Analysis of Consumer Preferences on Mineral Water Packaging from The Perspective of a Product Design

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Abstract
The bottled water market is projected to be the largest beverage category by volume worldwide. This is one of the reasons why the growth rate of the packaging industry in Indonesia is growing rapidly. However, with the increasing use of plastic as a basic material for mineral water packaging, the recycling or recycling process may be difficult to carry out so that the impact caused by plastic pollution can be minimized, so packaging materials and information on material use become important. This research needs to be carried out to find out the importance for companies to know and understand the world's efforts in campaigning to go green as a joint effort to care about the environment and the ability to create products with environmentally friendly packaging. The aim is to analyze consumer preferences for mineral water packaging designs available on the market, to the attributes attached to the product, especially the packaging materials and product information conveyed. The method used is utility analysis, the results of this research are that the observed attributes can inform and be used as recommendations for creating a packaging design that can continuously facilitate consumers and measure how important the ingredients and information on the packaging influence it. So, there are efforts to improve the design attributes of existing mineral water packaging products, to influence consumer preferences in making purchasing decisions for these products.

***Keywords*:** *Mineral Water Packaging, Mineral Water, Environmentally Friendly Packaging*.

Abstrak
Pasar air minum dalam kemasan diproyeksikan menjadi kategori minuman terbesar berdasarkan volume di seluruh dunia. Hal inilah yang menjadi salah satu alasan mengapa laju pertumbuhan industri pengemasan di Indonesia

berkembang pesat. Namun dengan semakin meningkatnya penggunaan plastik sebagai bahan dasar kemasan air mineral, proses daur ulang atau daur ulang mungkin akan sulit dilakukan sehingga dampak yang ditimbulkan oleh pencemaran plastik dapat diminimalkan, sehingga bahan kemasan dan informasi penggunaan bahan menjadi penting. Penelitian ini perlu dilakukan untuk mengetahui betapa pentingnya bagi perusahaan untuk mengetahui dan memahami upaya dunia dalam mengkampanyekan go green sebagai upaya bersama untuk peduli terhadap lingkungan dan kemampuan menciptakan produk dengan kemasan ramah lingkungan. Tujuannya adalah untuk menganalisis preferensi konsumen terhadap desain kemasan air mineral yang tersedia di pasaran, terhadap atribut-atribut yang melekat pada produk, terutama bahan kemasan dan informasi produk yang disampaikan. Metode yang digunakan adalah analisis utilitas, hasil penelitian ini adalah atribut-atribut yang diamati dapat menginformasikan dan dijadikan rekomendasi untuk membuat suatu desain kemasan yang dapat memudahkan konsumen secara terus menerus dan mengukur seberapa penting bahan dan informasi pada kemasan tersebut mempengaruhinya. Sehingga adanya upaya perbaikan atribut desain pada produk kemasan air mineral yang ada, dapat digunakan untuk mempengaruhi preferensi konsumen dalam mengambil keputusan pembelian terhadap produk tersebut.

Keywords**:** *Produk Kemasan Air Mineral, Air Minum dalam Kemasan, Kemasan Ramah Lingkungan*.

1. Introduction

Product preference is how the product tastes subjectively, by measuring the level of benefits obtained, so that a set of objects stimulates someone's behavior in making purchasing decisions. Thus, consumer preferences are measured by the level of consumer satisfaction with different types of products (Kontot et al., 2016). Meanwhile, (Guleria, 2012) states that consumer preferences explain how consumers rank a set of products or services or prefer one type of product over another, which is measured by satisfaction or the benefits received.

The perspective of consumer preference for drinking water packaging will be reviewed in line with the rapid growth of the mineral water industry, which will allow the level of public consumption of packaging made of plastic to increase, so that it will also follow the environmental impact it causes (Susanto et al., 2021), considering that globally plastic will be produced as much as 368 million tonnes by 2019 and will increase by 0.3% in 2020 (statista.com, 2023), and is most widely used in the product packaging industry, namely 146 million tonnes (Jambeck et al., 2015).

