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IMPROVEMENT OF PRODUCT BOTTLED WATER QUALITY THROUGH SIX SIGMA AND FUZZY MARKETING MIX APPROACHES

PENINGKATAN MUTU PRODUK AIR MINUM DALAM KEMASAN DENGAN PENDEKATAN METODE SIX SIGMA DAN FUZZY MARKETING MIX

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ABSTRAK

Dari data hasil penjualan tahun 2019, jumlah penjualan air minum dalam kemasan Baros 19 L mengalami penurunan sebanyak 26.304 unit. Tujuan penelitian ini adalah untuk mengetahui tingkat sigma yang menunjukkan level kinerja perusahaan secara keseluruhan dengan six sigma. Metode Fuzzy Marketing Mix dapat menunjukkan mutu pelayanan yang masih belum memuaskan pelanggan, sehingga dapat dilakukan perbaikan. Pendekatan metode Six Sigma memiliki tahapan DMAIC, yaitu Define, Measure, Analyze, Improve, dan Control. Hasil dari tahap define untuk pemetaan atribut dimensi Marketing Mix 4P (product, price, promotion, dan place) sebanyak 27 atribut dan dilakukan pengukuran voice of costumer kepada 100 responden. Tahap measure mendapatkan gap kesenjangan negatif terbesar antara kepuasan dan kepentingan, yaitu pada atribut 23 sebesar -0,4452. Berdasarkan hasil perhitungan DPMO dan tingkat sigma dari tingkat kepuasan pelanggan didapatkan rata-rata nilai sigma produk air minum dalam kemasan sebesar 2,561 dengan rata-rata DPMO sebesar 153.204. Tahap analyze menemukan variabel utama penyebab terjadinya ketidakpuasan pelanggan untuk segera dapat dilakukan perbaikan. Atribut dengan gap negatif dan nilai DPMO terbesar yaitu keterlambatan pengiriman produk air minum dalam kemasan kepada konsumen (atribut 23), sehingga menjadi fokus untuk perbaikan. Perbaikan yang dapat dilakukan untuk meningkatkan mutu produk air minum dalam kemasan 19 L adalah memastikan ketersediaan kemasan botol baru untuk setiap sopir yang kekurangan botol kosong.

Keywords : fuzzy, marketing mix, kualitas,six sigma

ABSTRACT

According to 2019 annual sales data, the amount of Baros 19-liter bottled water sales experienced 26,304 units drop. The objective of this research was to determine the level of sigma which indicates the level of overall company performance with Six Sigma and with Fuzzy Marketing Mix method to see which service quality that is still not satisfying the customers so that improvements can be made. The Six Sigma approach was done through DMAIC steps, which were define, measure, analyze, improve, and control. The result from the define step, which was mapping of attribute dimensions Marketing Mix 4P ((product, price, promotion, and place), was 27 attributes and voice of customer measurement was done with 100 respondents. The measure step found that the biggest negative discrepancy with the value of -0.4452 was between satisfaction and importance in attribute 23. Based on calculation of DPMO and the sigma level, the average Sigma score of bottled water in Indonesia was 2.561 with average DPMO of 153,204. In the analysis step, it was conducted to find the main variable that causes customer dissatisfaction to be repaired immediately. Attribute with the highest negative discrepancy was delayed in product delivery to the costumers (attribute 23). Improvement that can be done to increase the product quality of 19-liter bottled water was to ensure availability of new water bottle for every driver lacking empty bottle.

Keywords : fuzzy, marketing mix, quality, six sigma

INTRODUCTION

PT. Banyu Reverse Osmosis (PT. Baros) is a bottled drinking water company, producing “Baros” brand drinking water. Two main products are drinking in19 liter bottle and in 250 milliliter cup. According to production data in 2018, PT. Baros successfully sold 276,667 units of 19-liter bottled water to the consumers, whereas in 2019, the total sales was 250,363 units. From the aforementioned data, it can be seen that the number of sales had rapidly declined for Baros 19-liter bottled water. In 2019, Baros 19-liter bottled water product experienced decline in sales of about 26,304 units or around 10% compared to 2018. From the results of interviews with the marketing manager of PT. Baros, the decline in sales was caused by customers to unsubscribe due to unsatisfactory product service quality, including late product delivery.

