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Evaluation of Housing Product Quality Using the Importance-Performance Analysis Method at PT. Galaxy Alam Semesta

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ABSTRACT

Government support for the property sector through incentive policies, such as the Ministry of Finance Regulation on Government-Borne Value Added Tax (VAT-GOV) on properties, was reintroduced in 2024 to boost economic growth, focusing on the delivery of new landed houses and new apartment units. In this context, property and real estate companies are required to maintain customer satisfaction, which is the key to the company's success. Customer satisfaction not only reflects product quality but also influences the company's brand image. To understand customer satisfaction with product quality, particularly landed houses, PT. Galaxy Alam Semesta conducts periodic surveys of its customers. However, survey results from the first semester of 2023 indicated that customer satisfaction with the quality of houses was still below the company's standards. Therefore, this research aims to evaluate the quality of PT. Galaxy Alam Semesta's houses using the Importance-Performance Analysis method. This research will identify attributes that need quality improvement priority, with the hope of enhancing customer satisfaction and the company's image, as well as utilizing the House of Quality to determine the priority of these improvement proposals. The analysis results indicate that the attributes requiring quality improvement priority are even and non-streaky paint, straight wall corners, even wall and ceiling surfaces, smoothly and easily operable doors and windows, neat and even paint and sealant, even tile installation, and precise and neat installation of door and window accessories. From the analysis of the proposed improvement, five main priorities were identified: increasing the frequency of supervision and inspection to ensure compliance with quality standards, setting limits on the number of units overseen by building supervisors, using higher quality paint, evaluating the quality of door accessories and tile materials, and conducting regular evaluations and selections of contractors.

Introduction

The government through the Ministry of Finance of the Republic of Indonesia issued a Regulation of the Minister of Finance providing Government-Borne Value Added Tax (VAT DTP) facilities on the property (Alfin & Nurdin, 2017). This incentive aims to provide consumption stimulus to maintain the rhythm of economic recovery. This facility is provided for the handover of new landed houses and new flats residential units. Tax discount incentives in the form of VAT DTP facilities are given 100% for houses or units with a maximum selling price of IDR 2 billion and 50% for houses or units with a selling price above IDR 2 billion to IDR 5 billion (Chohan, Irfan, & Awad, 2015). This facility, after previously being provided from March to August 2021, has been extended until December 2021. In 2023, the government will again provide VAT DTP incentives from housing to maintain the momentum of economic growth and is expected to get a positive response in terms of supply and demand in the housing sector with a scheme to provide VAT incentives of 100 percent, which will only be given for the purchase of houses with prices below Rp. 2 billion from November 2023 to June 2024. then the amount of VAT DTP incentives will be cut to 50 percent (Ministry of Finance, 2023).

In line with government support, many property and real estate development companies are also enlivening the business. In running a business, customer satisfaction with the products produced is one of the keys to the success of a company. Customer satisfaction indicates how good a product is compared to customer expectations. These expectations are found in customers before they buy and try the product. Satisfied customers will refer to others and will remain loyal customers (Takagi & Varajão, 2020). Meanwhile, dissatisfied customers will file complaints and spread their dissatisfaction to their relatives. Recently, there has been a rampant spread of bad news related to customer dissatisfaction on public channels such as social media, where bad news spreads faster in the public environment and affects the company's brand image (Puķīte & Geipele, 2017). If this happens, the brand image of the developer will be affected.

The relationship with the customer is not only completed when a sales transaction occurs but continues after the purchase. Customer satisfaction in business is important because customers who are satisfied with the products received will be loyal to the company, make a return purchase, become an agent that has an impact on the company's reputation, and is even willing to pay more as long as they are satisfied. In addition, from satisfaction, service users can give rise to loyalty (Latief, 2018) explained that the creation of customer satisfaction can provide several benefits, namely the occurrence of a harmonious relationship between the company and the service user, providing repurchase of products or services offered by a company to consumers and can cause loyalty from the service user (Noer, 2016).

One of the largest property and real estate development companies in Indonesia, Ciputra Group, through one of its subsidiaries, PT. Galaxy Alam Semesta in the Citraland Utara project in Surabaya is one of the property companies that has built a city-scale independent residential area that has built more than 4000 houses in the last 5 years. The level of house sales in the Citraland Utara Surabaya project has always reached the target

set by the company for the last 3 years in 2021-2023, one of which is due to the use of VAT DTP incentives (Anthony, Tresani, & Halim, 2017).

PT. Galaxy Alam Semesta knows that good product quality and timely handover of homes to customers are important things for the company to maintain so that customer satisfaction can be achieved. As a company that wants to maintain good customer satisfaction and continue to evaluate PT. Galaxy Alam Semesta always conducts product quality surveys in the form of questionnaires filled out by customers after the handover of the house. The things surveyed are related to the quality of home products including wall paint finishing, door-window paint finishing, floor-wall installation, door-window accessories installation, sanitation accessories installation, installation and installation and placement of electrical accessories, building cleanliness, and the quality of home materials (Kusuma & Sukaatmaja, 2018).

