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Influence of Consumer Perception and Packaging Design on the Increase of Consumer Satisfaction with Packaged Drinking Water

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ABSTRACT

The Indonesian Bottled Drinking Water (AMDK) industry faces complex and multidimensional challenges, especially those related to consumer satisfaction and environmental sustainability. One of the main issues highlighted is consumer dissatisfaction with the current AMDK packaging, which is often considered impractical, environmentally unfriendly, and raises concerns about the safety and cleanliness of the water content. These concerns significantly influence consumer preferences and purchasing behavior in a highly competitive market. The main objective of this study is to identify the influence of consumer perceptions of the quality, safety, and added value of AMDK products on overall consumption satisfaction. The research method consists of several stages, including problem identification, literature study focusing on the application of the Quality Function Deployment (QFD) method in developing Bottled Drinking Water products, formulation of survey questions regarding factors that influence purchasing decisions, and identification of critical attributes through QFD analysis. The research findings show a strong positive response from respondents at the questionnaire validation stage. Consumers highly value aspects such as innovative product design, use of high-quality and environmentally friendly materials, appropriate capacity, increased bottle thickness, and the potential for large-scale production of the product. These results suggest that integrating consumer input into the product development process can significantly improve satisfaction and market acceptance.

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INTRODUCTION

The bottled water industry (AMDK) in Indonesia has experienced rapid growth in recent decades, driven by increasing health awareness and busy lifestyles (Sun & Moon, 2024). This has led to a rise in AMDK consumption and, consequently, an increase in the volume of plastic waste generated. However, behind this growth lie several challenges that need to be addressed, particularly concerning consumer satisfaction (Harsanto & Jakti, 2021). The most essential benefit of water for humans is for drinking. Humans require at least two liters of water per day for drinking. In 2018, Indonesia's population reached 265 million people, and the Central Bureau of Statistics revealed that daily drinking water needs

could reach 530 million liters (Ningsih et al., 2016). AMDK consumption has increased due to the growing difficulty in providing safe drinking water and modernization demanding practical living needs, leading to a shift in human habits and behaviors. Recently, almost all segments of society have switched to AMDK. Currently, there are numerous producers of AMDK products, allowing consumers to choose from a wide range of options, from very cheap to expensive brands (Mu et al., 2025). The increasing market demand for AMDK necessitates producers to provide new innovations in its provision, processing, and marketing (Dwi Setiawan, 2022).

Data from the World Bank indicates that in 2012, only 54% of the Indonesian population had access to satisfactory sanitation facilities (private or shared). Such facilities are often assessed based on self-reported cleanliness (Cooper, 2019). Even in terms of facilities deemed satisfactory on hygienic grounds, there might still be significant potential for contamination of drinking water wells. The high demand for drinking water has motivated the emergence of various water industries, including AMDK. Bottled water is mineral water that undergoes processing with a specific system, making it directly consumable or drinkable without prior cooking or boiling (M. Deril & Novirina. H, 2014). AMDK from bottled water companies generally has received recommendations from the National Agency of Drug and Food Control (BPOM), which has implemented the Indonesian National Standard in water management to prevent contamination with substances or materials harmful to human health, including heavy metals ([BSN] Badan Standardisasi Nasional, 2006).

Bottled water (AMDK) comes in a variety of flavors and brands, offering consumers a wide range of choices to suit their preferences. The added value offered by the AMDK industry is also increasingly diverse, including freshness, mineral content, higher oxygen levels, or specific acidity levels (pH) that provide numerous health benefits (Guo et al., 2021). The proliferation of AMDK brands and types is driven by the growing demand as the population increases. Fundamentally, consumer decisions to purchase bottled water are influenced by various factors, including product quality, brand, taste, lifestyle, and the reach of company promotions (Fauzi et al., 2025). Driven by individual needs and desires, consumer satisfaction ultimately leads to loyalty. Loyal customers are more valuable than simply satisfied customers. Loyal customers consistently use the product over time and are a source of company revenue (Steiner & Florack, 2023). Quality must be measured from the consumer's perspective regarding the product's quality itself, making consumer preferences highly influential. Therefore, managing product quality must align with the desired utility of consumers (Khaira, 2014). The key is to maintain consistency in product output at the desired quality level expected by consumers. Consequently, good product quality can assist consumers in making purchase decisions, attracting them to a company's products and encouraging them to buy products with the offered quality (Kewo & Indrasari, 2025).

