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Strategy for Quality Control of "Ayam Kampung" Production Using Six Sigma-DMAIC Method (Case Study in CV. Pinang Makmur Food)

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Abstract:- This study aims to control the quality of "ayam kampung" products using Fishbone. Six Sigma and FMEA so that the productivity of "ayam kampung" increased from August 2018 to October 2018. The research data used were data on native chicken production for 19 months of observation (January 2017 to March 2017). From a population of 2000, 333 samples were taken (May to July 2017). The method used in this study is, Fishbone, DMAIC and FMEA. At the Fishbone stage, it is known that there are many defects. At the Define stage, it is known that "ayam kampung" defects are found in one-week-old native chickens, one-month ayam kampung, two-month old "ayam kampung" and there are 3 CTQs with 3 defect criteria. From the Measure phase, 3 defect criteria were found with the highest frequency and control chart values p, center line, upper control limit and lower control limit of 0,0775, 0,2325, 0,2625, 0,1935, 0,220 and 0,166, respectively. At the Analyze stage, it was found that the main cause of the defect was that the native chicken growth was not optimal. In the Improve stage, the solution taken using 5W + 1 H. The results shown in the Control stage are making SOPs, as well as an increase in Productivity to 4,241 (from August - October 2018). At the FMEA stage, the highest RPN value was found to be 900.

Keywords:- *Defect, Ayam Kampung, FMEA, DMAIC, Fishbone, Productivity, Quality.*

I. INTRODUCTION

Defect is a component that is not included in the customer specification limits, every step or activity in a company is an opportunity for defects (Jacob et al, 2009). Defect includes a form of waste or waste.

Employee errors, materials used, equipment usage and other factors that cause defects.

Defective products can be reduced if the company is able to reduce the number of defects that occur in production, by reducing the number of defects it is expected that the number of defective products also decreases. Thus the Six Sigma DMAIC method can be used which aims to minimize defects and maximize the added value of a product (Gygi, et al 2015). Six Sigma is a comprehensive approach that focuses on reducing defects and improving quality through the DMAIC (Define-Measure-Analyze-Improve-Control) stage. The focus of the Six Sigma concept is to reduce waste and reduce quality costs in the production process.

"Ayam kampung" is one type of local poultry that has the potential to produce eggs and meat so that it is widely cultivated by the community, especially those who live in rural areas. This is because native chickens have a good adaptation to the environment. Consumer demand for "ayam kampung" meat is increasing every year.

CV. Pinang Makmur Food is a fairly new company, because it has only been operating for three years in the "ayam kampung" farming industry. The company is committed to continuously improving the quality of products produced in each unit of its production process. The company takes Day of Chicken (DOC) from three suppliers, namely: 1. PT. Ayam Kampung Indonesia, 2. PT. Putra Perkarsa Farm, 3. PT. Sumber Unggas Indonesia.

The company has a target of 1,900 "ayam kampung" per month in 2017 and 2018. However, the production volume produced from these production only reaches an average of 1602 "ayam kampung" per month in 2017 and the production volume produced from such production only reaches an average an average of 1702 "ayam kampung" per month in 2018.

Various quality control programs are carried out by the company so that they can produce good products and comply with the quality standards set but in reality there are still products that are of poor quality. Defects of "ayam kampung" consists of 3 types, namely dead DOC (sick, squeezed, trampled, etc.), Growth of "ayam kampung" is not optimal and Chicken is deformed (blind, limping, etc.). The total number of defects of native chickens in 2017 is 4990 "ayam kampung" from the total production of 24,000 "ayam kampung" and the total number of defects of "ayam kampung" in 2018 is 2085 "ayam kampung" of the total production of 14,000 "ayam kampung".

The research problems are how to control the quality of "ayam kampung" products to increase productivity?, what factors cause defect products that cause the decline in quality of "ayam kampung" products ready for slaughtering?, what is the strategy to reduce defect of "ayam kampung" to increase productivity?