As a result, customer satisfaction was obtained and in semester 1 of 2023 out of 150 houses that were handed over, the results of the customer satisfaction survey on the quality of home products were 77.53%. This result is below the minimum customer satisfaction standard set by the company, which is 80%. The quality of this product is something that must be improved so that customer satisfaction can increase and the company's image becomes better, which will ultimately make the company's business more successful in terms of sales and profits.

In this case, the Importance-Performance Analysis method will be used to find out the variables that are the priority for improving product quality. The analysis method used is quadrant analysis. This quadrant analysis is used to determine consumer responses to the attributes placed based on the level of importance and performance of each of these attributes. Based on this quadrant analysis, it can then be seen where each attribute is in which quadrant so that it can be known what attributes need to be improved and get attention (Saleem, Afzal, Ahmad, Ismail, & Nguyen, 2023).

Therefore, in this study, the goal is to examine the quality of home products at PT. Galaxy Alam Semesta to provide an evaluation of the perception and expectations of customers of PT. Galaxy Alam Semesta attributes which have the largest gap and which have met expectations. This study uses the Importance-Performance Analysis and House of Quality methods to determine the priority of the technical response for improvement (Mahira, Hadi, & Nastiti, 2021).

Based on the description of the background of the problem, this study is entitled "Evaluation of the Quality of Home Products with the Importance-Performance Analysis Method at PT. Galaxy Alam Semesta". The main problem that will be discussed is the quality attributes of home products that are important according to customers but their performance has not met expectations, as well as attributes that must be improved first to increase customer satisfaction and proposed improvements. The purpose of this study is to identify important home quality attributes whose performance has not met expectations, analyze the attributes that must be improved first, and provide suggestions for improvement. The expected benefit is to get the quality attributes of home products that need to be improved first and the proposed improvements to be implemented in the

next housing construction project in the next cluster, with the hope of being able to increase customer satisfaction according to company standards. The study was limited to home development projects in the Northwest Central & and Northwest Park clusters, discussing only technical aspects without economic aspects, and only discussing consumer satisfaction with products, not services.

Method

This research is a case study on the evaluation of home product quality using a rational, systematic, and scientific approach to find out the customer satisfaction criteria that need to be improved immediately. This study helps companies determine sub-tasks that need to allocate resources to effectively improve quality according to customer expectations. Researchers directly involved in the construction of home products from start to finish have full access to the information and project team. The Importance Performance Analysis (IPA) method is used to assess the performance of product attributes and their importance, resulting in criteria that must be improved first. The research was conducted in the North Citraland area of Surabaya by PT. Galaxy Universe, with primary data from customer surveys at home handover and secondary data from related literature. The study population was homeowners in the Northwest Central and Northwest Park clusters, with the sample determined based on the Slovin formula. The validity and reliability test was carried out using the Product Moment Correlation technique and the Cronbach Alpha method. Focus Group Discussion (FGD) is used to propose technical responses, and the House of Quality (HoQ) method is applied to determine quality improvement priorities. Discussions of research results are carried out with supervisors and project teams to obtain conclusions and suggestions, which are then formulated as input for the company and further research. The conclusion of this study includes an evaluation of attributes based on scientific analysis and a proposal to improve attributes with HoQ for planning to improve the quality of home products at PT. Galaxy Alam Semesta.

