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QUALITY CONTROL OF CAMILLE BEAUTY *FACE MASK* PRODUCTS USING *FAILURE MODE AND EFFECT ANALYSIS* METHOD : A CASE STUDY

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Abstract— Regarding criticism and suggestions from consumers, it shows that of the 881,140 products sold, there are 22,947 products that are considered manufacturing defects, with an average percentage of defective products per month of 2.71%, with several types of defects submitted by consumers through the survey. This is quite serious because it will provide a bad experience to consumers in using this product. Failure Mode and Effect Analysis (FMEA) is a method used to evaluate system design by considering existing failure modes in a machine or equipment component system and analyzing the consequences for the reliability of the system. Based on the method used, it was found that the highest RPN value was in a case of disability, namely causing itching, with an RPN value of 504, consisting of a severity value of 9, occurrence of 7 and detection of 8, with a percentage of RPN occurrences of 35%. Beased on this result, it proposes improvements to the priority types of product defects and other product defects.

Keywords: Face Mask, FMEA, Quality Control, Pareto Diagram, and RPN.

1. Introduction

Increasing profits can be done by one of them paying attention to customer satisfaction. Product quality meets customer expectations, automatic customer satisfaction can be achieved. One of the things that can damage customer satisfaction is a defect in the product. The resulting defective product can lead to a claim market case. This incident will affect customer perception and assessment of the product. In addition, the company needs to incur additional costs for the repair of defective products.

This quality control is a way to improve and reduce the number of defective products in accordance with the plan, so that the resulting products can be more effective and efficient. The quality control process aims to achieve the quality to be achieved, reduce design costs, reduce control costs, and reduce production costs. Every production process generally has the opportunity for waste to occur. One way that can be done is to take an FMEA approach to manage processes in the production system to be more effective and efficient. The FMEA concept evaluates the possibility of a failure of a system, design, process or service to make handling steps (Andiyanto, Sutrisno, and Punuhsingon 2019).

Based on data obtained from the company PT XYZ, it can be seen that the sales of Camille Beauty face mask products in 2022 reached 881,140 products. This shows quite high sales that year. However, a survey conducted by PT XYZ regarding criticism and suggestions from consumers, showed that of the

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881,140 products sold, there were 22,947 products considered manufacturing defects, with an average percentage of defective products per month of 2.71%, with several types of defects submitted by consumers through the survey. This is quite serious because it will provide a bad experience to consumers in using this product. Therefore, quality analysis and control are carried out using this FMEA method to display the priority causes of defects, as well as provide current control advice on defects that occur, so that companies know what to do first to overcome potential defective products in the future.

2. Method

There are several stages that can be done in solving the problem. First,field studies are carried out at PT XYZ by conducting surveys to factories and Quality Control Sections. Furthermore, literature studies were carried out to support the survey results from field studies. Then, iidentified the problem found in this study is quality control of Camille Beauty Face Mask products that are defective in production. Furthermore, the formulation of the problem in the research and writing of this report is how to identify the factors that cause Camille Beauty Face Mask products to produce defects and proposed improvements to the factors that cause defects in Camille Beauty Face Mask products. After that, data collection is carried out. The data used are production data of Camille Beauty Face Mask products and production defective Camille Beauty Face Mask product data to support the calculation of the FMEA method and through direct observation and research to support the data, so as to support the provision of improvement proposals. Data that has been obtained and collected will be processed using the FMEA (Failure Mode and Effect Analysis) method which aims to analyze the failure mode in a design, service, process, or system. Furthermore, an analysis was carried out based on the qualitative processing that had been carried out. Aanalysis carried out is analyzing factors that affect product quality based on RPN values and pareto charts to determine the cause of production defects in Camille Beauty Face Mask products and provide improvement proposals.

3. Result and Discussion

Data collection is carried out through direct observation and research. Data collection is carried out directly by visiting the company's location. Once in the company, data collection is carried out by observation and observation of the production process for several days. After making observations, interviews were conducted with the company, especially the quality control department and guided by field supervisors. In conducting interviews, the data collected was in the form of sales data for Camille Beauty Face Mask products at PT XYZ for the period January – December 2022, data on production defects for each period and the type of product defects. Raw data on sales of Camille Beauty Face Mask products with 6 types of variants, namely strawberry, coffee, greentea, lemon, milk, and chocolate can be seen in **Table 1** below.