This research is based on the research of (Ibrahim et al., 2020), which states that consumer preferences are influenced by image, packaging safety, reference group, and manufacturer's reputation, while the reference group according to (Kartika, 2018) consists of normative

influences, the effect of value expression, and the influence of information, while (De Marchi et al., 2020) states that consumer preferences and willingness to pay for plastic water bottles made from conventional plastic polymers and plastic alternatives are sustainable. Then research (Grebitus et al., 2020) states in his research that there is a possibility of consumers' willingness to pay for drinking water in containers made of vegetable plastic or waste plastic, then research (Horowitz et al., 2018) conducts a complete analysis of the life cycle of drinking water in packaging. So (Marzuki Ibrahim, 2013) has researched to make suggestions for improving the quality of product attributes in the process of designing and developing bottled drinking water products.

From the above description of the research undertaken, it is clear that the focus of the research is to improve the design attributes of existing mineral water packaging products in order to identify the factors that influence consumer preferences when making purchasing decisions for these products.

2. Method

The data analysis method used in this study is conjoint analysis. This method is used to find out the preferences of consumers for the design of a 600 ml mineral water package. Conjoint analysis is used to find out how a person perceives an object consisting of one or more parts. The main result of conjoint is a form (design) of goods or services or specific objects desired by the majority of respondents. In this study, conjoint analysis is used to determine consumer preferences for product design.

Determining the sample means that the conjoint analysis of the considered sample size ranges from fifty to two hundred (Hair, J.F.,. et al., 1998). Based on the following formula (Felayana Isfar, 2020) :

Minimum number of samples = [(Number of levels - Number of attributes)+1] x 5 (1)

The number of levels and attributes used in this study is 4 levels and 12 attributes, so based on the formula above, the number of samples in this study is 45.

Conjoint Analysis Steps:

A. Define Attributes and then Select the Attribute Levels

Table 1. The attribute levels

Variable	Attributes/Indicators	Level of Attribute/Sub-Indicator
Consumer preferences for mineral water packaging design	Function (Ibrahim et al., 2020)	1. Practical to Use 2. Functions Well 3. Effectively 4. Additional Functions
	Material (Ibrahim et al., 2020)	1. Environment Friendly Material 2. That Have Long Shelf Life 3. Low Cost
	Material Type (De Marchi et al., 2020)	1. r-PET 2. bio-PET 3. PLA (Bio-bottle)
	Color (De Marchi et al., 2020)	1. Transparent 2. Blue

In Table 1, the attribute levels, explain the variables in this study, which consist of attributes/ indicators that affect and levels of attributes in each attribute/indicator.

B. Stimulus Design

The way to combine them is to multiply the number of attributes by the number of attribute levels. If the number of attributes in this research is 4, and each attribute consists of 4, 3, 3, and 2, then the possible combinations are 4 x 3 x 3 x 2 = 72.

Table 2. Stimulus Design

Material	Material Type	Color	Function	Card
That have long shelf life	r PET	Transparent	Function well	1
Environment friendly	r PET	Blue	additional Functions	2
Low cost	r PET	Blue	effectively	3
Environment friendly	PLA bio bottle	Transparent	additional Functions	4
Environment friendly	bio-PET	Transparent	Function well	5
That have long shelf life	r PET	Blue	Practical to use	6
Low cost	r PET	Transparent	additional Functions	7
Low cost	bio-PET	Transparent	Practical to use	8
That have long shelf life	PLA bio bottle	Transparent	effectively	9
Environment friendly	r PET	Transparent	effectively	10
Environment friendly	PLA bio bottle	Blue	Practical to use	11
Environment friendly	r PET	Transparent	Practical to use	12
Low cost	PLA bio bottle	Blue	Function well	13
Environment friendly	r PET	Blue	Function well	14
That have long shelf life	bio-PET	Blue	additional Functions	15
Environment friendly	bio-PET	Blue	effectively	16

Table 2 Stimulus design is an explanation of the number of combinations that pair each attribute level, from the existing combinations, the number of pairs that can be done is as many as 16.

