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Implementation of the kano method to assess level of customer satisfaction in the manufacture of custom chopper motor sparepart

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ABSTRACT

The development of two-wheeled motorcycles is very rapid in Indonesia, making the development of the modification industry, the aftermarket spare parts industry and also body repair. One of the modifications that is currently popular with consumers from young to old is the modification of custom chopper motorcycles. Custom chopper motorcycles are motorcycles with special designs that highlight the style and personality of the rider. The frame design is considered monotonous and boring. Encouraging people to create and design unique, strong and comfortable chopper frames to ride. The Kano method research optimized by Noriaki Kano aims to group attributes into categories based on consumer satisfaction assessments. To determine the level of customer satisfaction with the creation of new custom motorcycle frame designs, and implement the Kano method to meet consumer desires for custom chopper motorcycles. The results of the design research show that the frame design is based on the servqual dimension. The average level of importance based on the highest servqual dimension value is 8.76. With the knockdown system attribute on the frame, it provides security in the assembly process. While the average value of the level of importance based on each attribute, the highest attribute value is the knockdown frame that is made to be suitable as a frame with a value of 8.76. This means that the attribute is considered very important in consumer satisfaction with the product. In conclusion, the redesign of the frame provides results that are in accordance with what consumers want for the product.

Keywords: Kano; satisfaction level; voice of customer

1. INTRODUCTION

The development of two-wheeled motorcycles is very rapid in Indonesia. Based on the Central Statistics Agency (BPS) data from 2021. Two-wheeled motorcycle transportation ranks first in Indonesia with 121,209,304 units. The large number of two-wheeled motorcycle transportation has led to the development of the modification industry, the aftermarket spare parts industry and also body repair. Basically, two-wheeled motorcycles are currently useful for facilitating individual movement in supporting activities from one location to another. Apart from being a means of transportation, two-wheeled motorcycles are also used as a medium for channeling hobbies and art by modifying them [1]. One of the modifications that is currently popular with consumers from young to old is the custom chopper motorbike modification [2]. A custom chopper motorbike is a motorbike with a special design that highlights the style and personality of the rider [3]. Custom chopper motorbikes have distinctive characteristics, namely, a very long front suspension with a slim front wheel diameter, and the frame is the main component that determines the characteristics and performance of custom chopper motorbikes. However, the frame design is considered monotonous and boring [4], encourage people to create and design unique, strong and comfortable chopper frames to ride [5]

In designing a custom chopper frame, there are important aspects to consider, such as frame geometry, material and manufacturing process. From a technical perspective, emphasis is placed on

material strength analysis, safety factors, functionality and comfort. Cost and production time aspects are now closely related to economic aspects. Both of these aspects depend on the manufacturing and assembly process [6]. Therefore, before designing a custom chopper frame, it is necessary to have a design for the desired and required assembly [7]. Product shape is one of the factors that plays an important role in the industrial world. When consumers buy a product, they must consider the shape, size, color, material, and other supporting functions. Once they do not like the shape or supporting functions of a product, they will think twice about buying it [1]. Strict competition and rapid product development forces designers to be creative and understand consumer choices [2]. The degree of fit between product and consumer has become a determining factor in product value [3]. There have been many assembly methods. The canoe method is one of the survey or research techniques that can be used [8]. The Kano method research optimized by Noriaki Kano aims to group attributes into categories based on consumer satisfaction assessments [9]. The canoe method is also often used as a tool to determine customer needs [10]. Research on the use of the canoe method has been conducted by Galuh and Hari, who mentioned the results of the study with the additional design of a tent frame on a bicycle using the canoe method. The results showed that the tent was easy to install and comfortable to use [11]. Research on the use of the canoe method has been conducted by Zyahri and Purnomo, stating the results of the research on the development of trolley product design using the canoe method. Its greatest advantage is that it can go up and down stairs, equipped with brakes and additional properties as stairs. This system is expected to minimize the level of fatigue due to heavy loads [7].