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With the rapid technological advancements, drinking water provision is also advancing, for example, availability as bottled water. The high number of rising bottled water companies create higher competition between producers. After experiencing such rapid advancement, now drinking water producers must be extra careful (Syamsul, 2010). The very determining factor of a company to be able to survive in the multidimensional crisis that Indonesia is currently experiencing is making a marketing strategy according to customer desires (Munandar *et al*, 2004). Consumers will choose drinking water with good quality and price that is corresponding to the product quality, along with the benefit from consuming the drinking water (Ningsih *et al.*, 2016), so that companies should understand completely the needs of consumers out of the produced products (Amrina and Fajrah, 2015). By this problem, PT. Baros must improve on its 19-liter bottled water product quality to avoid further sales declining.

In this research, improvement on 19-liter bottled water product quality will be done through Six Sigma and Fuzzy Marketing Mix methods. The Fuzzy Marketing Mix approach was chosen in accordance with Aly and Vrana (2005) in order to solve the instability and uncertainty problems on the Marketing Mix in a company. Marketing is regarded as the primary factor in product survivability in the market (Vorhies *et al.*, 2009).

Six Sigma is a way of measuring the process to meet near perfect goal, presented with 3.4 Defect Per Million Opportunities (DPMO), and it is an approach to changing organizational culture. One of the methodologies in an effort to improve on Six Sigma targets is DMAIC (Define, Measure, Analyze, Improve, dan Control) which provides a step in finding the problem, identifying the cause of the problem until finally finding a solution to fix it. As a step in using this DMAIC method, it is necessary to describe the performance of a process, namely through process control charts and fishbone diagram (Kartini and Jayanthi, 2019). Six Sigma is a continuous improvement effort to decrease variations on process, to increase the process capability to produce products (and/or service) which is zero defects, with minimum target of 3.4 DPMO and to ensure customer value (Hutahean, 2018).

Kotler (2006) defines the Marketing Mix as a mix of marketing variables that can be controlled and used by company for pursuing the expected sales in target market (Isyana *et al.*, 2017). The Marketing Mix has many elements that can be specified according to the main goal of the organization, main elements of marketing mix refer to the 4 P (product, price, place or distribution, and promotion). These elements of marketing mix may strengthen the customer satisfaction's level (Thabith and Raewf, 2018). The variables in the Marketing Mix will be connected to one another (Singh, 2012).

The correlation between target, economical condition, development, and other input variables on one hand and control of marketing mix on the other hand is non-linear and difficult or cannot be defined correctly unless it is stated in the form of decision. One of the methods to handle all of the mix marketing problem aspects is to utilize fuzzy logic set, which effectively handle unclear, uncertain, and subjective inputs while also efficiently modelling the nonlinear correlation between input and output of the problem (Aly and Vrana, 2005).

FMEA (Failure Modes and Effects Analysis) is a structured procedure for identifying and preventing as many as possible modes of failure (failure mode). It is used to identify the sources and root causes of a quality problem. A failure mode includes the defect or failure in design, conditions outside the limits of the specifications has been defined, or changes in the product that causes disruption of the function of the product (Ulfah *et al.*, 2019). The failure mode suggests to analysing the consequences of a process and its effects on the company (Fitriana *et al.*, 2020). As an engineering technique, it is used to determine, identify, and eliminate known failures, problems, and errors of a design, process, and/or services before it reaches the consumers (Hanif *et al.*, 2015). The advantage of FMEA is that it is an analytical tool that can evaluate reliability by examining failure modes and is one of the systematic techniques for analyzing failures (Ulfah *et al.*, 2016).

Fuzzy FMEA is a development from conventional FMEA method which shows flexibility for uncertainties due to vague information or subjective preference element which was used in the scoring of the failures. Addition of fuzzy concept to FMEA algorithm allows both linguistics and numeric data to be used, which will have membership value in each of its attribute (Iqbal *et al.*, 2013). Three main steps in fuzzy FMEA, which are (Suryoputro *et al.*, 2018):

a. Fuzzification, process with linguistic variable to convert risk factors severity, occurrence, and detection into fuzzy. Through linguistic variable along with definition, followed with ranking the three factors with base scale to obtain membership degree in each class.
b. Rule evaluation contains knowledge from the experts about failure mode interactions and the effects of it in fuzzy rule "if then". This rule is easier to formulate in linguistic rule compared to numeric.
c. Defuzzification, process of creating ranking from fuzzy RPN to give failure mode priority ranking. Defuzzification process utilizes centroid method.

