

## ***THE EFFECT OF BRAND STRATEGY AND PRICING IN INCREASING CUSTOMER LOYALTY OF ELECTRIC CIGARETTE***

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Submit : 4 October 2025, Review : 2 November 2025, Accepted : 14 December 2025

### ***Abstract***

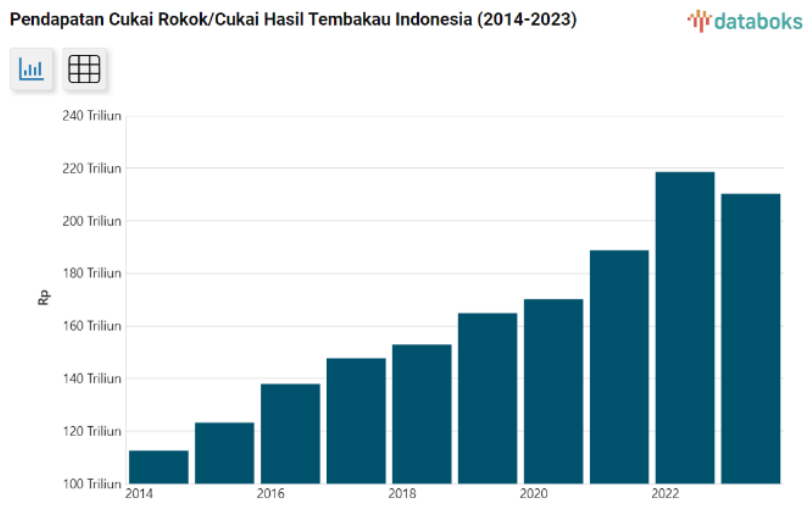
*This study aims to explore the influence of Product Quality, Brand Image and Price on Customer Satisfaction and Customer Loyalty in e-cigarette products. This study identified that the largest number of e-cigarette users are in the age range of 21-30 years (Generation Z). The main factors that influence customer satisfaction and loyalty among this generation include product quality, brand image, and price. This is due to the tendency of Generation Z to be very sensitive to product quality, brand trust, and price considerations in making purchasing decisions. This study uses a qualitative approach by conducting in-depth interviews with regular e-cigarette consumers and analyzing customer satisfaction and loyalty towards e-cigarette products. The findings show that quality products affect customer satisfaction and loyalty, in addition, a positive brand image, supported by a good product image and user image will form strong brand values, quality products with a strong brand image will affect customer satisfaction and loyalty if the product has a competitive price, contributing significantly to customer satisfaction and loyalty. The practical implications of this study are the importance of product quality, brand image and price as a strategy to increase long-term customer satisfaction and loyalty in e cigarette products in the Indonesian cigarette industry. This study also needs to know that there needs to be quality control of a product and maintaining a positive image of a product by setting competitive prices on e-cigarettes is very helpful in increasing the satisfaction and loyalty of e-cigarette customers. Customer satisfaction and loyalty are investments from an industry to expand the target market of a product.*

**Keywords:** *E-cigarettes, Product Quality, Brand Image, Price, Customer Satisfaction, Customer Loyalty.*

## **INTRODUCTION**

In recent years, the use of electronic cigarettes in Indonesia has increased significantly, particularly among younger age groups. Data from the Ministry of Health show that the percentage of electronic cigarette users rose from 0.3% in 2011 to approximately 3% in 2021. This change in consumption behavior indicates a shift in preference from conventional cigarettes to electronic cigarettes, which are perceived as more practical and to have a better health image.

However, there is still limited empirical research that simultaneously examines the effects of product quality, brand image, and price on customer satisfaction and loyalty toward electronic cigarettes in Indonesia. Therefore, this study aims to analyze the influence of these three variables on customer satisfaction and loyalty at PT Autentik Jaya Bersama.



Source : (Kemenkes, 2024)

**Figure 1 Cigarette Excise Revenue**

## LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

### Product Quality

Previous research conducted by Abigail et al. (2024) states that product quality encompasses various aspects, including effectiveness, safety, and the materials used in a product. Products that meet or exceed consumer expectations are considered high quality. Good product quality directly contributes to customer satisfaction. When customers are satisfied with the results of using a product, they are more likely to return.

Meanwhile, according to Rosillo-Díaz et al. (2024), customers tend to evaluate products based on their experiences and expectations formed by brand image. High-quality products can create a positive image. Good product quality directly contributes to customer satisfaction, and satisfied customers are more likely to remain loyal to the brand. Brand loyalty increases when customers feel that the product meets or exceeds their expectations, with a positive brand image serving as a reinforcement of loyalty.

Product quality can significantly decline depending on storage conditions and delivery duration. Products that are not properly stored may deteriorate more quickly. This decline in product quality can result in economic costs, including product loss and reputational damage for the company. Therefore, companies need to implement good quality control to maintain product quality (Lin et al., 2024).

