



Ecobrick Sofa Design Is Environmentally Friendly Using The House Of Quality Method And The Boston Consulting Group (BCG) Method

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Abstract. Plastic is one of the most extended decomposing types of waste, and it has been decomposed for up to 10 centuries. Plastic waste that is difficult to decompose can be minimized using ecobrick techniques. This ecobrick technique aims to turn plastic waste that was initially worthless (zero value) into a value-added product. This study uses four methods, namely the House of Quality (HOQ), Quality Function Deployment (QFD), Slovin, and Boston Consulting Group (BCG) methods. These methods determine product planning and development, consumer desires, product position in market share, and systematic evaluation of its ability to produce products to satisfy consumers. This study involved 100 respondents who obtained information using the Slovin method. Where the respondents are positioned as research subjects. The respondents' data was obtained by distributing questionnaires through Google Forms. The data collected is calculated and analyzed for unique and minimalist sofa House of Quality (HOQ). The results of this study inform that customer feedback on the product or Voice of Customer can affect quality control and improvement by using the statistical method or Statistical Quality Control. Furthermore, each unique and minimalist sofa company has a different product development focus. Following up on the findings in this study, the company can adjust the needs and desires of these consumers to the design and service standards and the obstacles that may occur.

Keywords: Boston Consulting Group (BCG); House of Quality (HOQ); Quality Function Deployment (QFD), Slovin

INTRODUCTION

In the current era, waste is one of the most common environmental problems in the world and Indonesia. Almost every region in Indonesia has waste savings ranging from a few tons to hundreds of tons produced daily. Types of plastic waste are found in large quantities in various landfills. Moreover, more and more manufacturers still use single-use plastics made in small *sachets* to wrap products. Plastic is one of the most extended decomposing types of waste, and it has been decomposed for up to 10 centuries. Plastic waste that is difficult to decompose can be minimized using ecobrick techniques. The main

problem is that people do need help understanding how to use plastic waste. Most people in Indonesia dispose of plastic waste in landfills, which are then transported to temporary landfills (TPSS), which are then transported to landfills. As a result, this poses a danger to environmental health, damage to natural ecosystems, and other problems. (Mamdudah et al., 2023)

The ecobrick technique is related to the creative handling of plastic waste to transform plastic waste that was initially worthless into a product with added value. In addition, these ecobrick bottles are used to make furniture products, including an eco-friendly Ecobrick Sofa. Ecobricks are plastic waste coated with aluminum foil. Since plastic waste cannot be sold, there is only one way to utilize it before it is disposed of in landfills. Plastic waste can be turned into more beneficial products to the community and the local ecosystem. Another way to reduce plastic waste is to use Ecobricks, made from polyethylene terephthalate (PET) plastic bottles that have been cleaned (Yusiyaka & Yanti, 2021) and dried. (Fauzi et al., 2020) Ecobricks can be converted into chairs, tables, bookshelves, and other cost-effective and eco-friendly products. (Asih & Fitriani, 2018)

Furniture from plastic waste is another widely used way to deal with the accumulation of plastic waste. So far, various countries worldwide, including Indonesia, have adopted the concept of environmentally friendly design. However, a few furniture makers in Indonesia still use plastic waste (Nurlima, 2020). The main benefit of making this Ecobrick Sofa certainly comes from plastic waste management. Where instead of throwing away, burning, or hoarding plastic residues that have the potential to become a factor in natural pollution, we can use these plastic residues as materials to form ecobricks. In addition to accommodating plastic waste management, this waste innovation has various other benefits. The benefits can be seen from the functional side and the economic side. From a functional point of view, the benefits of ecobricks are known to be often the primary material in producing a product. Starting from the ecobrick sofa is one of them.

LITERATURE

This Ecobrick sofa, although simple in shape, has durability and strength. In addition, other benefits from the economic aspect. In addition to saving on product manufacturing costs, because the primary basic material for making this sofa is free, there is no need to spend large raw material costs. We can also sell Ecobrick sofas on the market. Currently, ecobricks are widely sold to online buying and selling platforms, such

as *Facebook*, *Shopee*, *Tokopedia*, *Instagram*, and other online buying and selling platforms. The description of the potential and benefits of Ecobrick Sofas still needs to be optimized for Indonesians. This condition is caused by various competitor products, such as the Round Stool Sofa and the Rottan Gentong Sofa, which have been launched for a long time and have attracted the hearts of *customers*. This, of course, impacts the existence of Ecobrick Sofas, which have recently begun to appear in the lineup of various furniture products. The quality of the Ecobrick sofa is equal to that of the two competitors' products. One of the efforts in this case is product development and quality control of Ecobrick Sofa products using *House of Quality* (HOQ), *Quality Function Deployment* (QFD), and *Boston Consulting Group* (BCG) analysis.

The results of the research (Wahyuda, 2022) and the HOQ method are focused on the results of the calculation of questionnaire data without being informed of the detailed analysis of the components in the HOQ relationship matrix. In line with this information, the research examines quality control with the HOQ method in Ecobrick Sofas in detail from the various components in the HOQ matrix. This kind of research needs to be carried out because it can provide information on how customer feedback on the product or (Makmuri & Zahri, 2016) *Voice of Customer* (VoC) can affect quality control and improvement using statistical methods or *Statistical Quality Control* (SQC). The company can adjust the needs and desires of these consumers to the design and service standards and obstacles that may occur.

Product design and development use the quality function development (QFD) method. The QFD specifies how and where priorities should be set during the product development process in accordance with technical requirements and specific quality characteristics. The product design concept that originated in Japan in the 1960s is Quality Function Deployment (QFD). At that time, the Japanese industry began to make original products rather than imitating existing ones. (Mantika et al., 2017) (Sugianto et al., 2020)

The BCG Matrix is a strategy tool to guide resource allocation decisions based on market share and growth rate. According to, the BCG Matrix relies on providing products or services that will benefit the business in the future (Sanjaya & Mulyanti, 2023). Still, it is necessary to determine how to maintain the business's profits in the future. Find out what will change in future products and services. The BCG matrix in marketing and strategic management assists businesses in determining where development resources

should be focused. Developing products with "star" and "Q&A" labels will quickly increase market share in several categories. Business managers who invest in products that fall into the "dairy cow" category must ensure that the product offering will be updated through upgrades and modernizations to ensure the growth rate of the product. The explanation results above differ from those of the previous research because this study combines the HOQ and BCG methods, specifically on ecobrick sofas. The ecobrick sofa is the result of plastic waste processing, so the purpose of the research is to analyze the quality of the development of the ecobrick sofa.