Although the canoe method is considered very compatible, there are not many workshops that use this method to design custom chopper frames for two-wheeled motorcycles. Therefore, researchers are encouraged to conduct research on redesigning frames to meet consumer needs and also apply the canoe method to custom chopper motorcycle frames.

2. METHOD

This research was conducted at a motorcycle workshop in Sidoarjo. Setowration garage is a company engaged in motorcycle modification services and motorcycle spare parts. A total of five months were dedicated to the study from October 2022 to February 2023. Data collection methods are influenced by investigations and discussion materials regarding sources. Data collection methods through interviews, observations, and questionnaires [12]. To find out the characteristics of the product, data was collected through direct interviews with members of the custom motorcycle community. The questions include: 1. How consumers use separate custom frame custom products, 2. Problems when using the product, 3. Use of Criteria when purchasing the product, 4. The product includes new features, 5. What expectations do customers have, if the product changes.

Conducting direct observation data collection, by distributing questionnaires to 130 individual bicycle users who do Sunmori in Sidoarjo. With a 90% confidence level and 10% accuracy. Random data collection using the Sloven formula technique identified 56 respondents. Survey respondents are custom chopper bicycle users who like and enjoy every detail of their custom bicycles. Survey collection aims to collect data and grouping product attributes sourced from the Kano category. The two survey questions contain, the fulfillment of the desired attributes and the non-fulfillment of the desired attributes [9].

A. Sample

Conducting direct observation data collection, by distributing questionnaires to 130 individual bicycle users who do Sunmori in Sidoarjo. With a 90% confidence level and 10% accuracy. Random data collection using the Sloven formula technique identified 56 respondents. Survey respondents are custom chopper bicycle users who like and enjoy every detail of their custom bicycles. Survey collection aims to collect data and grouping product attributes sourced from the Kano category. The two survey questions contain, the fulfillment of the desired attributes and the non-fulfillment of the desired attributes [9].

B. Validity test

Validity testing is carried out to determine the extent to which the measuring instrument can measure what is to be measured, by comparing it with the provisions if r count > r table then the item is

declared valid. In this study n (number of samples) = 85, (a; 85-2), so the value of a = 85-2 = 83, with a significant level of α = 0.05 then the r-table is 0.220 (2-tailed) If the Pearson correlation value> the comparative value in the form of r-critical or r table, then the item is valid. Or if the Sig. (2-tailed) value <0.05 means the item is valid and vice versa. The following are the results of the validity test for each variable. The research instrument consists of 2 types of statements, namely functional and dysfunctional. The results of the functional statement validity test analysis can be seen in Table *1*.

Table 1. Validity test results

Question	r count	r table (two tailed)	Results
P1	0.543	0.220	Valid
P3	0.668	0.220	Valid
P5	0.579	0.220	Valid
P7	0.582	0.220	Valid
P9	0.643	0.220	Valid
P11	0.761	0.220	Valid
P13	0.538	0.220	Valid
P15	0.628	0.220	Valid
P17	0.564	0.220	Valid
P19	0.675	0.220	Valid
P21	0.780	0.220	Valid
P23	0.676	0.220	Valid

Table 2. Dysfunctional validity

Question	r count	r table (two tailed)	Results
P2	0.738	0.220	Valid
P4	0.842	0.220	Valid
P6	0.746	0.220	Valid
P8	0.713	0.220	Valid
P10	0.705	0.220	Valid
P12	0.797	0.220	Valid
P14	0.772	0.220	Valid
P16	0.814	0.220	Valid
P18	0.719	0.220	Valid
P20	0.765	0.220	Valid
P22	0.759	0.220	Valid
P24	0.670	0.220	Valid

Table 2 r product moment table is 0.220. It can be seen in the table above after the calculation with SPSS obtained valid results on the questions in the research instrument because the rCount result > 0.220 [9].