### Brand Image

Brand image is an important aspect that companies must pay attention to. Brand image is formed from consumers' experiences, information, and communication received about a brand. It includes attributes such as quality, value, and reliability. Brand image also has an emotional dimension, where a brand can create emotional bonds with consumers, influencing purchase decisions and loyalty. A positive brand image contributes to higher levels of customer satisfaction. When consumers have a favorable perception of a brand, they are more likely to feel satisfied with the products they purchase (Tahir et al., 2024).

## Price

Price is a key element in marketing that influences purchasing decisions and customer loyalty. Companies need to set competitive prices by considering the value perceived by customers. Research by Anguera-Torrell and Nicolau (2025) examines how price perception affects consumer decisions. When the price of a product or service is perceived as high, consumers may expect the service received to be of higher quality, thereby increasing customer expectations.

## Customer Satisfaction

Customer satisfaction plays an important role in building loyalty, as satisfied customers tend to return and make repeat purchases. Research by Le et al. (2024) explains that customer satisfaction is the result of evaluating customer experiences with products or services. This satisfaction can be measured through various variables, such as product quality, price, customer service, and ease of use of e-commerce platforms.

Additionally, research conducted by Ariesta et al. (2023) found that service quality has a positive and significant effect on customer satisfaction at Pharmacy XYZ. Meanwhile, price also has a positive effect on customer satisfaction, but the effect is not significant. Customer satisfaction itself has a positive and significant impact on customer loyalty. Furthermore, service quality and price also have a positive influence on customer loyalty, indicating that these factors play an important role in building long-term relationships with customers.

## Customer Loyalty

Loyalty refers to a deep commitment to continue using the same service provider, resulting in repeat purchases of the same services in the future. To measure individual loyalty, there are two forms of loyalty assessment: attitudinal loyalty and behavioral loyalty (Kim et al., 2024). According to Tahir et al. (2024), customer loyalty influences how consumers perceive an offering, whether a product or service, and how they express satisfaction by using the product or service over the long term with sustained benefits.

Research by Yasmin et al. (2024) shows that product and service quality have a positive and significant effect on customer satisfaction and loyalty. Good product quality not only increases customer satisfaction but also strengthens customer loyalty toward a brand. Similarly, good service quality significantly contributes to customer satisfaction and loyalty.

## Conceptual Framework

To understand market dynamics in increasing customer loyalty, this study examines the relationships among variables. The conceptual framework used in this research analyzes product quality, brand image, and price in relation to customer loyalty through customer satisfaction. Based on the theoretical foundation and the problems described, the conceptual framework is illustrated in a figure. Therefore, the initial assumptions of this study are as follows:

H1: Product Quality has a positive effect on Customer Satisfaction

H2: Brand Image has a positive effect on Customer Satisfaction

H3: Price has a positive effect on Customer Satisfaction

H4: Product Quality has a positive effect on Customer Loyalty

H5: Brand Image has a positive effect on Customer Loyalty

H6: Price has a positive effect on Customer Loyalty

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## RESEARCH METHODOLOGY

This study employs an associative quantitative approach to analyze the relationships between product quality, brand image, and price on customer satisfaction and loyalty. The object of the study is PT Autentik Jaya Bersama, with respondents being PODS Authentic customers in the Jakarta area. The research was conducted from November to December 2024.

The research population consists of 198,764 customers. The sample was determined using a non-probability sampling technique with a total of 270 respondents, in accordance with the minimum requirements for Structural Equation Modeling (SEM). Data were collected through questionnaires using a five-point Likert scale.

The research instruments were tested using validity and reliability tests. All indicators were declared valid and reliable with Cronbach's Alpha values greater than 0.70. Data analysis was conducted using Structural Equation Modeling (SEM). Model fit was evaluated using goodness-of-fit indicators, and the results showed that the model achieved an acceptable level of fit.

### Operational Definition of Variables

In the context of quantitative research, variables can be categorized into two main types: independent variables and dependent variables. Independent variables refer to factors or conditions that are assumed to have an influence on changes in other variables within the study. These variables often become the main focus of research, as researchers aim to identify how changes in independent variables may cause or affect changes in dependent variables.

In this study, the independent variables are denoted as Variable X and are represented by Product Quality, Brand Image, and Price. Meanwhile, the dependent variables are denoted as Variable Y and are represented by Customer Satisfaction and Customer Loyalty. The operationalization of the variables in this study can be seen in the table below.

*Table 1 Operational Variable*

<b>Variables</b>	<b>Operational Definition</b>	<b>Indicators</b>	<b>Measurement Scale</b>
<b>Product Quality</b>	Product quality is the ability of a product to meet the needs and desires of E-Cigarette customers.	1. Performance 2. Reliability 3. Feature 4. Durability 5. Consistency 6. Design	Likert
<b>Brand Image</b>	Brand Image is a depiction of customer associations and beliefs towards a brand of e-cigarette.	1. Company Image 2. Users Image 3. Brand Image	Likert
<b>Price</b>	Price is the exchange value in a buying and selling transaction for goods or services expressed in monetary units.	1. Pricing Rate 2. Price Reduction 3. Payment Time 4. Payment Terms	Likert
<b>Customer Satisfaction</b>	Customer satisfaction is formed from the level of conformity between the performance of a product and customer expectations of an electronic cigarette product.	1. Conformity to Expectations 2. Repurchase Interest 3. Willingness to Recommend	Likert
<b>Customer Loyalty</b>	Customer loyalty is the feeling of pleasure and satisfaction felt by customers when using the products/services offered by the company.	1. Customer Retention Rate 2. Customer Lifetime Value 3. Net Promoter Score 4. Repeat Purchase Rate 5. Customer Engagement Score 6. Upsell Ratio	Likert

### Population and Sample

The overall population of this study consists of all electronic cigarette customers of PODS Authentic. Based on company data on electronic cigarette customers in 2024, the population in

this study totals 198,764 customers spread across Indonesia, serving as a data source with specific characteristics relevant to the research.