METHOD

This research is to analyze product development and quality control using the HOQ method. The stages in the research are as follows:

1. Initial Identification

a. Background of the Problem

Before starting research, the background of the problem must first be explained. The background of the problem is the background of the problem that the company is facing and the subsequent search for a solution.

b. Problem Identification

Problem Identification is a series of questions that will be answered through research that will be conducted.

c. Purpose and Purpose

Aims and objectives are the objectives of the research.

d. Problem Limitation

In conducting research, the problems to be taken must be limited so that it is clearer.

2. Data Collection

At this stage, what is done is to collect the necessary data during the research. The data collected will be used as input to data processing to solve the problems raised. The data collected was based on the distribution of questionnaires to 100 respondents.

3. Data Processing

The steps in data processing are as follows:

- a.** In this research methodology, we first collect data through the distribution of questionnaires to 100 respondents.

- b. After the data is collected, a series of data processing steps using a data adequacy test will be carried out to determine whether the data is valid.
- c. After the market share and growth are known, the data is analyzed again using the *Quality Function Deployment (QFD)* method. One of them is the *HOQ stage*.
- d. The first step is to determine the level of customer interest of each sofa product, including the Ecobrik Sofa, Round Stool Sofa and Rottan Gentong Sofa.
- e. Then determine the value of the position of a company's products and the products of competing companies (in this case, it is related to furniture companies with each other) such as the competition between Ecobrik Sofas, Round Stool Sofas and Rottan Gentong Sofas, then determine the value of the position of the company and the competitor company.
- f. The next step is to create a benchmarking table.
- g. The next step is to create a *HOQ matrix*, or also called a quality house for existing furniture products to find out which attributes must be prioritized for improvement.
- h. Conclude the results of a series of data processing that has been carried out.

HOQ is a matrix to show the relationship between consumer needs and desires with technical engineering properties and find their causes. Thus the company can adjust the needs and the consumer's desire with the design and service standards as well as the obstacles that may occur.

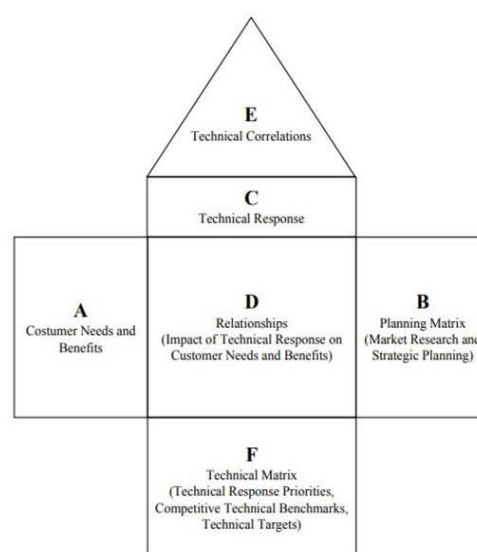


Figure 1. House of Quality (HOQ)

4. Analysis

After conducting data processing, the results of data processing are analyzed whether the data is sufficient or not.

5. Conclusion and Advice

Conclusions and suggestions are stages that contain the conclusions of the results of the completed research and are the answers to the formulation of the problem and suggestions obtained from the results of the research carried out.

Slovin Method

$$n = \frac{N}{1 + Ne^2}$$

$$n = \frac{100}{1 + 100.(0,01)^2}$$

$$n = 99,01$$

$$n = \frac{N}{1 + Ne^2}$$

$$n = \frac{100}{1 + 100.(0,05)^2}$$

$$n = 80$$

The Slovin method with $e=0.01$ obtained 99.01% or can be rounded to 100%, and 80% is also obtained with a value of $e=0.05$. The Slovin formula is commonly used to take a representative number of samples so that the study results can be generalized and the calculation does not require a table of sample numbers.

DISCUSSION

Data Adequacy Test

1. Sofa Ecobrick HMTI

Based on the calculation on the data adequacy test, it was found that the value of N' at $K = 99\%$, which is 1.05, and the data of the value of N' at $K = 95\%$, which is 0.49. $N' < N$ so that the data is said to be sufficient, and in the calculation of the data uniformity test, it was found that the data of the HMTI Ecobrick Sofa with an average value of 10 variables was 3.264, a standard deviation of 0.42, an Upper Control Limit (BKA) of 5.124, and a Lower Control Limit (BKB) of 2.604. So, the data can be said to be uniform.

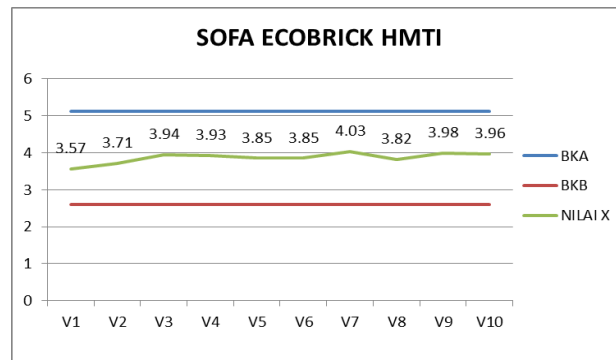


Figure 2 HMTI Ecobrick Sofa

2. Round Stool Sofa

Based on the calculation of the data adequacy test, it was found that the value of N' at $K = 99\%$, which was 0.25, and the data of the value of N' at $K = 95\%$, which was 0.2. $N' < N$ so that the data is said to be sufficient, and in the calculation of the data uniformity test, it was found that the data of the Round Stool Sofa with an average value of 10 variables was 3.964, a standard deviation of 0.2, an Upper Control Limit (BKA) of 4.56, and a Lower Control Limit (BKB) of 3.36. So, the data can be said to be uniform.