Research Design

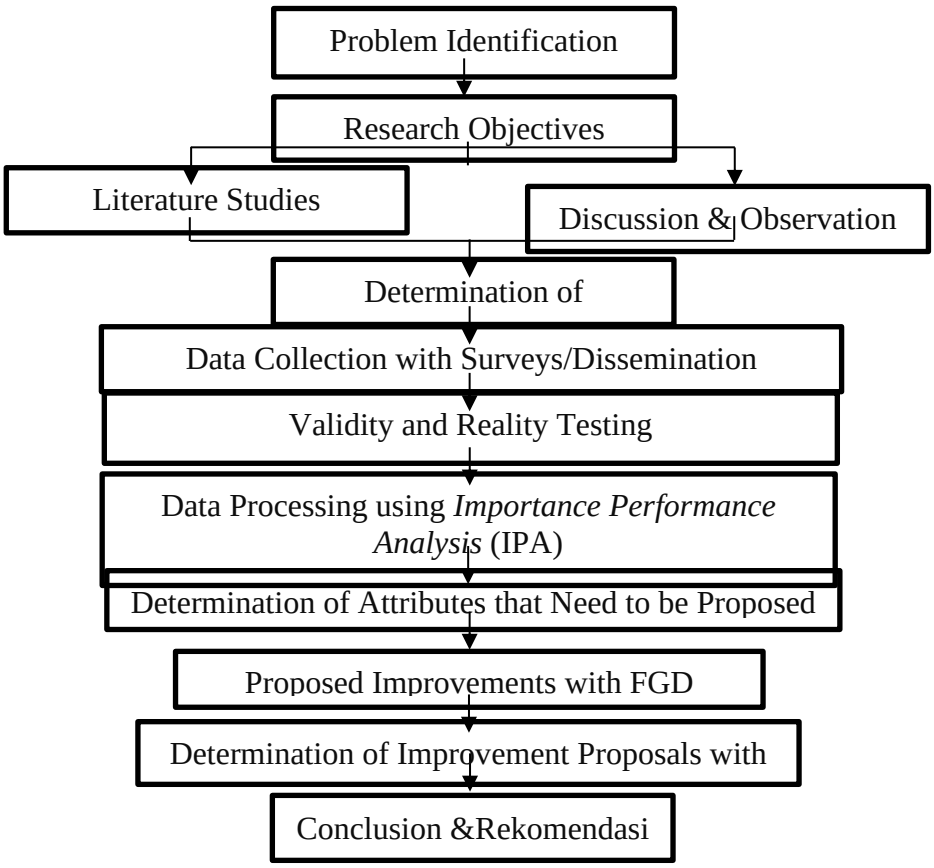


Figure 1 Research Stages

The preliminary study is carried out by the researcher using discussion and observation together with the project team and management who are directly involved in the construction of the house and the handover of the house to the customer, then an evaluation process is carried out to identify the problem and determine the purpose of the research.

Results and Discussion

Validity Test Results

From the results of the questionnaire data obtained, which refers to the assessment, there are statements related to the quality of home products based on interests and satisfaction that refer to the Likert scale rules 1-5, 55 respondents were obtained. The quality attributes of home products that have been assessed by the respondents will then be tested for data validity using SPSS software version 25. In this study, a validity test was measured, by the description in sub-chapter 3.5 to measure the validity of the data obtained. Data is considered valid if the r positive count is greater than the r table (r count > r table)

The r-value of the table used for 55 respondents with α = 5% was 0.266. The following are the results of the calculation from the research questionnaire data on the aspects of interest and satisfaction in Table 1, and Table 2.

Table 1
Results of Validity Test of Satisfaction Aspect

Attribute Code	Variable Code	r Table	r Calculate	Information
CD1	X01	0.266	0.552	Valid
CD2	X02	0.266	0.693	Valid
CD3	X03	0.266	0.676	Valid
PJ1	X04	0.266	0.350	Valid
PJ2	X05	0.266	0.328	Valid
PJ3	X06	0.266	0.319	Valid
PJ4	X07	0.266	0.423	Valid
LD1	X08	0.266	0.348	Valid
LD2	X09	0.266	0.350	Valid
LD3	X10	0.266	0.352	Valid
AP1	X11	0.266	0.286	Valid
AP2	X12	0.266	0.317	Valid
AS1	X13	0.266	0.347	Valid
AS2	X14	0.266	0.292	Valid
AS3	X15	0.266	0.358	Valid
AL1	X16	0.266	0.329	Valid
AL2	X17	0.266	0.356	Valid
AL3	X18	0.266	0.382	Valid
ST1	X19	0.266	0.392	Valid
ST2	X20	0.266	0.350	Valid
KK1	X21	0.266	0.675	Valid
KK2	X22	0.266	0.488	Valid
LR1	X23	0.266	0.275	Valid
LR2	X24	0.266	0.381	Valid
LR3	X25	0.266	0.405	Valid
DR1	X26	0.266	0.286	Valid
DR2	X27	0.266	0.315	Valid
DR3	X28	0.266	0.335	Valid
DR4	X29	0.266	0.309	Valid

Table 2
Results of the Validity Test of Interests Aspects

Attribute Code	Variable Code	r Table	r Calculate	Information
CD1	Y01	0.266	0.531	Valid
CD2	Y02	0.266	0.738	Valid
CD3	Y03	0.266	0.478	Valid
PJ1	Y04	0.266	0.556	Valid
PJ2	Y05	0.266	0.468	Valid
PJ3	Y06	0.266	0.457	Valid
PJ4	Y07	0.266	0.629	Valid