The sample for this study was selected from PODS Authentic customers located in Jakarta. This location was chosen because Jakarta represents the city with the highest number of purchasing transactions, accounting for more than 35% of the 198,764 PODS Authentic customers compared to other cities. The sample includes customers who have active engagement with the company's Product Quality, Brand Image, and Price.

The sampling technique used in this study is non-probability sampling. According to Hair et al. (2011), the minimum sample size in modeling should be at least ten times the number of parameters to be estimated. However, a recommended sample size ranges from 200 to 400 respondents, as samples exceeding 400 respondents may become overly sensitive. The minimum sample size in this study was determined using the formula:

$$10 \times 27 \text{ indicators} = 270 \text{ respondents.}$$

Thus, a total of 270 respondents were selected to represent PODS Authentic customers. The proportion of data distribution was adjusted based on a 20% allocation for each area within Jakarta.

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## Research Instrument Testing

### 1. Pilot Test

Before distributing the questionnaire to all respondents in this study, an initial trial (pilot test) was conducted to test the research instrument, particularly to ensure the reliability and validity of each indicator in the prepared questionnaire. The pilot test was conducted by distributing the questionnaire to 20–30 respondents. The respondents involved in the pilot test were expected to represent the characteristics of the research population and have profiles similar to the target population of PODS Authentic customers.

### 2. Validity Test

A validity test indicates whether an instrument can be used to obtain valid data. A questionnaire is considered valid if the questions are able to reveal or measure what the questionnaire is intended to measure (Hair et al., 2011). If the significance value (p-value) > 0.05, no significant relationship occurs. The criteria are as follows:

(1) If the calculated r-value is positive and  $r\text{-calculated} > r\text{-table}$ , the variable is valid.

(2) If the calculated r-value is not positive and  $r\text{-calculated} < r\text{-table}$ , the variable is not valid.

### 3. Reliability Test

This study uses a reliability test to indicate the extent to which the measurement instrument can be trusted or relied upon. A measuring instrument is considered reliable if it produces consistent results. If the instrument is used more than once to measure the same phenomenon and yields consistent results, it is considered reliable (Hair et al., 2011). In this study, reliability was tested using Cronbach’s Alpha, which indicates the level of consistency for each variable.

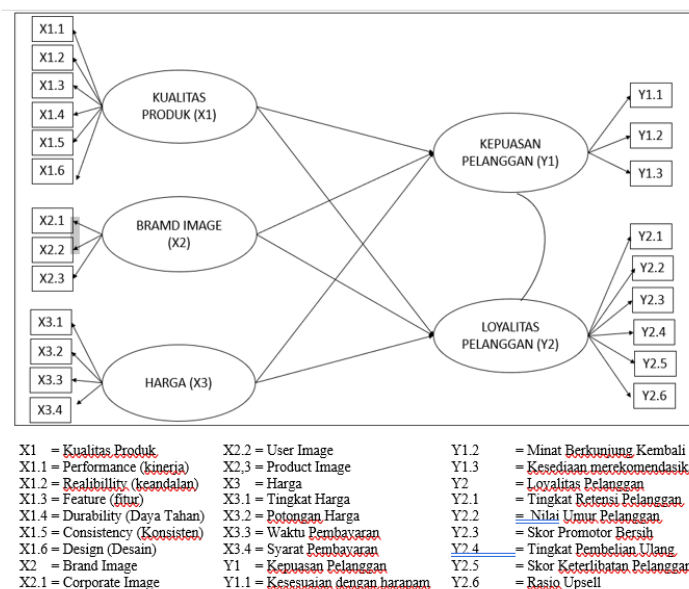
**Table 2 Criteria for questionnaire reliability values**

Value	Criteria
<b>0.80 1.00</b>	Very High
<b>0.60 0.80</b>	High
<b>0.40 0.60</b>	Fair
<b>0.20 0.40</b>	Low
<b>0.00 0.20</b>	Very Low

Source: (Hair et al., 2011)

