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CONSUMER PREFERENCES FOR TOBACCO WASTE DIVERSIFICATION IN NA OOGST JEMBER CIGARS

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ABSTRACT

The high demand for cigarettes yearly produces tobacco waste in the form of unused tobacco leaf stalks. Tobacco leaf stalks have high burning power and sufficient calorific value to produce heat energy, so that tobacco leaf stalks can be used as a mixture of cigarettes and as a substitute for cloves. The purpose of this study is to utilize tobacco waste, especially tobacco leaf stalks, as a mixture of cigarettes to analyze consumer diversification of tobacco waste and to improve consumer preferences for Hand-Rolled Cigarettes (SKT) with a mixture of tobacco leaf stalks—this research as conducted in March-August 2024 using a quantitative method with a non-probability sampling sample data source. The data sources for this study are secondary data and primary data. The total population of respondents is 25 people. This research is based on consumer preferences for the attributes of Taste, Flavor, strength, smoke texture, and taste. The data analysis method employed was multiple linear regression using software and the Quality Function Deployment (QFD) method. The study revealed that tobacco waste affected taste, flavor, strength, smoke texture, and aftertaste. The results of the software analysis tool showed a significant joint influence of 0.423 on each attribute of consumer preferences. The attributes that have a significant partial effect are flavor and aftertaste attributes. Consumer preference assessment using QFD analysis can affect product quality attributes after taste, which need improvement to meet consumer preferences. Fulfillment of product quality attributes after taste that needs improvement are sweet and bitter attributes at the end.

Key ords: cigarettes; consumer diversification; consumer preference; tobacco waste; QFD.

INTRODUCTION

Current technological advancements pertain to the 5.0 era, where the fundamental needs of the population and the agricultural systems remain traditional (Putri, 2024). So, a more modern system is needed to improve production quality results that can compete for market share. Current economic developments have caused many new companies in the industry to emerge since companies still have a significant market share to gain. This means there are many options when determining a product choice. One industry that has a significant market share is the cigarette industry.

The population in Indonesia has different patterns of needs and purchases for each household because each house has different types of expenses. One of them is the reasonably high level of cigarette consumption among Indonesian people. Currently, six out of ten of the poorest households in Indonesia have expenditure on purchasing cigarettes. Cigarette consumption currently occupies second place after grains (Ernah & Yonda, 2017). This is evidenced by Indonesia being recognized as one of the most significant contributors to the global prevalence of smokers. In 2018, Indonesia was the seventh country with the highest number of smokers globally, and it entered the second position in Southeast Asia. The World Health Organization (WHO) also predicts that the

prevalence of smokers in Indonesia will reach 45% in 2025. This projection is supported by various data showing that people's smoking behavior continues to increase from year to year (World Health Organization, 2018). Basic Health Research (Riskesdas) data shows a drastic increase in the prevalence of smokers aged ≥15 years from 27% in 1995 to 36.30% in 2013, with a prevalence of male smokers of 66% and females of 6.70%. In 2015, the prevalence of male smokers in Indonesia experienced a drastic increase, reaching 76.20% (Badan Penelitian dan Pengembangan Kesehatan, 2018). The high number of cigarette addicts in Indonesia has made the cigarette industry produce up to 315 billion cigarettes per year, which increases by 10 percent every year (Kemenkes, 2018).

In 2022, cigarette consumers will reach 28.51%, increasing in 2023 to 28.83% in East Java (Badan Pusat Statistik, 2023). The increase in cigarette companies in East Java supports this. In 2020, 425 cigarette companies were operating in East Java (Badan Pusat Statistik, 2022). Jember region is one of the regions that produced the largest tobacco in East Java in 2022, reaching 27.25 tonnes (Badan Pusat Statistik, 2023). These factors resulted in the emergence of cigarette companies in the Jember Region.

One of the companies that produces cigarettes is CV. Dwipa Nusantara Tobacco or DNT. This company has been producing cigarettes since 2019. Cigarettes are processed tobacco products wrapped in cigars or other forms. One of the cigarettes produced by DNT is Hand-Rolled Cigarettes (SKT). In producing cigarettes, DNT uses good quality curate and only uses dried leaves. So, the tobacco handle is not used. In the cigarette production process, tobacco leaf stalks do not belong to main or side materials. Cigarettes use dried tobacco leaves as the primary raw material and are rolled using paper. With increasingly high competition, Dwipa Nusantara Tobacco, or DNT, must innovate and maintain product quality to increase consumer appeal. Production carried out every day produces waste that accumulates in the company area. The company has not yet utilized this waste.

The high demand for cigarettes every year produces unused tobacco taste. One of the tobacco waste produced is tobacco leaf handles. The more cigarette productivity, the more waste it will produce and accumulate. In the cigarette production process, tobacco leaf stalks do not belong to main or side materials. Cigarettes use dried tobacco leaves as the primary raw material and are rolled using paper.