LD1	Y08	0.266	0.624	Valid
LD2	Y09	0.266	0.651	Valid
LD3	Y10	0.266	0.403	Valid
AP1	Y11	0.266	0.612	Valid
AP2	Y12	0.266	0.569	Valid
AS1	Y13	0.266	0.667	Valid
AS2	Y14	0.266	0.573	Valid
AS3	Y15	0.266	0.452	Valid
AL1	Y16	0.266	0.569	Valid
AL2	Y17	0.266	0.612	Valid
AL3	Y18	0.266	0.293	Valid
ST1	Y19	0.266	0.461	Valid
ST2	Y20	0.266	0.535	Valid
KK1	Y21	0.266	0.482	Valid
KK2	Y22	0.266	0.675	Valid
LR1	Y23	0.266	0.615	Valid
LR2	Y24	0.266	0.703	Valid
LR3	Y25	0.266	0.615	Valid
DR1	Y26	0.266	0.616	Valid
DR2	Y27	0.266	0.712	Valid
DR3	Y28	0.266	0.519	Valid
DR4	Y29	0.266	0.463	Valid

Based on the results of the validity test conducted using SPSS version 25 software as shown in Table 4.3 and Table 4.4, it was found that all data from the calculation results were declared valid because, in all variables/attributes, the results of r calculation are greater than r table (r calculation > r table), so that the reliability test on the data can be continued.

Reliability Test Results

At this stage, after the data is declared valid, a reliability test is carried out using SPSS software version 25. This reliability test aims to determine the consistency of the calculation results from the validity test results in data by the theory that has been described in sub-chapter 3.5. The data can be declared reliable if Cronbach's Alpha > 0.6. The results of the reliability test calculation can be seen in Table 3 and Table 4 as follows:

Table 3
Reliability Test Results of Satisfaction Aspect

Reliability Statistics	
Cronbach's Alpha	N of Items
.792	29

Table 4
Results of Reliability Test of Importance Aspects

Reliability Statistics	
Cronbach's Alpha	N of Items
.923	29

From the results of the reliability test calculation using SPSS software version 25, it was obtained that the value of Cronbach's Alpha was greater than 0.6 in the aspects of importance and satisfaction, so the data can be considered reliable so that the data can be used for calculation and analysis using the Science and HoQ methods.

Gap Analysis of Satisfaction and Importance

By calculating the average value of each attribute, a table of average data from the results of the questionnaire listed in Table 5 is obtained below:

Table 5
Results of Gap Analysis of Satisfaction and Importance Levels

No.	Attribute Code	Attribute	*Mean*		*Gap*
			Satisfaction	Interests	
1	CD1	The paint is flat and not streaked	3,98	4,49	-0,51
2	CD2	Straight wall corners	3,89	4,42	-0,53
3	CD3	Flat wall and ceiling plane	3,64	4,56	-0,93
4	PJ1	The quality of the wood materials used is good	3,93	4,38	-0,45
5	PJ2	The quality of the aluminum material used is good	4,09	4,36	-0,27
6	PJ3	Doors and windows can be operated smoothly and easily	4,04	4,45	-0,42
7	PJ4	Neat and even paint and sealant	3,69	4,44	-0,75
8	LD1	The quality of the ceramic materials used is good	4,13	4,42	-0,29
9	LD2	Flat ceramic installation	3,87	4,42	-0,55
10	LD3	Grout-filled ceramic gaps	3,87	4,27	-0,40
11	AP1	Material quality (handles, hinges, locks, and doorstoppers) is good	3,96	4,40	-0,44
12	AP2	Neat installation and precision	3,95	4,44	-0,49
13	AS1	The quality of sanitary water materials (showers, toilets, sinks, etc.) is good	4,20	4,38	-0,18
14	AS2	Installation of sanitary accessories neat and precise	4,13	4,42	-0,29
15	AS3	Works well and doesn't leak	4,31	4,67	-0,36
16	AL1	Position and location are easy to reach	4,15	4,38	-0,24
17	AL2	Installation of neat 2894and precise Erjasa accessories	4,15	4,42	-0,29
18	AL3	Functioning properly and actively on	4,44	4,67	-0,24
19	ST1	No structural deflection	4,51	4,65	-0,15
20	ST2	No structural cracks	4,51	4,71	-0,20
21	KK1	Clean and fragrant room	3,89	4,11	-0,22
22	KK2	Clean front and back gardens	4,07	4,36	-0,29
23	LR1	Easy access to public facilities	4,02	4,40	-0,38
24	LR2	Wide and wide road	4,16	4,33	-0,16

25	LR3	Beautiful and comfortable garden	4,04	4,25	-0,22
26	DR1	The size of each room is sufficient	4,00	4,33	-0,33
27	DR2	Efficient arrangement of each room	4,04	4,33	-0,29
28	DR3	Lighting every room is good	4,13	4,31	-0,18
29	DR4	The air circulation in each room is good	4,27	4,36	-0,09

In Table 5, the calculation of the mean value of the level of interest and the mean level of consumer satisfaction was obtained from 55 respondents. From the results of the data analysis, it can be seen that there is a gap in all attributes which means that each attribute still needs to be improved.