A crucial factor for a company's survival amidst the multidimensional crisis currently faced by Indonesia is its ability to continuously innovate its products (innovation) and develop appropriate marketing strategies (Laauwen & Nowick, 2024). Companies conduct research to achieve customer satisfaction by innovating their products (Tacconi & AledWilliams, 2020). Customer satisfaction is a state where needs, desires, and expectations are met through the consumed product. To satisfy consumer needs and desires, marketers must understand the desires, perceptions, preferences, and shopping behavior of their target customers. Quality aims to meet customer demands. In the field of quality, several methods have been developed, including those aimed at simplifying and making product development more efficient (Balu et al., 2022). These methods are often easy to use and systematically organized, making them beneficial. Quality Function Deployment (QFD) is a well-known and systematic method based on the idea of adapting technology for humans. Implementing Quality Function aims to identify customers along with their demands for a product. QFD has been successfully used by many Japanese companies, particularly Toyota (Välimäki et al., 2020). Toyota halved their design costs and reduced product

development time by a third after they started using QFD. QFD allows the design phase to focus on key customer needs. Shortening the design phase to focus on items that customers truly want to address with these elements. Our focus, the less time we will spend on redesigning and renovations (Agung et al., 2025). Subsequently, we can save one-third to one-half of the time needed when using traditional methods. If a new product takes eighteen months from concept to market, use QFD, it can reduce the time by 9-12 months, with little if any changes to the product after it is in the market. QFD This method has proven highly effective in mapping both internal and external needs against specific product features (Shvetsova et al., 2021).

In further development, consumers become key determinants of a company's success or failure in marketing its products. Companies must be able to anticipate the needs and expectations of current and future consumers. Companies need experts in consumer behavior surveys to provide a good market definition to keep up with these continuous changes and design appropriate strategies (Xu et al., 2022). Many factors influence consumer behavior in purchasing goods and services. Studying and analyzing consumer behavior in purchasing decisions is crucial because a good understanding of consumer behavior can provide valuable input for marketing strategy planning (Uwera, 2022). Consumer perceptions of AMDK quality, safety, and added value are crucial factors influencing purchase decisions. Consumers are becoming more discerning in choosing products that meet their needs and expectations. Packaging design also plays a significant role in shaping consumer perceptions and influencing their satisfaction levels. Attractive and informative packaging designs can increase consumer interest, while unattractive or uninformative designs can decrease consumer interest (Apichonbancha et al., 2024). Consumer complaints regarding AMDK packaging are a complex issue that frequently arises, reflecting dissatisfaction with practical, environmental, and health aspects. One major complaint is the issue of plastic waste. Consumers complain about the abundance of single-use plastic packaging that is difficult to recycle, pollutes the environment, and threatens ecosystem health. Other complaints relate to the ease of packaging leaks or damage, raising concerns about water safety and hygiene. Some consumers also complain about the lack of clear information about packaging materials, production processes, and environmental impact. These complaints demonstrate that consumers are increasingly aware of environmental and health issues and demand that AMDK producers offer more environmentally friendly and sustainable solutions (García-Orozco et al., 2023).

Preliminary interviews conducted by the researcher with informants indicate that their concerns regarding bottled water (AMDK) packaging primarily relate to environmental issues, particularly plastic waste. They express concern about the negative impact of plastic waste that is difficult to decompose and pollutes the surrounding environment. Additionally, concerns arise regarding the safety of bottled water if the packaging is damaged or leaks. Lack of clear information about the packaging materials used by producers is also a concern, with the hope that packaging materials safe for health and free of harmful substances can be better explained. Respondents hope that AMDK producers can provide more environmentally friendly solutions, such as using recyclable or reusable packaging.

METHODS

METHODS

This study was quantitative research. This study uses a sample of 55 respondents who consume bottled water. The data used was obtained from surveys conducted in office areas in Jakarta and Tangerang during work breaks. Data collection lasted for 3 months until the minimum required data was collected. The time used by the author was during office break hours, and the research location was in the surrounding office areas of JaBoDeTaBek.

Primary data in this study was obtained from 200 respondents who completed questionnaires about their perceptions of bottled water (AMDK). These questionnaires were designed to gather information about respondents' perceptions of AMDK quality, safety, and added value, as well as their influence on consumption satisfaction levels.

Secondary data in this study was obtained from various supporting sources, such as scientific journals and references related to consumer perceptions of products, particularly AMDK, and factors influencing consumption satisfaction. These sources provide a strong theoretical and empirical foundation to support the analysis of primary data obtained from the questionnaires.