Table 1.1 Sales Data of Camille Beauty Face Mask Products in 2022

Month	Strawberry	Coffee	Greentea	Lemon	Milk	Brown	Total
January	28.392	22.238	17.490	16.418	12.417	17.586	114.541
February	33.861	24.665	22.070	18.345	20.942	14.763	134.646
March	21.343	20.336	20.693	15.793	18.737	13.096	109.998
April	23.589	19.910	18.303	15.209	17.506	10.015	104.532
May	19.823	13.749	13.394	10.476	14.188	6.968	78.598
June	10.387	10.028	9.611	7.038	9.645	4.210	50.919
July	11.842	9.594	9.058	6.848	9.236	4.265	50.843
August	14.805	10.439	9.329	6.922	10.025	4.668	56.188
September	11.018	7.780	6.682	4.812	7.159	3.142	40.593
October	9.192	6.496	5.562	4.050	5.907	2.052	33.259

November	12.863	9.155	7.546	6.092	8.521	4.131	48.308
December	15.377	9.254	8.918	10.493	9.288	5.385	58.715
Total	**212.492**	**163.644**	**148.656**	**122.496**	**143.571**	**90.281**	**881.140**

Furthermore, after the product reaches consumers, PT XYZ will provide a kind of assessment or criticism platform or suggestions for products that have arrived or they have used. The platform is distributed in the form of an online form that can be filled out by consumers. Based on the survey results, the raw data for Camille Beauty Face Mask products is obtained in **Table 2** below.

Table 2. Defective **2**Camille Beauty Face Mask Product Complaint Data in 2022

Month	**Defective Product Complaints**				
	Breakouts	**Dry Skin**	**Causes itching**	**Causes a rash**	**Damaged Packaging**
January	772	654	588	685	679
February	477	586	543	560	683
March	483	724	501	657	402
April	487	793	549	630	800
May	287	234	210	276	286
June	324	252	302	205	241
July	230	255	247	241	223
August	241	309	217	343	289
September	212	231	220	319	339
October	343	290	257	210	293
November	331	263	297	258	310
December	254	314	243	279	219

Then, based on the number of monthly productions, it can be determined for the percentage of defective Camille Beauty Face Mask products each month in 2022, the total defective products by composition, and the average presentation of defective products, can be seen in **Table 3** below.

Table 3.3 Percentage of Defective Camille Beauty Face Mask Products in 2022

Month	**Number of Defects**	**Ratio**
January	3378	2,95%
February	2849	2,12%
March	2767	2,52%
April	3259	3,12%
May	1293	1,65%
June	1324	2,60%
July	1196	2,35%
August	1399	2,49%
September	1321	3,25%
October	1393	4,19%

November	1459	3,02%
December	1309	2,23%
Total	**22947**	
Average		**2,71%**

The calculation of the severity factor in the case of production defects in Camille Beauty Face Mask products along with the analysis of the criteria can be seen in **Table 4** below.

4Table 4. Severity Factors of Camille Beauty Face Mask Products

Number	Types of Product Defects	Frequency	S
1	Causes itching	3877	9
2	Dry skin	3596	6
3	Rash	3860	4
4	Breakouts	3986	5
5	Damaged Packaging	3497	6
Total		**18816**	**30**

The calculation of the occurence factor in the case of production defects in Camille Beauty Face Mask products along with the analysis of the criteria is shown in **Table 5** below.

Table 5.5 Occurance Factors of Camille Beauty Face Mask Products

Number	Types of Product Defects	Frequency	O
1	Causes itching	3877	7
2	Dry skin	3596	6
3	Rash	3860	7
4	Breakouts	3986	8
5	Damaged Packaging	3497	5
Total		**18816**	**33**

The calculation of detection factors in the case of defective production of Camille Beauty Face Mask products along with the analysis of the criteria can be seen in **Table 6** below.

Table 6. Camille Beauty Face Mask Product Detection Factors

Number	Types of Product Defects	Frequency	D
1	Causes itching	3877	8
2	Dry skin	3596	8
3	Rash	3860	9
4	Breakouts	3986	6
5	Damaged Packaging	3497	4
Total		**18816**	**35**

In this case, the value of factor S, factor O or factor D has been obtained for each mode of failure or defect in the production of Camille Beauty Face Mask products. Then, it can be specified for the RPN value of each failure mode as in **Table 10** below.

Table 7. 6 Risk Priority Number (RPN) Value of Camille Beauty Face Mask Products

Number	Types of Product Defects	Frequency	S	O	D	RPN
1	Causes itching	3877	9	7	8	504
2	Dry skin	3596	6	6	8	288
3	Rash	3860	4	7	6	252
4	Breakouts	3986	5	8	9	240
5	Damaged Packaging	3497	6	5	4	120
Total		**18816**	**30**	**33**	**35**	**1404**

In this case, a pareto diagram will be designed to illustrate and visualize the sequence of events in the case of failure or manufacturing defects in Camille Beauty Face Mask products based on frequency, from largest to smallest. The order of the types of production defects of Camille Beauty Face Mask products that have been determined based on the percentage of occurrence can be seen in **Table 8** below.

Table 8.7 Percentage of Production Defects in Camille Beauty Face Mask Products

No	Types of Product Defects	Frequency	RPN	Percentage of Occurrence	Cumulative Percentage
1	Causes itching	3877	504	35%	35%
2	Breakouts	3986	360	25%	60%
3	Dry skin	3596	288	20%	80%
4	Rash	3860	168	12%	92%
5	Damaged Packaging	3497	120	8%	100%
Total		**18816**	**1440**	**100%**	

Then, for the pareto diagram of the failure mode or manufacturing defect of Camille Beauty Face Mask products shown in Figure 1 below.