From the previous studies, the authors did not find research which used six sigma and fuzzy marketing mix approaches. Ganguly (2012) used six sigma approach with DMAIC methodologies in the project to determine the project's CTQ

characteristics, defining the possible causes, identifying the variation sources, establishing variable relationships and implementing control plans. Other previous study, Azhar *et al*. (2019) utilized marketing mix approach and service quality. This study aims to investigate the effect of the marketing mix and service quality to tourist satisfaction and loyalty. The result showed that marketing mix had a positive and significant effect on tourist satisfaction in the region of Samosir.

Paramita *et al.* (2015) and Prameswara *et al.* (2014) used Servqual approach with the tangible, reliability, responsiveness, assurance, and empathy as dimensions They applied the "Define" step of Six Sigma. This research made some modification to replacing the dimension with 4P dimensions (product, price, promotion, and place) which is known as marketing mix theory. The six sigma and fuzzy marketing mix approaches was used to get better better improvement on product quality. The advantages of the six sigma method can improve product quality and increase the number of sales to consumers, while the advantages of fuzzy marketing mix approach can assess consumer satisfaction from the product. Six Sigma approach determined Sigma level in the scale of 1-6, if the scale was below Six Sigma terminology target, quality improvement was done through Fuzzy Failure Mode Effect Analysis (FFMEA) method. Fuzzy FMEA is the developed of conventional version and has been implemented in several researches (Rahmatin *et al*., 2018). Fuzzy marketing mix approach was done to determine the attributes and to measure the discrepancy between importance and consumers satisfactory upon the product or the service.

The objective of this research was to determine the level of sigma which indicates the level of overall company performance with six sigma and with fuzzy marketing mix method, it can be seen which service quality is still not satisfying to customers so to that improvements can be made.

RESEARCH AND METHOD

The first step of this research was observation and direct interview with PT. Baros about the problems of the factory. Then, problem solving was done through Six Sigma method with DMAIC cycle. The second step were making of the questionnaire with Marketing Mix theory with 4P dimensions. The collected data was processed to include gap and DPMO and sigma calculation, root cause analysis, and strategic steps for improvement.

The questionnaire results from Baros 19-L bottled water consumers in Serang, Cilegon, and Pandeglang area. The main focus of questionnaire data on quality attributes was about the consumers unsatisfactory. These attributes were then analysed to figure out the root cause and assess applicable improvement strategies. Strategies were assessed with fuzzy FMEA method in which the questionnaire filling process was done through interview and brainstorming with PT. Baros delivery manager. Flowchart Research stages that integrate all the methods used are shown in Figure 1.

Data Processing Using The Six Sigma Approach

Data processing used the six sigma approach with stages define, measure, analyze, and improve. At define stage, the questionnaire was compiled using dimensions from the markeing mix theory, namely product, price, promotion and distribution (place). At the measure stage, data processing was carried out to determine the score gap between the level of satisfaction and the level of importance using the fuzzy marketing mix method, as well as calculating the DPMO and the sigma level. At the analyze stage, a Cartesian diagram analysis was carried out using the IPA method, then continued by making a cause and effect diagram to identity the root cause of the problem. The improve stage was carried out using the Fuzzy FMEA method.

Data Processing Using The Fuzzy Marketing Mix Approach

The fuzzy marketing mix approach was used in the define stage of six sigma to find the gap between satisfaction and importance, calculating the DPMO value and the six sigma level. The stages in data processing using Fuzzy Marketing Mix to calculate fuzzification of the questionnaire results then defuzzification of the level of importance.

Fuzzification process is a process to translate crisp score into fuzzy language which was done with Overall Effectiveness Measure (OEM) formula which produces score (a, b, c) or lower limits, middle limits and upper limits. OEM formula is as below (Rosyidah *et al.*, 2015) :

$$OEM_i = (\frac{1}{N}) \; x \; [(PM_i^j \; x \; PI^1) + \ldots + (PM_i^j \; x \; PI^N)] \quad (1)$$

Where:

PM_i^j = Weights the fuzzy value of the i^{th} to j variable indicator
PI^N = Relative importance
I = 1,2, 3, . . .N
J = 1, 2, 3, . . . M
N = The number of respondents