C. Collecting Respondents' Opinions on Each Stimulus

The list of stimuli obtained from the SPSS processing is then used as a basis for compiling the questionnaire, which is given to the respondent to fill in, by applying weight for each stimulus presents with a value from 1 to 5, from the worst to the best

D. Perform the Conjoint Technique

The next step is to collect respondents' opinions, the next step is to carry out conjoint analysis, namely estimating the shape of the product based on the respondents' desires

E. Determine predictive Accuracy

After obtaining the results of the conjoint analysis carried out, the next step is to test the validity of the stimulus, which aims to determine the harmony between the sample and the population. The validity test is carried out using Kendall's Tau and Pearson's R correlations, with the following conditions:

a) H_0 indicates that the observed variable and the estimated preferences do not have a strong relationship.
b) H_1 indicates that there is a strong relationship between the observed variable and the estimated preferences.

with the following conditions:

H_0 is accepted if the significance value is ≥ 0.05.

H_0 is rejected when the significance value is <0.05. (Ihwah, 2020) (Felayana Isfar, 2020)

3. Result and Discussion

1) Utilities Analysis

The following are the Utilities results for all respondents:

Table 3. Utilities Analysis

		Utility Estimate	Std. Error
Function	practicalto_use	-.125	.077
	functions_well	.108	.077
	effectively	.075	.077
	additional_functions	-.058	.077
Material	environment_friendly	.056	.059
	that_have_long_shelf_life	.006	.070
	low_cost	-.061	.070
Material_Type	r-PET	-.007	.059
	bio-PET	.106	.070
	PLA	-.099	.070
Color	transparent	.017	.045
	blue	-.017	.045
(Constant)		3.402	.049

Table 3 Utilities Analysis, is the result of an analysis that shows the number of utilities in each attribute. From the numbers, the results of the analysis consist of positive numbers and negative numbers results. The positive number results show that respondents like the stimuli and vice versa if the number results show negative then the stimuli are not liked by respondents.

2) Importance Values

Output Importance Values provide the most important or least important results on the attribute/attribute level relationship, as shown in the following table:

Table. 4. Importance Values

Variable	Value
Function	31.690
Material	24.104
Material_Type	26.120

Variable	Value
Color	18.086

Averaged Importance Score

Table 4 Describes the importance level used to see how important an attribute is according to respondents' ratings. It can be explained that the function has the highest number of 31,690, then material type of 26,120, then the material of 24,105 and finally the color of 18,086.

3) Predictive Measures and Significance Tests (Correlations)

Table 5. Correlations

	Value	Sig.
Pearson's R	.742	.001
Kendall's tau	.609	.001

a. Correlations between observed and estimated preferences

Table 5 the correlation, the high values of Pearson's R and Kendall's tau are obtained respectively 0.7441 and 0.609 with significance values of 0.001 and 0.001. These results have a value that is not much different between respondents' opinions and stimuli estimation results.

The function of the product is stated to have 4 criteria, namely practical use, functioning properly, effectively, and having additional functions, this refers to research (Ibrahim et al., 2020). However, in testing the atribute, the function of the product that suits the respondent is that the product functions well and effectively, this is chosen based on the respondent's decision to give a positive value. Then the materials used are environmentally friendly, have a long shelf life, low cost (Ibrahim et al., 2020). However, Based on value utilitas, it can be concluded that the attribute that respondents are looking for is a product made from environmentally friendly materials with a long shelf life. The results of the assessment above show that respondents are not looking for expensive materials. While the type of material used is bio-PET, this is based on an assessment that provides a positive value that means respondents preference. This is based on the type of bio-PET material made from ethylene glycol (EG) and terephthalic acid (TA), which is produced from vegetable sugar, making it expensive (Kuciel & Mazur, 2019). And finally related to the use of color, the test results show that the transparent color becomes the desired color by the respondent, this is based on the positive rater carried out by the respondent which means that the respondent likes transparent colors.

