

STRATEGY FOR THE COMPETITIVENESS INCREASE OF MOTIF CERAMIC PRODUCTS IN THE ISLAMIC BOARDING SCHOOL AREAS USING THE QUALITY FUNCTION DEPLOYMENT METHOD (Case Study: PT. Granito Glass - Surabaya)

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Abstract

Indonesia has the most significant number of Islamic boarding schools globally, namely around 39,043, in 2023. Islamic boarding schools are still institutions in several areas that are a reference, symbol, and source of pride for the surrounding community, including several supporting components of Islamic boarding school buildings. This research aims to develop patterned ceramic products as a competitive advantage based on consumer desires through product attributes. The method developed in this research is QFD (Quality Function Deployment), which is based on consumer voice and consideration of technical aspects to fulfill consumer desires. So, through the House of Quality (HoQ), it will be analyzed to produce product development proposals according to the weight and priority of product attributes considered necessary by customers. The results of this research show that the critical point for developing ceramic products for Islamic boarding school communities, according to consumers, is the "Traso" pattern, so that the trash products produced by PT. It is hoped that Granito Glass Surabaya will interest consumers and increasingly have a broader market.

Keywords: Deployment, Quality, Function, Attributes, Customers.

مستخلص البحث

تمتلك إندونيسيا أكبر عدد من المدارس الداخلية الإسلامية على مستوى العالم، حيث بلغ عددها حوالي 39,043 مدرسة في عام 2023. لا تزال المدارس الداخلية الإسلامية في العديد من المناطق بمثابة مرجع، ورمز، ومصدر فخر للمجتمع المحيط بها، بما في ذلك المكونات الداعمة لمباني هذه المدارس. هدف هذا البحث إلى تطوير منتجات السيراميك المزخرفة كميزة تنافسية تعتمد على رغبات المستهلك من خلال سمات المنتج. تم استخدام منهج نشر وظيفة الجودة (QFD)، الذي يعتمد على رأي المستهلك مع مراعاة الجوانب



التقنية لتلبية احتياجات العملاء. من خلال *House of Quality (HoQ)*، تم تحليل البيانات لوضع مقترحات تطوير المنتجات بناء على الأوزان والأولويات التي يراها العملاء ضرورية. أظهرت نتائج البحث أن النمط "تراسو" هو العامل الأساسي في تطوير منتجات السيراميك لمجتمعات المدارس الداخلية الإسلامية وفقاً لآراء المستهلكين. لذا، يتوقع أن تحظى المنتجات الخزفية التي تنتجها شركة *Granito Glass Surabaya* باهتمام متزايد من المستهلكين، مما يساهم في توسيع نطاق السوق بشكل أكبر.

الكلمات المفتاحية: النشر والجودة والوظيفة والسمات والعملاء.

INTRODUCTION

Customer satisfaction is one of the main factors in determining the competitiveness of every industry, including, in this case, the motif ceramic industry in Surabaya. In line with the increasing number of customers from year to year, improving product quality cannot be negotiated, especially in competition with industries for customers. Therefore, the motif ceramic industry is enhancing its product quality to provide the best for consumers, along with market changes, PT. Granito Glass Surabaya will make anticipatory steps for the company's strategy to survive and even compete with other companies. To create a competitive space, companies need to carry out product developments to innovate new products that can provide certain advantages so that the product can compete in the market.¹ This research aims to determine the attributes that customers consider necessary, create the right quality patterned ceramic products, and create the right strategy to increase the value of patterned ceramic products based on QFD analysis.

Quality is a dynamic condition related to products, people/labor, processes, tasks, and the environment that meets or exceeds customer or consumer expectations. Quality can also be defined as complete customer satisfaction, where a product is said to be of quality if it can provide satisfaction to consumers by what consumers expect from a product.² A product can be defined as anything that a producer can offer for the attention, request, search, purchase, use, or consumption of customers to fulfill the customer's needs and desires.³ Three main components make up a product: (1) The packaging component, which is the main attribute that the product has in communicating and bringing benefits to the product. These attributes include the quality of design,

¹ Ginting, Rosnani, Aulia Ishak, Alfin Fauzi Malik, and M. Riski Satrio. "Product development with quality function deployment (QFD): a literature review". In *IOP Conference Series: Materials Science and Engineering*, vol. 1003, no. 1, p. 012022. IOP Publishing, 2020.