### Data Analysis Planning

In this study, it is characterized by the existence of hypothesis testing in the analysis carried out with the support of strong theory. So the researcher uses Structural Equation Modeling (SEM) data collection techniques to solve the problems studied. The use of appropriate and accurate analysis tools will affect the accuracy of the research in drawing conclusions. Variables in SEM research are divided into 2 types, namely latent variables and manifest variables. Latent variables (unobserved variables) are variables that cannot be measured directly, but must be measured by formulating indicators of these variables (manifest variables or observed variables). Manifest variables are variables that can be measured, can be observed directly (observed variables) or in other words are indicators of latent variables. The steps for applying SEM in this study According to (Hair et al., 2011), namely: (1) Model Conceptualization (Building a Model Based on Theory) Model conceptualization is the initial step in SEM analysis. At this stage, the researcher conceptually defines the indicators to be studied and determines their dimensionality to the indicators or manifest variables. Next, the direction of causality between constructs that indicate the hypothesized relationship must be clearly determined and, most importantly, must have a strong theoretical basis. (2) Building a path diagram. The model that has been designed based on a strong theory is then created a framework of relationships between variables expressed in a path diagram. A path diagram is a picture that displays the relationship of constructs where the line must have an arrow indicating that the source variable (arrow) is an exogenous variable and the variable affected by the arrow is an endogenous variable. The conceptualization of the model is based on the study within the framework in Figure 2, Research Path Diagram:



**Figure 2 Research Path Diagram**

The relationships previously illustrated in the path diagram are then translated into a system of linear equations that link the indicators and define the measurement model. In this study, it is assumed that each endogenous variable (Y) can be predicted by its exogenous variables (X) or by other endogenous variations. An error term is included in each equation to represent the total effects of specific errors or random measurement errors. Two types of equation models must be specified, namely the structural model and the measurement model.

A research model must be identified when more than one parameter estimate exists for each variable. In this study, the researcher has algebraically examined whether the parameters to be analyzed have uniqueness compared to previous studies. This research uses the Maximum Likelihood Estimation (MLE) method, in which the recommended minimum sample size ranges from 100 to 200 samples. This requirement is consistent with the sample size used in this study, which consists of 270 samples.

After obtaining the SEM parameter estimates, the researcher must determine how well the data fit the model. To evaluate model fit in this study, the goodness-of-fit (GOF) method is employed. The criteria for evaluating overall model fit are as follows:

1. Likelihood Ratio Chi-Square Statistic

Used to compare the fit of the tested model with a saturated or baseline model. A p-value > 0.05 indicates a good model fit.

2. Root Mean Square Error of Approximation (RMSEA)

Measures the approximation error of the model relative to the population. A value  $< 0.05$  indicates a good model fit.

3. Confidence Interval (Lower Bound & Upper Bound, p-close)

Represents the confidence interval for RMSEA. A lower bound  $< 0.90$  indicates an acceptable fit.

4. Comparative Fit Index (CFI)

Compares the tested model with the baseline model. A CFI value  $> 0.90$  indicates a good model fit.

5. Tucker–Lewis Index (TLI)

An alternative to CFI that focuses on penalizing more complex models. A TLI value  $> 0.90$  indicates a good model fit.

6. Akaike Information Criterion (AIC) & Bayesian Information Criterion (BIC)

Used to select the best model among several alternatives. Lower values indicate a better model. In assessing good fit, the model with the lowest AIC and BIC values is preferred.

7. Standardized Root Mean Square Residual (SRMR)

Measures the average difference between the observed and estimated covariance matrices. A value  $< 0.08$  indicates a good fit.

8. Coefficient of Determination (CD)

Measures the proportion of variance explained by the model. Values close to 1 indicate a good model fit.

Fit Statistic	Abbreviation	Cut-off	Good Fit Indicated
Likelihood ratio	chi2_ms(0)	> 0.05	Model vs saturated
	p > chi2		
Population Error	chi2_bs (9)	0.000	Baseline vs saturated
	p > chi2		
90% CI	RMSEA	< 0.05 good fit	Root mean square error of approximation
	lower bound upper bound pclose	< 0.90 acceptable fit	Probability RMSEA <= 0.05
Baseline comparasion	CFI	> 0.90	Comparative fit index
	TLI		Tucker-Lewis index
Information Criteria	AIC	0.000	Akaike's information criteria
	BIC	0.000	Bayesian information criteria
Size Residual	SRMR	< 0.08	Standardized root mean square residual
	CD	0.069	Coefficient of determination

Sumber : Huber, 2016

**Figure 3 Goodness of Fit Test Criteria**

After conducting the Goodness of Fit test on the model, the study then examines whether model modification is necessary due to any lack of fit in the obtained results. The cross-validation model in this research represents the final stage, which involves fitting the model to a new dataset (validated sample). This study applies a split-sampling method, in which the sample is divided into two parts: the first part is used for model development, and the second part is used for validation.

RESEARCH RESULTS AND DISCUSSION

Respondent Profile

This study continues the analysis by measuring measures of central tendency, namely the mean, median, and mode. The mean indicates the average value of the data, such as the level of customer satisfaction, while the median identifies the middle value in a data distribution that is not symmetrical or contains extreme values. The mode represents the value that appears most frequently, reflecting respondents' preferences for certain product aspects.

