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QUALITY CONTROL OF OPERATIONAL EMPLOYEE GROOMING STANDARDS AT PT ARYAN PEMBANGUNAN PERUMAHAN PROPERTI USING SIX SIGMA AND FMEA METHODS

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ABSTRACT

PT Aryan Properti Housing Development or KidZania Surabaya operates in the entertainment industry sector, so grooming standards are very important. This is because employees interact directly with customers, and their appearance reflects the company's values of professionalism. This research aims to analyze and improve operational employee grooming standards at PT Aryan Pembangunan Perumahan Properti Surabaya using the Six Sigma (DMAIC) and FMEA methods. Grooming plays an important role in creating a professional impression and improving the company's image. Historical data from January to August 2024 was used to identify the root causes of grooming violations. The research results showed that violations of inappropriate clothing were 39%, 37% had long nails, and 24% had untidy hair. Analysis using the Define, Measure, Analyze, Improve, and Control stages produces solutions in the form of retraining, regular supervision, and stricter enforcement of standards. The Pareto diagram identifies that inappropriate clothing is the main priority for improvement because it has the highest total violations, namely 606 people. Implementation of this method can increase compliance and strengthen the company's image.
Keywords: *FMEA, Grooming, Six Sigma.*

A. INTRODUCTION

An organization or company can operate effectively if it has strong human resources capabilities to achieve its predetermined objectives [1]. In the modern workplace, grooming has become an essential element that reflects both individual and organizational professionalism. Grooming refers to personal appearance enhancement to look better and more presentable. Grooming, or personal grooming and appearance, is an often-overlooked yet crucial aspect of the business world. For company employees, their appearance and personal behavior can significantly impact the company's image and their performance. A neat appearance and professional attitude can boost employees' confidence and leave a positive impression on customers and clients [2]. Employees play a key role in achieving organizational success [3]. They are the human resources at the forefront of whether a system implemented by the company succeeds in producing something beneficial for both the company and society [4].

Work quality refers to an employee's competence in performing tasks, including accuracy, neatness, and timeliness [5]. The quality of human resources correlates with organizational commitment. Human resources' role is indisputable as they contribute significantly to a company's success [6]. Continuous improvement in human resources quality is essential. Companies must play a role in developing human resource quality. Developing human resources is an absolute necessity to meet current job demands and future challenges [7]. Companies must supervise to ensure employee grooming quality, aiming to ensure each individual maintains appearance, behavior, and work competence aligned with company standards. Supervision involves all efforts to monitor operational activities and ensure they

align with the company's plans [8]. Supervision aims to maintain quality control by addressing non-compliance, changing conditions, or improper replacements [9].

The Entertainment and Media (EnM) Industry encompasses organizations that distribute, produce, and publish goods across various markets, including publishing, radio, internet, advertising, film and theater, television, music, and publishing, collectively known as the entertainment business [10]. PT Aryan Pembangunan Perumahan Properti, or KidZania Surabaya, operates in the entertainment industry, making grooming standards crucial. Employees interact directly with customers, and their appearance reflects the company's professionalism. Despite having grooming guidelines, violations such as long nails, untidy hair, and inappropriate attire frequently occur. These violations negatively impact the company's image and may decrease customer trust. To address this issue, PT Aryan requires a systematic, data-driven approach. The Six Sigma DMAIC methodology is one of the techniques used to enhance quality standards [11]. Additionally, the Failure Mode and Effects Analysis (FMEA) method is employed to identify and analyze effects or impacts causing defects in a product [12]. Six Sigma emphasizes general methods for measuring quality. In Six Sigma terminology, a defect or nonconformance refers to errors or flaws unacceptable to customers [13].

The primary objective of this study is to identify factors contributing to grooming violations, analyze violation data using Six Sigma and FMEA methods, and develop sustainable improvement strategies. The research findings are expected to provide tangible contributions to improving human resource quality at PT Aryan. This study adopts Six Sigma and FMEA methods, recognized as quality management tools for identifying root causes and improving compliance with grooming standards. From the 1980s to the 1990s, awareness of quality grew rapidly. Companies made significant strides in improving quality [13]. The Six Sigma approach, particularly the Define, Measure, Analyze, Improve, Control (DMAIC) method, is an effective practice for enhancing process capabilities in industries [14]. This approach aims to provide evidence-based recommendations to improve efficiency and the company's image. During the Analyze phase, Failure Mode and Effect Analysis (FMEA) is integrated to identify causes of failure and propose solutions to specific problems [12].