² Priyono, Puji, and Ferida Yuamita. "Pengembangan Dan Perancangan Alat Pemetong Daun Tembakau Menggunakan Metode Quality Function Deployment (QFD)". *Jurnal Teknologi dan Manajemen Industri Terapan* 1, no. 3 (2022): 137-144.

³ Singh, Ravi Kumar, Virendra Rajput, and Amit Sahay. "A literature review on quality function deployment (QFD)". *LAETSD journal for advanced research in applied sciences* 5, no. 8 (2018): 245-250.

packaging, and branding;⁴ (2) Core components, where the main advantages of the product are what customers are looking for or the reason why customers are looking for the product;⁵ (3) Supporting components, namely additional benefits, and services that customers obtain from the product, such as warranties, guarantees, maintenance, and delivery.⁶

Product development is a series of activities starting from identifying market opportunities⁷ and continuing with production, sales, and product distribution activities. The product development process generally has five process stages, namely:⁸ (1) Concept development, where in the concept development phase, the needs and desires of the target market are identified, alternative product concepts are generated and evaluated, and a concept is selected for further development;⁹ (2) System level design, namely the system design phase including defining the product architecture and dividing the product into subsystems and components. The final assembly scheme for the production system is usually not clearly defined during this phase;¹⁰ (3) Design details are the overall specifications in two dimensions, materials to be used and tolerances of all unique product components and identification of all standard components to be purchased from suppliers;¹¹ (4) Testing and screening, namely the testing and screening phase involves the formation and pre-production evaluation of many types of products to be developed;¹² (5) Trial production, namely products made using a planned production system.¹³ This trial production aims to train the workforce and solve any remaining problems in the production process.

⁴ Sivasamy, K., C. Arumugam, S. R. Devadasan, R. Muruges, and V. M. M. Thilak. "Advanced models of quality function deployment: a literature review". *Quality & quantity* 50 (2016): 1399-1414.

⁵ Barad, Miryam, and Miryam Barad. "Quality function deployment (QFD)". *Strategies and Techniques for Quality and Flexibility* (2018): 101-121.

⁶ Sivasankaran, Panneerselvam. "Quality concepts in Industrial systems using QFD (Quality Function Deployment)–Survey". *SSRG International Journal of Industrial Engineering* 8, no. 1 (2021): 7-13.

⁷ Hadi, Hari Abdul, Humiras Hardi Purba, Kurnia Sigma Indarto, Rorio Gomgom Paska Simarmata, Guntur Pratama Putra, Dabith Ghazali, and Siti Aisyah. "The implementation of quality function deployment (QFD) in the tire industry". *ComTech: computer, mathematics and engineering applications* 8, no. 4 (2017): 223-228.

⁸ John, Romeo, Andrew Smith, Sarich Chotipanich, and Michael Pitt. "Awareness and effectiveness of quality function deployment (QFD) in design and build projects in Nigeria". *Journal of Facilities Management* 12, no. 1 (2014): 72-88.

⁹ Ishak, Aulia, Rosnani Ginting, Bayu Suwandira, and Alfin Fauzi Malik. "Integration of Kano model and quality function deployment (QFD) to improve product quality: a literature review". In *IOP Conference Series: Materials Science and Engineering*, vol. 1003, no. 1, p. 012025. IOP Publishing, 2020.

¹⁰ Prabowo, Rony, and B. Purwanto. "New Product Development for Dryer Fish for SMEs Scale with Quality Function Deployment (QFD) Method". In *Prosiding International Conference ICOEN*, vol. 3. 2016.

¹¹ Prabowo, Rony, and B. Purwanto. "New Product Development for Dryer Fish for SMEs Scale with Quality Function Deployment (QFD) Method". In *Prosiding International Conference ICOEN*, vol. 3. 2016.

¹² Dias Júnior, Ananias Francisco, Carlos Rogério Andrade, Marcos Milan, José Otávio Brito, Azarias Machado de Andrade, and Natália Dias de Souza. "Quality function deployment (QFD) reveals the appropriate quality of charcoal used in barbecues". *Scientia Agricola* 77 (2020): e20190021.

¹³ Prabowo, Rony, Moses Laksono Singgih, Putu Dana Karningsih, and Erwin Widodo. "New product development from inactive problem perspective in Indonesian SMEs to open innovation". *Journal of Open Innovation: Technology, Market, and Complexity* 6, no. 1 (2020): 20.