**Table 3 Demographic Characteristics of Respondents**

		Freq.	Percent.	Cum.
Gender	Male	132	48.89	48.89
	Female	138	51.11	100.00

	<b>Total</b>	<b>270</b>	<b>100.00</b>		
Age	21 - 30 Years	227	84.07	84.07	
	31 - 40 Years	28	10.37	94.44	
	41 - 50 Years	13	4.81	99.26	
	50 Years Up	2	0.74	100.00	
	<b>Total</b>	<b>270</b>	<b>100.00</b>		
Results	<b>Total</b>	<b>270</b>	<b>100.00</b>		
	Latest Education	Diploma	21	7.78	7.78
		Doctor (S3)	2	0.74	8.52
		Master (S2)	8	2.96	11.48
		Bachelor (S1)	111	41.11	52.59
		Senior High School/	126	46.67	99.26
		Vocational School	2	0.74	100.00
		Graduates			
		Junior High School			
		Graduates			
		<b>Total</b>	<b>270</b>	<b>100.00</b>	

regarding the characteristics of respondents presented in the form of a respondent identity table, the details of the research respondents are shown in the table below.

It can be concluded that the majority of respondents are female, totaling 138 individuals or 51.11%. Most respondents are aged 21–30 years, with a total of 227 individuals or 84.07%. In this context, the largest group of respondents can be categorized as Generation Z. In terms of educational background, most respondents have a senior high school/vocational high school (SMA/SMK) education, totaling 126 individuals or 46.67%.

## Validity Test Results

### 1. Product Quality Validity Test Results

A validity test was conducted using 30 respondents whose characteristics represent the research population and have profiles similar to the target population of PODS Authentic customers, as shown in the table below.

Variable	r Count	r table	Conclusion
X1.1	0,7454	0,3061	Valid

<b>Table 4 the Test of Quality</b>	X1.2	0,8007	0,3061	Valid	<b>Results of Validity Product Variables</b>
	X1.3	0,8677	0,3061	Valid	
	X1.4	0,6045	0,3061	Valid	
	X1.5	0,7382	0,3061	Valid	

Thus, it can be identified that from the six (6) indicators proposed in the theory, only five items were used as questionnaire statements. This adjustment was made because indicator X1.4 (Durability) was found to be invalid based on the validity test results. One of the contributing factors is that the respondents in this study are predominantly within the 21–30 age range (Generation Z), a generation that tends to become quickly bored with a product.

Therefore, from the five (5) questionnaire items used to measure the validity of the Product Quality variable (X1), it can be concluded that all items have calculated r-values greater than the r-table value. As a result, all five (5) items are declared valid. The r-table value at a 5% significance level is 0.3061.

## 2. Brand Image Validity Test Results

A validity test was conducted using 30 respondents whose characteristics represent the research population and have profiles similar to the target population of PODS Authentic customers, as shown in the table below.

**Table 5 Validity Test of BRAND IMAGE Variable (X2)**

Variable	r count	r table	Conclusion
X1.1	0,9443	0,3061	Valid
X1.2	0,8482	0,3061	Valid
X1.3	0,8486	0,3061	Valid

A validity test was conducted using 30 respondents whose characteristics represent the research population and have profiles similar to the target population of PODS Authentic customers. Based on the results, it can be concluded that all three (3) questionnaire items used to measure the validity of the Brand Image variable (X2) have calculated r-values greater than the r-

table value. Therefore, all three (3) items are declared valid. The r-table value at a 5% significance level is 0.3061.

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### 3. Price Validity Test Results

A validity test was conducted using 30 respondents whose characteristics represent the research population and have profiles similar to the target population of PODS Authentic customers, as shown in the table below.

**Table 6 Results of the Validity Test of the Price Variable**

Variable	r count	r table	Conclusion
X3.1	0,7330	0,3061	Valid
X3.2	0,7616	0,3061	Valid
X3.3	0,7895	0,3061	Valid
X3.4	0,6605	0,3061	Valid

A validity test was conducted using 30 respondents whose characteristics represent the research population and have profiles similar to the target population of PODS Authentic customers. Based on the results, it can be concluded that all four (4) questionnaire items used to measure the validity of the Price variable (X3) have calculated r-values greater than the r-table value. Therefore, all four (4) items are declared valid. The r-table value at a 5% significance level is 0.3061.

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### 4. Customer Satisfaction Validity Test Results

A validity test was conducted using 30 respondents whose characteristics represent the research population and have profiles similar to the target population of PODS Authentic customers, as shown in the table below.

**Table 7 Results of Validity Test of Customer Satisfaction Variables**

Variable	r count	r table	Conclusion
Y1.1	0,8332	0,3061	Valid
Y1.2	0,6872	0,3061	Valid
Y1.3	0,9027	0,3061	Valid

A validity test was conducted using 30 respondents whose characteristics represent the research population and have profiles similar to the target population of PODS Authentic customers. From the four (4) theoretical indicators, only three (3) questionnaire items were used. This adjustment was made because indicator Y2.3 (Net Promoter Score) was removed due to its overlap in meaning with the customer lifetime value indicator.

Thus, from the three (3) questionnaire items used to measure the validity of the Customer Satisfaction variable (Y1), it can be concluded that all items have calculated r-values greater than the r-table value. Therefore, all three (3) items are declared valid. The r-table value at a 5% significance level is 0.3061.