B. LITERATURE

B.1 Grooming

Grooming refers to improving personal appearance to look better. Grooming, or personal grooming and appearance, is an often-overlooked yet essential aspect of the business world. For company employees, their appearance and personal behavior can significantly impact the company's image and their performance. A neat appearance and professional attitude can boost employees' self-confidence and leave a positive impression on customers and clients [2]. Employees play a critical role in ensuring performance success [3]. Therefore, companies must conduct supervision to control employee quality through grooming activities, ensuring that every individual demonstrates an appearance, behavior, and work competence that aligns with company standards. Supervision refers to all efforts to observe the execution of operational activities to ensure that these activities align with what the company has planned [8]. The goal of supervision is to maintain control quality and prevent disruptions caused by non-compliance, changing conditions, or improper changes [9].

B.2 Six Sigma

Six Sigma begins with an emphasis on general quality measurement methods. In Six Sigma terminology, a defect or nonconformance refers to an error or mistake that is unacceptable to the customer. From the 1980s to the 1990s, awareness of quality grew rapidly, with companies making significant progress in improving quality [13]. The concept of Six Sigma was introduced by Motorola in 1986 and has since been adopted by various organizations worldwide to gain a competitive edge. At its core, Six Sigma employs statistical

methods to analyze and enhance existing processes, with the ultimate goal of producing high-quality products that satisfy customers [15]. Six Sigma combines Lean principles and the Six Sigma methodology to create a systemic and systematic approach for identifying and eliminating non-value-added activities through radical and continuous improvement, ultimately achieving six-sigma-level performance [16]. There are five key approaches in Six Sigma, with the Define, Measure, Analyze, Improve, and Control (DMAIC) method being an effective practice for enhancing process capability in industries [14].

B.3 Failure Mode and Effects Analysis

FMEA (Failure Mode and Effects Analysis) is a systematic technique used to identify and minimize the occurrence of production process failures that can lead to product damage or defects. It involves analyzing tasks, job descriptions, failure modes, calculating the Risk Priority Number (RPN), and identifying the highest RPN values [17]. FMEA is a method that can be applied to identify potential causes of damage and serves as a tool to effectively identify, evaluate, and manage risks within an activity. The evaluation of process failures is carried out using three indicators: Severity (S), Occurrence (O), and Detection (D), which collectively determine the RPN value [18]. The objective of this method is to enhance system design, improve subsystem or component design, and refine manufacturing process design. Considering the risk of damage in each component, such as in a lift, corrective actions must be implemented appropriately and effectively [19].

C. RESEARCH METHOD

The method used in this research is the Six Sigma and FMEA methods. This approach represents a comprehensive and adaptive system to enhance, support, and optimize process performance. Six Sigma primarily focuses on understanding customer needs through the use of facts, data, and statistical analysis, ensuring that the company's business processes are continuously improved and reviewed.

In a previous study by Pratama & Chirzun (2023), the Six Sigma method was applied to improve service quality in the financial services industry. The study successfully identified and reduced issues related to incomplete documents and increased service efficiency. This research serves as a relevant reference for applying Six Sigma to enhance employee grooming standards, as both aim to optimize quality using data-driven and statistical approaches.

This study employs the Six Sigma method with the DMAIC (Define, Measure, Analyze, Improve, Control) approach combined with the Failure Mode and Effects Analysis (FMEA) method to improve compliance with employee grooming standards. The DMAIC approach was chosen for its proven effectiveness in identifying problems, analyzing root causes, and providing data-driven solutions to improve process quality. Meanwhile, FMEA is used as a tool to analyze risks and prioritize potential failures that may occur during the implementation of grooming standards. This combined approach enables the research to not only identify and address problems efficiently but also prioritize risks requiring immediate action. The integration of Six Sigma and FMEA provides a more comprehensive framework to ensure that compliance with grooming standards can be significantly and sustainably improved. Data was collected from employee grooming violation records from January to August 2024. Data processing was carried out using tools such as Pareto diagrams, proportion control charts, and process capability analysis to identify root causes and develop improvement strategies.