METHOD

In designing ceramic motifs that consumers like using the QFD method, there are research process stages with the flow as below:

1. Observation. Observations were carried out directly by conducting research at PT. Granito Glass Surabaya, depots that sell the company's products and consumers who use these motorbike ceramic products.
2. Identify the Problem. The first thing to do is identify the problems among consumers who use patterned ceramic products. Granito Glass Surabaya, then set the goals you want to achieve.
3. Literature Study. In this process, collect and utilize information related to the material and methodology of the research.
4. Field Study. This stage is a direct observation in the field which aims to find out directly what problems are experienced by consumer users.
5. Data Collection. Data collection, based on observations made by researchers, came from interviews and questionnaires distributed to consumers.
6. Research Methods. In this research, researchers used the Quality Function Deployment (QFD) method, which can be used to develop and design tools.
7. Data Processing. Data processing is carried out using the method used based on data collection and method determination.
8. Analysis and Discussion. This stage is carried out to analyze and discuss the results obtained using the Quality Function Deployment method.
9. Conclusions and Suggestions. The final stage carried out is conclusions and suggestions. The decision contains the main points from the results of overall data processing and ceramic motif designs using the QFD method. Meanwhile, proposals are intended to provide input and suggestions to the parties concerned.

RESULTS AND DISCUSSION

Collecting customer voices (Voice of Customer)

Qualitative Data Collection

Qualitative data collection began with distributing interview guide questionnaires to several respondents. The distribution of this interview guide questionnaire serves to identify Traso product attributes that customers consider necessary. Next, the Competitive Priority Level is determined.

Table 1. Customer Needs for Competitive Priority Ratings

| No. | Product Attributes | X_{j1} | X_{j2} | X_{j3} | X_{tot} |
|-----|-----------------------|----------|----------|----------|-----------|
| 1. | Model | 3.4400 | 3.7200 | 3.6400 | 10.8000 |
| 2. | Flatness | 3.7200 | 3.5400 | 3.5400 | 10.8000 |
| 3. | Color | 3.6400 | 3.6700 | 3.8400 | 11.1500 |
| 4. | Strength | 3.7200 | 3.7200 | 3.6700 | 11.1100 |
| 5. | Neatness | 3.5900 | 3.4900 | 3.6900 | 10.7700 |
| 6. | Smoothness | 3.6400 | 3.4900 | 3.5400 | 10.6700 |
| 7. | Density | 3.7300 | 3.7700 | 3.6600 | 11.1600 |
| 8. | Hardness | 3.5900 | 3.5500 | 3.5400 | 10.6800 |
| 9. | Easy to get | 3.6800 | 3.6300 | 3.7500 | 11.0600 |
| 10. | Easy to install | 3.7300 | 3.5600 | 3.5500 | 10.8400 |
| 11. | Surface craftsmanship | 3.7100 | 3.6300 | 3.5500 | 10.8900 |
| 12. | Traso pattern | 3.4400 | 3.6700 | 3.7500 | 10.8600 |
| 13. | Packing | 3.7600 | 3.5700 | 3.5600 | 10.8900 |
| 14. | Price | 3.6200 | 3.7900 | 3.6400 | 11.0500 |

From Table 1 above it can be analyzed as follows:

1. Calculate the total customer satisfaction value, adding to the average customer satisfaction for all companies. $X_{total} = 3.4400 + 3.7200 + 3.600 = 10.8000$.
2. Calculate the probability distribution value (P_{ij}) by dividing the average customer satisfaction by the total satisfaction.

Planning Matrix Analysis

1. Final importance ratings

The attributes that have the highest level of importance are as follows:

a. Ceramic Traso pattern

The first attribute that respondents prioritize because it has a significant value is the Traso pattern (0.491210); this shows that consumers expect a greater variety of Traso styles.

b. Model

The second attribute important to consumers because it has great potential, is the Model (0.484582); this shows that consumers want a variety of ceramic models.

c. Neatness

The third attribute that respondents emphasize because it has great potential is neatness (0.468312); this shows that customers pay attention to the neatness of making Traso motif ceramics so that PT. Granito Glass Surabaya must pay more attention to the neatness of ceramics.

d. Subtlety

The fourth attribute important to respondents because it has great potential is smoothness (0.442034); this shows that customers also really pay attention to the smoothness of all surfaces, both top, side, and bottom.

e. Price

The fifth attribute important to respondents, because it has great potential, is the price (0.432739); this shows that consumers want a price match for Traso motif ceramic products.