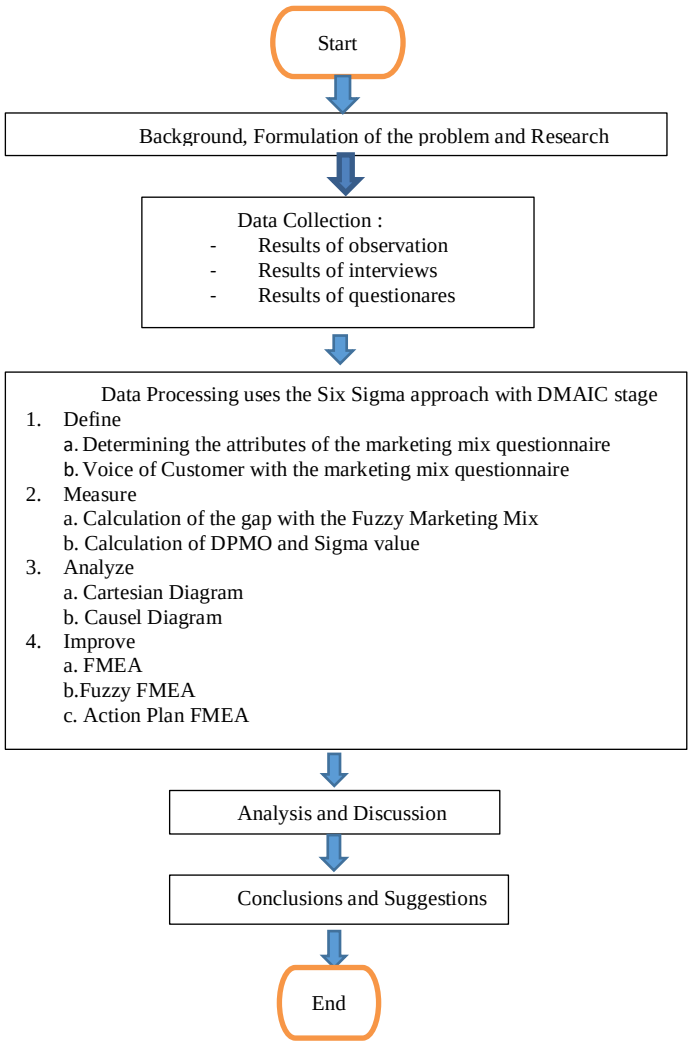

Figure 1. Research stages flowchart

Recapitulation of the research questionnaire scores was carried out first prior to the fuzzification stage. The satisfaction level data were obtained from the sum of each respondent's score of the criteria and scores, namely very dissatisfied (1), dissatisfied (2), quite satisfied (3), satisfied (4), and very satisfied with a score of (5).

The next step is to calculate the defuzzification value of the satisfaction and importance levels. It is to transform and restate the output of fuzzy domain into crisp domain which got a single representative value. Then, the gap calculation for each attribute was carried out based on the difference between the defuzzification value of the satisfaction and the importance levels. The gap value was used to determine the product marketing mix at the PT.Baros. Defuzzification was done with geometric mean formula:

$$Defuzzification=(a_i \; x \; b_i \; x \; c_i)^{1/3} \quad \ldots\ldots\ldots\ldots \quad (2)$$

Explanation : $a_i = lower\ limits$

$b_i = middle\ limits\ (crisp)$

$c_i = upper\ limits$

RESULT AND DISCUSSION

Define Step

The define step of this research included Marketing Mix 4P attributes mapping in accordance with marketing mix theory and questionnaire filling process to 100 respondents (sample adequacy with Slovin formula). Attributes in Table 1 were determined from the 4 dimension of the marketing mix to measure customer satisfaction, begun with the mapping of marketing mix attributes to determine the voice of consumers through answering the questionnaire.

Measure Step

The measure step in this research consisted of Fuzzy Marketing Mix data processing to look for gap or discrepancy between satisfaction and importance, calculation of DPMO score, and Sigma level.

Gap Calculation with Fuzzy Marketing Mix

The customer satisfactory analysis was done by calculating the discrepancy gap between satisfaction average score and importance average score. The steps in Fuzzy Marketing Mix data processing were by fuzzification calculation of the questionnaire result, followed by defuzzification of the satisfaction and importance levels.

Table 3 shows that all attributes have negative gap score. It means that the consumers still feel unsatisfied with Marketing Mix 19-liter bottled water of PT. Baros. Attribute that needs to be improved with the highest negative gap score was attribute 23 of distribution dimension. It is delivery of 19-liter bottled water to the consumers should be done in a quick manner. The consumers considered that the delivery or distribution was slow.

