

# Application of Quality Function Deployment for the Design & Development of Consumer Cosmetic Packaging Bottle

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## ABSTRACT

*The purpose of this research is to be able to provide alternative product design updates that are acceptable to consumers. The method to be used is the Quality Function Deployment (QFD) approach. QFD is a structured product planning and development method, to clearly determine the desired consumer needs and then carry out systematic calculations, ultimately produce products that can satisfy consumers. The results of this study obtained the highest rating value was the technical response of the packaging design with a value of 400.00, then in second place with a value of 162.96 namely the strength of the packaging material, the selection of packaging materials and the quality of packaging.*

**Keywords:** Product Design, QFD, Innovation, SMI, Sustainability.

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## 1. INTRODUCTION

Product design is a pioneer and the key to the success of a product in penetrating the market as a basic bargaining marketing, designing a product means reading a market, market will, market capability, market mindset and many other aspects which are finally translated and applied in designing a product [1]. The ability of a product to survive in market cycles, one of which is determined by how a product design, both visually and functionally, is able to adapt to changes that occur in the market. This capability can certainly be one of the success values for companies in marketing these products, so that they can be accepted by consumers.

PT. Budi Andhika Prima Ayudia is an SMI that was founded in 1995 by Dra. Effiati Aryoko, Apt. Starting from a trading company, PD. Budi Andhika produces natural-based cosmetics for beauty and body care, including hair, face, hands and feet. PT. Budi Andhika Prima Ayudia has been around for a long time, but with business development that is increasingly lively and fast, the company needs a strategy to be able to compete. One of the highlights in increasing the value of pro natural 2000 products is that the form of packaging used has never changed until now. This is the background for researchers to help carry out the analysis and development of product packaging designs for this SMI.

Figure 1 shows the current form of product packaging, this packaging has been used since the beginning of product manufacturing at PT. Budi Andhika. It has been more than 20 years that the packaging used by the company has never changed.



Figure 1. Pro Natural 2000 Body Lotion Whitening

## 2. LITERATURE REVIEW

### 2.1. Quality Function Deployment (QFD)

Quality Function Deployment (QFD) was developed by Yoji Akao in Japan in 1966. According to Akao, QFD is a method for developing design quality that aims to satisfy consumers and then translating consumer demand into design targets and main points of quality assurance to be used throughout all stages of production. QFD is a way to guarantee design quality, while products that are still in the design stage are a very important side [2]. Quality Function Deployment (QFD) is a methodology in the process of designing and developing products or services that are able to integrate 'voices of consumers' into the design process. QFD is actually a way for companies to identify and meet the needs and desires of consumers for the products or services they produce [3]. QFD enables organizations to prioritize customer needs, find innovative responses to those needs and improve processes for maximum effectiveness. QFD is also a practice towards process improvement that can enable an organization to exceed customer expectations.

The steps of the Quality Function Deployment (QFD) are listed below.

1. Define Voice of Customer (VOC). The attribute that acts as a VOC is the attribute of the applicant's desire with a low level of perception of expectations and high expectations.
2. Identification of technical requirements as a response from Research and Development.
3. Define target values, importance levels, improvement ratios, weights and normalized weights.
4. House of Quality (HOQ) description.
5. Determine the relationship that occurs between technical requirements.
6. Determine the relationship that occurs between the technical requirements and the attributes of the wishes of the Applicant/customer.

### 2.2. House of Quality (HOQ)

The matrix that connects consumer desires with how companies fulfill consumer desires is the House of Quality. House of Quality is a tool used in Quality Function Deployment. House of Quality (HoQ) structure. The steps for making a House of Quality are as follows [4].

1. Identify customer wants. (What do customers want in this product?).
2. Identify how the product/service will satisfy customer wants. (Identify special product characteristics, features, or attributes, and indicate how they will satisfy customer wants).
3. The relationship between the customer's desire for how many products. (Build a matrix, showing a relationship).
4. Identify the relationship between how many companies. (How to do how many ties together?).

5. Develop an importance rating. (Using the customer importance rating and the weights for the relationships shown in the matrix, calculate the importance rating).
6. Evaluate product competition. (How well does the product compete to satisfy customer wants?).
7. Determine desired technical attributes, your performance and competitors' performance against these attributes.

The matrix structure of the HOQ [5] can be seen in Figure 2.