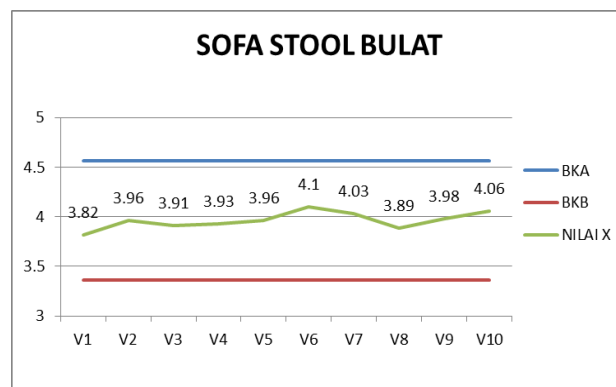
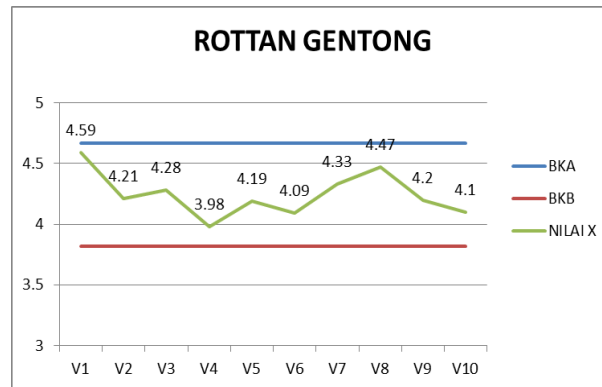


Figure 3 Round Stool Sofa

3. Sofa Rottan Gentong

Based on the calculation in the data adequacy test, it was found that the value of N' at $K = 99\%$, which is 1.50, and the data of the value of N' at $K = 95\%$, which is 0.81. $N' < N$ so that the data is said to be sufficient, and in the calculation of the data uniformity test, it was found that the data of the Rottan Gentong Sofa with an average value of 10 variables was 4.244, a standard deviation of 0.14, an Upper Control Limit (BKA) of 4.67, and a Lower Control Limit (BKB) of 3.82. So, the data can be said to be uniform.



Picture 4. Rottan Gentong Sofa

Boston Consulting Group (BCG) Matrix

1. Sofa Ecobrick HMTI

Based on the results of BCG analysis on hmti ecobrick sofas, it was found that the market growth was 24.8%% and the market share was around (0.000168). The results of the BCG matrix calculation were obtained, namely the HMTI Ecobrick Sofa company with competitors (HMTI Ecobrick Sofa, Round Stool Sofa, and Rottan Gentong Sofa) located in the *DOG* position. *This DOG condition* is a situation that shows the position of a company in a condition of low market share and market growth.

This condition indicates that the flow of funds or cashflow is in a weak state. In a position like this, the HMTI Ecobrick Sofa company must decide on a decision to strengthen the existing division by carrying out an intensive strategy in the form of developing product innovations or features. So, being able to compete with *other competitors*.

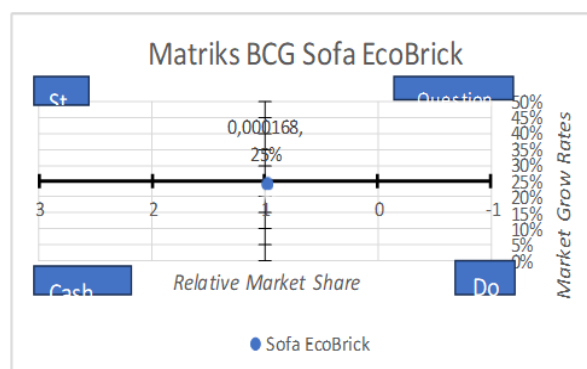


Figure 5 HMTI Ecobrick Sofa

2. Round Stool Sofa

Based on the results of *BCG* analysis on hmti ecobrick sofas, it was found that the market growth was 17.4%% and the market share was around (0.0012). The results of the *BCG* matrix calculation were obtained, namely the Round Stool Sofa company with competitors (HMTI Ecobrick Sofa, Round Stool Sofa, and Rottan Gentong Sofa) located in the *DOG* position. This *DOG* condition is a situation that shows the position of a company in a condition of low market share and market growth.

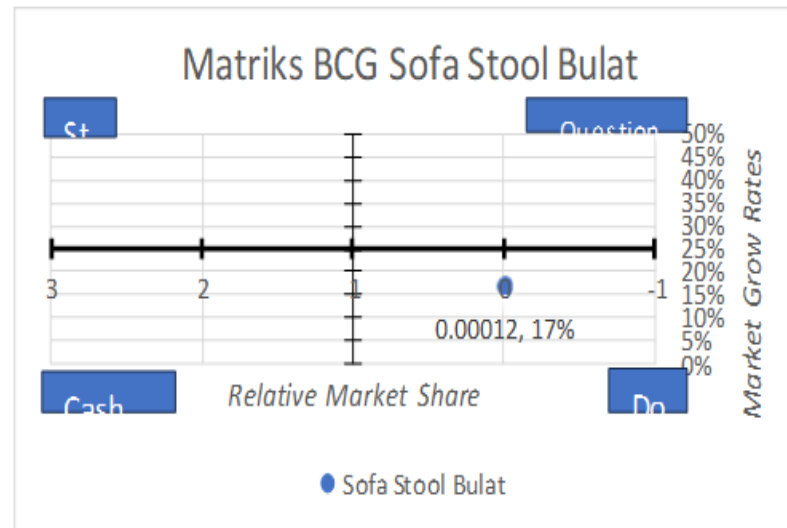
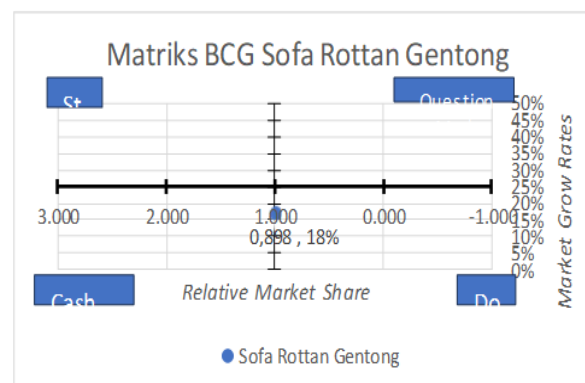


Figure 6 Round Stool Sofa

This condition indicates that the flow of funds or *cashflow* is in a weak state. In a position like this, the Sofa Stool Bulat company must decide to strengthen the existing division by carrying out an intensive strategy in the form of developing product innovations or features. So, being able to compete with other *competitors*.

3. Sofa Rottan Gentong



Picture 7 Rottan Gentong Sofa

Based on the results of *BCG* analysis on hmti ecobrick sofas, it was found that the market growth was 17.5% and the market share was around (0.298). The results of the *BCG* matrix calculation were obtained, namely the Rottan Gentong Sofa company with competitors (HMTI Ecobrick Sofa, Round Stool Sofa, and Rottan Gentong Sofa) located in the *DOG* position. *This DOG* condition is a situation that shows the position of a company in a condition of low market share and market growth.