C. Reliability test

Reliability is done to determine the consistency of the measuring instrument in measuring the same symptoms. The requirement to state that the item is reliable is to see the results of the reliability test if each variable is>0.6, it means that the variable is reliable. This reliability test uses the Cronbach's alpha model because the answer alternatives are more than 3 choices. The test is carried out using the Cronbach's Alpha technique. The results of the reliability test can be seen in Table *3*.

Table 3. Results of functional question reliability tests [9].

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items	Remarks
,850	,855	12	Reliabel

The results of Table 3. Shows the Cronbach's Alpha value on each variable > 0.6 and all questions in the research questionnaire are declared reliable. The results of the Reliability Test on dysfunctional questions can be seen in Table *4*

Table 4. Results of the reliability test of functional dysfunctional questions [9].

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items	Remarks
,928	,929	12	Reliabel

The results of Table 4. It shows that the Cronbach's Alpha value for each variable is > 0.6 and all questions in the research questionnaire are declared reliable.

D Determining canoe categories

The first step taken to categorize service attributes into the Kano method is by determining the overall answer to the respondent's questionnaire based on the grouping of questions into functional and dysfunctional types of questions. The use of the Kano evaluation table in Table 5 is to group the attributes of each respondent.

Table 5. Canoe evaluation table

Consumer Needs		Dysfunctional				
		1 Like	2 Hope	3 Neutral	4 Tolerance	5 Do not like
Functional	1. Like	Q	A	A	A	O
	2. Hope	R	I	I	I	M
	3. Neutral	R	I	I	I	M
	4. Tolerance	R	I	I	I	M
	5. Tidak Suka	R	R	R	R	Q

When:

A = *Attractive*
M = *Must – be*
O = *One – dimensional*
R = *Reverse*
Q = *Questionable*
I = *Indifferent*

1 = Similar
2 = Hope
3 = Neutral
4 = Tolerance
5 = Do not like

E Research flow diagram

The following is a research flow diagram that explains the activities carried out during the research.

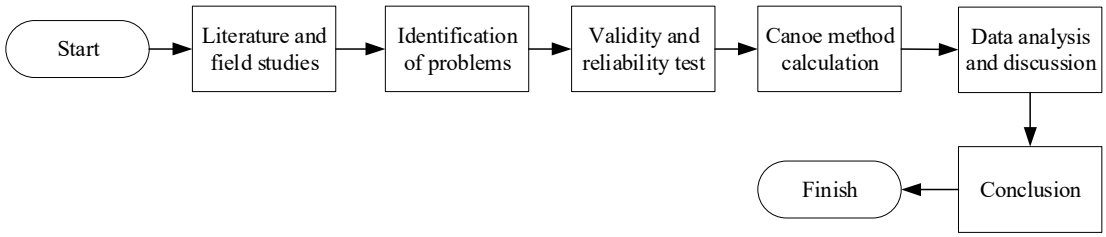

Figure 1. Research flow diagram

The flowchart of the research is as follows. 1) The completion symbol starts and the flow direction is towards. 2) Problem identification process, symbol of direction of flow towards. 3) Data Acquisition Process, 1 Validity test becomes a symbol of continuous assessment in the direction of flow to determine whether or not data is valid, 2. Reliability testing. Continue the direction of flow to the decision symbol to determine whether the data is trusted is Yes or No, and continue in the direction of flow towards. 4) Processing symbols for Kano method calculations. Continue in the direction of flow towards. 5) The process of analyzing and discussing symbol processing data,

continued in the direction of flow towards. 6) Conclusions and suggestions for symbol processing, continued in the direction of flow towards. 7) Terminator symbol completed

3. RESULTS AND DISCUSSION

How to collect data

Data were collected from field studies at the Setowration workshop. The data collected included the design of the chopper frame of two-wheeled motorcycles in general, the number of components installed on the frame, the materials and materials used in the chopper frame of two-wheeled motorcycles, and the level of safety during assembly. Based on the data obtained, an analysis was then carried out using the kano method.