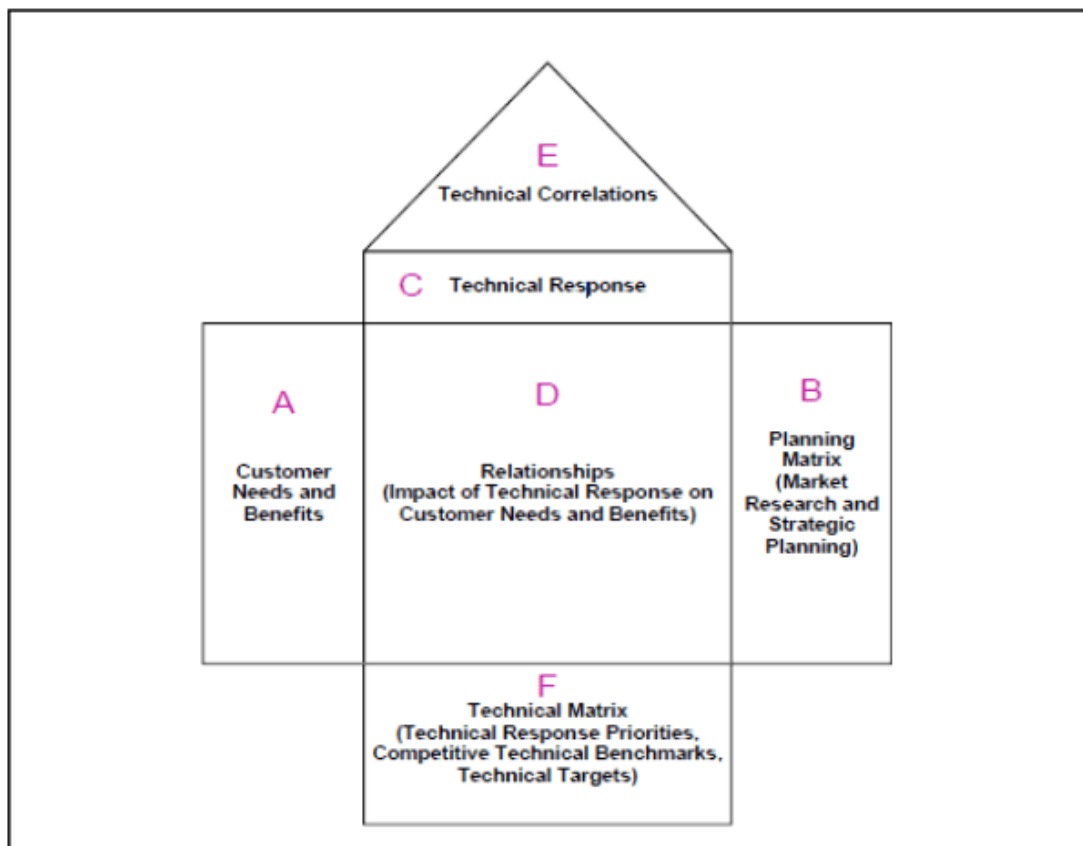


Figure 2 House of Quality

### 3. RESEARCH METHODOLOGY

Figure 3 shows that in this research, used literature study and expert interviews also collect a data to identify customer needs and Technical response from the company to fulfill customer needs. Then the researchers designed the QFD model using House of Quality, so that we will be able to know what needs to be developed in the product design.