Research Stages:

1. Preliminary Analysis

A preliminary analysis was conducted by reviewing the data and documents available within the company to gain an initial understanding of grooming standards. This stage aims to gather essential information as the foundation for the research process.

2. Problem Identification

Problem identification was carried out by analyzing secondary data obtained from the company. The analysis focused on findings related to grooming standard control issues. Interviews with competent personnel within the company were also used to confirm the problems found in the data.

3. Literature Review

The literature review includes collecting theories, articles, journals, or other references relevant to this research. The references cover concepts of quality control, the Six Sigma method, and FMEA to provide a strong theoretical basis for the study.

4. Problem Formulation

Problem formulation was conducted based on secondary data analysis and insights from the literature review. The main focus of this study is the issue of violations of grooming standards occurring among the company's operational employees.

5. Determination of Research Objectives

The research objectives were determined based on the problem analysis. The primary goal of this research is to improve employee compliance with grooming standards through the application of Six Sigma and FMEA methods.

6. Data Collection

The data used in this research was entirely derived from secondary sources, such as internal company reports, grooming violation data, and related policies. This data was analyzed without requiring direct observation.

7. Analysis and Discussion

The analysis and discussion phase was carried out through the following steps:

a. Define:

This stage defines Critical to Quality (CTQ), elements directly related to customer needs and satisfaction. CTQ identification includes understanding customer needs and preferences, as well as the ability to measure and manage attributes that most influence customer satisfaction.

b. Measure:

In this stage, measurements are conducted using the following methods:

1). Defect Per Opportunities (DPO):

Formula:

DPO = (Number of Violations) / (Number of Groomed Employees × CTQ)……(1)

2). Defect Per Million Opportunities (DPMO):

Formula:

DPMO = DPO × 1.000.000 ...…….……....……...… (2)

3). Defect Per Unit (DPU):

Formula:

DPU = (Number of Violations) / (Number of Groomed Employees)..... (3)

4). Sigma Level:

Formula:

NORMSINV((1.000.000 - DPMO) / 1.000.000) + 1.5 ……..…….... (4)

c. Analyze:

In this stage, several steps were taken to analyze the issues, including:

1). Identifying types of violations contributing the most to the total violations using Pareto diagram analysis.

2). Using Fishbone diagrams to analyze various root causes of violations found.

d. Improve:

This phase focuses on performance improvement using FMEA to identify failure risks and prioritize corrective actions. Improvements were proposed based on FMEA analysis results.

e. Control:

The control phase aims to enhance and ensure the stability of the improved performance.

8. Conclusion and Suggestions

In the final phase, conclusions were drawn based on data analysis results. Additionally, recommendations were provided to the company as guidance for maintaining and improving the effectiveness of quality control in the future.

D. RESULT AND DISCUSSION

This research employs the Six Sigma method, which comprises five main stages: Define, Measure, Analyze, Improve, and Control (DMAIC). This approach is designed to identify problems, systematically analyze data, and provide fact-based solutions to improve process quality. During the Analyze stage, this method is enhanced by incorporating Failure Mode and Effects Analysis (FMEA).

FMEA is used to identify potential causes of problems that contribute to defects or nonconformance with standards. Below are the results of the calculations that have been performed:

D.1 Define

At this stage, the definition of Critical to Quality (CTQ) is carried out, which refers to elements directly related to customer needs and satisfaction. Three main violations of employee grooming standards were identified: excessively long nails, untidy hair, and improper attire not adhering to company regulations.

TABLE I
CRITICAL TO QUALITY

No	Types of Violations	Number (People)	Violation Percentage (%)	Cumulative Percentage (%)
1	Long Nails	577	37%	37%
2	Untidy Hair	379	24%	61%
3	Improper Clothing	606	39%	100%
	Total	**1562**	**100%**	

Source : Data Processing

The employee grooming data shows that the violation percentages are 37% for long nails, 24% for untidy hair, and 39% for improper clothing.

D.2 Measure

Measure is the second stage that focuses on data collection and process performance measurement.