Based on research by Smith and Novotny (2019), many tobacco industries have been afraid of being held responsible for cigarette waste for more than 20 years. Unused tobacco stems will continue to grow until they eventually become waste that cannot be used.

Based on the research results of Kusuma Wardhani et al. (2017), solid waste from the cigarette industry from the tobacco shredding process contains 1.18 - 2.09% nicotine. The highest average nicotine content of 3.67% is obtained from the small fine (SF) maceration process. Using small, fine raw materials produces higher nicotine levels because a small fine is sorted in 10 relatively coarse tobacco leaf stalks not mixed with other ingredients. Tobacco leaf stalks have high burning power because they contain cellulose, which has sufficient calorific value to produce heat energy (Handayani et al., 2018). Therefore, research is needed regarding the utilization of tobacco stalk aste as a mixture of cigarettes that have high burning power. There is no research on the utilization of tobacco waste as a mixture of cigarettes, so it is necessary to research the diversification side of the products produced from the mixture of aste utilization to consumers of SKT.

This research aims to diversify the side function of tobacco waste as a mixture of cigarette ingredients. Knowing the level of consumer preference for SKT products with a mixture of tobacco waste can make evaluation material for companies so that consumers will accept the products. This mixing is done to reduce cigarette production waste. Tobacco leaf stalks contain water and chlorine, which can produce burning power. So, this waste is intended to increase the attraction and sensation of consuming cigarettes. One way to find out the success of utilizing this waste and whether it is by consumers' ishes when purchasing cigarette products is by conducting a comparative study of consumer preferences for product attributes based on consumer assessments of the various attributes of the product. Research related to the diversification of side utilization of tobacco aste in SKT has never been done, so it is necessary to research consumer preferences using the Quality Function Deployment (QFD) method. This study was carried out to analyze consumer diversification for several cigarette product attributes, fulfill the desires of Dwipa Nusantara Tobacco cigarette consumers, consumer preference assessment, and relationship bet een technical response and product attributes.

MATERIALS AND METHODS

The study was conducted in Karanganyar, Ambulu District, Jember Regency, East Java, from March to August 2024, as Jember is a significant tobacco producer in East Java. This research used

a quantitative approach with surveys. Both primary and secondary data were collected. Non-probability sampling was used to select 25 respondents, who were aged 17-60 and had smoked D ipa Nusantara Tobacco cigarettes for over six months. A validity test requires at least 20 participants, ensuring a normal distribution of results.

Before the data collection process was carried out on consumers, the study involved testing cigarette filters made from tobacco aste (stalks) for nicotine and tar levels over 3 months—a questionnaire was then distributed to assess consumer preferences for these products. Consumer preferences were analyzed using soft analysis and QFD tools.

The data analysis will analyze consumer preferences for cigarette product attributes. This research data measurement includes five attributes: taste, flavor, durability, smoke texture, and aftertaste, which are measured using a differential semantic scale. According to Aisyah Yuri (2024), SKT is characterized by the quality of tobacco and cloves. SKT cigarettes produce a distinctive taste and flavor. SKT offers a perfect balance of taste between tobacco, cloves, and other flavors without being too dominant. Smooth smoke and a pungent flavor, when smoked, provide a satisfying smoking experience, and cigarette rolling is done carefully and neatly. It has a good shape and is comfortable to hold to provide quality strength and a comfortable taste when consumed. Based on this, this study uses the variables of flavor, flavor strength, smoke texture, and aftertaste.

This analysis requires a t-test, f-test, and multiple linear regression analysis, and the analysis results are continued using QFD analysis.

The formula used to calculate the F test is as follows:

$$r = \frac{\frac{R^2}{K}}{(1-R^2)(n-K-1)} \quad (1)$$

Information: F = Distribution approach ficher probability, K = number of free variables, R = Multiple correlation coefficient, n = number of samples

According to (Sugiyono, 2022:192), The testing criteria for the F test is if the F count > F table, the theory is fulfilled. The free variables impact the attached variable with an error rate of 5%. Then, if F count < F table, the results are not fulfilled, which means the free variables have no significant impact on the attached variable with an error rate of 5%.

This test proves whether the free variable is relevant or not regarding the attached variable individually (Partial). In this research, the t-test. The formula used to assess the t-test is as follows:

$$t = 1/2r\left[\frac{n-2}{1-n^2}\right] \quad (2)$$

Information: r = Product moment correlation, n =Number of respondents

Ghozali (2021) states that decision-making is based on the significance of the point. Typically, regression results are tested with a level of confidence of 95% or with a relevant level of 5% (α= 0.05). If the result of the t-test > 0,05, that is, Ho is fulfilled and Ha is not fulfilled; otherwise, if the result of the t-test > 0,05, it means Ho is not fulfilled and Ha is fulfilled (Ghozali, 2021) Formula:

$$t\ table = (\alpha/2\ ;\ n-k) \quad (3)$$

Information: α/ 2: Alpha, n: Population total, k: Total of free variables and attached variables.