The form of triangular membership function of linguistic variable determining the fuzzy set used in the level of satisfaction are shown in Table 2.

DPMO Score Calculation and Sigma Level

The result of DPMO scores calculation and Sigma level are shown in Table 4. It can be seen that the average consumers satisfaction was 85%, average DPMO of 153,204 and average Sigma level of 2.561.

Table 1. Marketing mix attributes mapping in Baros 19-liter bottled water product

No	Attributes
	Product
1	The water in Baros 19 L bottled water is not dark or coloured
2	The water in Baros 19 L bottled water does not have bad odour
3	The health and hygiene of Baros 19 L bottled water is guaranteed
4	The packaging of Baros 19 L bottled water is strong and not easily leaking
5	The packaging of Baros 19 L bottled water is moss-free
6	The packaging design of Baros 19 L bottled water is eye-catching
7	The cap of Baros 19 L bottled water packaging is sealed and secured
8	Baros 19 L bottled water can compete with competitors/commercially available 19-liter bottled water in the market
No	**Attributes**
9	Baros 19-liter bottled water has good product image in the market
	Price
10	The price of Baros 19 L bottled water is cheap in comparison to market
11	The price of Baros 19 L bottled water is suitable with the offered quality
12	The price of Baros 19 L bottled water is suitable with public purchase power
13	The price of Baros 19 L bottled water is cheaper than other products
	Promotion
14	The promotion for Baros 19 L bottled water was done via online media
15	The promotion for Baros 19 L bottled water was done via printed media
16	PT. Baros gives discount for consumers with bulk order
17	PT. Baros gives discount to regular consumers
18	PT. Baros gives special lottery prize for consumer with most purchase
19	Baros 19 L bottled water can be exchanged in case of product defects
20	Promotion about Baros 19 L bottled water information was done by all employees to attract consumers
21	PT. Baros provides best services on Baros 19 L bottled water delivery
22	Free delivery charge for Baros 19 L bottled water for all consumers
	Distribution
23	Delivery of 19 L bottled water to the consumers is done in quick manner
24	The stock availability of 19 L bottled water fulfils every request from the consumers
25	The amount of vehicle used for the distribution of 19 L bottled water is adequate
26	Distribution of 19 L bottled water to the consumers was done according to schedule
27	PT. Baros responds to consumers' orders in quick manner

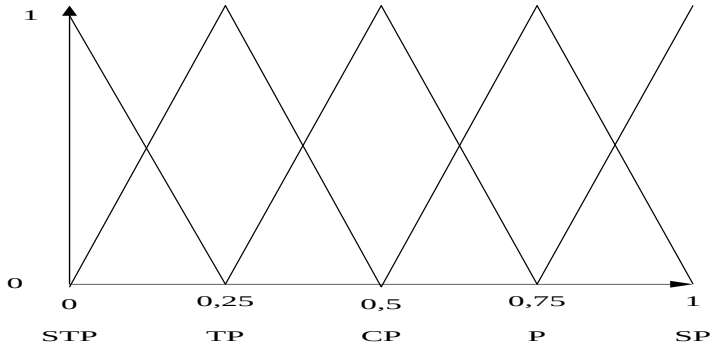

Figure 2. Satisfaction level lingustic variable membership function

Tabel 2. *Triangular Fuzzy Number* satisfaction level

	Triangular Fuzzy Number		
Satisfaction Level	**Lower Limits**	**Midle Limits**	**Upper Limits**
Very Satisfied	0.75	1	1
Satisfied	0.5	0.75	1
Quite satisfied	0.25	0.5	0.75
Dissatisfied	0	0.25	0.5
Very dissatisfied	0	0	0.25