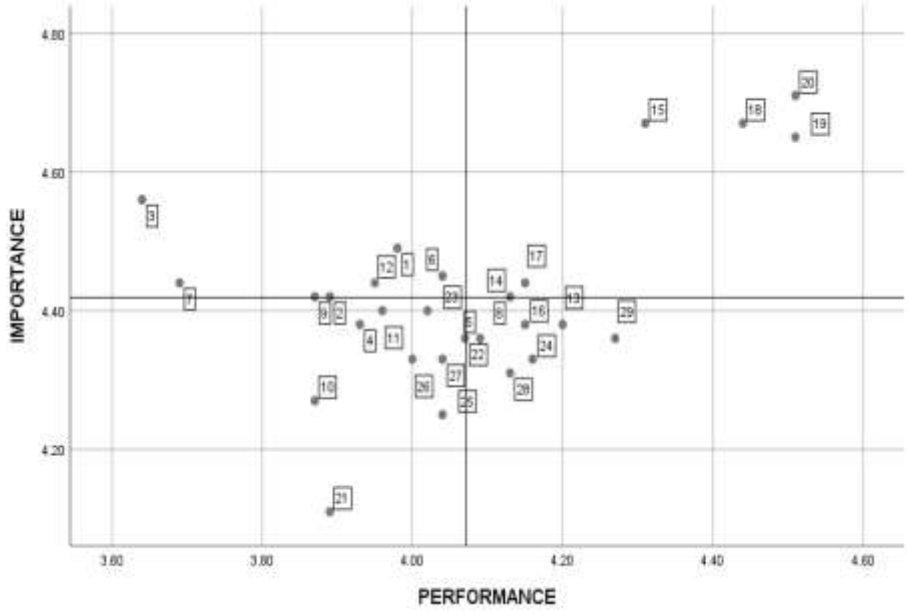
Satisfaction and Importance Level Diagram Analysis

After conducting a gap analysis, each of these attributes is then analyzed using an Importance-Performance Analysis chart. The data used are the average level of satisfaction and the average level of consumer interest in the quality attributes of home products at PT. Galaxy Alam Semesta.

The average value of the satisfaction level is the X-coordinate value, and the average value of the importance level is the Y-coordinate value. The coordinate axis in this diagram is expressed by the X = a, and Y=b lines, where the axis is the quadrant boundary line which can be calculated as follows: a equals equalualslsequals= $\bar{x} = \frac{118,04}{29} = 07 = \bar{y} = \frac{128,16}{29} = 4,42$

After obtaining the axis lines of the X and Y coordinates, a plot of all attributes totaling 29 points will be obtained on the Importance Performance Analysis diagram made using SPSS software version 25 with the results of the scatterplot as follows:

The results of the analysis based on the Importance Performance Analysis quadrant in Figure 2 can be described in Table 6 as follows.



Gambar 2 Hasil Diagram Importance Performance Analysis

Table 6
Results of the Quadrant Analysis of Importance Performance Analysis

No	Quadrant I	Quadrant II	Quadrant III	Quadrant IV
1	LD1 (8)	CD1 (1)	PJ1 (4)	AS1 (13)
2	AS2 (14)	CD2 (2)	PJ2 (5)	AL1 (16)
3	AS3 (15)	CD3 (3)	LD3 (10)	KK2 (22)
4	AL2 (17)	PJ3 (6)	AP1 (11)	LR2 (24)
5	AL3 (18)	PJ4 (7)	KK1 (21)	DR3 (28)
6	ST1 (19)	LD2 (9)	LR1 (23)	DR4 (29)
7	ST2 (20)	AP2 (12)	LR3 (25)	
8			DR1 (26)	
9			DR2 (27)	

Based on the results of the Importance Performance Analysis shown in the diagram in Figure 2 and Table 6, the attributes that need to be improved and become the top priority for improvement are: Quadrant I (Maintain Performance) includes attributes such as good quality of ceramic materials, neat and precise installation of sanitary and electrical accessories, and the absence of deflection or cracks in the structure. Quadrant II (First Priority) includes attributes such as flat and unstreaked paint, straight wall corners, flat wall and ceiling planes, smoothly and effortlessly functioning doors and windows, neat and even paint and sealant, even ceramic installation, and neat and precise installation of door accessories. Quadrant III (Low Priority) includes attributes such as good quality wood and aluminum materials, grout-filled ceramic gaps, good quality door accessories materials, clean and fragrant rooms, easy access to public facilities, beautiful and comfortable gardens, efficient room size and arrangement. Quadrant IV (Excessive) includes attributes such as good quality sanitary materials, easy-to-reach position and

location of electrical accessories, clean front and back gardens, wide and wide walkways, good lighting, and air circulation in each room. Of the four quadrants, the quadrant that is taken as an attribute for the priority of improving the quality of home products is Quadrant II which includes attributes with the number codes CD1, CD2, CD3, PJ3, PJ4, LD2, and AP2. Quadrant II contains attributes that are considered important by consumers, but are not in line with expectations, or the level of consumer satisfaction is still low. Therefore, in improving the quality of home products, PT. Galaxy Alam Semesta must use the attributes in the second quadrant to be prioritized, by making improvement efforts to improve the performance of attributes in this quadrant.