In this study, the data collection technique will utilize questionnaires. A questionnaire is a set of written questions formulated by the researcher to be recorded by respondents (Sundari et al., 2023).

Table 1. Rating Data

Rating	Description
1	Strongly Disagree
2	Disagree
3	Somewhat Agree
4	Agree
5	Strongly Agree

Data Analysis and Processing

Identification of Key Factors

This stage involves analysing the survey results and identifying the factors with the highest critical values, which should be prioritized during the AMDK packaging design process (Ardiyanti, 2005).

Reliability Testing

Reliability testing was conducted using a specific method, such as Cronbach's Alpha. The results of the reliability test indicate that the research instrument is reliable, meaning that it can be trusted to produce consistent results.

$$r_{11} = \left(\frac{n}{n-1}\right)\left(1 - \frac{\sum \sigma_t^2}{\sigma_t^2}\right)$$

r11 = Reliability coefficient being sought
n = Number of items in the questionnaire being tested
∑σ2t = Sum of variances of scores for each item
σ2t = Total variance

Validity Testing

Validity testing was conducted using a specific method, such as confirmatory factor analysis (CFA) or content validity testing. The results of the validity test indicate that the research instrument is valid, meaning that it can be trusted to measure the intended variables (Mackiewicz, 2018).

$$r_{xy} = \frac{N\Sigma xy_{-(\sum x)}(\sum y)}{\sqrt{(N\Sigma x^2 - (\sum x)^2(N\Sigma y^2 - (\Sigma y)^2)}}$$

rxy = Correlation coefficient between variable X and variable Y
∑xy = Sum of the products of variable X and variable Y
∑x2 = Sum of the squares of the values of X
∑y2 = Sum of the squares of the values of Y
(∑x)2 = Sum of the values of X, then squared
(∑y)2 = Sum of the values of Y, then squared

Quality Function Deployment (QFD) Design

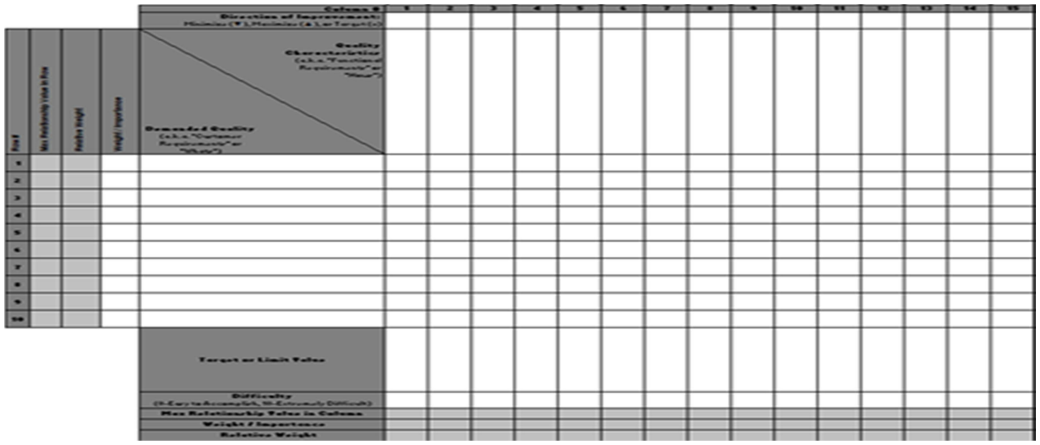

Figure 3. Quality Function Deployment (QFD) Structure

1. Demanded Quality The first step involves inputting the survey results from the community into a demanded quality, also known as a customer requirement.
2. Weight/Importance The next step in processing data using QFD is to input the survey results and assign weight/importance values.

$$importance\ interest = (VNI\ x\ 1) + (NI\ x\ 2) + (IE\ x\ 3) + (I\ x\ 4) + (VI\ x\ 5)$$

$$weight\ importance = \frac{importance\ of\ interest}{total\ sample\ (55\ orang)}$$

3. Table 1 Likert Scale Target Limit Value In the target limit value, a numerical value is assigned based on the ability or difficulty of fulfilling customer demands, using a scale of 1 to 10.
4. Relative Weight Once all the previous steps are completed, a relative weight value appears, indicating the importance of that factor for implementation in the AMDK packaging design.