This condition indicates that the flow of funds or *cashflow* is in a weak state. In a position like this, the Rottan Gentong Sofa company must decide on a decision to strengthen the existing division by carrying out an intensive strategy in the form of developing product innovations or features. So, being able to compete with *other competitors*.

Level of Customer Interest

1. Sofa Ecobrick HMTI

Keinginan Pelanggan	CI
I. Faktor 1 (Dimensi Tangibles)	
Desain/penampilan produk sofa ecobrick HMTI (V1)	3.57
Ukuran Sofa Ecobrick HMTI (V2)	3.71
Kekuatan dan ketahanan dari Sofa Ecobrick HMTI (V3)	3.94
II. Faktor 2 (Dimensi Responsivness)	
Pengaruh harga Sofa Ecobrick HMTI (V4)	3.93
Pengaruh merek/reputasi Sofa Ecobrick HMTI (V5)	3.85
III. Faktor 3 (Dimensi Reability)	
Kemudahan dalam mendapatkan Sofa Ecobrick HMTI (V6)	3.85
Kualitas bahan dari Sofa Ecobrick HMTI (V7)	4.03
IV. Faktor (Dimensi Empathy)	
Kenyamanan saat menggunakan Sofa Ecobrick HMTI (V8)	3.82
Sofa Ecobrick HMTI multi fungsi (V9)	3.98
V. Faktor 5 (Dimensi Assurance)	
Ada garansi Sofa Ecobrick HMTI (V10)	3.96

Figure 8 HMTI Ecobrick Sofa

Based on Figure 8 (Table of Customer Interest Levels of Important HMTI Ecobrick Sofa) shows that the highest CI value is in the customer's desire for the "3 Dimension *Reability* Factor", namely the material quality level of the HMTI Ecobrick Sofa (V7) with a CI value of 4.03. Meanwhile, the lowest CI value in Figure 7 is 3.57. This value is owned by the "Factor 1 Dimension *Tangibles*", namely the design/appearance of the HMTI Ecobrick Sofa (V1) product.

2. Round Stool Sofa

Keinginan Pelanggan	CI
I. Faktor 1 (Dimensi Tangibles)	
Desain/penampilan produk sofa Stool Bulat (V1)	3.82
Ukuran Sofa Stool Bulat (V2)	3.96
Kekuatan dan ketahanan dari Sofa Stool Bulat (V3)	3.91
II. Faktor 2 (Dimensi Responsivness)	
Pengaruh harga Sofa Stool Bulat (V4)	3.93
Pengaruh merek/reputasi Sofa Stool Bulat (V5)	3.96
III. Faktor 3 (Dimensi Reability)	
Kemudahan dalam mendapatkan Sofa Stool Bulat (V6)	4.10
Kualitas bahan dari Sofa Stool Bulat (V7)	4.03
IV. Faktor (Dimensi Empathy)	
Kenyamanan saat menggunakan Sofa Stool Bulat (V8)	3.89
Sofa Stool Bulat multi fungsi (V9)	3.98
V. Faktor 5 (Dimensi Assurance)	
Ada garansi Sofa Stool Bulat (V10)	4.06

Figure 9 Round Stool Sofa

Based on Figure 9 (Table of Customer Interest Levels of *Customer of Important Round Sofa Stool*) shows that the highest CI value is in the customer's desire for the "3 Dimension *Reability* Factor", which is the level of ease of obtaining a Round Sofa Stool (V6) with a CI value of 4.10. Meanwhile, the lowest CI value in Figure 8 is 3.82. This value is owned by the "Factor 1 Dimension *Tangibles*", namely the design/appearance of the Round Stool Sofa (V1) product.

3. Sofa Rottan Gentong

Based on Figure 10 (Table of Customer Interest Levels of Rottan Gentong Sofa) shows that the highest CI value is in the customer's desire for "Factor 1 *Tangibles* Dimension", which is the level of ease of getting the Rottan Gentong Sofa (V1) with a CI value of 4.59. Meanwhile, the lowest CI value in the table above is 3.98. This value is owned by the "Factor 2 Dimension of *Responsiveness*", which is the influence of the price of the Rottan Gentong Sofa (V4).

Product Position Value and Competitor Products

Based on the table above (Product Position and Competitor Value) for the CI value of HMTI Ecobrick Sofa is in the range of three commas (3,...). With the highest CI value of 4.03 and the lowest CI value of 3.57. Based on this data, it can be interpreted that HMTI Ecobrick Sofa focuses its products on the Reability Dimension more specifically on the quality of the material of the sofa product (V7). Meanwhile, for the design/appearance of HMTI Ecobrick Sofa products is the lowest focus. The CI value of the Round Stool Sofa is

in the average range of three points (3,...). With the highest CI value of 4.10 and the lowest CI value of 3.82. Based on this data, it can be interpreted that the Round Stool Sofa focuses its products on the Reability Dimension more firmly on the ease of getting the sofa product (V6). Meanwhile, the focus is the lowest for the design/appearance of the Round Stool Sofa product. The CI value of the Rottan Gentong Sofa is in the average range of four points (4,).

Keinginan Pelanggan	CI
I. Faktor 1 (Dimensi Tangibles)	
Desain/penampilan produk sofa Rottan Gentong (V1)	4.59
Ukuran Sofa Rottan Gentong (V2)	4.21
Kekuatan dan ketahanan dari Sofa Rottan Gentong (V3)	4.28
II. Faktor 2 (Dimensi Responsivness)	
Pengaruh harga Sofa Rottan Gentong (V4)	3.98
Pengaruh merek/reputasi Sofa Rottan Gentong (V5)	4.19
III. Faktor 3 (Dimensi Reability)	
Kemudahan dalam mendapatkan Sofa Rottan Gentong (V6)	4.09
Kualitas bahan dari Sofa Rottan Gentong (V7)	4.33
IV. Faktor (Dimensi Empathy)	
Kenyamanan saat menggunakan Sofa Rottan Gentong (V8)	4.47
Sofa Rottan Gentong multi fungsi (V9)	4.20
V. Faktor 5 (Dimensi Assurance)	
Ada garansi Sofa Rottan Gentong (V10)	4.10