The coefficient of determination value is in the range of 0 and 1. Mark$R$A little number of 2 defines The capacity of free variables to account for variations in the attached variable is quite restricted. A value near one suggests that the free variables offer nearly all the information required to predict changes in the attached variable.

$$Adjusted\ R2 = 1-\left(1-R^2\right)\left[\frac{n-1}{n-k}\right] \quad (4)$$

Information: R^2 = Multiple correlation coefficient, K = Total of free variables, n = Total of population

The analysis method uses multiple regression analysis with the following formula:

$$Y= a+b1X1+b2X2+b3X3+b4X4 + b5X5 \quad (5)$$

Information: Y =consumer preferences, a = constant, b1,b2 = regression coefficient, X1 = taste, X2 = flavor, X3 = strength, X4 = smoke texture, X5 = after taste

Cigarette products consist of 5 attributes, including taste (X1), flavor (X2), strength (X3), smoke texture (X4), and aftertaste (X5). Taste attributes combine sweet, spicy, and cooling flavors with the charm of artisanal craftsmanship. The flavor attribute is the complex smoke with spicy, sweet, and smooth characteristics, often with a cooling menthol for added refreshment. Strength attribute offers a balanced, flavorful experience with a combination of mild tobacco strength, spicy clove intensity, and moderate nicotine content, ideal for smokers seeking a smooth, satisfying smoke. The smoke texture is a balance of smoothness, richness, and a refreshing cooling sensation, with the added complexity of spicy and mild harsh notes, catering to smokers who prefer a full, flavorful, and enjoyable smoke. The taste combines clove sweetness, earthy tobacco, and sometimes a cooling or spicy finish, appealing to those who prefer a distinct, satisfying finish that lingers pleasantly after the smoke.

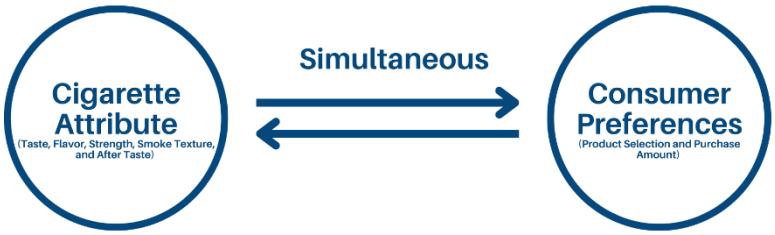

Figure 1. Simultaneous hypothesis framework

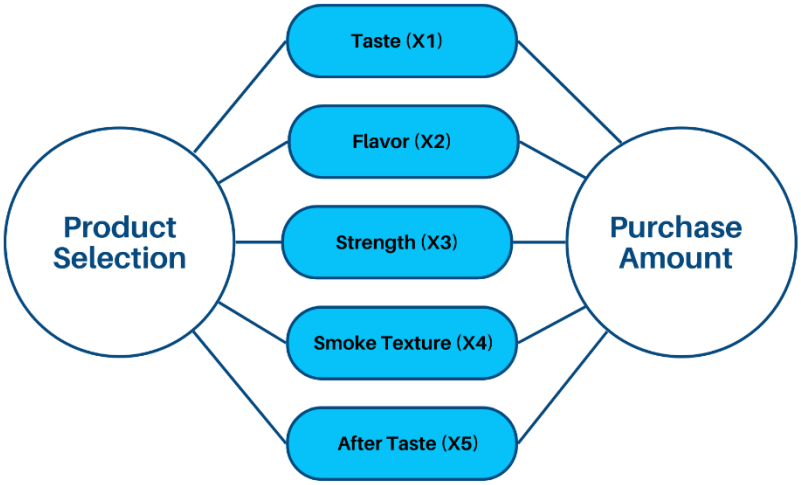

Figure 2. Partial hypothesis framework

The hypothesis of this research is simultaneous hypothesis and partial hypothesis. Cigarette attributes (X variable) consist of taste (X1), flavor (X2), strength (X3), smoke texture (X4) and aftertaste (X5). Consumer Preferences (Y variable) consist of product selection (Y1) and purchase amount (Y2). Cigarette attributes simultaneously influence consumer preferences, and each cigarette attribute variable partially influences each consumer preference variable.

According to Wijaya (2018), the QFD analysis outcome is a systematic approach used to determine consumer desires and translate these desires into appropriate technical design, manufacturing, and production planning.