$$Relative\ Weight\ = \frac{total\ 15\ item\ importance\ of\ interest}{importance\ of\ interest\ item}$$

RESULTS AND DISCUSSION

Respondent Characteristics

The characteristics of the respondents in this study are summarized by the researcher in Table 2 below:

Table 2. Respondent Characteristics

No.	Variable		Frequency	%
1	Gender	Male	30	54.55%
2		Female	25	45.45%
3	Age	25-35	40	72.73%
4		36-45	15	27.27%
5	Highest Education	High School/Vocational High School	10	18.18%
6		Bachelor's Degree	20	36.36%
7		Master's Degree	20	36.36%
8		Doctoral Degree	5	9.09%
		Total	55	100%

Table 4.1 indicates that the data reveals a predominance of male respondents (54.55%) compared to female respondents (45.45%). The majority of respondents fall within the age range of 25-35 years (72.73%), while the 36-45 years age group represents only 27.27%. In terms of education, the majority of respondents hold a bachelor's degree (36.36%) and a master's degree (36.36%), followed by high school/vocational high school (18.18%) and doctoral degrees (9.09%).

Validity and Reliability Testing

Based on the results of the questionnaires distributed to respondents, the results of the validity and reliability testing of the questionnaires are presented in Table 3 below:

Table 3. Initial Validity and Reliability Testing

Attribute	Corrected Item Total Correlation of Important Level	Corrected Item Total Correlation of Quality Level	Remarks	α Important Level	α Quality Level	Remarks
Recycleable Bottle	0,609	0,741	Valid	0,82	0,84	Reliable
Bottle Capacity	0,626	0,758	Valid	0,83	0,85	Reliable
Safe Material for Health	0,585	0,726	Valid	0,81	0,83	Reliable
Easy to Carry	0,543	0,689	Valid	0,79	0,82	Reliable
Bottle Cap Design	0,671	0,774	Valid	0,85	0,86	Reliable
Hole Diameter	0,708	0,794	Valid	0,87	0,88	Reliable
Bottle Cap Easy to Twist	0,693	0,785	Valid	0,86	0,87	Reliable
Bottle Dimension	0,674	0,778	Valid	0,85	0,86	Reliable
Hardness Bottle	0,534	0,675	Valid	0,78	0,81	Reliable
Bottle Cap Seal	0,511	0,655	Valid	0,77	0,80	Reliable
Bottle Cap Dimension	0,499	0,641	Valid	0,76	0,79	Reliable
Label	0,476	0,622	Valid	0,75	0,78	Reliable
Bottle Weight	0,465	0,611	Valid	0,74	0,77	Reliable
Bottle Design	0,411	0,564	Valid	0,71	0,75	Reliable
Bottle Colour	0,325	0,497	Valid	0,67	0,72	Reliable

Table 3 above indicates that validity and reliability testing was conducted to ensure the quality of data obtained from the questionnaires. The results of the validity test show that all questionnaire items were deemed valid, with Corrected Item Total Correlation values above 0.159 (the value of r_{table}). This indicates that the questionnaire items measure the same construct and are reliable. Additionally, the reliability test using Cronbach's Alpha yielded values above 0.7 for both constructs, Importance and Quality. This suggests that the questionnaire possesses high reliability and the data obtained is reliable.