TABLE II
EMPLOYEE GROOMING DATA FROM JANUARY TO AUGUST 2024

No	Date	The Number of Observations		Types of Violations (C)		
		Observation (n) (people)	d (violations) (people)	Long Nails	Untidy Hair	Improper Clothing
1	02/01/2024	73	30	20	10	12
2	08/01/2024	75	32	13	13	14
3	15/01/2024	71	34	16	9	20
4	22/01/2024	74	28	18	11	18
5	29/01/2024	70	29	18	12	22
6	05/02/2024	68	33	16	9	18
7	12/02/2024	69	35	22	8	19
8	19/02/2024	66	34	24	10	21
9	26/02/2024	66	30	20	12	20
10	04/03/2024	72	40	25	14	22
11	13/03/2024	83	42	19	15	16
12	25/03/2024	84	48	32	22	27
13	01/04/2024	80	38	18	12	23
14	16/04/2024	82	44	20	11	18
15	22/04/2024	76	31	23	15	22
16	29/04/2024	75	30	20	13	21
17	06/05/2024	68	32	18	9	18
18	13/05/2024	69	31	15	14	16
19	21/05/2024	74	30	13	8	15
20	27/05/2024	68	35	12	9	16
21	03/06/2024	72	28	18	9	13
22	10/06/2024	69	32	15	8	17
23	19/06/2024	70	28	12	11	20
24	24/06/2024	70	25	11	12	15
25	01/07/2024	66	23	15	8	17
26	08/07/2024	62	35	15	10	16
27	15/07/2024	65	33	13	11	13
28	22/07/2024	70	27	12	13	15
29	29/07/2024	75	28	28	18	30
30	05/08/2024	60	26	18	13	19
31	12/08/2024	62	32	15	12	20
32	19/08/2024	62	28	13	10	17
33	26/08/2024	65	27	10	8	16
	Total	**2331**	**1058**	**577**	**379**	**606**

Source : Data Processing

From the table above, it can be seen that the most common violation is the violation of wearing improper clothing, with a total of 606, followed by long nails with 577, and untidy

hair with 379. After that, a process of calculating control analysis using the P-chart map was carried out, and here are the results of the P-chart analysis:

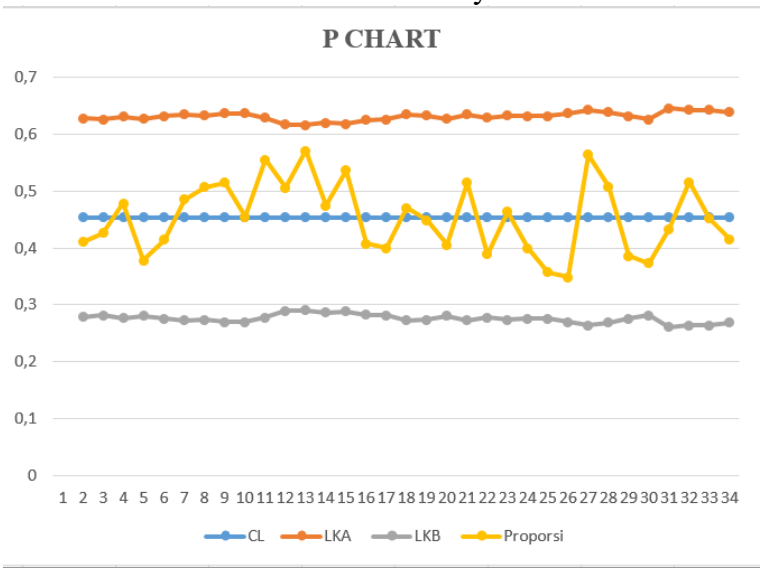

Figure 1. P-Chart
Source : Data Processing

Based on the P-Chart Control above, it can be observed that there are no values exceeding the upper control limit (UCL) and lower control limit (LCL), which indicates that the data on the P-Chart are within control. This shows that the company has made efforts to maintain quality control. However, the company should intensify its efforts in quality control to reduce the grooming violations that continue to occur each week.