Kano analyst

Kano analysis aims to reflect consumer and customer preferences. Each product is created with a pair of questions that include positive and negative questions. Questions that have a reaction relationship with respondents when a product is present, become positive questions. Conversely, if a question does not have a reaction relationship with respondents when a product is present, it becomes a negative question. The results of positive and negative questions are summarized in a contingency table containing respondents' answers to positive and negative questions. and each product is categorized into the Kano category [14].

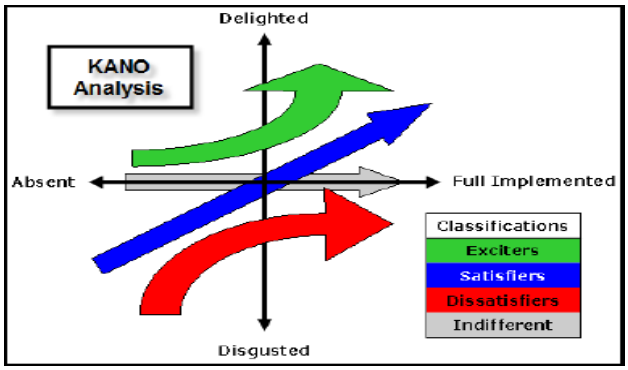

Figure 2. Kano analysis diagram.

Figure 2 research stages in the Kano method are as follows [15]: 1) Classify each respondent's answer, into the Kano method assessment. That is, there must be (M), very attractive (A), average (I), one dimension (O), opposite (R) or contradictory (question). 2) Calculate the results of satisfaction (ES), dissatisfaction (ED) on each attribute. The ES value is also ED stated as 0 and 1. Shows how much customer satisfaction increases if the function is provided (A&O). The level of dissatisfaction shows how much customer satisfaction decreases if the function is not provided (O&M). 3) Create a scatter diagram by setting the ES value on the vertical axis and the ED value on the horizontal axis, you can understand the position of each attribute and the strength of the attribute's influence on customer satisfaction or dissatisfaction. The Kano diagram has four quadrants. That is, always present (M), very attractive (A), so-so (I) and one dimension (O). 4) Apply the results of the Kano analysis based on the characteristics of service and facility changes. This corrective action generally helps the organization set goals for the Kano category. This means trying to meet all the required attributes, outperforming your competitors in one-dimensional attributes, and including compelling attributes that set you apart from your competitors.

Kano method has six categories, namely must be (M) which means consumers consider the existing attributes as a must to be fulfilled, one-dimensional (O) means if the attribute is added then consumer satisfaction will increase, attractive (A) this is a category where the level of customer satisfaction will increase very high according to the increase in attribute performance but the decrease in attribute performance does not affect the decrease in the level of consumer satisfaction, indifferent (I) is a neutral category, reserve (R) is a category where the attribute is removed or not provided then consumers will feel satisfied, questionable (Q) this is a category that indicates a question error. The first stage in the sixsigma process is define which is a stage to define the process

that will be discussed before determining the quality characteristics and other customer needs. In this phase, the purpose of the sixsigma project is determined. The results of the Kano evaluation are shown in Table 6.