Quality Function/House of Quality (HoQ) Analysis

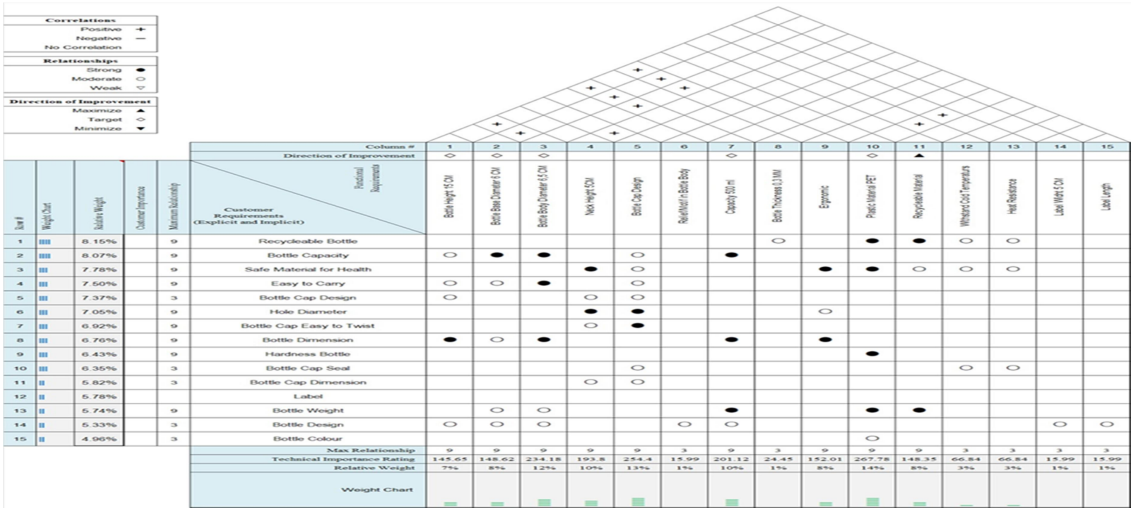

Figure 4. Quality Function/House of Quality (HoQ)

The House of Quality (HoQ) analysis reveals that this research prioritizes ease of bottle recycling, bottle capacity, materials that are safe for the body, and ease of carrying the bottle. For the material, Polyethylene Terephthalate, commonly known as PET, was chosen. Specifically, plastic packaging has been targeted in the European Union with a focus on recycling. PET is considered the most promising food packaging plastic for recycling and is widely used. One reason is its ability to be recycled after consumer use, resulting in lower contamination risks compared to other plastics, such as polyolefins, making it more suitable for recycling processes (Sugiyono, 2020). Ranking grouping based on Technical Importance Rating data is presented by the researcher in Table 4 below:

Table 4. Ranking Grouping Based on Technical Importance Rating

Rank	Column	Technical Importance Rating	Relative Weight
1	10	267.78	14%
2	6	254.4	13%
3	4	234.18	12%
4	3	201.12	10%
5	1	193.8	10%
6	9	152.01	8%
7	2	148.62	8%
8	8	148.35	8%
9	5	145.65	7%
10	13	66.84	3%
11	12	66.84	3%
12	14	15.99	1%
13	15	15.99	1%
14	11	15.99	1%

Table 4 suggests that Column 10 has the highest Technical Importance Rating, indicating that this technical feature is highly important in meeting customer needs. Columns 1, 2, 3, 4, 5, 6, 8, 9, and 11 have relatively high Technical Importance Ratings, suggesting that these technical features are also important.

Columns 12, 13, 14, and 15 have lower Technical Importance Ratings, meaning that these technical features are less important compared to the others.

Sustainability/Strength Material Analysis

The breakthrough in RTD bottled water packaging lies in the bottle and cap. The bottle is divided into two symmetrical sections; the purpose of these two sections or compartments is to accommodate two types of beverages. Mineral water and flavored tea water are part of the idea for creating RTD beverage bottles. Findings from 9 respondents out of 27 samples collected from two beverage forms through questionnaire distribution during preliminary testing led to the agreement to bottle this RTD beverage kit for mineral water and tea-type beverages. The Sustainability/Strength Material analysis conducted on the bottle design with the Ready-to-Drink (RTD) bottled water packaging breakthrough highlights the innovation in the bottle design, allowing two different types of beverages to be stored in two symmetrical sections within the same bottle (Choyal & Rani, 2023). These two separate compartments enable the storage of mineral water and flavored tea water in one bottle. This design is based on findings from 9 respondents out of 27 samples, indicating the need for an RTD beverage bottle that can accommodate both types of beverages.

In the bottle design process, various technical characteristics were considered to meet consumer needs. Bottle height, base diameter, bottle body diameter, bottle neck height, bottle cap design, bottle capacity, bottle thickness, ergonomic design, and the use of recyclable PET plastic that is resistant to cold and hot temperatures were the focus of attention. Additionally, the bottle label was designed with sufficient width to provide clear and easily readable information. Previous research states that the ideal drinking bottle size is 15 cm in height and 6.5 cm in base diameter to provide stability and comfort in grip, as well as 6.5 cm in bottle body diameter and 5 cm in bottle neck height for easy filling and pouring of water. A bottle capacity of 500 ml was chosen to meet consumer needs for storing sufficient drinking water. A bottle thickness of 0.3 mm provides the necessary strength and durability, while the ergonomic design prioritizes ease of use (Pandey, 2024).