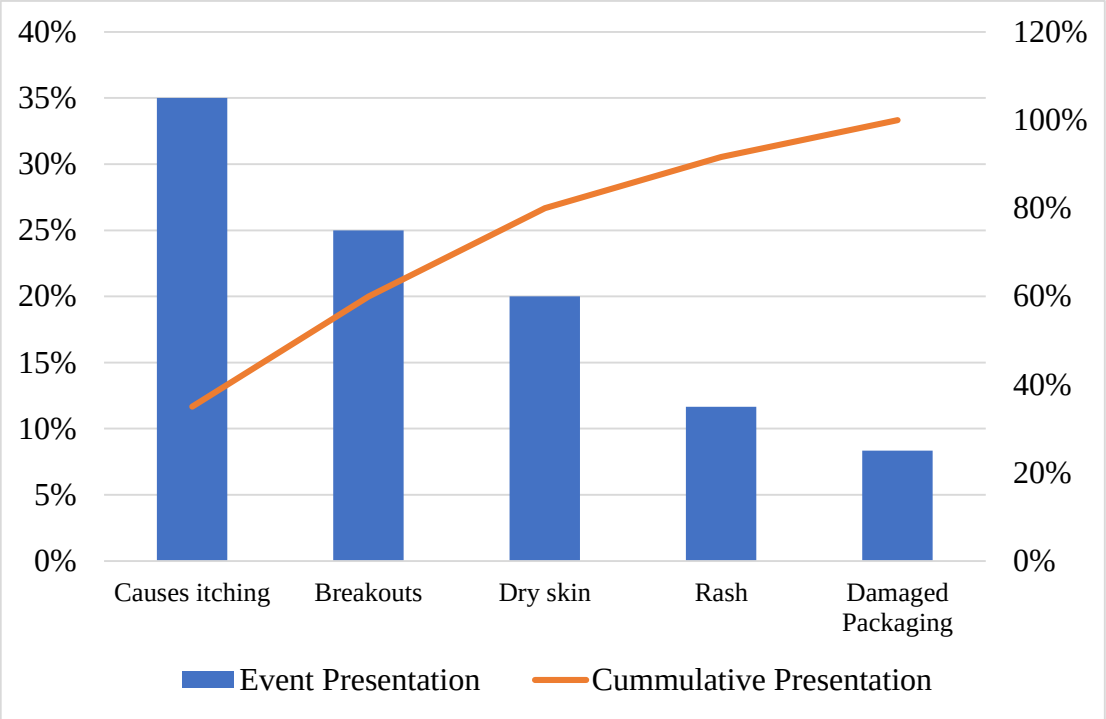

Figure 1.1 Pareto Diagram of Camille Beauty Face Mask Products

Based on the calculation of the RPN value and visualization with a pareto chart, it can be analyzed for failure mode with the largest RPN value is itching, with an RPN value of 504, with an incidence percentage of 35%. The severity value for failure mode causes itching of 9. Based on these values, it can be analyzed the mode of failure to cause itching including the type of potential severity or potential severity where the disability is high risk and consumers cannot accept the consequences of the disability. Then, for an occurrence value of 7, where the probability of an itchy product from 1000 productions is 20 products. While the factor value of detection is 8, where the cause of product defects that cause itching is difficult to detect even though preventive methods are applied.

Based on this analysis, several control processes can be determined (current control). The first is to set SOPs for safe doses of tochoperyl acetate. Tochoperyl acetate is a form of vitamin E that is generally available in the form of supplements or cosmetic products. Tocopheryl Acetate is known to have benefits to prevent or overcome vitamin E deficiency in the body. However, even though it contains vitamin E, this chemical can cause skin problems, namely irritating, burning sensation, itching, and blisters if used with improper doses or used by customers with certain medical conditions. The next current control is to provide a warning of side effects if using the product. It is possible that customers of this product have special conditions. Sometimes there is a small percentile of customers who have a medical condition that if their skin comes into direct contact with an ingredient of this product, there will be a reaction on the skin, resulting in irritation and causing the face to itch. Therefore, this can be overcome by providing literature or warning on the product against possible side effects that will occur if in direct contact with one of the ingredients of the Camille Beauty face mask product.

4. Conclusion

Based on the research that has been done, it can be concluded that the failure mode with the largest RPN value is to cause itching, with an RPN value of 504, with a percentage of incidence of 35%. Based on the failure mode, it can be identified for event control or current control is to set SOPs for safe doses of tochoperyl acetate and provide literature or warnings on the product against possible side effects that will occur if in direct contact with one of the ingredients of Camille Beauty face mask products.

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