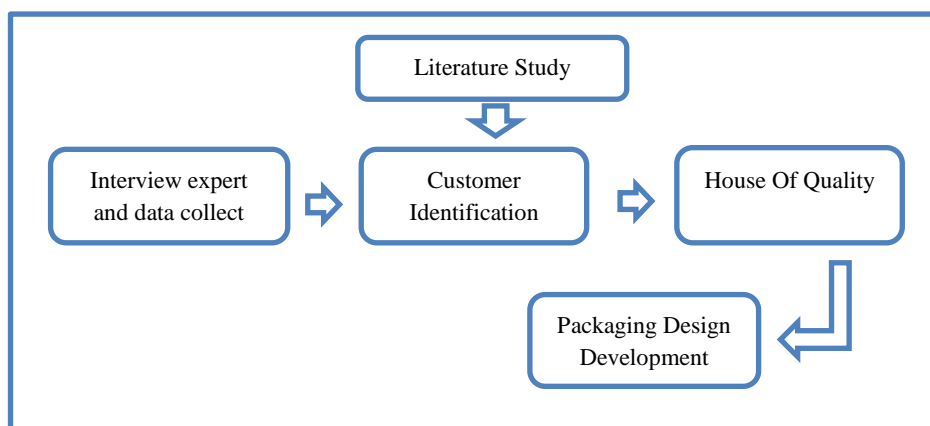


Figure 3. Research Steps Using QFD

### 4. RESULT AND DISCUSSION

**4.1 Customer Identification**

Identification of consumer needs is carried out using the Voice of Customer (VOC) approach. VOC represents a list of customer needs and wants used in the product development process. VOC can be obtained in several ways including group discussions, interviews, surveys, and other similar methods [6]. In addition to product development, VOC is also used to listen to input, responses, and claims from every customer who has purchased a product or service. There are 2 general procedures used in VOC collection, namely determining what attributes are considered important by consumers and measuring the level of importance of these attributes [7].

In this study, identification of consumer needs was carried out by means of group discussions and interviews to find out what needs the customer needed for the body lotion whitening pro natural 2000 packaging, what things they liked and what things they didn't like, as well as improvements. what is wanted. The results obtained from the results of group discussions and interviews were then made a list of consumer needs as shown in Table 1. The technical response is the company's answer to the needs of the participants, as shown in Table 2.

**Table 1 List of Consumer Needs**

NO	CONSUMER NEEDS
1	The packaging lid is sturdy and easy to use
2	Label design is more informative and attractive
3	Attractive color packaging
4	The packaging is non-slip and comfortable to hold
5	The packaging is strong and doesn't leak easily
6	Clearly written instructions for use and storage
7	Detailed information on product descriptions, product ingredients and expiry times are clearly written

**Table 2 Technical Response**

NO	CONSUMER NEEDS	TECHNICAL RESPONSE
1	The packaging lid is sturdy and easy to use	Packaging material strength
2	Label design is more informative and attractive	Dimensions / Package Size
3	Attractive color packaging	Packaging Color Change
4	The packaging is non-slip and comfortable to hold	Selection of Materials
5	The packaging is strong and doesn't leak easily	Packaging Quality
6	Clearly written instructions for use and storage	Packaging Design
7	Detailed information on product descriptions, product ingredients and expiry times are clearly written	Product volume/weight

**4.2 House of Quality**

All data obtained is then entered into the HOQ format to be carried out in the stages of the process to give value to how strong the relationship between consumer needs and the technical response provided by the company, which can be seen in more detail in Figure 4. The stages in compiling the HOQ matrix include entering every identified consumer need on the left side of the matrix, then the technical response on the top side of the matrix. Enter each rating weight for each consumer need, after that identify the

relationship for each need with the technical response listed. From this matrix, a Technical Importance Rating will be obtained from each technical response to determine priorities and what actions should be taken by the company to meet consumer needs.