Picture 10 Rottan Gentong Sofa

Customer of Needs	Posisi		
	Sofa Ecobrick HMTI	Sofa Stool Bulat	Sofa Rottan Gentong
I. Faktor 1 (Dimensi Tangibles)			
Desain/penampilan produk sofa (V1)	3.57	3.82	4.59
Ukuran produk sofa (V2)	3.71	3.96	4.21
Kekuatan dan ketahanan dari produk sofa (V3)	3.94	3.91	4.28
II. Faktor 2 (Dimensi Responsivness)			
Pengaruh harga sofa (V4)	3.93	3.93	3.98
Pengaruh merek/reputasi sofa (V5)	3.85	3.96	4.19
III. Faktor 3 (Dimensi Reability)			
Kemudahan dalam mendapatkan produk sofa (V6)	3.85	4.10	4.09
Kualitas bahan dari produk sofa (V7)	4.03	4.03	4.33
IV. Faktor (Dimensi Empathy)			
Kenyamanan saat menggunakan produk sofa (V8)	3.82	3.89	4.47
Produk sofa multi fungsi (V9)	3.98	3.98	4.20
V. Faktor 5 (Dimensi Assurance)			
Ada garansi produk sofa (V10)	3.96	4.06	4.10

Figure 11 Product Position Value and Unique and Minimalist Sofa Competitor Products

With the highest CI value of 4.59 and the lowest CI value of 3.98. Based on this data, it can be interpreted that Sofa Rottan Gentong focuses its products on the Tangibles Dimension more specifically on the design/appearance of the Sofa (V1) product. Meanwhile, for the influence of the price of Rottan Gentong Sofa products, it is the lowest focus. Based on table 4.2.4, broadly speaking, the HMTI Ecobrick Sofa and Round Stool

Sofa have the lowest focus on the design/appearance of the sofa product (V1). From the table, we can know and understand that each unique and minimalist sofa competitor has a different position of the highest and lowest CI values. This can also be interpreted that each company (HMTI Ecobrick Sofa, Round Stool Sofa, and Rottan Gentong Sofa) has a focus on attracting different customers or customers. So, the company's focus on the aspect of customer desire in each company is different. This was obtained from the results of a survey analysis of the distribution of questionnaires on customer desires for unique and minimalist sofas.

The value of product position analysis and competitors of HMTI Ecobrick Sofa for attributes for the design/appearance of sofa products (3.57), sofa size (3.71), strength and durability of the sofa (3.94), influence of sofa price (3.93), influence of sofa brand/reputation (3.85), ease of getting a sofa (3.85), quality of sofa materials (4.03), comfort when using the sofa (3.82), multifunctional sofa (3.98), sofa warranty tone (3.96). For Round Stool Sofa on the design/appearance attributes of the sofa product (3.82), sofa size (3.96), strength and durability of the sofa (3.91), influence of sofa price (3.93), influence of sofa brand/reputation (3.96), ease of getting a sofa (4.10), quality of sofa materials (4.03), comfort when using the sofa (3.89), multifunctional sofa (3.98), and sofa warranty tone (4.06). And for Rottan Gentong Sofa on the attributes of the design/appearance of the sofa product (4.59), the size of the sofa (4.21), the strength and durability of the sofa (4.28), the influence of the price of the sofa (3.98), the influence of the brand/reputation of the sofa (4.19), the ease of getting a sofa (4.09), the quality of the sofa material (4.33), the comfort when using the sofa (4.47), the multifunctional sofa (4.20), and the warranty tone of the sofa (4.10).

Product Position Value and Competitor Products

Based on the table above (Product Position Value and Competitor Products) for the HMTI Ecobrick Sofa symbolized by the symbol (+) ranges from the value of position three (3), which is the category "NORMAL", for the Round Stool Sofa symbolized by the symbol (x) ranges from the value of position three (3), which is the category "NORMAL", and for the Rottan Gentong Sofa symbolized by the symbol (-) ranges from the value of position four (4), namely the "GOOD" category. Meanwhile, for the range of position value three (3), namely the "USUAL" category. Based on this, we can find out that the average value of the highest position is on the Rottan Gentong Sofa compared to the other

two sofas (HMTI Ecobrick Sofa and Round Stool Sofa). This can also be interpreted that customers or customers put the highest desire on the Rattan Gentong Sofa.

NILAI POSISI PRODUK DAN PRODUK PESAING						
		Nilai Posisi				
		+ : Sofa Ecobrick HMTI		5 = Sangat baik		
		x : Sofa Stool Bulat		4 = Baik		
		- : Sofa Rattan Gentong		3 = Biasa		
				2 = Tidak baik		
				1 = Sangat tidak baik		
		5	4	3	2	1
TCP	Desain/penampilan produk sofa (V1)		(-)	(+)(x)		
	Ukuran produk sofa (V2)		(-)	(+)(x)		
	Kekuatan dan ketahanan dari produk sofa (V3)		(-)	(+)(x)		
RSP	Pengaruh harga sofa (V4)			(+)(x)(-)		
	Pengaruh merek/reputasi sofa (V5)		(-)	(+)(x)		
RB	Kemudahan dalam mendapatkan produk sofa (V6)		(-) (x)	(+)		
	Kualitas bahan dari produk sofa (V7)		(x) (-) (+)			
EMP	Kenyamanan saat menggunakan produk sofa (V8)		(-)	(+)(x)		
	Produk sofa multi fungsi (V9)		(-)	(+)(x)		
ASS	Ada garansi produk sofa (V10)		(-) (x)	(+)		

Figure 12 Product Position Value and Unique and Minimalist Sofa Competitor Products

Correlation Matrix

Factor 1 (*tangibles dimension*) about product design/appearance, there are 3 relationships of customer desires, namely in the design/appearance of products that have a strong relationship with results (32.13), product size that has a moderate relationship with results (10.71) and product strength and durability with results (3.57). Factor 3 (*reability dimension*) about the ease of obtaining products there are 3 relationships of customer desires, namely the ease of obtaining products that have a strong relationship with results (34.65), the influence of product prices that have a moderate relationship with value (10.71) and multifunctional sofa products that have a weak relationship with value (3.85). Factor 5 (*assurance dimension*) about product warranty there are 3 relationships of customer desires, namely product warranty which has a strong relationship with results (35.64), quality of sofa products which have a moderate relationship with results (10.71), and product design/appearance which has a weak relationship (3.96).

