

QUALITY IMPROVEMENT THROUGH DESIGN AND MANUFACTURE OF TOTE BAG PROTOTYPES USING QUALITY FUNCTION DEPLOYMENT METHOD (CASE STUDY IN SMEs X)

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abstract

Every consumer wants a quality product. Likewise, consumer needs for quality tote bag products. A quality tote bag describes the suitability of the specifications of the tote bag with the needs and desires of consumers. Research to improve the quality of tote bag products was conducted at an MSME in Indonesia that sells tote bag products in one of the largest marketplaces in Indonesia. Based on the results of the initial data collection, information was obtained that the quality of the tote bag could still be improved. Therefore it is necessary to do research to produce a better tote bag design. The Quality Function Deployment (QFD) approach is used to improve the design and specifications of the tote bag product. The research began by gathering information from respondents regarding the needs and desires regarding the tote bag product. The needs and desires that have been identified will become the basis for the development of tote bag products using the House of Quality (HoQ) method. Through the design stages produced several concepts to be selected according to predetermined criteria. Two types of tote bag designs were prototyped to be assessed by consumers. The survey results prove that consumers prefer the newest tote bag product compared to the previous tote bag product.

Keywords: Consumer needs, HOQ, tote bag prototype.

INTRODUCTION

Product quality is a product's ability to perform its functions, that ability includes durability, reliability, accuracy, obtained by the product as a whole [1]. Every consumer must attach importance to the quality of products and services needed to meet the needs of his life. Quality is important because quality can increase the company's reputation, the opportunity to realize cost reduction, and be the key to gaining consumer loyalty. [2]

Quality improvement is also important because it can potentially be a source of increased income due to repeated purchases from loyal consumers, consumers also tend to be more tolerant of prices because they already believe in quality. [3] Meanwhile, if consumers already believe in the existence of good quality in the company, it will cause satisfaction for consumers where the end is also able to increase sales. [4]. Competition conditions are increasingly fierce and the increasing number of MSMEs causes MSME players to increasingly try to maintain the quality of their production. [5]. The use of existing quality control tools allows business actors to know which elements need special attention, such as raw materials, production processes [6]. Another method that is often used for quality improvement is the TQM (Total Quality Management) method. TQM begins with an understanding of consumer desires and consumer satisfaction [7]. However, the TQM method is considered less effective because it focuses too much on quality with less attention to other problems in the company. In contrast to the sig sigma method which is considered to be able to increase organizational understanding of consumers, improve performance by setting

targets, increase efficiency, encourage active employee participation and others. But besides that, there are challenges that must be faced such as lack of organizational understanding of the improvement opportunities provided, lack of manpower, and lack of involvement of organizational management in the implementation of the Six Sigma method. [8]. The QFD method provides a standard format for knowing consumer needs, can help the production or design process based on existing facts not just intuition. Although it takes a lot of time in making HOQ, the QFD method is considered good enough to be applied in MSMEs. [9].

UMKM X is a business located in West Jakarta engaged in garments that produce tote bag products that are marketed throughout Indonesia. The vision and mission of these MSMEs is to prioritize GO Green so that the use of plastic waste that is difficult to recycle can be reduced. This vision is in line with the obligation to use environmentally friendly shopping bags in shopping centers, convenience stores. This is regulated in DKI Jakarta Governor Regulation Number 142 of 2019 [10]. The company continues to innovate bag materials that were previously canvas fabrics into bag products that can be used instead of plastic bags. Based on careful observation, it can be seen that the resulting product has quite neat stitching, a cute and unique design, simple, and looks attractive. However, there are also differences in the color of the fabric and the size of the product and there are defects and fades in the image on the tote bag. In addition, tote bag products that do not have a zipper but are innovated by using adhesives in the middle. However, there are still very many consumers who complain and worry about luggage easily falling out of the bag due to not being completely closed. Therefore, it is necessary to design a tote bag that is able to answer more consumer needs.

RESEARCH METHODOLOGY

Product design based on consumer needs begins by extracting information from consumers, both positive and negative opinions and consumer expectations. Data collection using questionnaires. The needs and desires of consumers will be data referred to as the voice of customer and used to determine the scale of importance of consumer needs. Tote bag product specifications needed and desired by consumers will be mapped with the house of quality (HoQ). HoQ is the basis for determining the target specifications of tote bag products that will be remade product design. Furthermore, tote bag design, selection and comparison of competitor products are carried out both as concept drawings and materials to be used. The output of this research is a prototype tote bag that suits the needs and desires of consumers.

RESULTS AND DISCUSSION

The research questionnaire was filled out by 112 respondents. Questionnaire contains 9 codes that represent customer requirements and engineering specifications. The data obtained are first tested for adequacy, validity, and reliability. The test resulted in data meeting the requirements. The scale of importance on each need is presented in Table 1 below.