Table 3. Defuzzification result of satisfaction and importance level

Dimension	**Attribute**	**Satisfaction**	**Importance**	**Gap**	**Average**	**Rank**
Product	1	0.6105	0.822	-0.2110	-	10
	2	0.6277	0.827	-0.1994		17
	3	0.6105	0.811	-0.2010		15
	4	0.5677	0.806	-0.2386		6
	5	0.5704	0.800	-0.2291		8
	6	0.6054	0.810	-0.2042	0.1883	12
	7	0.6385	0.761	-0.1227		26
	8	0.6124	0.773	-0.1603		23
	9	0.6301	0.759	-0.1286		24
Price	10	0.5426	0.777	-0.2339	-0.2059	7
	11	0.5880	0.788	-0.2000		16
	12	0.5854	0.773	-0.1874		18
	13	0.5795	0.782	-0.2022		14
Promotion	14	0.5281	0.745	-0.2164	-0.1682	9
	15	0.5667	0.693	-0.1261		25
	16	0.4999	0.674	-0.1741		20
	17	0.4923	0.701	-0.2086		11
	18	0.4654	0.669	-0.2036		13
	19	0.6589	0.819	-0.1605		22
	20	0.6069	0.792	-0.1849		19
	21	0.6107	0.778	-0.1672		21
	22	0.7381	0.810	-0.0720		27
Distribution	23	0.3893	0.834	-0.4452	-0.3660	1
	24	0.5254	0.829	-0.3040		4
	25	0.5238	0.804	-0.2800		5
	26	0.3922	0.824	-0.4317		2
	27	0.4598	0.832	-0.3721		3

(Source: Processed data, 2019)

The result of average DPMO and Sigma level indicated that PT. Baros for Baros 19 L bottled water was in the average category of Indonesian Industry. Defuzzification result and gap score of the 27 Marketing Mix attributes for 19 L bottled water in PT. Baros are shown in Table 3.

Analyze Step

The analysis step of this research was started with Cartesian diagram to analyse in detail the important attributes for the consumers. Then, it was followed with the construction of root cause diagram or fishbone diagram in order to find the root cause of the dissatisfaction problem in attribute with highest discrepancy value.

Cartesian Diagram Analysis

The result of the Cartesian diagram is shown Figure 3. IPA (Importance Performance Analysis) method derives a matrix which contains four quadrants. The quadrant I is main concern of analysis, the consumers perceived condition and actual performance at the current state was seen unsatisfactory. According to Figure 3, there were five attributes in this category. The attribute 23 (delivery in quick manner), attribute 26 (distribution to the consumers according to schedule), attribute 27 (PT.Baros responds to consumers' orders in quick manner), attribute 24 (the stock availability to fulfil every request from the consumers), and attribute 25 (the adequity of vehicle used for the distribution). The Cartesian diagram showed that the attributes in quadrant I were belonged to distribution dimensions.

Root Cause Diagram Analysis

The fishbone diagram of attribute 23, which was the cause of delivery delayed of the 19 L bottled water product to the consumer can be seen in Figure 4.

Improve Step

This step was done with FMEA, Fuzzy FMEA, and action planning FMEA. The interview and brainstorming with the delivery manager of PT. Baros, and the Fuzzy Risk Priority Number (FRPN) calculation in Matlab software of the cause of delivery delayed for 19 L bottled water product to the consumers are shown Table 5.

Table 4. DPMO score and sigma level calculation result

Attribute	Average Satisfaction	Satisfaction Target	Satisfaction Level	DPMO	Sigma Level
1	3.600	4	90%	100,000	2.782
2	3.670	4	92%	82,500	2.888
3	3.600	4	90%	100,000	2.782
4	3.430	4	86%	142,500	2.569
5	3.440	4	86%	140,000	2.580
6	3.570	4	89%	107,500	2.740
7	3.700	4	93%	75,000	2.940
8	3.590	4	90%	102,500	2.767
9	3.670	4	92%	82,500	2.888
10	3.330	4	83%	167,500	2.464
11	3.500	4	88%	125,000	2.650
12	3.490	4	87%	127,500	2.638
13	3.470	4	87%	132,500	2.615
14	3.270	4	82%	182,500	2.406
15	3.420	4	86%	145,000	2.558
16	3.170	4	79%	207,500	2.315
17	3.140	4	79%	215,000	2.289
18	3.040	4	76%	240,000	2.206
19	3.780	4	95%	55,000	3.098
20	3.580	4	90%	105,000	2.754
21	3.590	4	90%	102,500	2.767
22	4.130	5	83%	174,000	2.438
23	2.770	4	69%	307,500	2.003
24	3.270	4	82%	182,500	2.406
25	3.260	4	82%	185,000	2.396
26	2.780	4	70%	305,000	2.010
27	3.020	4	76%	245,000	2.190
		Average	85%	153,204	2.561