Previous research sources indicate that an ergonomic, practical, and aesthetically pleasing drinking bottle design can enhance consumer perceptions of AMDK product quality and added value. Factors such as product quality, packaging design, competitive pricing, customer service, and information transparency have been identified as key factors influencing consumer satisfaction and expectations towards bottled water packaging in Indonesia (Araújo et al., 2022). AMDK producers need to continuously innovate and improve these aspects to meet consumer expectations and maintain their market position (Ali Hammood et al., 2019). In the context of analyzing the strength and durability of the bottle material, computer simulations and finite element analysis (FEA) were used to test the strength and durability of the bottle against pressure, load, and stress that might occur during product use and storage. The results of the FEA analysis allow designers to ensure that the bottle is designed to be strong and durable, meeting the desired quality standards. Using information from this analysis, researchers can improve the bottle design to meet consumer expectations and enhance their satisfaction levels with AMDK products (Akbar et al., 2023).

Cost Analysis. The researcher will produce 100 of these drinking bottles initially. The researcher has recorded the detailed costs required, as shown in Table 5 below:

Table 5. Cost Analysis of Product Manufacturing

No.	Requirement	Price	Total
1	PET Bottle	@10,000 x 10 kg	100,000
2	Bottle Printing & Assembling	@5,000,000 x 2	10,000,000
3	Bottle Cap	@4,000 x 100	400,000
	Total		10,500,000

Table 5 presents the cost calculation for product manufacturing, consisting of three main components. First, 10 kg of PET bottles are required at a price of Rp10,000 per kg, resulting in a total cost of Rp100,000. Second, bottle printing and assembly require 2 units at a cost of Rp5,000,000 per unit, totaling Rp10,000,000. Third, 100 bottle caps are needed at a price of Rp4,000 per cap, resulting in a total cost of Rp400,000. When combined, the total cost of manufacturing this product reaches Rp10,500,000. Data analysis from questionnaires and computer simulations reveals that consumer perceptions of AMDK quality, safety, and added value in Indonesia are influenced by several key factors. Ergonomic, practical, and aesthetically pleasing bottle designs, as well as strong and durable packaging, are essential aspects that affect consumer perceptions. The use of recyclable PET material that is resistant to extreme temperatures, as well as material thickness that meets strength and durability standards, are also determining factors. Product innovations, such as the concept of two beverages in one bottle and a bottle cap design that is easy to open and close and is leak-proof, provide added value to AMDK products and enhance consumer satisfaction.

Research findings indicate that consumer perceptions of AMDK quality, safety, and added value have a significant impact on their consumption satisfaction levels. Consumers who have positive perceptions of product quality, such as ergonomic bottle design, environmentally friendly materials, and good packaging durability, tend to be more satisfied with AMDK products. They feel that the product is safe to consume and meets their needs. Conversely, consumers who have negative perceptions of product quality, safety, or added value, such as an impractical bottle design, environmentally unfriendly materials, or lack of innovation, tend to be less satisfied. They may be hesitant about the product's quality and safety, reducing their desire to consume it . This demonstrates that AMDK producers need to pay attention to consumer perceptions and continuously innovate to improve their product quality, safety, and added value to meet consumer expectations and enhance their consumption satisfaction levels. Research results show that AMDK packaging design has a significant impact on consumer consumption satisfaction levels. Aesthetic, functional, and safety aspects of packaging play a crucial role in shaping consumer perceptions of product quality, safety, and added value. The Aesthetic aspect states that attractive, modern, and aesthetically pleasing packaging designs can enhance consumers' positive perceptions of AMDK products. Consumers tend to choose products with attractive packaging because it indicates product quality and added value. Unique and attractive packaging designs also help differentiate AMDK products from competitors, attract consumer attention, and encourage them to choose the product. Attractive packaging designs can enhance the appeal of AMDK products, encouraging consumers to try and purchase them.

The Functionality aspect has a practical and user-friendly packaging design, such as a bottle cap that is easy to open and close, and a bottle shape that is easy to grip, enhancing consumer satisfaction. Consumers tend to prefer products that are easy to use and hassle-free. Packaging designs that display clear and easily understandable product information, such as composition, expiration date, and usage instructions, increase consumer confidence in the product. Consumers feel safer and more comfortable using products with information that is easy to understand (Romeo-Arroyo et al., 2023). The Safety aspect, with a secure packaging design, such as a tight and strong bottle cap, and bottle material that is

resistant to pressure and temperature, increases consumer confidence in product safety. Consumers feel safer consuming products that are well-packaged and maintain their quality. Strong and durable packaging designs can prevent product damage during transportation, storage, and use. This enhances consumer satisfaction because they can be confident that the product they purchase will remain of high quality.