Focus Group Discussion Determines improvement Proposals

In the next stage, by the results of the analysis of the Importance Performance Analysis method, 7 attributes are priorities for quality improvement, then the determination of improvement proposals which is a technical response is obtained through Focus Group Discussion with the parties that have been determined in subchapter 3.5.3. FGD participants are assumed to have the same weight and subjectivity as well as the justification of the assessment. The participants of the FGD are employees at PT. Galaxy Alam Semesta with a period of service in the company varies between 5-10 years. FGD participants represent each division of the Construction and Development department that is directly involved starting from the planning process, tenders, work drawings, preparation, and construction to the handover of units to consumers.

Table 7
Data Peserta Focus Group Discussion

No	Department	Last Education
1	Manager Dept. of Construction & Development	S2 Master of Technology Management
2	Div. Head of Building	S1 Civil Engineering
3	Div. Head of Infrastructure	S1 Civil Engineering
4	Div. Head of Planning & Design	S2 Architecture
5	Div. Head of Building Service Control	S1 Civil Engineering

All of these attributes will be analyzed and FGD will be conducted to evaluate and determine proposals to improve the quality of houses at PT. Galaxy Alam Semesta with the following results: the use of high-quality paint for better durability and color camouflage, requiring the use of precision measuring equipment such as laser level to ensure the right angle of the wall, the use of new working methods with electric wall sanding tools for smoother and more efficient results, evaluation and selection of contractors based on performance for more precise allocation of work, Establish a limit on the number of surveillance units to improve focus and accountability, reallocate costs from low priority attributes for the more efficient use of structural consultants, use of appropriate ceramic adhesives to improve installation quality, evaluate the material quality of door accessories and ceramics to ensure strength and durability, increase the frequency of surveillance and inspections with modern technologies such as drones to

ensure compliance with quality standards, and replacement of wooden door frame and leaf material with UPVC or aluminum for better durability and function.

Analysis of Improvement Proposals using the House of Quality method

The House of Quality (HoQ) method aims to translate customer requirements into design requirements and their targets. To the description in sub-chapter 2.7, the creation of the HoQ matrix is divided into 6 stages, namely:

Matrix of Customer Needs and Wants

In this study, customer needs are obtained from the results of priority attributes that will be improved, which is by the results of the science analysis, namely attributes whose position is in quadrant II. The second quadrant contains attributes that are considered important quality attributes by consumers, but in reality, the attributes in this quadrant are at a low level of satisfaction. 7 attributes can be used as customer needs as described in sub-chapter 2.7 with the following results:

Table 8
Attributes that Become Customer Needs

Code	Attribute
CD1	The paint is flat and not streaked
CD2	Straight wall corners
CD3	Flat wall and ceiling plane
PJ3	Doors and windows can be operated smoothly and easily
PJ4	Paint and sealant of neat and even frames
LD2	Flat ceramic installation
AP2	Installation of neat and precise door accessories

Planning Matrix

At this stage, the value of 6 priority attributes that will be improved is determined with the following details:

Importance to Customer

This value was obtained from the data from the results of the questionnaire conducted looking at the mode values on 7 attributes that will be improved from the aspect of the level of importance.

1) Customer Satisfaction Performance

This value was obtained from the data from the questionnaire results, the calculation of the mean value on 7 attributes was carried out which will be improved from the aspect of satisfaction level.

Goal

The goal value was obtained from questionnaire data, with the calculation of the mean value on 7 attributes that will be improved from the aspect of the level of expectation/importance.

2) Improvement ratio

The improvement ratio value is obtained from the result of dividing the goal value by the customer satisfaction performance value.

Raw weight

The calculation of the raw weight value is obtained from the result of multiplying the importance of customer value with the nasal nulla from the calculation of the improvement ratio.

3) Normalized raw weight

The normalized raw weight value is obtained from the result of dividing the raw weight value by the total sum of the raw weight value.