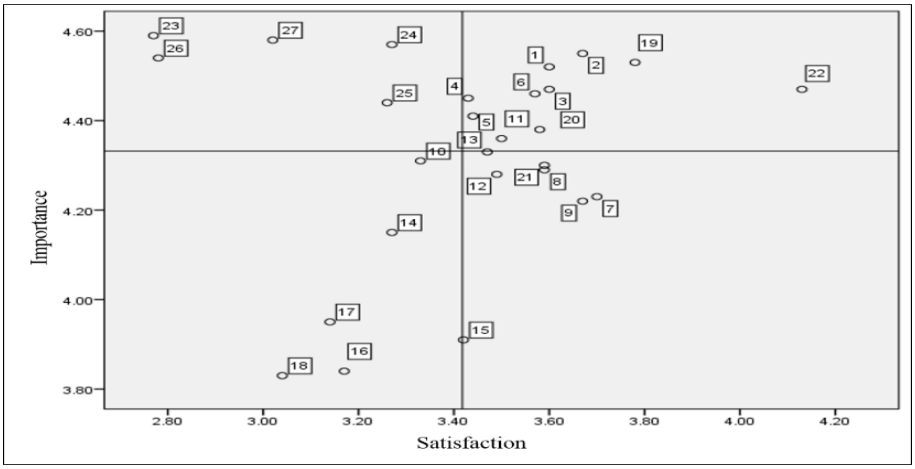

Figure 3. Cartesian diagram

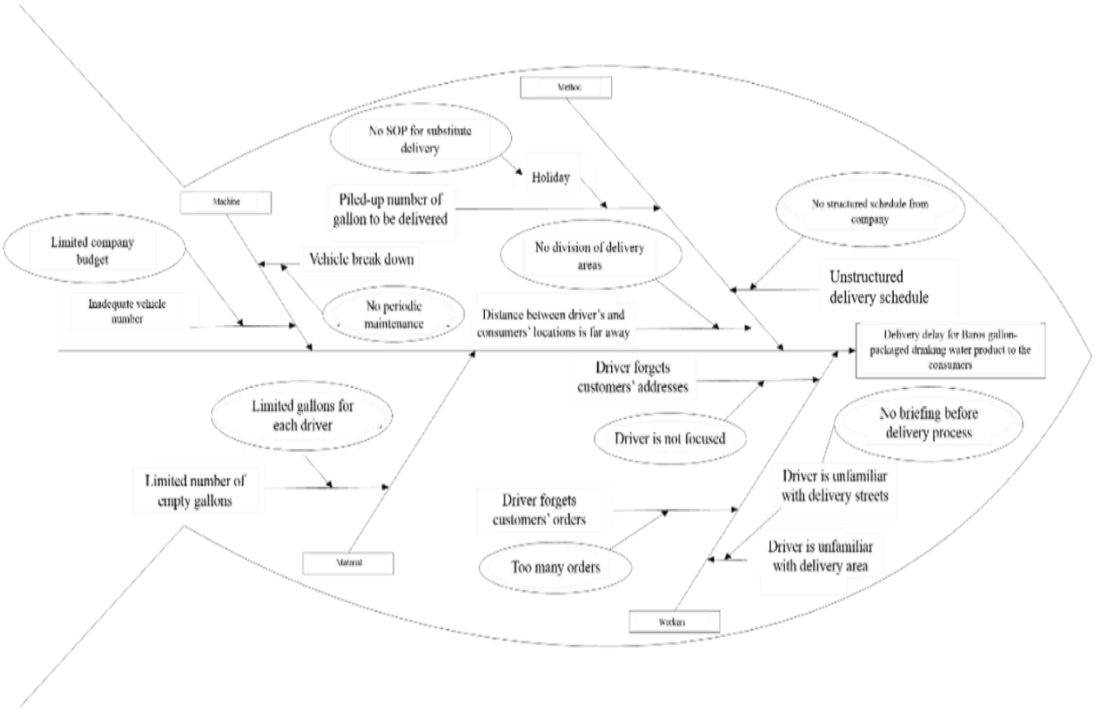

Figure 4. Root cause diagram of delivery delayed of PT. Baros 19 L bottled water Product

After determining FRPN score standardization, the next step is the implementation of the formulated recommended action. Action Planning for Failure Modes was made to determine appropriate actions, especially for failure modes with high failure risk. This improvement strategy was the result of interview and brainstorming between the researcher with the delivery manager and the delivery driver for Baros 19 L bottled water. The action planning FMEA for controlling the delivery delay of the 19 L bottled water products to the consumers is as shown Table 6.