## 5. Customer Loyalty Validity Test Results

A validity test was conducted using 30 respondents whose characteristics represent the research population and have profiles similar to the target population of PODS Authentic customers, as shown in the table below.

**Table 8 Results of Validity Test of Customer Loyalty Variables**

Variable	r count	r table	Conclusion
Y2.1	0,7622	0,3061	Valid
Y2.2	0,8560	0,3061	Valid
Y2.3	0,9128	0,3061	Valid
Y2.4	0,7293	0,3061	Valid
Y2.5	0,7369	0,3061	Valid

A validity test was conducted using 30 respondents whose characteristics represent the research population and have profiles similar to the target population of PODS Authentic customers. From the five (5) questionnaire items used to measure the validity of the Customer Loyalty variable (Y2), it can be concluded that all items have calculated r-values greater than the r-table value. Therefore, all five (5) items are declared valid. The r-table value at a 5% significance level is 0.3061.

### Reliability Test Results

The analysis method for testing the reliability of the questionnaire instrument uses Cronbach's Alpha. A smaller alpha value indicates that more questionnaire items are not reliable. According to Hair et al. (2011), a variable is considered reliable if the alpha value > 0.70. The reliability results are presented in the table below.

**Table 9 Reliability Test Results for Each Variable**

<b>Product Quality Reliability Test Results (X1)</b>	
Test scale = mean(unstandardized items)	
Average interitem covariance:	.659387
Number of items in the scale:	6
Scale reliability coefficient:	0.7974
<b>Brand Image Reliability Test Results (X2)</b>	
Test scale = mean(unstandardized items)	
Average interitem covariance:	.8666667
Number of items in the scale:	4
Scale reliability coefficient:	0.8566
<b>Price Reliability Test Results (X3)</b>	
Test scale = mean(unstandardized items)	
Average interitem covariance:	.5136782
Number of items in the scale:	5
Scale reliability coefficient:	0.7933
<b>Customer Satisfaction Reliability Test Results (Y1)</b>	
Test scale = mean(unstandardized items)	
Average interitem covariance:	.4404215
Number of items in the scale:	4
Scale reliability coefficient:	0.8312
<b>Customer Loyalty Reliability Test Results (Y2)</b>	

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Test scale = mean(unstandardized items)	
Average interitem covariance:	.7048276
Number of items in the scale:	6
Scale reliability coefficient:	0.8034

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Based on the reliability test results, all scales tested—X1, X2, X3, Y1, and Y2—have Cronbach’s Alpha values > 0.7, meaning that all scales can be considered reliable. This indicates that the items used to measure the respective variables produce consistent results, although scales X1 and X3 are at the minimum threshold of reliability.

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## Data Processing Results of Structural Equation Modeling (SEM)

### 1. Model Diagram

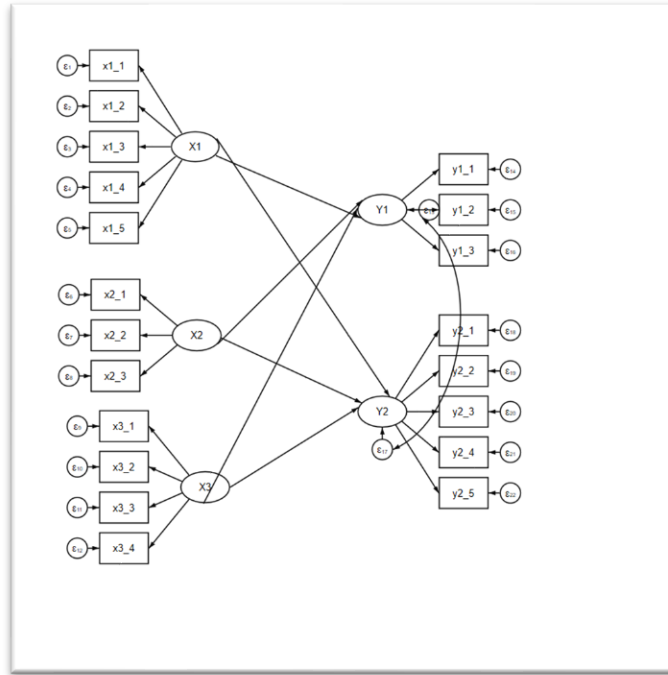
The conceptual model is illustrated in the figure below, showing the relationships between the exogenous latent variables, X1 (Product Quality), X2 (Brand Image), and X3 (Price), and the endogenous latent variables, Y1 (Customer Satisfaction) and Y2 (Customer Loyalty). X1 is measured with five (5) indicators, X2 with three (3) indicators, and X3 with four (4) indicators, while Y1 is measured with three (3) indicators and Y2 with five (5) indicators. The relationships in this model reflect both direct and indirect effects among X1, X2, X3, Y1, and Y2. The model aims to evaluate causal links between latent variables and how indicators represent their respective constructs.