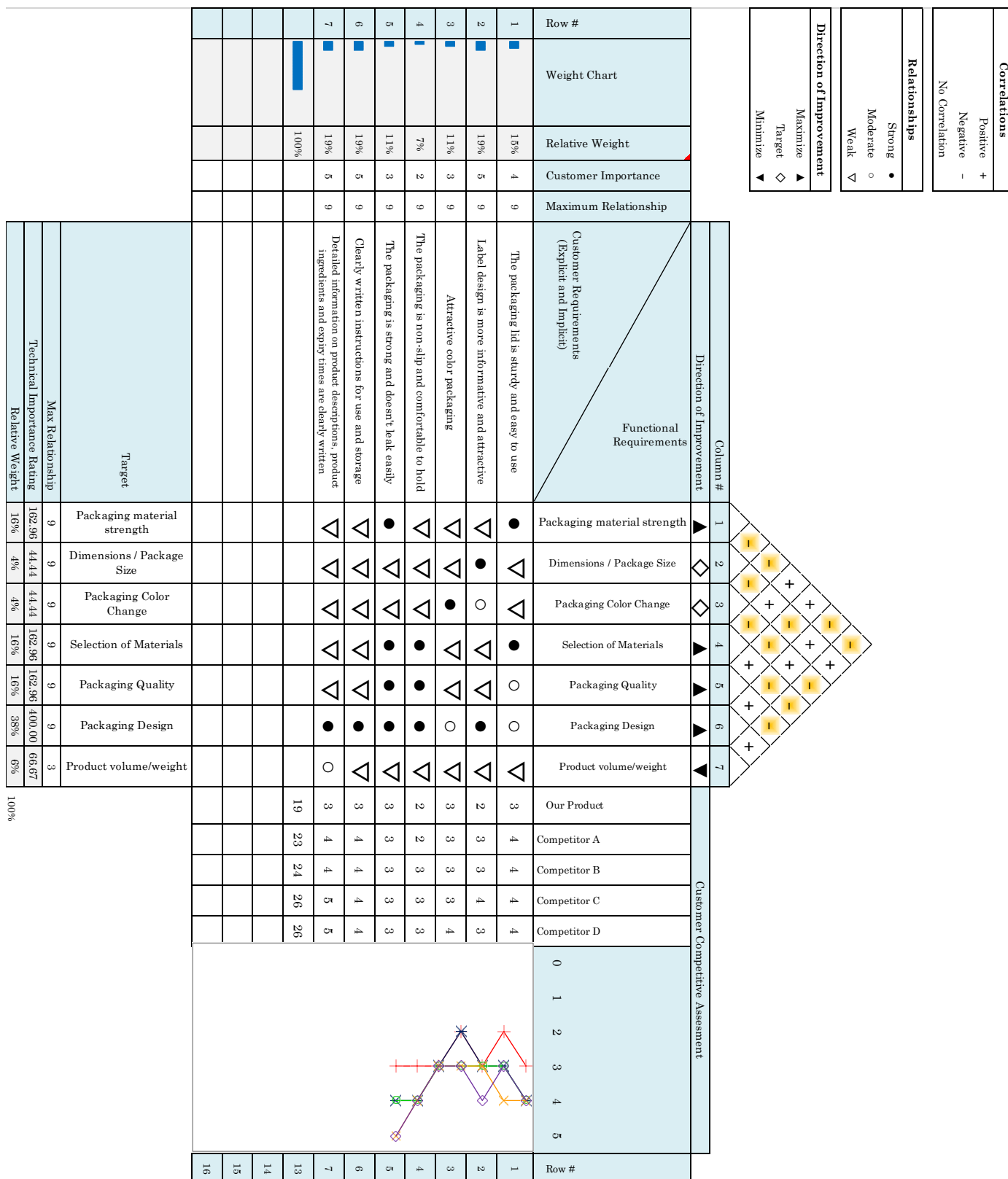


Figure 4. House of Quality

Based on the HOQ matrix that has been made, a prioritized technical response rating can be determined to be implemented in packaging designs according to consumer needs. This calculation is obtained from the relative weight values and the weight values of each symbol given for each relationship. The technical response rating results obtained can be seen more clearly in Table 3.

Table 3. Technical Response Rating

Technical Response	Technical Importance Rating
Packaging material strength	162,96
Dimensions / Package Size	44,44
Packaging Color Change	44,44
Selection of Materials	162,96
Packaging Quality	162,96
Packaging Design	400,00
Product volume/weight	66,67

Based on the results obtained, from Table 3 it can be seen that the highest rating value is the technical response of the packaging design with a value of 400.00, then second highest with a value of 162.96 namely the strength of the packaging material, the selection of materials, the quality of the packaging. Based on the two highest values, it can be concluded that customers want renewal of product design, especially labeling to make it more attractive, detailed and informative, as well as renewal of higher quality packaging. To fulfill this, the company can redesign the existing packaging so that it can meet consumer needs and of course be able to attract new consumers.

From the results obtained from making the HOQ matrix, the researcher tries to make a general design illustration for pro natural 2000 products. Figure 4 is an illustration for the new product labeling design pro natural 2000 whitening body lotion, this design was made as a suggestion for companies to support Packaging renewal is carried out to meet consumer needs. The color selection was taken based on the naming of pro natural products, natural is identical to natural colors, one of which is green.

In addition to color selection, the packaging design is also equipped with descriptions and information about products according to what consumers need, such as ingredients or product composition, how to use, how to store and information about production batch details and product shelf life.



Figure 5 Illustration of the Proposed Packaging Label for Pro Natural 2000 Whitening Body Lotion

## 5. CONCLUSION

From the results and discussion that has been carried out in this study, it can be concluded as follow, the results of the technical response rating obtained show that the highest score is found in the packaging design with a value of 400.00, then the second highest score is found in the strength of the packaging material, the selection of materials, the quality of the packaging with a value of 162.96 each.

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