Next, calculations were carried out to determine the CTQ (Critical to Quality), DPO (Defects Per Opportunity), DPMO (Defects Per Million Opportunities), and Sigma values. Here are the results of the calculations:

TABLE III
THE CALCULATION OF CTQ, DPO, DPMO, AND SIGMA

No	Date	The Number of Observations		CTQ	DPU	TOP	DPO	DPMO	SIGMA
		Observation (n) (people)	d (violations) (people)						
1	02/01/2024	73	30	3	0,411	219	0,1370	136986,3014	2,5940
2	08/01/2024	75	32	3	0,427	225	0,1422	142222,2222	2,5704
3	15/01/2024	71	34	3	0,479	213	0,1596	159624,4131	2,4960
4	22/01/2024	74	28	3	0,378	222	0,1261	126126,1261	2,6449
5	29/01/2024	70	29	3	0,414	210	0,1381	138095,2381	2,5889
6	05/02/2024	68	33	3	0,485	204	0,1618	161764,7059	2,4872
7	12/02/2024	69	35	3	0,507	207	0,1691	169082,1256	2,4578
8	19/02/2024	66	34	3	0,515	198	0,1717	171717,1717	2,4474
9	26/02/2024	66	30	3	0,455	198	0,1515	151515,1515	2,5300
10	04/03/2024	72	40	3	0,556	216	0,1852	185185,1852	2,3958
11	13/03/2024	83	42	3	0,506	249	0,1687	168674,6988	2,4594
12	25/03/2024	84	48	3	0,571	252	0,1905	190476,1905	2,3761
13	01/04/2024	80	38	3	0,475	240	0,1583	158333,3333	2,5013
14	16/04/2024	82	44	3	0,537	246	0,1789	178861,7886	2,4197
15	22/04/2024	76	31	3	0,408	228	0,1360	135964,9123	2,5986

No	Date	The Number of Observations		CTQ	DPU	TOP	DPO	DPMO	SIGMA
		Observation (n) (people)	d (violations) (people)						
16	29/04/2024	75	30	3	0,400	225	0,1333	133333,3333	2,6108
17	06/05/2024	68	32	3	0,471	204	0,1569	156862,7451	2,5074
18	13/05/2024	69	31	3	0,449	207	0,1498	149758,4541	2,5375
19	21/05/2024	74	30	3	0,405	222	0,1351	135135,1351	2,6024
20	27/05/2024	68	35	3	0,515	204	0,1716	171568,6275	2,4480
21	03/06/2024	72	28	3	0,389	216	0,1296	129629,6296	2,6281
22	10/06/2024	69	32	3	0,464	207	0,1546	154589,3720	2,5169
23	19/06/2024	70	28	3	0,400	210	0,1333	133333,3333	2,6108
24	24/06/2024	70	25	3	0,357	210	0,1190	119047,6190	2,6798
25	01/07/2024	66	23	3	0,348	198	0,1162	116161,6162	2,6944
26	08/07/2024	62	35	3	0,565	186	0,1882	188172,0430	2,3847
27	15/07/2024	65	33	3	0,508	195	0,1692	169230,7692	2,4572
28	22/07/2024	70	27	3	0,386	210	0,1286	128571,4286	2,6332
29	29/07/2024	75	28	3	0,373	225	0,1244	124444,4444	2,6531
30	05/08/2024	60	26	3	0,433	180	0,1444	144444,4444	2,5606
31	12/08/2024	62	32	3	0,516	186	0,1720	172043,0108	2,4461
32	19/08/2024	62	28	3	0,452	186	0,1505	150537,6344	2,5341
33	26/08/2024	65	27	3	0,415	195	0,1385	138461,5385	2,5873
	TOTAL	**2331**	**1058**						

Source : Data Processing

The data above represents the results of employee grooming analysis based on quality parameters such as CTQ (Critical to Quality), DPU (Defects per Unit), TOP (Total Opportunity), DPO (Defects per Opportunity), DPMO (Defects per Million Opportunities), and Sigma Level. In general, the performance of employee grooming shows fluctuations over time, with the lowest DPO of 0.1162 in week 25 (01/07/2024) and the highest of 0.1905 in week 12 (25/03/2024). This reflects that the rate of defects per opportunity varies, which affects DPMO and Sigma Level, with the best performance achieved at a Sigma Level of 2.6944 and the worst at 2.3761. This indicates that overall employee grooming performance is at an average level, with indications that the process still generates many violations and requires improvement. To improve performance, identification of the root causes of variation, enhanced quality control, process standardization, employee training, and regular monitoring and evaluation are needed to achieve a higher and more stable Sigma Level.