Based on the correlation matrix of customer desires with technical characteristics, the diagonal matrix of correlation of customer desires with strong technical characteristics is obtained. As in the value in BOLD. The diagonal of the strong matrix is obtained and the result of multiplication between the average value of customer desire and the number 9 (a strong indicator). The number 9 is used for matrices that have a strong relationship between customer desires and customer technical characteristics. For example, the stronger the technical characteristics of the design/appearance of the sofa product, the stronger the

customer's desire for the design/appearance of the sofa product. Likewise with other technical characteristics and customer desires. The correlation matrix values of the HMTI Ecobrick Sofa are as follows: product design/appearance (32.13); sofa product size (33.39); strength and durability of sofa products (35.46); the influence of sofa prices (35.37); brand influence/reputation of sofas (34.65); ease of obtaining sofa products (34.65); the quality of materials from sofa products (36.27); multifunctional sofa products (35.82); and sofa product warranty (35.64).

Matriks Hubungan Keinginan Pelanggan dengan Karakteristik Teknis												
SOFA ECOBRICK HMTI												
Karakteristik Teknis Keinginan Pelanggan		Tingkat Kepentingan Pelanggan	TGP			RSP		RB		EMP		ASS
			Desain/penampilan produk sofa	Ukuran produk sofa	Kekuatan dan ketahanan dari produk sofa	Pengaruh harga sofa	Pengaruh merek/reputasi sofa	Kemudahan dalam mendapatkan produk sofa	Kualitas bahan dari produk sofa	Kenyamanan saat menggunakan produk sofa	Produk sofa multi fungsi	Ada garansi produk sofa
TGP	Desain/penampilan produk sofa	3.57	32.13	10.71	3.57	10.71	10.71	3.57	10.71	10.71	10.71	3.57
	Ukuran produk sofa	3.71	11.13	33.39	11.13	11.13	3.71	11.13	3.71	11.13	11.13	3.71
	Kekuatan dan ketahanan dari produk sofa	3.94	3.94	11.82	35.46	11.82	11.82	3.94	11.82	11.82	3.94	11.82
RSP	Pengaruh harga sofa	3.93	11.79	11.79	11.79	35.37	11.79	3.93	11.79	3.93	3.93	3.93
	Pengaruh merek/reputasi sofa	3.85	11.55	11.55	3.85	11.55	34.65	3.85	3.85	11.55	11.55	3.85
RB	Kemudahan dalam mendapatkan produk sofa	3.85	3.85	11.55	3.85	3.85	3.85	34.65	3.85	3.85	3.85	3.85
	Kualitas bahan dari produk sofa	4.03	12.09	4.03	12.09	12.09	4.03	4.03	36.27	12.09	4.03	12.09
EMP	Kenyamanan saat menggunakan produk sofa	3.82	11.46	11.46	11.46	3.82	11.46	3.82	11.46	34.38	3.82	11.46
	Produk sofa multi fungsi	3.98	11.94	11.94	3.98	3.98	11.94	3.98	3.98	3.98	35.82	3.98
ASS	Ada garansi produk sofa	3.96	3.96	3.96	11.88	3.96	3.96	3.96	11.88	11.88	3.96	35.64

Benchmarking

Karakteristik Teknis Keinginan Pelanggan		Tingkat Kepentingan Pelanggan	TGP			RSP		RB		EMP		ASS
			Desain/penampilan produk sofa	Ukuran produk sofa	Kekuatan dan ketahanan dari produk sofa	Pengaruh harga sofa	Pengaruh merek/reputasi sofa	Kemudahan dalam mendapatkan produk sofa	Kualitas bahan dari produk sofa	Kenyamanan saat menggunakan produk sofa	Produk sofa multi fungsi	Ada garansi produk sofa
Banchmarking	Sofa Ecobrick HMTI	1	+	+	+	-	+	+	+	-	+	-
	Sofa Stool Bulat	2	-	+	-	+	+	-	-	+	-	+
	Sofa Rottan Gentong	3	-	+	+	-	+	+	+	+	-	+

Figure 14 Bancmarkig Unique and Minimalist Sofa

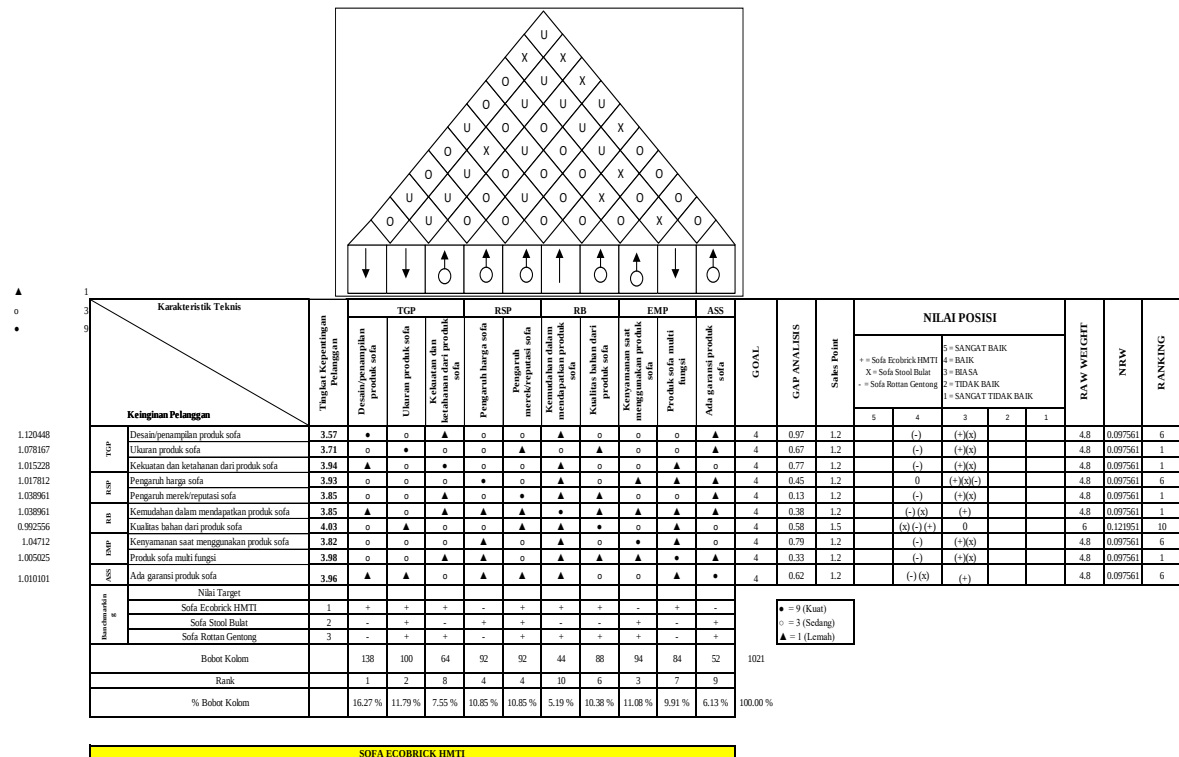
Based on Figure 14 of the Banchmarking, it is informed that the HMTI Ecobrick Sofa, Round Stool Sofa, and Rottan Gentong Sofa are at different points in each existing