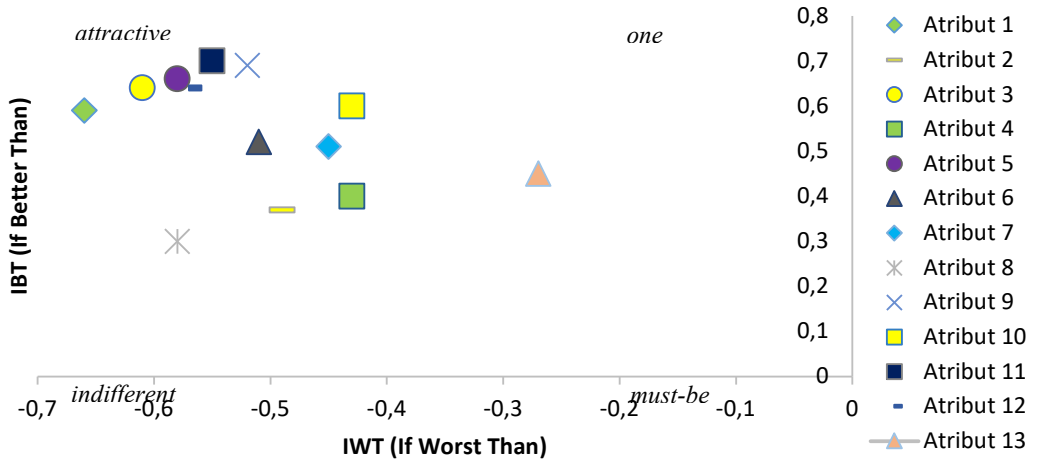

Figure 3. Satisfaction coefficient

Table 6. Coefficient of each attribute

No	Attribute	A	M	O	R	Q	I	IBT: $A+O$ $(A+O+M+I)$	IWT: $M+O$ $(A+O+M+I)$	Canoe Category
Durability										
1	The frame has good durability	13	7	26	0	0	10	0,69	-0,58	O
2	Besi plat yang ditambahkan pada strong frame	16	20	9	0	0	11	0,44	-0,51	M
3	Quality raw materials	16	17	23	0	0	10	0,69	-0,71	O
Aesthethic										
4	The frame has distinctive characteristics	9	13	12	0	0	22	0,37	-0,44	I
5	The frame has a suitable model Desire	14	10	24	0	0	8	0,66	-0,60	O
Comformance										
6	Additional pipes in the frame as appropriate for chopper frame	20	13	15	0	0	8	0,62	-0,51	A
7	Knockdown frames are made to be suitable for use as frames	20	16	14	0	0	17	0,61	-0,53	A
Performance										
8	Chopper frame has convenience dalam merangkainya	21	25	5	0	0	5	0,46	-0,53	M
9	Frame memiliki kenyamanan saat	22	10	17	0	0	7	0,69	-0,48	A

No	Attribute	A	M	O	R	Q	I	IBT: $A+O$ $(A+O+M+I)$	IWT: $M+O$ $(A+O+M+I)$	Canoe Category
Feature										
10	Knockdown can be applied on the chopper frame	20	15	15	0	0	6	0,62	-0,53	A
Perceived Quality										
11	Knockdown system on frame provides safety in the assembly process	20	10	21	0	0	5	0,73	-0,55	O
Service Ability										
12	Easy knockdown frame Fixed	24	11	3	0	0	18	0,48	-0,25	A

Table 7 shows that there are 4 categories of canoes, namely attractive, indifferent, must be and one dimensional. The attractive canoe category consists of 5 attributes, namely additional pipes on the frame are suitable for chopper frames, knockdown frames that are made are suitable for use as frames, frames are comfortable to use, knockdown systems on frames provide safety during assembly, knockdown frames are easy to repair. The indifferent canoe category consists of 1 attribute, namely frames that have distinctive characteristics. The must be canoe category consists of 2 attributes, namely iron plates added to strong frames and chopper frames that are easy to assemble. The one-dimensional canoe category consists of 4 attributes, namely frames that have good durability, quality raw materials, frames that have a model according to desire, and knockdown can be applied to chopper frames.

Table 7 shows that the product attribute value affects the level of satisfaction. The IBT (if better than) value indicates consumer satisfaction ranging from 0–1 and the IWT (if worse than) value indicates consumer dissatisfaction with a value of -1. The calculation results in Table 7 can be seen that the value in the IBT column (if better than) is the Y coordinate and the value in the IWT column (if worse than) is the X coordinate used in the Kano satisfaction coefficient as shown in Figure 3.