The initial stage of product development is identifying customer needs and determining technical requirements by creating a House of Quality (HoQ). This stage involves analyzing important attributes, customer satisfaction levels, and competitor comparisons to determine development targets (Smith & Jones, 2020). This process includes the creation of a customer requirements matrix

based on relevant attributes and a planning matrix that includes customer requirements importance rating (ItC), customer satisfaction level (CSP), target value based on comparison with competitors, improvement ratio (IR) to determine the effort required, and selling points (SP) to identify priority attributes. Ra eight (R) is calculated from the combination of ItC, IR, and SP and then normalized to NR to determine development priorities. Technical responses are designed based on expert inputs, linking customer satisfaction attributes of the product with relevant technical components through an interaction matrix. This stage also includes benchmarking to compare product performance with that of the best competitors and set development targets. This process aims to analyze the diversification of consumer preferences for several cigarette product attributes, fulfill the wishes of Dwipa Nusantara Tobacco cigarette consumers, know the consumer Preference Assessment, and the Relationship between Technical Response and Product Attributes.

The purpose of analyzing the diversification of consumer preferences in cigarettes is to understand the variety of choices and factors influencing consumer preferences for cigarette products. This analysis can assist manufacturers in designing more effective marketing strategies, such as developing products that suit specific market segments and improving brand communication to increase competitiveness. In addition, the analysis results can provide insight into changes in consumer behavior due to evolving social, economic, and regulatory factors (Kotler & Keller, 2016).

The purpose of analysis using the QFD method is to translate consumer needs and ants into measurable and relevant product specifications. Using QFD, this research aims to identify consumers' top priorities and integrate them into the product design process to improve customer satisfaction. This approach is important, especially in the context of unprecedented research, to make new contributions to understanding the dynamics of consumer preferences and product innovation (Akao, 1990).

The purpose of the diversification analysis of consumer preferences in cigarettes is to evaluate the variation in consumers' choices of different brands, flavors, and features of cigarette products based on factors that influence their preferences, such as price, quality, package design, and social value. This analysis aims to identify different market segments and understand consumers' diverse needs and expectations to provide a basis for more effective marketing strategies and product innovation (Kotler & Keller, 2016). This research is also important to uncover dynamic consumption trends, especially amidst regulatory changes and awareness of health impacts (Schiffman & Kanuk, 2010).

The purpose of analyzing the relationship between technical responses and product attributes is to understand the extent to which the technical features of a product can fulfill the attributes consumers desire. This analysis is important to evaluate the fit of consumers' needs, which are identified through their preferences and the product's technical ability to fulfill them. Thus, this research can help optimize product design to match consumer expectations better, improve market competitiveness, and maximize customer satisfaction.

RESULTS AND DISCUSSION

Respondent characteristics

The use of tobacco waste as a cigarette filter gets different responses from each consumer—the experiment's results using filters from tobacco waste produced positive comments from the samples taken. The results include taste, flavor, strength, smoke texture, and aftertaste. These results are used as variables for further research. This research process has continued by distributing questionnaires to consumers of DNT products to obtain the results of consumer preferences for experimental products.

Table 1. Respondent characteristics

Characteristics	Description
Age	13 respondents were aged 23-30 y.o, and 12 respondents were aged 31-50 y.o
Gender	All the respondents are men.
Profession	All the respondents are workers.
Time Consumed Cigarettes	The average of all respondents consumed cigarettes for more than 6 months.

According to (Sugiyono, 2022), a population is a broad group of objects or subjects that share identically excellent types identified by the author for research and subsequent conclusions. The respondents of this research were Dwipa Nusantara Tobacco cigarette consumers, and there was a

sample of 25 respondents. 13 respondents were aged 23-30 years, and 12 According to research on consumer preferences, this age group is often a loyal market segment with higher standards for the products they consume (Munir, 2018). Taking these characteristics into account, respondents in the 31-50 age group make an important contribution to the assessment of product preferences and the relationship between technical responses and product attributes to ensure that Dwipa Nusantara cigarette products can meet market expectations and improve its competitiveness in this highly competitive industry (Akao, 1990; Chen et al., 2019). Respondents consumed cigarettes on average for more than 6 months.

Analysis of Consumer Preferences for Cigarette Product Attributes

According to Ghozali (2021:145), The multiple linear regression equation uses two or more free variables. Multiple linear regression analysis conducted on 25 consumer respondents can explain the impact of free variables (X), Taste (X1), Flavor (X2), Strength (X3), Smoke Texture (X4), and Aftertaste (X5) on the attached variable (Y), namely consumer preferences.

The multiple linear regression analysis results that stated that smoke's flavor and texture attributes partially influenced consumer preferences were obtained. Taste, strength, and aftertaste are the attributes that partially influence consumer preferences. The outcomes are in Table 2.