factor. The HMTI Ecobrick Sofa in design got a score of 4, the Round Stool Sofa got a score of 3, and the Rottan Gentong Sofa got a score of 3. For the *Responsiveness dimension* (brand influence/reputation of the sofa), the HMTI Ecobrick Sofa received a score of 3 (-), the Round Stool Sofa received a score of 4 (+), and the Rottan Gentong Sofa received a score of 3 (-). For the *Realible dimension* (the quality of the material of the sofa product), the HMTI Ecobrick Sofa got a score of 4 (+), the Round Stool Sofa got a score of 3 (-), and the Rottan Gentong Sofa got a score of 4 (+). For the *Emphaty dimension* (multifunctional sofa product), the HMTI Ecobrick Sofa got a score of 4 (+), the Round Stool Sofa got a score of 3 (-), and the Rottan Gentong Sofa got a score of 3 (-). For the *Assurance dimension* (There is a warranty for sofa products) the HMTI Ecobrick Sofa gets a score of 3 (-), the Round Stool Sofa gets a score of 4 (+), and the Rottan Gentong Sofa gets a score of 4 (+). As well as the symbol provision, where the symbol (+) is for the value of 4. The symbol (-) is for a value of less than 3. In this benchmarking analysis, for HMTI Ecobrick Sofa in the design/appearance attributes of the sofa product (+), sofa size (+), strength and durability of the sofa (+), influence of sofa price (+), influence of sofa brand/reputation (-), ease of getting sofa (+), quality of sofa material (+), comfort when using sofa (+), multifunctional sofa (-), sofa warranty tone (+). For Round Stool Sofa on the design/appearance attributes of the sofa product (-), sofa size (+), strength and durability of the sofa (-), influence of sofa price (+), influence of sofa brand/reputation (+), ease of getting sofa (+), quality of sofa material (-), comfort when using sofa (-), multifunctional sofa (+), and sofa warranty tone (+). And for Rottan Gentong Sofa product design/appearance (-), sofa size (+), strength and durability of the sofa (+), influence of sofa price (-), influence of sofa brand/reputation (+), ease of getting sofa (+), quality of sofa material (+), comfort when using sofa (+), multifunctional sofa (-), sofa warranty tone (+).

House Of Quality (HOQ) Matrix

The "*Goal*" column contains the determination of the level of *customer performance* aimed at finding out consumer needs. *Performance goals* are expressed by the level of *performance*. Based on the results of data processing obtained, there are customer desires that will be used as targets for development. These desires are the design/appearance of the sofa product, the size of the sofa product, the strength and durability of the sofa product, the influence of the sofa price, the influence of the sofa brand/reputation, the ease of obtaining sofa products, the quality of the materials of the

sofa product, the multifunctional sofa product, there is a sofa warranty. This can be seen from the highest goal value, which is 4 (four) which means important for HOQ.



From the results of data processing that has been carried out on the Ecobric HMTI sofa, there are several customer desires that will be targeted for its development, including the influence of product brand/reputation (4), product material quality (4), comfort when using the product (4), and multi-function product (4), product design/appearance (4), sofa product size (4), strength and durability (4), the influence of price (4), the ease of obtaining products (4) and the existence of product warranties (4). This can be seen from the highest goal value of 4 which means important in the *House Of Quality* (HOQ).

In the data processing of the Ecobric HMTI Sofa, there are several superior attributes that are better than the products on the market today, including the influence of the brand/product reputation (0.13), the quality of the material of the product (0.58), the comfort when using the product (0.82), the multi-function of the product (0.79), the design/appearance of the product (0.97), the size of the sofa product (0.67), the strength and durability of the product (0.77), the influence of the product price (0.45), Ease of getting products (0.78), and product warranty (0.62). This can be seen from the positive value in the *House Of Quality* (HOQ) analysis gap.

Based on the results of the data processing that has been carried out, there are several points about customer desires, namely the quality of the material of sofa products by 1.5. As for the design/appearance of sofa products (1.2), the size of sofa products (1.2), the strength and durability of sofa products (1.2), the influence of sofa prices (1.2), the influence of sofa brands/reputation (1.2), the ease of getting sofa products (1.2), the comfort when getting sofa products (1.2), multi-functional sofa products (1.2), and there is a sofa product warranty of (1.2). This can be seen from the highest goal value of 4 which means very important in the *House of Quality*.

In the processing of ecobrick sofa data, there are 9 attributes that must be improved in the design/appearance of the product (1.12), product size (1.07), product strength and durability (1.01), influence of sofa price (1.01), ease of obtaining products (1.03), product warranty (1.01), influence of product brand/reputation (1.03), comfort when using the product (1.03), and multi-functional product (1.005) with a value of >1 . While 1 other attribute such as the quality of the material of the product (0.99) with a value of < 1 , so there is no need for changes.

Based on the results of *the Raw Weight (RW)* on the HMTI Ecobrick Sofa, it was obtained that were the design/appearance of the sofa product (4.8), the size of the sofa product (4.8), the strength and durability of the sofa product (4.8), the influence of the brand/reputation of the sofa (4.8), the comfort when getting the sofa product (4.8), the multi-functional sofa product (4.8), the ease of getting the sofa product (4.8), the influence of the price of the sofa (4.8), and there is a warranty for the sofa product (4.8). As for the quality of the material of the sofa product is (6).

Based on the results of *the Normal Raw Weight (NRW)* on the HMTI Ecobrick Sofa, the design/appearance of the sofa product (0.09), the size of the sofa product (0.09), the strength and durability of the sofa product (0.09), the influence of the brand/reputation of the sofa (0.09), the comfort when getting the sofa product (0.09), the multi-functional sofa product (0.09), the ease of getting the sofa product (0.09), the influence of the price of the sofa (0.09), and there is a warranty of the sofa product (0.09). As for the quality of the material of the sofa product is (0.12).