D.3 Analyze

This phase involves analyzing the data collected to identify the root causes of problems or variability in the process. This analysis helps in finding the factors that have the most significant impact on process outcomes. The analysis in this study uses a Pareto Chart and Fishbone diagram.

a. Pareto Chart

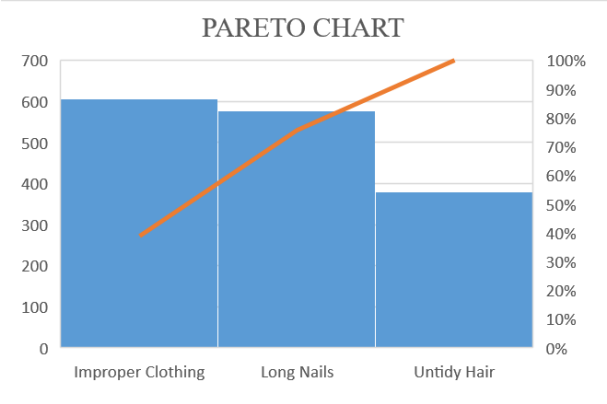

Figure 2. Pareto Chart
Source : Data Processing

Pareto Diagram identifies that non-compliant attire is the top priority for improvement, as it accounts for the highest number of violations, totaling 606 individuals. This is followed by long nails with 577 individuals and, lastly, untidy hair with 379 individuals.

b. Fishbone

1. Fishbone Diagram for Long Nails

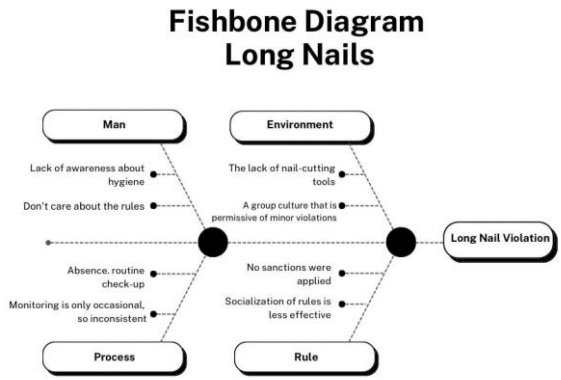

Figure 3. Fishbone Diagram Long Nails
Source : Data Processing

2. Fishbone Diagram for Untidy Hair

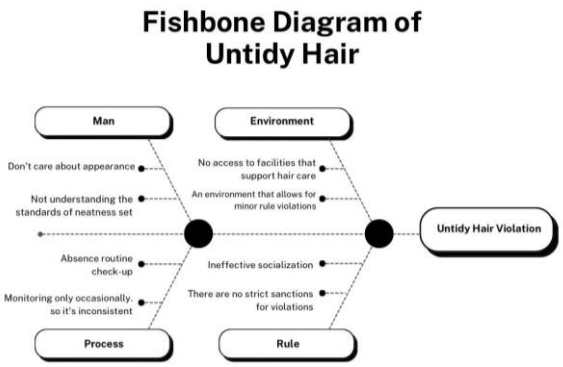

Figure 4. Fishbone Diagram of Untidy Hair
Source : Data Processing

3. Fishbone Diagram for Inappropriate Clothing

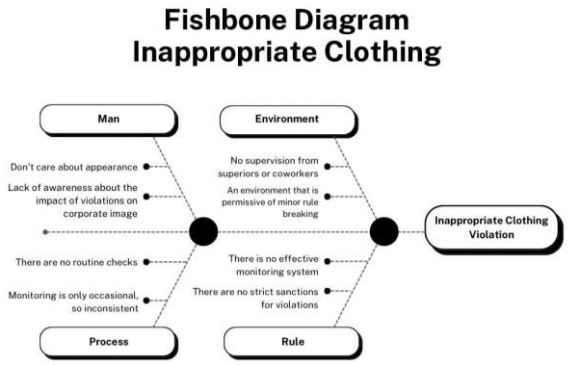

Figure 5. Fishbone Diagram Inappropriate Clothing
Source : Data Processing

D.4 Improve

This stage focuses on performance improvement using the Failure Mode and Effects Analysis (FMEA) method. Failure Mode and Effects Analysis (FMEA) is a method that allows for establishing the relationship between causes and effects of defects, ultimately seeking solutions by identifying the best decisions regarding the implementation of appropriate actions.