Technical Response

In this study, the technical response was obtained from the results of the Focus Group Discussion in sub-chapter 4.5, with the following results:

1) The use of higher quality paint. (TRI)
2) Requires the use of precise measuring equipment such as laser level. (TR2)
3) The use of a new method of work with a wall sanding tool. (TR3)
4) Conducting evaluation and selection of contractors. (TR4)
5) Establish a limit on the number of supervision units for building supervisors. (TR5)
6) Reallocation of costs from other attributes that are excessive or low priority with the use of other structural consultants. (TR6)
7) Proper use of ceramic adhesives in ceramic installation methods. (p. 7)
8) Evaluate the quality of door accessories and ceramics materials. (p. 8)
9) Increased frequency of supervision and inspections to ensure compliance with quality standards. (p. 9)
10) Replacement of wooden frame and door leaf materials with UPVC or aluminum. (TR10)

4) Relation Matrix

After determining the technical response/functional requirement (hows) items as the translation of customer requirements (whats), the next step is to determine the relationship matrix. At this stage of the relation matrix, a correlation analysis of each attribute in the customer requirement with the predetermined technical response is carried out in Table 9 below:

Table 9
Results of Relation Matrix Analysis

No	Code	Functional Requirement	Customer Requirement	Relationship	Information
1	TR1	Use of higher-quality paint	CD1	Θ	Strong
			CD2	Or	Medium
			CD3	Θ	Strong
2	TR2	Requires the use of precise measuring equipment such as laser levels	CD2	Θ	Strong
			CD3	Or	Medium
			PJ3	▲	Weak
			LD2	Or	Medium
3	TR3	The use of a new working method	CD1	Or	Medium
			CD3	Θ	Strong

		with a wall sanding tool			
4	TR4	Conducting evaluations and selections for contractors	CD2	Or	Medium
			PJ3	Or	Medium
			PJ4	▲	Weak
			LD2	Θ	Strong
			AP2	Or	Medium
5	TR5	Setting limits on the number of supervisory units for building supervisors	CD1	Or	Medium
			CD2	Θ	Strong
			CD3	Or	Medium
			PJ3	Θ	Strong
			PJ4	▲	Weak
6	TR6	Reallocation of costs from other attributes that are excessive or low priority with the use of other structural consultants	CD1	Θ	Strong
			CD2	Or	Medium
			CD3	Or	Medium
7	TR7	Proper use of ceramic adhesives in ceramic installation methods	PJ3	▲	Weak
			LD2	Θ	Strong
8	TR8	Evaluate the quality of door accessories and ceramics	PJ3	Or	Medium
			PJ4	▲	Weak
			LD2	Θ	Strong
			AP2	Θ	Strong
9	TR9	Increased frequency of surveillance and inspections to ensure compliance with quality standards	CD1	Or	Medium
			CD2	Θ	Strong
			CD3	Or	Medium
			PJ3	Θ	Strong
			PJ4	Or	Medium
			LD2	▲	Weak
			AP2	▲	Weak
10	TR10	Replacement of wooden door frame and leaf material with UPVC or aluminum	PJ3	Θ	Strong
			PJ4	▲	Weak
			AP2	Or	Medium

Technical Correlation Matrix

The next stage is the stage of determining the relationship between technical responses to each other. The following is a table of correlation relationships between technical responses contained in this study, by the theoretical basis that has been described:

Table 10

Hasil Analisis Technical Correlation Matrix

It	Technical Response		Relationship	Information
1	Use of higher-quality paints	Requires the use of precise measuring equipment such as laser levels	+	Moderate positive influence
2	Use of higher-quality paints	The use of a new working method with a wall sanding tool	++	Strong positive influence
3	Requires the use of precise measuring equipment such as laser levels	The use of a new working method with a wall sanding tool	++	Strong positive influence
4	Conducting evaluations and selections for contractors	The use of a new working method with a wall sanding tool	+	Moderate positive influence
5	Setting limits on the number of supervisory units for building supervisors	Increased frequency of supervision and inspections to ensure compliance with quality standards	++	Strong positive influence
6	Reallocation of costs from other attributes that are excessive or low priority with the use of other structural consultants	Use of higher-quality paints	++	Strong positive influence
7	Reallocation of costs from other attributes that are excessive or low priority with the use of other structural consultants	Requires the use of precise measuring equipment such as laser levels	+	Moderate positive influence
8	Reallocation of costs from other attributes that are excessive or low priority with the use of other structural consultants	The use of a new working method with a wall sanding tool	+	Moderate positive influence
9	Proper use of ceramic adhesives in ceramic installation methods	Increased frequency of supervision and inspections to ensure compliance with quality standards	+	Moderate positive influence

10	Evaluate the quality of door accessories and ceramics	Increased frequency of supervision and inspections to ensure compliance with quality standards	+	Moderate positive influence
11	Reallocation of costs from other attributes that are excessive or low priority with the use of other structural consultants	Evaluate the quality of door accessories and ceramics	+	Moderate positive influence
12	Replacement of wooden door frames and leaves with UPVC or aluminum	Evaluate the quality of door accessories and ceramics	+	Moderate positive influence

Technical Matrix

This technical matrix stage is the stage of calculating the priority value obtained from the contribution value of the technical response. The contribution value is obtained from the results of the calculation of the relationship between the function requirement and the customer requirement, multiplied by the relationship value of the existing relationship rule, and then summed. As for the normalized contribution value, it is obtained from the result of dividing the contribution by the total contribution.