Based on the results of the calculation of the RW value, where the size of the RW value affects the NRW ranking which is also likely to be influenced by the goal value, gap analysis, and sales point. For the largest ranking, namely with a value of 10, there is an attribute of material quality of sofa products where the NRW value is (0.12). Meanwhile,

the sixth rank is in the attributes of the design/appearance of the sofa product, the influence of the price of the sofa, comfort when using the sofa product, and the warranty tone of the sofa product. With the value of each NRW is (0.097). The first rank is found in the attributes of sofa product size, strength and durability of sofa products, influence of sofa brand/reputation, ease of obtaining sofa products, and multifunctional sofa products with an NRW value of (0.097).

The company's desire for consumers is on factor 1 (*tangibles* dimension) of product design/appearance with a column weight of (138) and a column weight percentage of (16.27%), in factor 2 (*responsive* dimension) on the influence of product price with a column weight of (92) and with a column weight percentage of (10.85%), in factor 3 (*reabilty* dimension) Ease of obtaining product products with a column weight of (44) and with a column weight percentage (7.55%) on factor 4 (*empathy* dimension) Comfort when using product products with a column weight of (94) and with a column weight percentage of (11.08%), and factor 5 (assurance dimension) on product warranty products with a column weight of (52) and with a column weight percentage by (6.03%). It can be concluded that the smallest percentage is in the warranty of sofa products will be made a priority by the company.

Based on the results of the calculation of column weights obtained from the results of summing on each value of the relationship between technical characteristics and customer desires, where the largest and smallest column weight values are obtained. The largest column weight is in the design/appearance of sofa products (138) and the percentage (16.27%) with the first ranking. Meanwhile, the value of the smallest column weight is in the attribute of ease of obtaining products (44) and the percentage (5.19%), and the ranking is in tenth place. This, of course, affects the company's decision to decide which attributes are the biggest focus for product improvement and development. In the HMTI Ecobrick Sofa HOQ matrix, companies must focus on the design/appearance of the sofa product. This is because customers put the highest desire on these attributes. However, companies should not ignore the attribute of convenience in getting sofa products, even though this attribute is in the largest ranking position, which is 10.

CONCLUSION

Based on the results of data processing that has been carried out in the study, it is concluded that:

1. Data adequacy tests are needed to ensure that the data that has been collected and presented in the report is objectively sufficient. Data adequacy testing is carried out based on statistical concepts, namely the level of accuracy and level of confidence. The effect of the level of rigor and confidence is that the higher the level of precision and the greater the level of confidence, the more measurements are required.
2. *Boston Consulting Group (BCG)* is a chart created by Bruce D. Henderson of *Boston Consulting Group* in 1970 to help companies analyze their various business units or product lines. The matrix is divided into market sections and four quadrants, namely stars, Dairy Cows, Questions and Dogs. Understanding where each product or business unit stands in the *BCG* Matrix quadrant helps companies make strategic decisions about resource allocation, investment, and product development.
3. Relationship matrix. This matrix determines the relationship between *the VOC* and *the SQC* and then translates it into a value that expresses the strength of the relationship (*impact*). *VOC* or *voice of customer* is a research or research method used to find and collect customer feedback on a business product or service. Meanwhile, *SQC* (*Statistical Quality Control*) is a method of quality control and improvement using statistical methods.
4. *House Of Quality (HOQ)* is a matrix to show the relationship between consumer needs and desires with technical engineering properties and find the causes. Thus, the company can adjust the needs and desires of these consumers to the design and service standards as well as the obstacles that may occur.

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BIBLIOGRAPHY

- Asih, H. M., & Fitriani, S. (2018). Preparation of Standard Operating Procedure (SOP) for Ecobrick Innovation Production. *Scientific Journal of Industrial Engineering*, 17(2), 144. <https://doi.org/10.23917/jiti.v17i2.6832>
- Fauzi, M., Sumiarsih, E., Adriman, A., Rusliadi, R., & Hasibuan, I. F. (2020). Community empowerment through ecobrick-making training as an effort to reduce plastic waste in Bunga Raya District. *Riau Journal of Empowerment*, 3(2), 87–96. <https://doi.org/10.31258/raje.3.2.87-96>
- Makmuri, M. K., & Zahri, A. (2016). Application Of The Quality Function Deployment (Qfd) Method In Locker Product Development. *Rapi XV National Symposium*, 162–169.
- Mamdudah, E. A., Kustini, S. M., M. Alwi, K. S., Hikamah, S. R., & Ichsan, M. T. (2023). Utilization of ecobrick plastic waste into bookshelves. *Dedication: Journal of Community Service*, 7(1), 21–30. <https://doi.org/10.31537/dedication.v7i1.1022>
- Mantika, F., Arifin, Z., Methalina Afma, V., Lecturer of the Industrial Engineering Study Program, S., Riau IslandsBatam Jl Batu Aji Baru, U., & Riau, K. (2017). Pengembangan Desain Poduk Bantal Sofa Untuk Memenuhi Kebutuhan Konsumen Dengan Metode Quality Function Deployment (Qfd) Di Cv Pili Pilo Indonesia Development Of Sofa Cushion Design To Meet Consumer Needs With Quality Function Deployment (Qfd) Method In Cv Pili Pilo Indonesia. *PROFICIENCY*, 5(2), 92–97.
- Mutia, P. (2022). *Product Planning and Design Practicum Research Report*.
- Sanjaya, O., & Mulyanti, D. (2023). Boston Consulting Group (Bcg) Matrix Analysis. *Journal of Economics, Business and Management*, 2(1), 146–153.
- Sugianto, A., Yuwono, N., & Satriawan, K. (2020). THE DESIGN OF STAIR CHAIRS USES THE QUALITY FUNCTION DEPLOYMENT METHOD. *Muara Journal of Science, Technology, Medicine and Health Sciences*, 4(2), 229. <https://doi.org/10.24912/jmstkik.v4i2.7968>
- Yusiyaka, R. A., & Yanti, A. D. (2021). Ecobricks are a smart and practical solution for plastic waste management. *Journal of Out-of-School Education*, 5(2), 68–74. <https://jurnal.unej.ac.id/index.php/JLC>
- Wahyuda, F. (2022). *Product Planning and Design Practicum Research Report*.