Table 2. Outcome of multiple linear regression analysis

Model		Unstandardized Coefficients		Standardized Coefficients
		B	Std. Error	Beta
1	(Constant)	16,223	4,077	
	Taste	-0.045	0.133	-0.055
	Flavor	0,231	0.105	0,376
	Strength	-0.137	0.127	-0.179
	Smoke Texture	-0.293	0.105	-0.519
	After Taste	0.017	0,074	0,039
	R Square	0,543		
	Adjusted R Square	0,423		
	F	4,515		[b]0.007

a. Free Variable: Consumer Preferences
b. Predictors: (Constant), After Taste, Flavor, Strength, Taste, Smoke Texture

Source: Primary Data (processed), 2024

According to Ghozali (2021:47), The coefficient of determination ($R2$) assess how the model can define the change of free variable. Multiple determination coefficient analysis (Adjusted$R2$) aims to find out how much the coefficient contributes between the attributes of taste, flavor, strength, smoke texture, and aftertaste with consumer preference attributes.

The coefficient of determination (R2) is 0.543, which means that if R2 is close to 1, the contribution of the free variables, namely taste, flavor, strength, texture, and aftertaste, is more significant than the attached variable, namely consumer preference. This research uses multiple coefficients of determination (Adjusted$R2$) amounting to 0.423 in the test because the support by the free variable to the attached variable is more significant. Adjusted value results$R2$amounting to 0.423 or 42.3% that the support by free variable contributes 42.3% to the attached variable.

According to Sugiyono (2022), the F test analyzes the effect of the free variable on the attached variable. The F test in this research aims to test or decide the impact of free variables (X), namely Taste (X1), Flavor (X2), Strength (X3), Smoke Texture (X4), and Aftertaste (X5) on the attached variable (Y), namely consumer preferences. The F test criteria, among others, if F count <F table, then the free variables (X) simultaneously do not affect the attached variable (Y); conversely, if F count> F table, then the free variables (X) simultaneously impact the attached variable (Y). The F count of this research is 4.515, with a significance level of 0.000.

The attributes of taste, flavor, strength, smoke texture, and aftertaste simultaneously or together influence consumer preference attributes. The calculation method compares the F count and F table with an important level of 0.05 (5%), and the number of respondents is n = 25 samples/person, so an F table is obtained of 2.866.

According to Sugiyono (2022), This test is employed to determine whether the free variable has an important individual (partial) effect attached to the variable. This study used the t-test to evaluate the individual influence of attributes such as taste, flavor, strength, smoke texture, and aftertaste. When the t-score over the critical t-value at a 5% error rate (0.05), it indicates a significant

connection between the free variable (X) and the attached variable (Y). Conversely, if the t-score is less than the crucial t-score at a 5% error rate, it signifies no significant relationship between the two variables. The results are shown in Table 3.

Table 3. t Test results

Model		Q	Sig.
1	(Constant)	3,979	0,001
	Flavor	-0.342	0,736
	Flavor	2,207	0,040
	Strength	-1,081	0,293
	Smoke Texture	-2,796	0.012
	After Taste	0,232	0,819

a. Attached Variable: Consumer Preferences

Source: Primary Data (processed), 2024

From the analysis results, testing on the taste attribute produces results with a calculated t value more significant than the t table of -0.342 and a significance of 0.736. These results show that taste attributes do not affect consumer preferences for Dwipa Nusantara Tobacco cigarettes. This could happen because the taste offered by Dwipa Nusantara Tobacco cigarettes is that not all consumers like the taste of cigarettes with a spicy touch.

The results of the flavor attribute analysis show a t-point of 2.207 with an important level of 0.040. These results show that flavor attributes have a significant influence on consumer preferences. Dwipa Nusantara Tobacco cigarettes have a strong clove flavor with tobacco nuances, which consumers like. So, consumers always buy these cigarettes.

The results of the strength attribute analysis show a t point of -1.080 with an important level of 0.293. These results show that the strength attribute does not affect consumer preferences. The strength attribute is an attribute offered, namely that if consumers consume this cigarette, they will feel the quality of the product comes from the original tobacco in this product. The use of real tobacco means that not all consumers like the power of using this flavor.

The smoke texture attribute analysis results show a t point of -2.796 with an importance of 0.012. The smoke texture shows that this attribute does not affect consumer preferences. The smoke texture, considered thick and soft, has a value that is not very important for consumers.

The results of the attribute analysis after taste show a t point of 0.232 with an important of 0.819. These results show that aftertaste attributes have a significant effect on consumer preferences. D ipa Nusantara Tobacco cigarettes have a sweet taste with a little bitterness and make you want to consume them again after consuming the cigarette. So, this attribute is considered important in consumer preferences.

a. Free Variables That Create Simultaneous Effect on Consumer Preferences

According to the findings of the analysis and data analysis, there is evidence that the free variables, Taste (X1), Flavor (X2), Strength (X3), Smoke Texture (X4), and Aftertaste (X5), against the attached variable (Y) namely consumer preferences ith F count of 4.515 with a significance value of 0.000. The significance value of F counts 0.000 < an important level of 0.05. Include that Taste (X1), Flavor (X2), Strength (X3), Smoke Texture (X4), and Aftertaste (X5) are against the attached variable (Y), namely consumer preferences.