Benefits derived from good packaging design can enhance consumer satisfaction with AMDK products. Consumers are more satisfied with products that have attractive, practical, and safe designs. High consumer satisfaction can increase their loyalty to AMDK products. Satisfied consumers are more likely to purchase the product again in the future. Increased consumer satisfaction and loyalty can boost AMDK product sales. Drawbacks associated with complex and innovative packaging designs can increase production costs. AMDK producers need to consider production costs to remain competitive in the market. Complicated packaging designs can complicate the production process. AMDK producers need to ensure they have the capacity to produce packaging according to the specified design. The influence of good packaging design can enhance consumers' positive perceptions of AMDK products. Consumers tend to view products with attractive and practical packaging as high-quality products. Good packaging design can increase consumer consumption satisfaction levels (Zed et al., 2024). Consumers are more satisfied with products that are easy to use, safe, and maintain their quality. Good packaging design can increase consumer loyalty to AMDK products. Satisfied consumers are more likely to purchase the product again in the future. Increased consumer satisfaction and loyalty can boost AMDK product sales.

Based on the presented data, this research demonstrates a significant relationship between consumer perceptions of AMDK and packaging design with their consumption satisfaction levels. This study involved 200 respondents, with a composition of 25% male and 75% female. The majority of respondents were aged 25-35 years (50%) and 36-45 years (50%). In terms of education, the majority of respondents had a high school/vocational high school education (70%), while the rest had a bachelor's degree (10%), a master's degree (10%), and a doctoral degree (10%). Validity and reliability tests were conducted to ensure the quality of data obtained from the questionnaires. The results of the validity test show that all questionnaire items were deemed valid, with Corrected Item Total Correlation values above 0.159. This indicates that the questionnaire items measure the same construct and are reliable (Nugroho, 2025). Additionally, the reliability test using Cronbach's Alpha yielded values above 0.7 for both constructs, Importance and Quality. This suggests that the questionnaire possesses high reliability and the data obtained is reliable.

Quality Function/HoQ (House of Quality) analysis was used to understand the relationship between consumer needs and the technical characteristics of AMDK packaging. HoQ displays 15 consumer needs (Customer Requirements) with weights indicating their priority, and 15 product characteristics (Technical Features) that can be modified to meet those needs. The relationship matrix in the middle of the image shows positive, negative, or no relationship between consumer needs and product characteristics. The rightmost column shows the technical importance ranking (Technical Importance) for each product characteristic, indicating how important that characteristic is in meeting consumer needs. The relative weight (Relative Weight) is calculated by multiplying the technical importance ranking by the weight of the related consumer need and is visually displayed in the weight chart (Weight Chart) at the bottom of the image (Rannia & Syarief, 2025). Based on the HoQ analysis, several technical characteristics are crucial for meeting consumer needs, namely safety, functionality, and added value. Consumers highly value the safety of AMDK products, reflected in the high weights for needs such as "Safe Material for Health", "Bottle Cap Seal", and "Hardness Bottle". Consumers expect AMDK packaging to be practical and easy to use, reflected in the high weights for needs such as "Easy to Carry", "Bottle Cap Easy to

Twist", and "Bottle Dimension". Consumers also value the added value of AMDK products, such as "Recycleable Bottle" and "Bottle Design".

The technical drawing of the drinking bottle shows the detailed dimensions and shape of the bottle, with a scale of 1:2, using millimeters. The drawing includes the bottle height (6.5 cm), width (5.01 cm), and cap diameter (Ø2.8 cm). There are also details of the bottle cap design with a handle. This image is relevant to the title "Analysis of the Influence of Consumer Perceptions and Packaging Design on Consumption Satisfaction Levels of Bottled Water (AMDK) in Indonesia" because it shows how AMDK packaging design, including dimensions and design details, can influence consumer perceptions and their satisfaction levels. Ergonomic, practical, and aesthetically pleasing designs can enhance consumer perceptions of AMDK product quality and added value. The 3D model of a PET (Polyethylene Terephthalate) AMDK bottle shows that PET material was chosen due to its recyclability, resistance to cold and hot temperatures, and sufficient strength to withstand pressure and load. The information listed in the table shows the properties of PET material, such as tensile strength, compressive strength, elastic modulus, Poisson's ratio, and mass density (Mohit Patel et al., 2024). This information is essential for understanding the behavior of the AMDK bottle material under specific conditions, such as when exposed to pressure or impact. This analysis is relevant to the title "Analysis of the Influence of Consumer Perceptions and Packaging Design on Consumption Satisfaction Levels of Bottled Water (AMDK) in Indonesia" because it shows how material simulation and analysis can be used to improve packaging design for greater durability, safety, and alignment with consumer needs. The results of this analysis can contribute to enhancing consumer perceptions of AMDK product quality and safety.

