized Residual
N			114
Normal Parameters a.b	Mean		.0000000
	Std. Deviation		1.15873019
Most Extreme Differences	Absolute		.082
	Positive		.082
	Negative		-.071
Test Statitic			.082
Asymp. Sig (2-tailed)c			.059
Monte Carlo Sig (2-tailed)d	Sig.		.057
	99% Confidence Interval	Lower Bound	.051
		Upper Bound	.063

Source: Primary Data Results

In Table 4, the obtained output result for asymp. sig. (2-tailed) is 0.059, indicating that this value is significant above 0.05. Therefore, it can be concluded that the data's residual values are normally distributed, fulfilling the assumption of normality.

Simple Linear Regression Analysis

Regression Analysis is a method used to determine whether the dependent variable increases or decreases based on changes in the independent variable. It involves examining the relationship between the independent and dependent variables, either functional or causal, forming the basis of simple regression [10].

Table 5. Regression Test Results (Coefficients[a])

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	6.988	1.808		3.864	<,001
X	.654	.059	.725	11.155	<,001

Source: Primary Data Results

Table 6. Regression Test Results (ANOVA[a])

	Sum of Squares	Df	Mean Square	F	Sig
Regression	168.561	1	168.561	124.432	<,001b
Residual	151.720	112	1.355		
Total	320.281	113			

Source: Primary Data Results

Table 7. Regression Test Results (Model Summary[b])

R	R Square	Adjusted R Square	Std. Error of the Estimate
.725a	.526	.522	1.164

Source: Primary Data Results

Based on the results of the above testing, the regression equation for the influence of augmented reality-based product visualization on customer satisfaction can be formulated as follows :

$$Y = 6.988 + 0.654X$$

The constant value of 6.988 implies that when the augmented reality-based product visualization value is 0, customer satisfaction is 6.988. The regression coefficient of 0.654 for augmented reality-based product visualization indicates that if the augmented reality-based product visualization increases by 1 unit, customer satisfaction will also experience an increase.

Hypothesis Testing (t-test).

This test aims to examine the partial influence of the independent variable on the dependent variable and is utilized to assess the extent of the individual impact of the independent variable used in this study in

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explaining the dependent variable partially (Ghozali, 2018).

Based on Table 5, the hypothesis test in this study was conducted at a significance level of 0.05, while the critical t-value can be calculated using the t-test table with the formula t = [α; (df = n - k)] or t = [0.05; 112], resulting in a critical t-value of 1.98099, rounded to 1.980. The calculated t-value, obtained as 11.155, is greater than the critical t-value of 1.980 with a significance level of 0.001 < 0.05. This indicates that the null hypothesis (Ho) is rejected and the alternative hypothesis (Ha) is accepted, indicating that the variable Visualisasi Produk with AR has a significant partial effect on customer satisfaction in the purchase of wall paint.

Determination Test (R^2)

Table 7 shows the Adjusted R-Square value of 0.526 or 52.6%, indicating that the visualisasi produk with AR has an influence on customer satisfaction by 52.6%, while the remaining 47.4% is influenced by other factors.

V. CONCLUSION AND SUGGESTION

Based on the results of this research, it is evident that Augmented Reality-based Product Visualization (X) significantly affects customer satisfaction (Y) in the purchase of wall paint. This is evidenced by the calculated t-value being greater than the t-table value (11.155 > 1.980).

Based on the calculations, it can be concluded that Augmented Reality-based Product Visualization (X) in this study has a 52.6% influence on customer satisfaction. The remaining 47.4% is influenced by other variables.

Therefore, based on the analysis and discussion of respondent data regarding the impact of Augmented Reality-based Product Visualization on Customer Satisfaction in the purchase of Wall Paint, it can be concluded that Augmented Reality-based Product Visualization significantly influences Customer Satisfaction in the Wall Paint Industry.

Based on the findings and analysis of this study, we would like to offer several strategic recommendations to companies in the wall paint industry to enhance customer experience and satisfaction through the implementation of Augmented Reality (AR)-based Product Visualization technology.

Firstly, it is crucial for companies to continuously enhance the integration and development of AR technology. Developing intuitive and realistic AR applications would enable customers to easily visualize various paint options in their environment, minimizing uncertainties in their purchasing decisions.

Secondly, effective education and training regarding AR usage need to be provided to customers. Workshops, tutorials, and online resources can help customers feel confident and skilled in utilizing this technology for better purchasing decisions.

Thirdly, bolstering customer support through AR platforms can be a pivotal point. Features such as chat or guidance within the AR application can provide instant assistance to customers with questions or issues.

Fourthly, maintaining a focus on overall product and service quality remains essential. While AR can enhance customer satisfaction, consistent quality of products and services must also be upheld.

Fifthly, exploring collaborations with interior design or color experts can offer valuable guidance and recommendations to customers in selecting paint. This can enrich the customer experience and aid them in making more informed decisions.

Lastly, implementing regular surveys or feedback from customers about their AR experience can provide a better understanding of the effectiveness of this technology and areas for improvement.

By implementing these recommendations, companies can elevate positive interactions with customers, strengthen brand connections, and uphold customer satisfaction in the wall paint industry.

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