This is following the research of Cahyo (2013) entitled "The Influence of Product Attributes on Purchasing Decisions (Survey on Consumers of Gudang Garam International Cigarettes, Residents of Sobo Village, Banyuwangi City District, Banyuwangi Regency)." The study results showed that the variables of taste, flavor, and texture significantly affected consumer preferences—the data analysis technique used as multiple linear regression analysis with the help of calculations. Based on the study results showed that the texture variables simultaneously or together had a significant effect on purchasing decisions. When choosing cigarettes, the taste offered can attract consumers. Flavor attributes are related to the suitability of the smell produced by cigarette products. The texture in this study explains the level of tar and nicotine content of each cigarette, the softness and density of each puff, and both the shape of the cigarette and the thickness of the smoke produced.

This follows the research of Cahyo (2013), who found that quality variables significantly influence consumer preferences—multiple linear regression analysis supported by calculations for the research method. The study outcome indicated that texture variables collectively impacted purchasing decisions. Consumer satisfaction in this study showed that the raw materials used were of high quality. The raw materials used were genuine tobacco and would provide satisfaction to consumers.

This follows the research of Edyansyah and Ahyar (2021), who found that consumer perception variables significantly affected consumer preferences. The research method used a multiple linear regression analysis and calculations system. The research showed that smoking gave a sense of calm and a taste that followed consumer desires.

b. Partial Influence of Flavor on Consumer Preferences

The Flavor variable has a t-value of 2.207 with a significance value of 0.040. This shows that the score 0.040 <0.05 (5%). It means flavor, individually or in part, has an important effect on Consumer Preferences.

Following the research of Cahyo (2013), the flavor variable affects consumer preferences. The research results show that the flavor variable partially or individually affects consumer preferences.

c. Partial Effect of Aftertaste on Consumer Preferences

The variable after taste makes a t-score of 0.232 with an important of 0.819. That is the score 0.040 <0.05 (5%). This means that taste, individually or partially, has an important influence on consumer preferences.

The outcome of the study by Edyansyah and Ahyar (2021) showed that the consumer perception variable significantly affected consumer preferences. The analysis method is multiple linear regression analysis. The research outcome showed that the consumer perception variable partially or individually influenced consumer preferences. The consumer perception in this study is that smoking gives a sense of calm and a sense of following what consumers feel or want with their respective perceptions.

Preference Assessment using QFD analysis

Based on the analysis above, two attributes significantly influence consumer preferences when purchasing Dwipa Nusantara Tobacco cigarettes. The two attributes are flavor and aftertaste attributes. The results of this analysis will be continued at the Quality Function Deployment (QFD) method analysis stage to determine consumer desires for the product.

The QFD analysis process uses the House of Quality (HoQ) matrix by comparing D ipa Nusantara Tobacco or DNT cigarettes with competitors, namely Semar Manthoel or SM. This competitor as chosen because the product is popular in the Jember region. HoQ Matrix analysis aims to make product analysis easier for competitors.

In the HoQ analysis, there is a whats matrix, which is an attribute according to consumer desires based on multiple linear analysis results from the previous method. The HoQ matrix, obtained from interviews with the head of the production, resulted in 5 attributes.