Table 1. Scale of Importance of Tote Bag Needs

Needs	Scale of Importance
Tote bag size	3
Safety tote bag	4
Tote bag aesthetics	2
Tote bag durability	5
Tote bag storage space	5
Tote bag strap adjustment	1

While the aspects considered in each of these needs are presented in Table 2.

Table 2. Aspects Considered on Every Need

Needs	Aspects to Consider
Tote bag size	The product is able to carry enough items for travel (Does not contain too few items)
Safety tote bag	Products are able to keep luggage safe when used (Do not fall or exit when carried)
Tote bag aesthetics	The product has attractive visuals both in terms of shape and color and design
Tote bag durability	Products are able to have strong durability for long periods of time and to carry certain loads
Tote bag storage space	Products are able to contain enough items to be used more efficiently
Tote bag strap adjustment	The product is able to adjust to the user's height so that when used the product is not too up or down so that the user is comfortable when using it

Making HoQ to map needs both in terms of consumers and in terms of producers. The compartment on the tote bag is a priority in designing new tote bag products, then followed by the material on the tote bag, then the zipper on the tote bag, adjustable strap, color choices, and image clarity. Next is the determination of target specifications as presented in Table 3.

Table 3. Target Product Specification Tote Bag

Needs	Metric	Solution	Unit	Size
Tote bag size	Products capable of loading luggage	Designed with standard tote bag size	cm	35x40
Safety tote bag	Products are able to keep luggage	Use of zipper as cover	Unit	1
Tote bag aesthetics	Products are attractively designed	Create unique designs and models	Subjective	Subjective
Tote bag durability	The product has strong and durable material	Use a thick canvas	Oz	10-12
Tote bag storage space	Products have compartments	Creating compartments	Subjective	Subjective
Tote bag strap adjustment	The product has an adjustable strap	Create an adjustable strap	Unit	1

The target specifications that have been obtained are used to determine the relationship between the needs of consumers and predetermined target specifications. After determining the relationship between product needs and specifications, the material used to make tote bag products will also be selected according to the aspects of their needs and presented in Table 4 below.

Table 4. Aspects of Tote Bag Component Material Requirements

Component	Material Requirements
Tote bag frame	Material that is able to withstand the weight of the entire product, and is strong
Zipper	Sturdy material and not easily broken
Adjustable strap	Strong material resists loads and is easy to adjust

The next design step is to make the tote bag concept design. The combination of existing concepts is presented in the illustration in Table 5.

Table 5. Tote Bag Product Concept Variants

Komponen	Aspek	Alternatif 1	Alternatif 2
Bahan	Kerangka	Kanvas	Katun
Bahan	Resleting	Metal	Coil
Bentuk	Penutup	Resleting	Kancing Magent
Bahan	Adjustable strap	Katun	Nilon
Bentuk	Adjustable strap	Kecil	Lebar