Managerial Implications

One of the contributions of this study was to provide recommendations to the company in the form of managerial implications as presented in Table 6. There are various components involve for the management to response included quality, capacity, effectiveness, efficiency and policies that can contribute to increasing company productivity:

Quality

The Company can improve the quality of 19 L bottled water products based on responses from consumers regarding the level of quality satisfaction that are felt during the subscription.

Table 5. FMEA of the cause of delivery delayed for Baros bottled water product to the consumers

Design FMEA Process FMEA	Potential Failure Mode	Potential Cause of Failure	Potential Effects of Failure	S	O	D	FRPN	Rank
Delivery Delay for Baros 19-L Bottled Water Product to the Consumers	Unstructured delivery schedule	Ineffective delivery management	Delivery is not on time	5	7	7	208	2
	The distance between consumers' house and driver is far	Company does not group driver per consumers' areas	Delivery delay	4	5	6	133	3.5
	The amount of product that has to be delivered piled up	No SOP for substitute delivery	Driver cannot deliver all products on time to the consumers	6	5	5	133	3.5
	Choosing wrong delivery route	No briefing before delivery	Longer delivery time	2	3	4	24.5	7
	Driver forgets consumers' addresses	Driver is overworked		2	2	3	24.5	7
	Driver forgets consumers' orders	Driver is overworked	Driver cannot deliver all products on time to the consumers	2	3	3	24.5	7
	Delivery vehicle broke down	Company does inadequate vehicle maintenance		4	2	4	24.5	7
	Inadequate number of vehicles	No budget allocation for adding vehicle number	Consumers' needs cannot be fulfilled on time	4	5	3	24.5	7
	Empty bottles are not available	Limited buying of new bottles		7	6	7	300	1

Capacity

Along with the quality improvement in product services, it will increase the number of sales and customer satisfaction, the production capacity will also increase.

Effectiveness

The proposed improvements effectiveness would be achieved as desired and could increase customer satisfaction. At the end, it is expected to reduce customer complaints, especially the distribution effectivity and efficiency.

Efficiency

The company should establish a more structured and planned delivery schedule to be more effective and efficient. It should be supported with SOPs dealing with the number of deliveries and creation of special routine maintenance schedules for delivery vehicles.

Company Policy

To improve quality and increase sales capacity, the company should establish policies to support company holding tour event to motivate drivers to be more enthusiastic. The should provide rewards for employees who work harder and are able to attract mor new customers. The company should make a policy to add the number of vehicles in order to be able to meet the increasing number consumer orders.

Table 6. *Action planning* FMEA

Rank	Mode of Failure	Actionable Cause	Design Action	Design Validation
1	Empty bottles are not available	Limited buying of new bottles	Adding the number of empty bottle division to every driver	Raw material purchase department provide new stock of empty bottle for every driver who lacks empty bottle
2	Unstructured delivery schedule	Ineffective delivery management	Create structured delivery schedule	Delivery section creates structured delivery schedule for every driver with even are division
3.5	The distance between consumers' house and driver is far	Company does not group driver per consumers' areas	Divide the consumers' area evenly	Delivery section creates structured delivery schedule for every driver with even are division
7	Inadequate number of vehicles	No budget allocation for adding vehicle number	Addition of vehicle number	Finance department analyses the budget to add the number of vehicles
7	Delivery vehicle broke down	Company does inadequate vehicle maintenance	Create periodic maintenance schedule for delivery vehicle	Delivery section creates periodic maintenance schedule for every delivery vehicle
7	Choosing wrong delivery route	No briefing before delivery	Before delivery process, every driver attend briefing to choose the correct delivery route	Delivery section creates effective delivery route instruction for every driver
7	Driver forgets consumers' orders	Driver is overworked	Driver must utilize the resting time effectively to maintain focus while working	Company creates an event to motivate the drivers to work

CONCLUSION AND SUGGESTION

Conclusion

The Sigma level of Baros 19-liter bottled water product was 2.561 which means the state of PT. Baros is in the average Indonesian Industry category. The attribute with the highest negative score gap and DPMO is attribute 23, delayed delivery to the costumers. Improvements that can be done to increase the product quality is to ensure availability of new water bottle for every day needs.

Suggestion

The company is expected to make improvements to minimize or reduce delays in delivery by increasing the sigma value. Furher research is needed to compare the quality of 19-liter bottled drinking water with other brands which should cover up with the control stage to estimate the implementation of the proposed improvements.

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