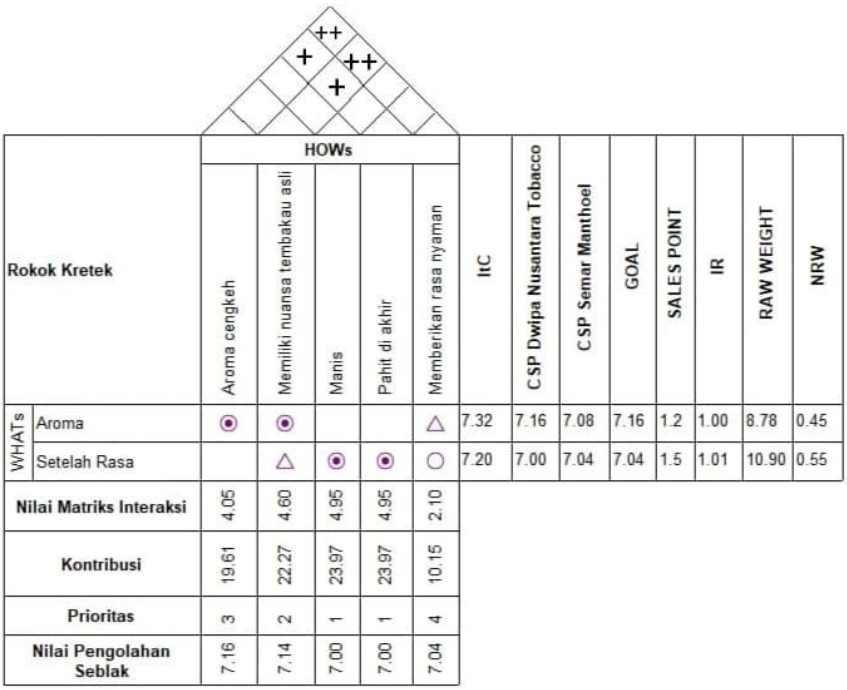

Figure 2. House of quality matrix

The first attribute is the flavor of cloves. The flavor of cloves is referred to as the flavor of genuine cloves, which, when consumed, produces a hot feeling (Sunarti, 2022). The second attribute is that it has a real tobacco feel. The main ingredient in cigarettes used is real tobacco without any mixtures that will change the taste of the product. The third attribute is sweetness. The sweet taste is given after consuming cigarettes. The sweet taste is produced from the flavors given during the production process. The fourth attribute is bitterness at the end. The bitter taste is produced by mixing raw clove materials. This feeling appears after consumers consume cigarettes. The fifth attribute is providing a sense of comfort. Good quality will produce comfortable products, increasing consumer buying interest (Herlina et al., 2020). The results of the analysis of cigarette products using the HoQ matrix can be seen in the following image:

1. Importance to Customer (ItC)

The Importance to Customer (ItC) calculation describes the importance of consumer expectations in getting product quality following consumer needs and desires (Pratama, 2024).

Table 4. ItC Value

No.	Consumer expectations	ItC
1.	Flavor	7.32
2.	After Taste	7.20

Source: Primary Data (processed), 2024

The highest ItC value is the flavor attribute, with an ItC value of 7.32. The importance score for flavor in the HoQ matrix for hand-rolled cigarettes signifies that customers place a high value on the taste and sensory quality of the product. The flavor is likely a core aspect of satisfaction and brand loyalty, suggesting a focus on quality, consistency, and potentially unique flavor innovations to meet and exceed customer expectations in this attribute. In studies focusing on machine-made cigarettes in the research of Cahyo (2013), features like packaging, convenience, or nicotine content might receive slightly lower scores in comparison, as they may not offer as much customization or experience control as hand-rolled cigarettes.

2. Customer Statistics Performance (CSP)

CSP is the consumer satisfaction level with product attributes.

Table 5. CSP value

No.	Attribute	DNT	BC
1.	Flavor	7.16	7.08
2.	After Taste	7*	7.04**

Note: lower (*), higher (**)
Source: Primary Data (processed), 2024

The CSP calculation results for Dwipa Nusantara Tobacco cigarettes have lower attribute values than those of competitors. Hand-rolled cigarette consumers often value an artisanal or personalized smoking experience. A low CSP score implies that Dwipa Nusantara Tobacco products may not deliver on these experiential aspects as effectively as other products, impacting customers' perception of its value. This shows that Dwipa Nusantara tobacco cigarettes require improvement and increased product quality based on consumer desires. According to the research of Cahyo (2013), collecting more in-depth feedback on why customers prefer competing products could provide insights to adjust the product to match what customers truly value in a hand-rolled cigarette.

3. Goal

The goal is to achieve the highest value by comparing the CSP value of the product under study with the value of competing products.

Table 6. Goal Value

No.	Attribute	DNT	Information
1.	Flavor	7.16	Deployed
2.	After Taste	7.04	Improved

Source: Primary Data (processed), 2024

The research results of Dwipa Nusantara Tobacco cigarettes have attribute values below those of competitor products. This attribute is the attribute after taste. So, the product attribute value needs to be increased because it still does not meet the requirements and wishes. According to the research of Cahyo (2013), by investing in high-quality ingredients and refining production processes, the product's overall consistency and appeal could improve, closing the satisfaction gap.

4. Improvement Ratio (IR)

Improvement Ratio (IR) aims to determine the level the company wants to achieve to meet consumer needs.

Table 7. IR value

No.	Attribute	CSP	Goals	IR
1.	Flavor	7.16	7.17	1
2.	After Taste	7	7.04	1.01

Source: Primary Data (processed), 2024

The IR value calculation results show that the attribute after taste is the highest value of all existing attributes. The improvement ratio shows the potential benefit of enhancing a particular attribute. A high score for aftertaste means that improving this aspect of the product could substantially increase customer satisfaction. This follows research by Cahyo (2013), likely because customers highly value aftertaste, yet the current performance falls short of their expectations.

5. Sales Points (SP)

Determining the Sales Point (SP) value is done to assess which attributes need corrective action to increase the competitive ability of a product.

Table 8. SP value

No.	Attribute	SP value
1.	Flavor	1,2
2	After Taste	1.5

Source: Primary Data (processed), 2024

The SP value that shows a strong selling point is in the flavor attribute. A high sales point score for flavor indicates that customers view this attribute as the most important to choose this product over others. In the hand-rolled cigarette market, flavor is often central to the sensory experience, making it a core part of the product's appeal and identity. Attributes with high sales value illustrate that these attributes influence consumers' decisions (Pratama, 2024).