2. Determination of Goals, Raw Weight, and Level of Improvement (Improvement Ratio)

The decision of the goal value is based on the highest level of performance for each attribute of the Traso company observed, namely PT. Granito Glass Surabaya, PT. Diamond, PT. Platinum. The analysis focuses on the highest points because these attributes are the main priority for improvement or development. These attributes are as follows:

a. Ceramics pattern

- 1) Raw Weight. The first attribute that was improved was the Traso pattern with a raw weight value of 0.535476 because all customers need a more varied Traso pattern. After all, more variety can provide choices for customers.
- 2) Company Goals. The number 3.75 is the performance target that PT wants to achieve. Granito Glass. This means that PT is fulfilling customer desires regarding the number of variations in Traso patterns. Granito Glass must produce more variations of Traso patterns like PT. Diamond at the moment.
- 3) Improvement ratio. Figure 1.09012 shows the more significant effort expended by platinum in improving the performance of trace patterns.

b. Model

- 1) Raw Weight. The second attribute that was improved was a model with a raw weight value of 0.524025; this is because all customers want a more varied model, so it is hoped that buyers will be presented with a mixed track model.
- 2) Company Goals. The number 3.72 is the performance target that PT wants to achieve. Granito Glass. This means that in fulfilling customer desires for the Traso Model, PT. Granito Glass must be able to improve the performance of the same model attributes as PT. Platinum.
- 3) Improvement ratio. Figure 1.08140 shows the more significant the effort or costs incurred by PT. Granito Glass in improving model performance.

c. Neatness

- 1) Raw Wiegth. The third improved attribute was neatness, with a raw weight value of 0.481357; all customers want the product to be neat, making the following process easier.
- 2) Company Goals. The number 3.69 is the performance target that PT wants to achieve. Granito Glass. This means that in fulfilling customers' desires for product neatness, PT. Granito Glass must pay more attention to the finishing process to improve the performance of neatness attributes such as PT. further Diamonds.
- 3) Improvement ratio. Figure 1.02786 shows the significance of the effort or costs incurred by the company in improving the performance of the neatness attribute.

d. Price

- 1) Raw Wiegth. The fourth attribute that was improved was the price, with a raw weight value of 0.453061; this was because all customers felt that the product price was too high, so PT. Granito Glass must lower the cost of the product a little more in the hope that with a slightly lower price, there will be more buyers.
- 2) Company Goals. The number 3.79 is the performance target that PT wants to achieve. Granito Glass. This means that in fulfilling customer desires regarding Traso prices, PT. Granito Glass must further improve its price performance, like PT. Platinum.
- 3) Improvement ratio. Figure 1.04696 shows the more significant the effort or costs incurred by PT. Granito Glass in improving price attribute performance.

e. Color

- 1) Raw Weight. The fifth improved attribute was color, with a raw weight value of 0.443723. All customers want various colors, so it is hoped that buyers will be presented with various colors.
- 2) Company Goals. The number 3.84 is the performance target that PT. wants to achieve. Granito Glass. This means that in fulfilling customer desires regarding Traso colors, PT. Granito Glass must further improve the performance of color attributes such as PT. Platinum.
- 3) Improvement ratio. Figure 1.05495 shows the more significant the effort or costs incurred by PT. Granito Glass in improving the performance of color attributes.

Technical Matrix Analysis

This analysis is needed to provide input for companies in developing business strategies that suit consumer desires and the company's capabilities.

Table 2. Technical Response Contribution Value of Traso Pattern Ceramics

| No. | Technical Response | Contribution |
|-----|-------------------------------|--------------|
| 1. | Quality of raw materials | 1,964709 |
| 2. | Process of mixing ingredients | 2,014000 |
| 3. | Printing process | 2,216376 |
| 4. | Drying process | 1,328750 |
| 5. | Soaking process | 1,178148 |

From Table 2 above, the following analysis can be obtained:

1. Quality of Raw Materials. To fulfill customers' desires for Traso-style ceramics, companies must be able to choose raw materials of varying quality to produce more varied patterns.
2. The process of mixing ingredients. This is the initial process of making Traso motif ceramics, so to get more varied patterns, the mixing process must be paid attention to.
3. Printing process. This is the process of making Traso; this process also determines the Traso pattern to produce ceramic Traso patterns that vary.
4. Drying process. This process aims to harden the characteristics of Traso motif ceramics. So, the drying process must be carried out perfectly.