### 2. Model Specification

The outer model in SEM analysis is used to evaluate the relationships between indicators and their respective latent constructs. In the outer model specification, the relationship between latent variables and their indicators is described in detail. For reflective models, latent variables such as X1 (Product Quality), X2 (Brand Image), and X3 (Price) influence the indicators used to measure each variable. Similarly, latent variables Y1 (Customer Satisfaction) and Y2 (Customer Loyalty) influence their corresponding indicators that reflect these concepts.

The inner model specification focuses on the causal relationships between latent variables. In this model, X1, X2, and X3 act as exogenous variables that affect Y1 and Y2 as dependent or

endogenous variables. This specification includes the direct effect of X1 on Y2, the indirect effect through Y1, and the combined influence of X1 and X2 on Y1, as well as X2 and X3 on Y2. The model also accounts for the simultaneous effects among variables to capture the complexity of the relationships.



**Figure 4 Model diagram of the relationship between exogenous and endogenous variables**

### 3. Model Identification

Model identification focuses on the relationships between latent variables and their indicators. The outer model aims to ensure that each indicator validly and reliably represents the latent construct being measured. In reflective models, the inner model or structural model emphasizes causal relationships between latent variables. This model is designed to test direct, indirect, or total effects between exogenous and endogenous variables.

During the identification process, it is important to ensure that the model does not face identification problems such as being under identified (where the number of parameters exceeds the available data). This is addressed by calculating the degrees of freedom and verifying the completeness of variable relationships in the model. The inner model is evaluated using fit indices such as CFI, TLI, RMSEA, and SRMR to ensure the model fits the data.

### 4. Parameter Estimation

In the structural model, parameter estimation is conducted to test the relationships between latent variables. The estimated parameters, such as regression coefficients, indicate significant positive relationships between latent variables, for example, between Brand Image (X2.1) and

Customer Satisfaction (Y1). The coefficient of determination ( $R^2$ ) shows that the independent variables explain a large portion of the variance in the dependent variables, indicating that the model has good predictive power. Furthermore, significance tests using t-statistics and p-values indicate that most relationships between variables are significant at the 95% confidence level. These findings provide strong support for the research hypotheses.

Parameter estimation in the measurement model aims to assess the validity and reliability of each indicator representing the latent variables. Based on the analysis results, the indicators in the measurement model show factor loadings that meet the criteria ( $> 0.5$ ), as presented in the table below.

**Table 10 Structural Model Results**

Dependent Variable	Independent Variable	Coefficient	Std. Error.	z-Value	Sig(P> z )
Customer Satisfaction	Product Quality	0.5318	0.0718	7.41	0.000
Customer Satisfaction	Brand Image	0.3697	0.0721	5.13	0.000
Customer Satisfaction	Price	0.1641	0.0559	2.94	0.003
Customer Loyalty	Product Quality	0.5769	0.0701	8.22	0.000
Customer Loyalty	Brand Image	0.3127	0.0663	4.72	0.000
Customer Loyalty	Price	0.1971	0.0540	3.65	0.000

Based on the results of the model testing, it shows that the variables X1 (Product Quality), X2 (Brand Image), and X3 (Price) influence Y1 (Customer Satisfaction), while X1, X2, X3, and Y1 influence Y2 (Customer Loyalty). The coefficient for the relationship between X1 and Y1 is 0.5318 with a p-value of 0.000, indicating that the relationship is statistically significant. This means that Product Quality has a positive effect on Customer Satisfaction.

Similarly, the relationship between X2 and Y1 has a coefficient of 0.3697 with a p-value of 0.000, indicating that Brand Image also has a positive and significant effect on Customer Satisfaction. The relationship between X3 and Y1 has a coefficient of 0.1641 with a p-value of 0.003, indicating that Price also has a positive and significant effect on Customer Satisfaction.

The relationship between X1 and Y2 has a coefficient of 0.5769 with a p-value of 0.000, indicating that Product Quality also has a positive and significant effect on Customer Loyalty. The

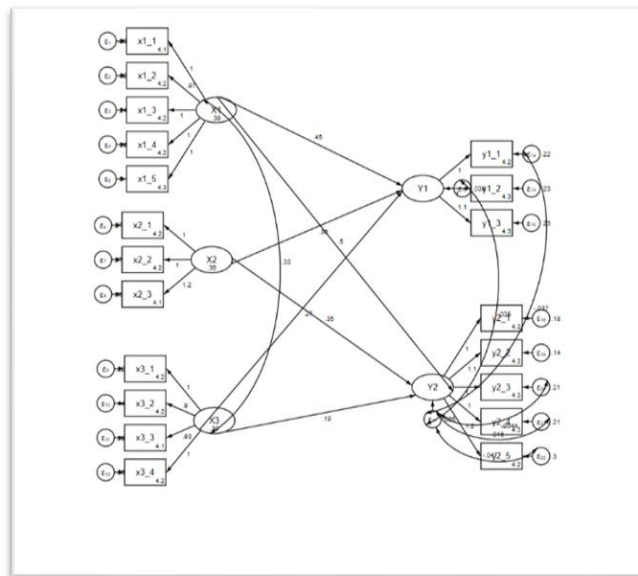
relationship between X2 and Y2 has a coefficient of 0.3127 with a p-value of 0.000, indicating that Brand Image has a positive and significant effect on Customer Loyalty. The relationship between X3 and Y2 has a coefficient of 0.1971 with a p-value of 0.000, indicating that Price also has a positive and significant effect on Customer Loyalty.