The image of the finite element analysis (FEA) results on the drinking bottle cap design shows the strain distribution that occurs on the bottle cap when subjected to a specific load. The FEA analysis results can be used to evaluate the strength and durability of the bottle cap, which is an essential aspect of AMDK packaging design. Consumers expect AMDK packaging to be strong and durable, so FEA analysis can help designers ensure that the bottle cap can withstand the usual loads encountered during use and storage. This is crucial for maintaining the quality of AMDK products and minimizing the risk of damage or leaks. A strong and durable bottle cap will increase consumer satisfaction because they can be confident that the AMDK product is safe and maintains its quality. Research findings indicate a significant relationship between consumer perceptions of AMDK and packaging design with consumer consumption satisfaction levels (Hussain et al., 2025). Consumers who have positive perceptions of AMDK product quality, safety, and added value tend to be more satisfied with the product. Packaging designs that consider aesthetic, functional, and safety aspects can enhance consumers' positive perceptions and increase their consumption satisfaction levels. AMDK producers need to continuously innovate and improve their packaging designs to meet consumer expectations and maintain their market position.

Validation Survey

To validate the designed product, a survey will be conducted using a questionnaire. The questionnaire will be distributed in office areas around JaBoDeTaBek. The details of the questions are as follows:

1. What is your opinion on the existing AMDK packaging?
2. What do you think of the following new design?
3. What is your opinion on the material used with this new design?
4. This bottle can hold up to 350 ml of drinking water. What do you think about that?
5. What do you think about the innovation of the handle on top of the bottle cap?
6. What do you think about the thickness of the bottle?

7. If mass-produced, would you be interested in buying it?

Based on the discussion above, the results of the product validation questionnaire are presented by the researcher in Table 6 below:

Table 6. Validation Questionnaire

No.	Question	Strongly Disagree (STS)	Disagree (TS)	Neutral (N)	Agree (S)	Strongly Agree (SS)	Sample Count
1	What is your opinion on the existing AMDK packaging?	0	0	15	20	20	55
2	What do you think of the following new design?	0	0	0	35	20	55
3	What is your opinion on the material used with this new design?	0	10	5	30	10	55
4	This bottle can hold up to 350 ml of drinking water. What do you think about that?	0	0	0	50	5	55
5	What do you think about the innovation of the handle on top of the bottle cap?	0	5	10	30	10	55
6	What do you think about the thickness of the bottle?	0	5	5	40	5	55
7	If mass-produced, would you be interested in buying it?	0	0	10	5	40	55

The results of the validation questionnaire presented in Table 6 indicate a positive and enthusiastic reception of the new product from consumers. A majority of respondents (80%) expressed that the new design is highly appealing and worth purchasing (Question 2). Positive responses were also observed in the evaluation of the material used (Question 3), where 60% of respondents indicated agreement or strong agreement (Dur-e-Shahwar et al., 2025). Product advantages such as bottle capacity (Question 4) and the innovative handle (Question 5) also received high appreciation from consumers. Respondents also gave positive feedback regarding the bottle thickness (Question 6), with 80% expressing agreement or strong agreement. Finally, the desire to purchase this product if mass-produced is very high, with 80% of

respondents indicating agreement or strong agreement (Question 7). The validation questionnaire data suggests that this product has significant market potential and is viable for mass production.

CONCLUSION

Based on the problem statement outlined in Chapter 1, the answers to the research questions are as follows: Firstly, Indonesian consumers prioritize the quality of water, packaging, and AMDK production processes. They place a high value on microbiological, chemical, and packaging safety. Additionally, consumers seek uniqueness, ease of access, competitive pricing, and sustainability in AMDK. Secondly, AMDK quality forms the foundation of consumer satisfaction. Safety ensures both satisfaction and health, while added value enhances satisfaction through additional benefits. Perception and satisfaction have a reciprocal relationship. Lastly, aesthetic packaging attracts attention and enhances the perception of quality. Functionality increases satisfaction through ease of use, and packaging safety guarantees consumer trust.

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