Table 7. Average level of importance

Level of importance of each attribute	Average importance level of each attribute	Level of importance based on servqual dimensions	Average level of importance based on servqual dimensions
Frame has good durability	8,28	Durability	7,28
Iron plate added to the frame is strong	5,28		
Quality raw materials	8,28		
Frame has distinctive characteristics	4,44	Aesthetic	6,18
Frame has a model according to your wishes	7,92		
Additional pipe on the frame is suitable for chopper frame	7,44	Conformance	8,1
The knockdown frame that is made is suitable to be used as a frame	8,76		
The chopper frame has the ease of assembling it 21	5,52	*Performance*	6,9
The frame has comfort when used	8,28		

Level of importance of each attribute	Average importance level of each attribute	Level of importance based on servqual dimensions	Average level of importance based on servqual dimensions
Knockdown can be applied to chopper frames	7,44	*Feature*	7,44
The knockdown system on the frame provides security during the assembly process	8,76	*Perceived Quality*	8,76
Knockdown frame is easy to repair	5,76	*Service Ability*	5,76

Table 3, the level of importance for each attribute and attribute grouping based on the servqual dimension can be seen. The average level of importance based on the servqual dimension, the highest value lies in perceived quality with the highest value, which is 8.76. This value contains attributes in it, namely the knockdown system on the frame provides security in the assembly process. This means that this attribute is considered the most important in consumer satisfaction with the product. While the average value of the level of importance based on each attribute, the highest value lies in the knockdown frame attribute that is made to be suitable as a frame with a value of 8.76.

The average value of the level of importance of each attribute is obtained in order of importance from the highest to the lowest, namely the knockdown frame that is made has suitability to be used as a frame (8.76), the knockdown system on the frame provides safety in the assembly process (8.76), the frame has good durability (8.28), quality raw materials (8.28), the frame is comfortable to use (8.28), the frame has a model according to desire (7.92), additional pipes on the frame are suitable for the chopper frame (7.44), knockdown can be applied to the chopper frame (7.44), the knockdown frame is easy to repair (5.76), the chopper frame is easy to assemble (5.52), the iron plate added to the frame is strong (5.28), the frame has distinctive characteristics (4.44). Meanwhile, the average value of the level of importance based on the servqual dimensions is obtained in the following order: perceived quality (8.76), conformance (8.1), features (7.44), durability (7.28), performance (6.9), aesthetics (6.18), service ability (5.76).

C. Frame recommendations

Figure 4. Old frame design

Figure 5. Desain Frame baru

Figure 6. Desain Frame baru

Figure 4, Figure 5 and Figure 6 redesign of the chopper frame, the frame design has a new innovation for consumers or customers. The chopper frame is added with a center bolt hole as a knockdown joint holder, as a binder for the chopper frame. Seen in the picture Frame between the iron plate and pipe joints. From the results of the redesign of this chopper frame, there is a new chopper frame where the chopper frame from the work of the Setowration workshop will be designed to become a custom knockdown chopper frame

4. CONCLUSION

The results of the research in the setowration workshop, the suggestions expected by the author to become new ideas or innovations where this product will help consumers or customers make the desired frame according to their wishes, the frame has comfort when used and the frame with a knockdown system provides safety during assembly. Based on the results of the canoe category, it can be seen that there are 4 categories of canoes, namely attractive, indifferent, must be and one dimensional. The attractive canoe category consists of 5 attributes, namely additional pipes on the frame are suitable for chopper frames, the knockdown frame that is made has suitability as a frame, the frame has comfort when used, the knockdown system on the frame provides safety during the assembly process, the knockdown frame is easy to repair. The indifferent canoe category consists of 1 attribute, namely the frame has distinctive characteristics. The must be canoe category consists of 2 attributes, namely iron plates added to the strong frame and the chopper frame is easy to assemble. The one dimensional canoe category consists of 4 attributes, namely the frame has good durability, quality raw materials, the frame has a model according to desire, knockdown can be applied to the chopper frame.

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