Table 11
Results of Technical Matrix Analysis

No	Code	Functional Requirements	Contribution	Normalized Contribution	Priority
1	TR1	Use of higher-quality paint	3.29	12.65%	3
2	TR2	Requires the use of precise measuring equipment such as laser levels	2.31	8.89%	6
3	TR3	The use of a new working method with a wall sanding tool	2.08	8.00%	8
4	TR4	Conducting evaluations and selections for contractors	2.57	9.85%	5

5	TR5	Setting limits on the number of supervisory units for building supervisors	3.50	13.46%	2
6	TR6	Reallocation of costs from other attributes that are excessive or low priority with the use of other structural consultants	2.17	8.35%	7
7	TR7	Proper use of ceramic adhesives in ceramic installation methods	1.35	5.20%	10
8	TR8	Evaluate the quality of door accessories and ceramics	2.96	11.38%	4
9	TR9	Increased frequency of surveillance and inspections to ensure compliance with quality standards	4.06	15.59%	1
10	TR10	Replacement of wooden door frames and leaves with UPVC or aluminum	1.73	6.63%	9

House of Quality

After calculations have been carried out in the previous several stages, the creation of a HoQ matrix can be carried out with the results of the matrix below:

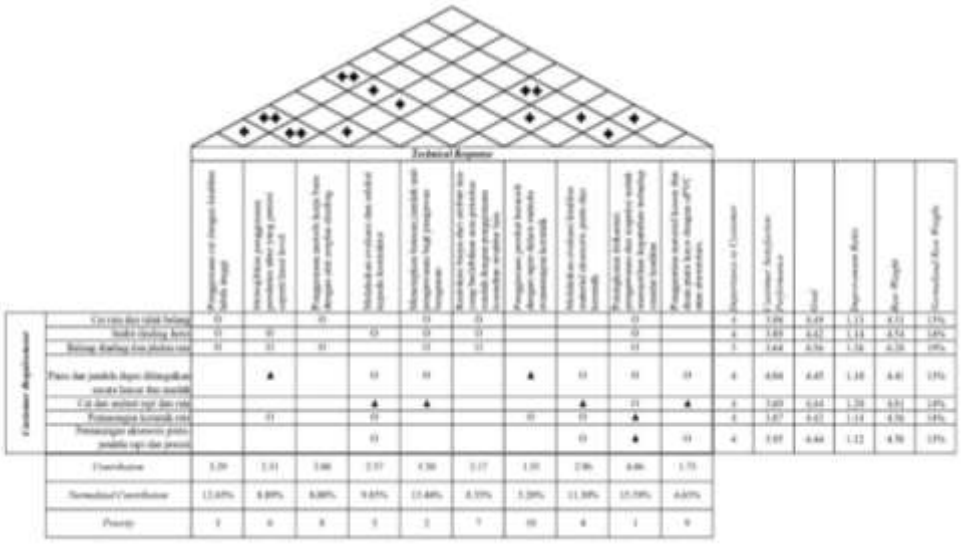


Figure 3 House of Quality Matrix

Based on the results of the calculation and analysis of the elaboration of the House of Quality matrix in Figure 3, the results of 5 priority technical responses are recommendations for improving the quality of home products at PT. Galaxy Alam Semesta, with the following results:

1. Increased frequency of supervision and inspections to ensure compliance with quality standards.
2. Establish a limit on the number of supervision units for building supervisors.
3. The use of higher quality paint.
4. Evaluate the quality of door accessories and ceramics materials.
5. Conducting evaluation and selection of contractors.

Conclusion

Seven home quality attributes are important to customers but their performance has not met expectations based on the Importance Performance Analysis method, namely flat and non-striped paint, straight wall corners, flat wall and ceiling planes, doors and windows that can function smoothly and easily, neat and even paint and sealant of frames, flat ceramic installation, and installation of neat and precise door and window accessories. All of these attributes must be immediately improved to improve customer satisfaction, with proposed improvements obtained from the Focus Group Discussion and House of Quality analysis, including increasing the frequency of supervision and inspection to ensure compliance with quality standards, setting limits on the number of supervision units for building supervisors, the use of higher quality paints, evaluating the quality of door accessories and ceramics materials, as well as periodic evaluation and selection to contractors. From the results of the research, suggestions that can be given to PT. Galaxy Alam Semesta is using this improvement proposal as a reference for improving quality

and resource allocation to increase consumer satisfaction, as well as being more responsive to the high workload for each building supervisor. For the next researcher, it is recommended to conduct sampling tests on houses with different classes and price ranges, as well as collect data from consumers who have purchased the 2nd, 3rd, and so on.

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