TABLE IV
FAILURE MODE AND EFFECTS ANALYSIS

1	2	3	4	5	6	7	8
Expected Standard	Type of Violation	Cause of Violation	Effect of Violation	Severity	Occurrence	Detection	Risk Priority Number
				(1-10)	(1-10)	(1-10)	(1-1000)
Nails should be short, clean, and tidy to maintain cleanliness and professionalism.	Long Nails	Lack of attention to personal hygiene.	Increases the risk of spreading germs, especially when working in food establishments.	6	7	7	294
		Not understanding the importance of complying with company policies.	Reduces professional appearance in front of visitors.	4	5	4	80
1	2	3	4	5	6	7	8

Expected Standard	Type of Violation	Cause of Violation	Effect of Violation	Severity	Occurrence	Detection	Risk Priority Number
				(1-10)	(1-10)	(1-10)	(1-1000)
Hair should be styled neatly according to company rules.	Untidy Hair	Disregard for appearance standards.	Reduces professionalism and the company's positive image.	3	5	4	60
		Lack of time or effort to tidy hair.	Affects customer perception of service quality.	4	4	3	48
Employees should wear clothing in accordance with company SOPs.	Inappropriate Clothing	Not understanding the established SOPs.	Creates an unprofessional image of the company.	7	8	8	448
		Disregard for appearance standards.	Reduces uniformity and harmony in the work environment.	7	6	8	336

Source : Data Processing

The results of the FMEA analysis above are the result of discussions with the stakeholders at the company. The assessments obtained from this FMEA will be used as consideration for improving quality and addressing existing issues within the company.

Violations related to nail cleanliness, caused by a lack of attention to personal hygiene, have serious consequences such as increasing the risk of germ transmission and lowering the professional image, with a Risk Priority Number (RPN) of 294. Hair neatness violations, generally caused by indifference or lack of time or effort in styling the hair, have a lesser impact on professionalism and customer perception, with the lowest RPN of 48. Meanwhile, violations related to clothing standards, caused by a lack of understanding of company SOPs or indifference, have the greatest impact on the company’s image and workplace harmony, with the highest RPN of 448. To address these issues, improvements are required, such as training, routine monitoring, and enhanced detection systems to minimize violations, maintain professionalism, and improve uniformity in the workplace.

D.5 Control

Control is one of the phases in the Six Sigma methodology, aimed at ensuring that improvements that have been implemented continue to function effectively and yield consistent results as per the set targets. The Control phase also aims to prevent issues from reoccurring after improvements have been made.

The following are control actions for the violations that occurred:

a. Human:
- Provide regular training related to appropriate grooming standards.
- Motivate employees to care about personal appearance through rewards.
- Educate employees about the positive impact of dressing appropriately on the company's image.

b. Environment:
- Provide sufficient grooming facilities at the workplace.
- Create a work culture that supports cleanliness and neatness.
- Create an environment that emphasizes the importance of professionalism through visuals, such as posters.

c. Process:
- Establish a more regular inspection schedule for operational employee grooming.
- Provide routine feedback reports to increase awareness.
- Implement stricter supervision, especially during large events.

d. Rules:
- Implement strict sanctions for employees who frequently violate grooming standards.
- Disseminate rules through internal media such as posters.
- Establish clear policies on employee grooming, complete with SOPs.

E. CONCLUSION

The conclusion of this study indicates that violations of employee grooming standards at PT Aryan Pembangunan Perumahan Properti have a significant impact on the company's image and customer perception. The analysis using Six Sigma (DMAIC) and FMEA methods successfully identified that inappropriate clothing is the primary type of violation, with the highest number of violations, totaling 39%. The main root causes of this violation include a lack of understanding of the company's SOPs, indifference to appearance standards, and minimal routine supervision.

The implementation of solutions such as employee grooming training, periodic monitoring, and stricter enforcement of standards has proven to improve employee compliance with grooming standards. These findings make a significant contribution to improving the quality of human resources and process control within the company, while also strengthening the company's professional image. As a next step, this study recommends the application of ongoing control to ensure the sustainability of improvements and the exploration of innovative solutions to further enhance process efficiency.

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