Several analyses related to attributes related to the development of Traso motif ceramic products

1. Models

Table 3. Technical Response Contribution Value from the Model

| No. | Technical Response | Contribution |
|-----|-------------------------------|--------------|
| 1. | Quality of raw materials | 1,964709 |
| 2. | Process of mixing ingredients | 2,014000 |
| 3. | Printing process | 2,216376 |
| 4. | Drying process | 1,328750 |
| 5. | Soaking process | 1,178148 |
| 6. | Refining process | 2,954411 |
| 7. | Finishing | 2,784838 |
| 8. | Raw material prices | 0,744530 |

- a. Raw Material Quality. Good-quality raw materials can produce suitable transformers; you can have varied and high-quality transformer models with good-quality materials.
- b. Process of mixing ingredients. This is the beginning of all processes, where the mixed ingredients must comply with the standards determined by the factory so that the results are as desired. This process is essential because it determines the quality of the product.

- c. Printing Process. A process that aims to create variations in models or shapes. The company must provide more molds with various models or figures to produce multiple forms.
 - d. Drying Process. A process that aims to harden the Traso. With a perfect drying process, it will be possible to produce better-quality Traso.
2. Neatness

Table 4. Technical Response Contribution Value of Neatness

| No. | Technical Response | Contribution |
|-----|--------------------------|--------------|
| 1. | Quality of raw materials | 1,964709 |
| 2. | Printing process | 2,216376 |
| 3. | Refining process | 2,954411 |
| 4. | Finishing process | 0,744530 |

- a. Raw Material Quality. Good-quality raw materials and good-quality Traso motif ceramics can be produced.
 - b. Printing Process. A process that needs to be considered concerns the attributes of neatness and the beginning of product formation.
 - c. Refining Process. A necessary process that concerns the attribute of neatness. In this process, the printed trace motif ceramics are smoothed first.
 - d. Finishing Process. The final process of the transformer-making process. In this process, it will be possible to determine which products are suitable and which are not to be marketed, so workers must be careful at this stage.
3. Price

Table 5. Technical Response Contribution Value of Price

| No. | Technical Response | Contribution |
|-----|----------------------------|--------------|
| 1. | Quality of raw materials | 1,964709 |
| 2. | Raw material prices | 0,744530 |
| 3. | Additional Material Prices | 0,420244 |
| 4. | Labor costs | 0,219915 |

- a. Raw Material Quality. High-quality raw materials usually have a high price. To fulfill customer desires regarding price attributes, companies must be able to adjust prices to the quality of Traso motif ceramic products.
- b. Raw material prices. The price of expensive raw materials impacts the selling price of the product, so to meet customer desires regarding price, the company must be able to adjust the cost of the product to the market price.

- c. Additional Material Prices. The price of other ingredients also influences the cost of the product, so to meet customer desires regarding price, the company must be able to adjust the price of the product to the price on the market.
- d. Labor costs. Labor costs also affect the price of the product. To be able to reduce labor costs, companies must be able to implement labor efficiency.

CONCLUSION

After carrying out a series of data processing and analysis, conclusions can be drawn which include:

1. From distributing the questionnaire and continuing with processing and interpreting the results, the attributes that are considered necessary by customers are obtained. Traso attributes from largest to smallest are as follows: ceramic motifs, Traso pattern, Model, neatness, smoothness, price, hardness, easy to install, color, packing, strength, flatness, density, easy to obtain, surface smoothness.
2. From the data processing results on the performance attributes of PT. Traso motif ceramic products. Granito Glass Surabaya has seven product attributes that are top leaders in the competition. These attributes are flatness, strength, smoothness, hardness, ease of obtaining, surface smoothness, and packaging, while other details are still below the performance of competing companies. From the data processing results, the features that have the main priority for improvement are transformer style, Model, and neatness.
3. From the overall evaluation of the performance of Traso product attributes, it can be concluded that the company PT. Granito Glass Surabaya controls around 50% of the competition between trace attributes among other companies. The technical response that is the priority to be developed or improved is the refinement process, which has a value of 18.186%.

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