4. Conclusion

So that with the results of the Utilities Analysis, it can be concluded that the product desired by respondents is that the product must function properly, environmentally friendly, made from bio-PET, and transparent color.

Furthermore, the highest importance values are functions. This means that the most important thing is the product is designed according to its function. This has a good correlation based on Pearson and Kendall's tau method of 0.001 which means that the sig value is less than 0.05 which means the accuracy of actual assessment and assessment based on estimates has been significant.

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REFERENCES

De Marchi, E., Pigliafreddo, S., Banterle, A., Parolini, M., & Cavaliere, A. (2020). Plastic packaging goes sustainable: An analysis of consumer preferences for plastic water bottles. *Environmental Science & Policy*, *114*, 305–311. https://doi.org/10.1016/j.envsci.2020.08.014

Felayana Isfar,. (2020). Analisis Konjoin untuk Mengidentifikasi Preferensi Konsumen terhadap Busana Pesta di Butik Fenny Chen. *Fashion And Fashion Education Journal*, *9*(1).

Grebitus, C., Roscoe, R. D., Van Loo, E. J., & Kula, I. (2020). Sustainable bottled water: How nudging and Internet Search affect consumers' choices. *Journal of Cleaner Production*, *267*, 121930. https://doi.org/10.1016/j.jclepro.2020.121930

Guleria, D. (2012). *A Study Of Consumer Preference For Smartphone: A Case Of Solan Town Of Himachal Pradesh*. 9.

Hair, J.F.,., Anderson, R.E, & Tatham, R.L. (1998). *Multivariate Analysis* (Fifth Edition). Prentiice-Hall International.

Horowitz, N., Frago, J., & Mu, D. (2018). Life cycle assessment of bottled water: A case study of Green2O products. *Waste Management*, *76*, 734–743. https://doi.org/10.1016/j.wasman.2018.02.043

Ibrahim, M., Kamal, N. I. H., & Omar, M. H. (2020). *Nira Water Bottle Design in a Bid to Elevate Malaysian Coconut Industry*. *07*(03), 7.

Ihwah, A. (2020). Analysis of consumers' preference on taro-flavored UHT Ultra milk using conjoint method in Malang City. *Advances in Food Science, Sustainable Agriculture and Agroindustrial Engineering*, *3*(2), 91–100. https://doi.org/10.21776/ub.afssaae.2020.003.02.7

Jambeck, J. R., Geyer, R., Wilcox, C., Siegler, T. R., Perryman, M., Andrady, A., Narayan, R., & Law, K. L. (2015). Plastic waste inputs from land into the ocean. *Science*, *347*(6223), 768–771. https://doi.org/10.1126/science.1260352

Kartika. (2018). *Pengaruh kelompok referensi terhadap keputusan pembelian kawasaki ninja 250 cc*. *3*, 6.

Kontot, K., Hamali, J., & Abdullah, F. (2016). Determining Factors of Customers' Preferences: A Case of Deposit Products in Islamic Banking. *Procedia - Social and Behavioral Sciences*, *224*, 167–175. https://doi.org/10.1016/j.sbspro.2016.05.435

Kuciel, S., & Mazur, K. (2019). Novel hybrid composite based on bio-PET with basalt/carbon fibre. *IOP Conference Series: Materials Science and Engineering*, *634*(1), 012009. https://doi.org/10.1088/1757-899X/634/1/012009

Marzuki Ibrahim. (2013). *Reka Bentuk Produk*. Dewan Bahasa dan Pustaka.

statista.com. (2023). *Annual production of plastics worldwide from 1950 to 2021*. https://www.statista.com/statistics/282732/global-production-of-plastics-since-1950/

Susanto, A. B., Sundjojo, C. O., & Handriyono. (2021). Perancangan kemasan produk yang ramah lingkungan menggunakan metode Green QFD-II pada perusahaan AMDK Al Qodiri. *Jurnal Bisnis dan Manajemen, 15*(2).