### 5. Model Modification

After evaluating model fit, the research model was tested for modification due to the initial model being not fit. However, any modifications—even minor—must be based on supporting theory. The figure below shows the result of the Structural Equation Modeling (SEM) analysis after modification to achieve a better model fit.

This model consists of two types of latent variables: exogenous latent variables (X1, X2, and X3) and endogenous latent variables (Y1 and Y2). These latent variables are measured through several observed variable indicators represented as rectangles, such as x1\_1, x2\_2, and x3\_4, each with factor loading values.

Causal relationships between latent variables are shown with one-way paths accompanied by regression coefficients (for example, the path from X1 to Y1 has a coefficient of 0.45), indicating the magnitude of the effect of exogenous variables on endogenous variables. Additionally, correlation relationships between certain latent variables are shown with two-way arrows, such as the relationship between Y1 and Y2, indicating a linear interaction between these two variables.



**Figure 5 Model Modification Results**

This model modification encompasses various aspects, including the addition of new paths, such as a direct relationship between X2 and Y2 with a coefficient of 0.35, and the possible

elimination of insignificant paths based on the results of statistical analysis. These changes were made to improve the validity and reliability of the model, so that it can reflect relationships between variables that are more in line with the empirical data and the theory underlying the research. Furthermore, residuals or measurement errors for each latent variable indicator were taken into account, as indicated by small circles near each indicator. These model modification steps aim to meet model fit criteria, which are usually measured through indices such as Chi-square, RMSEA, GFI, and CFI. With these modifications, the resulting model is expected to provide a more accurate representation of the causal relationships between latent variables, as well as make a significant contribution to the theoretical understanding and practical implications of the research.

6. Model Fit Test Results

**Table 11 Goodness of Fit Test Results**

Fit statistic	Cut-Off	Value	Description	Result
<b>Likelihood ratio</b>				
chi2 <sub>ms</sub> (162)	>0.05	496.566	model vs. saturated	Tidak Fit
p > chi2		0.000		
chi2 <sub>bs</sub> (190)	0.000	3972.328	baseline vs. saturated	Tidak Fit
p > chi2		0.000		
<b>Population error</b>				
RMSEA	<0.05	0.089	Root mean squared error of approximation	Tidak Fit
90% CI	<0.90			
lower bound		0.080		Fit
upper bound		0.098		Tidak Fit
pclose		0.000	Probability RMSEA <= 0.05	FIT
<b>Information criteria</b>				
AIC	0.000	9739.057	Akaike's information criterion	Fit
BIC	0.000	9998.144	Bayesian information criterion	Fit
<b>Baseline comparison</b>				
CFI	>0.90	0.910	Comparative fit index	Fit
TLI		0.892	Tucker-Lewis index	Fit
<b>Size of residuals</b>				
SRMR	<0.08	0.248	Standardized root mean Squared Residual	Tidak Fit
CD	0.069	0.995	Coefficient of determination	Fit

The model fit test results (fit statistics) in the table above show the following indicators:

- (a) Likelihood Ratio Chi-square Test ( $\chi^2$ ) – The test result in this study shows a p-value of 0.000. Since the desired good fit value is <0.05, the Likelihood Ratio test indicates that this result is not significant (Not Fit).
- (b) Root Mean Square Error of Approximation (RMSEA) – The probability for  $RMSEA \leq 0.05$  (pclose) is 0.000, indicating that the model does not meet the  $RMSEA \leq 0.05$  criterion. Therefore, the population error value for RMSEA is considered Not Fit, while the confidence interval (CI) value is considered Fit.
- (c) Information Criteria – For the information criteria, the Akaike Information Criterion (AIC) is 9739.057 and the Bayesian Information Criterion (BIC) is 9998.144. Based on these values, both AIC and BIC in this study are considered Fit.

(d) Comparative Fit Index (CFI) – The study result shows a CFI of 0.910, indicating good model fit as expected.

(e) Tucker-Lewis Index (TLI) – The processed data shows a TLI value of 0.892, which is close to 1 and can be considered a good fit.

(f) Size of Residuals – The Coefficient of Determination (CD) is 0.995, indicating that the model has excellent predictive ability, so the model can be considered Fit.

Overall, the model fit test results indicate that the model approaches adequate fit, although some indicators suggest potential for further improvement in modifications.

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## **Conclusion**

This study concludes that product quality, brand image, and price have a positive and significant effect on customer satisfaction and loyalty for electronic cigarettes. Product quality is the most dominant factor in shaping customer satisfaction and loyalty. Therefore, companies need to maintain consistent product quality, strengthen brand image, and set competitive prices to sustainably enhance customer loyalty.

## **Recommendations**

Companies are advised to improve product quality control, maintain price stability, and strengthen brand image through positive customer experiences. Future research can include additional variables, such as service quality or user experience, to gain a more comprehensive understanding.

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