6. Ra eight (R)

Ra eight (R) is a weighting value given to product attributes. R is a model of the development team's overall interest in each consumer need.

Table 9. R-value

No.	Attribute	R	Priority
1.	Flavor	8.78	2
2.	After Taste	10.90	1

Source: Primary Data (processed), 2024

The highest R-value is the attribute after taste. Consumers highly value the aftertaste, which is as follo ing as research (Pratama, 2024), meaning that many customers consider it a key factor in the overall enjoyment of hand-rolled cigarettes. As a result, manufacturers may need to focus more on refining or enhancing this particular aspect of the product.

7. Normalized Raw Weight (NR)

The Normalized Raw weight (NR) value is part of the R, which is set on a scale between 0 and 1 and can be expressed as a percentage. The top NR value is the company's final important attribute for improvement. The fact that aftertaste has the highest normalized rate of eight in the HOQ matrix indicates that it is of primary importance in the overall product development of hand-rolled cigarettes. According to research by Cahyo (2013), this reflects customer preferences or market

demands and should drive design and marketing decisions to ensure that the product meets these expectations.

Table10. NR value

No.	Attribute	NR
1.	Flavor	0.45
2.	After Taste	0.55

Source: Primary Data (processed), 2024

8. Technical Response

There are five technical responses to answer consumer desires. The technical response is the flavor of cloves, which has the feel of real tobacco, sweet and bitter at the end, and provides a comfortable taste.

Relationship between Technical Response and Product Attributes

The relationship between the technical response and each attribute or relationship matrix shows the relationship between the to, which is depicted in the form of relationship symbols, namely weak (Δ), medium (○), and very strong (●). According to ratings by expert respondents, there are four symbols of a strong relationship, one symbol of a medium relationship, two symbols of a weak relationship, and the rest, there is no relationship.

1. Interaction and Contribution Matrix

The results of calculating the highest interaction and contribution values are found in the sweet and bitter attributes at the end. The interaction value is 4.95, and the contribution value is 23.97. The choice of tobacco blend will be essential. Certain tobaccos are naturally sweeter or more bitter, and blending them in the right proportions could create the desired aftertaste balance. For instance, some tobaccos might provide a smooth, sweet finish, while others might introduce a more bitter or earthy note. The research (Pratama, 2024) shows that aftertaste quality is critical to customer satisfaction and product design. The aftertaste plays a key role in the overall smoking experience and is heavily influenced by technical features like the tobacco blend, curing process, and burn characteristics. Product development efforts should prioritize this attribute, and marketing strategies can highlight this balance as a unique selling point to appeal to customers seeking a refined, satisfying aftertaste.

Table11. Value of Interaction and Contribution

No.	Technical Response	Interaction Value	Contribution	Priority
1.	Clove flavor	4.05	19.61	3
2.	It has a real tobacco feel	4.60	22.27	2
3.	S eet	4.95	23.97	1
4.	Bitter at the end	4.95	23.97	1
5.	It provides a sense of comfort	2.10	10.15	4

Source: Primary Data (processed), 2024

2. Benchmarking

Benchmarking is continuously measuring and comparing one or more company business processes with the best company in that business process. The benchmarking results show that consumer preferences for Dwipa Nusantara Tobacco cigarettes are related to the attributes of clove flavor, having the feel of real tobacco, and providing a comfortable feeling. These attributes drive consumer satisfaction and market appeal for hand-rolled cigarettes. Benchmarking compares the product against competitors or industry standards, highlighting areas where the product performs well or needs improvement. As following the research of (Pratama, 2024), by prioritizing the aspects in product design and marketing, it can better meet consumer expectations, differentiate the brand, and compete effectively in the market.

Table22. Benchmarking

No.	Technical Response	Cigarette
1.	Clove flavor	7.16
2.	It has a real tobacco feel	7.14
3.	It provides a sense of comfort	7.04

Source: Primary Data (processed), 2024

CONCLUSIONS

This study shows that diversification of consumer preferences for cigarette products by utilizing tobacco stalk waste as an ingredient in cigarette blends affects several product attributes such as taste, aroma, strength, smoke texture, and aftertaste. The analysis results using SPSS and the QFD method found that flavor and aftertaste attributes have an important effect on consumer preferences. The outcome of the QFD method emphasized that the aftertaste attribute needs to be improved as consumers prioritize this attribute in their smoking experience. This attribute can be improved by increasing the balance of sweetness and bitterness at the end of cigarette consumption. Benchmarking also showed that although this product has some advantages, there are still opportunities to improve the quality to be more competitive. Thus, this study provides important insights into how diversification of tobacco aste can increase the appeal of cigarette products while reducing production waste and providing both environmental and economic benefits. So that companies can improve the attributes that consumers feel are lacking in order to increase desire and attract high consumer purchasing power.

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