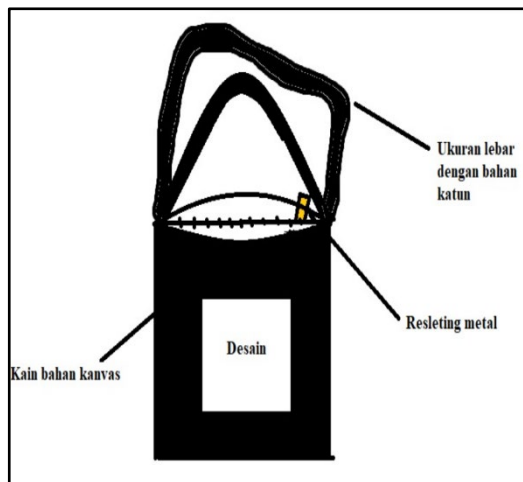


Figure 1. Variant 1

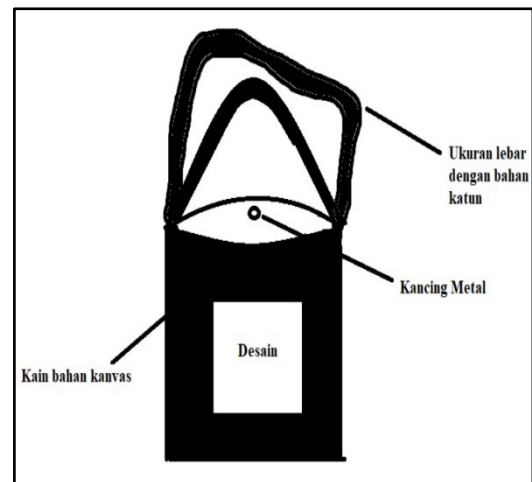


Figure 2. Variant 2

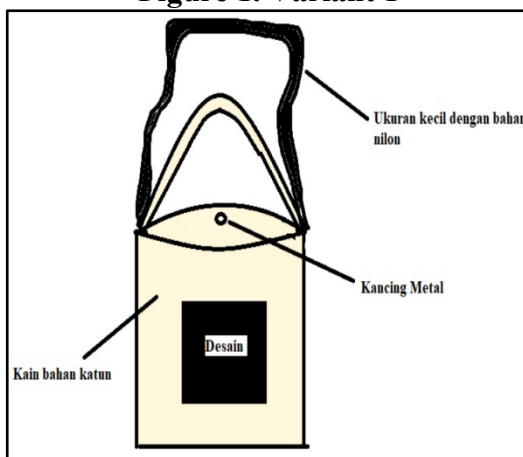


Figure 3. Variant 3

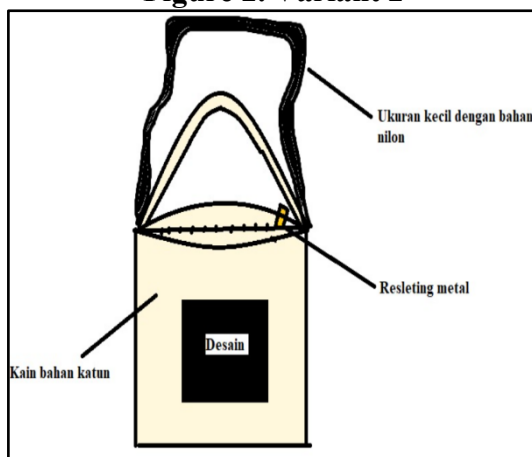


Figure 4. Variant 4

Concept variants 1, 2, and 4 were then re-selected based on predetermined weighting based on consumer needs through questionnaires. the results of the judging are presented in Table 6 below.

Table 6. Tote Bag Product Concept Variant Assessment

		Concept					
		Concept 1		Concept 2		Concept 4	
Selection Criteria	Weight	Rating	Rated Weight	Rating	Rated Weight	Rating	Rated Weight
Tote bag size	13,3	5	0,665	5	0,665	5	0,665
Safety tote bag	20	5	1	4	0,8	5	1
Tote bag aesthetics	6,7	4	0,268	4	0,268	4	0,268
Tote bag durability	33,3	5	1,665	5	1,665	4	1,332
Tote bag storage space	26,7	4	1,068	4	1,068	4	1,068
Penyesuaian tali tote bag	0	4	0	4	0	3	0
	Total Value	4,666		4,466		4,333	
	Level	1		2		3	
	Continue?	Yes		No		No	

The first concept variant is a selected tote bag product concept variant and will be continued at the prototype manufacturing stage. Tote bag prototypes are again asked to be assessed by consumers through questionnaires. Here's the prototype tote bag designed.



Figure 5. Black Color with Zipper



Figure 6. Black Color with Buttons



Figure 7. White Color with Zipper



Figure 8. White Color with Buttons

Various efforts are being made to reduce the use of plastic bags as grocery containers. For the DKI area, this is regulated in DKI Jakarta Governor Regulation Number 142 of 2019 [10]. Therefore, it is necessary to choose the choice of grocery container bags for consumers so that consumers are interested in moving from plastic bags to bags of environmentally friendly materials. Important criteria of a bag that can affect consumers include price, attractive design, capacity, security of luggage etc. need to be extracted from consumers either through direct interviews or indirect data mining.

This research aims to obtain a quality tote bag design. Therefore, the stage starts from collecting data on consumer needs. Based on the questionnaire that has been distributed, it was found that there are several needs in the design of the bag, namely size, security, aesthetics, durability, storage space, and adjustment of the strap on the tote bag. In the bag to be designed, ergonomic aspects are needed that can support comfort and ease when using it [18].

Needs are ranked so that only a few needs are implemented in the bag design, namely security, adjustable straps and bag size. The variant of the tote bag product concept from the design is then selected based on predetermined criteria. The concept assessment process is one of the stages at the concept development stage [17]. The final concept chosen is concept 1 with the highest value in 1st place of 4,666, namely a tote bag with canvas material, a zipper made of metal, an adjustable strap made of cotton with a wide strap size. But as a comparison so that consumers have a choice, it was decided to make a prototype of 4 pieces of beige and black bags and safety zippers and snap buttons. Consumers were again asked for their opinions on the prototype of the bag. Based on the results of questionnaires related to satisfaction with newly designed tote bag products, a response was obtained that consumers were more satisfied with the newly designed tote bag products. The bag strap that can be adjusted according to anthropometry and user wishes provides a sense of comfort when using the bag [19]. For further development, the image installed on the tote bag also needs attention and is adjusted to the characteristics of the business or product sold. For the sale of bags in general, it is recommended that pictures or writing on the tote bag contain an invitation to the public. In order for the bag to still have price competitiveness with similar bag products, it is necessary to conduct a financial analysis of making the tote bag.

CONCLUSION

Product considerations or attributes needed in designing tote bags are the safety of luggage, ropes for lifting, the presence of compartments and aesthetic aspects. Furthermore, improving the quality of tote bag products starts from collecting data on consumer desires followed by designing and implementing designed tote bag products. Design and manufacturing activities produce prototypes of tote bags made from kavas equipped with safety in the form of zippers and snap buttons, adjustable hangers and aesthetically pleasing designs and meet consumer needs.

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