The purpose of this study is to determine the quality control of "ayam kampung" products to increase productivity, to find out the factors that cause defect products that cause a decline in the quality of ready-to-eat "ayam kampung" products, to find out strategies to reduce defects to increase productivity.

The limitation of the problem of this study is the defective data released on the production data of native chicken in January 2017 to July 2018.

II. LITERATURE REVIEW

A. Quality

According to Yuri (2013: 11), the definition of quality is influenced by everyone's subjective perspective. Quality itself is considered as a relative measure of the merit of a product or service consisting of the quality of the design or the design and quality of conformity. Crosby in Wahyuni (2015: 4) states that quality is goods or services that meet customer specifications or requirements.

B. Product Quality

According to Wahyuni (2015: 7), there are several things that need to be considered related to quality in order to be able to manage quality effectively and efficiently, namely: 1. Products are goods or services produced by the company and have a certain size or dimension in accordance with established standards, 2. Consumers are people who buy products or services produced by the company. Consumers will buy products according to their needs, for size, function, and price. So, companies need to know the specifications of consumer desires for an item or service so that the products produced can be purchased by consumers, 3. Disability product (reject) is a form of product that is not in accordance with the standards set by the company. Product defects are a form of company waste and the causes of consumer dissatisfaction so they must be minimized by conducting quality control throughout the manufacturing process.

According to David Garvin, quoted by Gaspersz (2011) and Montgomery (2009) the dimensions of good product quality consist of: 1. Performance, which is related to the functional aspects of an item and is the main characteristic that is considered by the customer in buying the product. This dimension answers the question 'will the product fulfill the desired task?', 2. Features, which is a secondary or complementary characteristics, relating to the selection of products and development. This dimension explains what the product can do, 3. Reliability, which is less likely to experience damage or failure to use. In other words the success of the function in use at certain time periods and under certain conditions. This dimension discusses how often the product fails, 4. Conformance to Specification, namely the extent to which the design and operating characteristics meet predetermined standards. This dimension answers the question 'is the product made exactly as the designer wishes?', 5. Durability, which is related to how long the product can continue to be used. This dimension answers the question 'how long does the product last?, 6. Serviceability, include speed, competence, comfort, easily repaired, satisfying complaints handling. This dimension explains the ease in repairing product damage, 7. Aesthetics, subjective characteristics, namely the attractiveness of the product to the five senses and reflection of individual preferences. This dimension answers the question 'What does the product look like?', 8. Fit and finish, subjective nature, related to customer feelings about the existence of the product as a quality product. This dimension discusses the reputation of the company making the product or the product produced.

C. Quality Control Strategy

According to Pavletic et. al (2008), quality control is an effort to maintain and improve the quality of the products produced, to conform to product specifications that have been determined at the discretion of the company leadership.

D. Six Sigma

Six sigma is defined as a statistical tool used in quality management to build a process improvement framework (Goh and Xie in Ganguly, 2012). According to Evans and Lindsay (2015), the six SGG project has 3 key characteristics, namely the problem that must be resolved, the process in which the problem occurs, and one or more tools to measure the problem that must be resolved and to monitor progress.

E. DMAIC

Six Sigma management strategies require process improvement through problem identification, root cause search, process redesign and engineering, and process management (Mandahawi, 2012). Six sigma follows a model known as DMAIC (Define, Measure, Analyze, Improve, Control). DMAIC is a systematic six sigma project management practice inspired by the Deming PDCA (Plan, Do, Check, Action) cycle. This process consists of 5 stages known as define, measure, analyze, improve, and control.

In each stage of DMAIC, there are various tools that can be used to help complete each stage of Define, Measure, Analyze, Improve, and Control.

F. Define

Mandahawi (2012) states that in the define stage, the project outline, metrics, and objectives must be clearly identified. This stage focuses on forming the project team, determining project objectives, mapping the process, identifying customer needs, identifying the greatest impact of the characteristics of CTQs (Critical to Quality Characteristics).

The first thing that must be fulfilled in this stage is the project charter, which is a brief document about the description of the project and its scope, start date and estimated completion, a description of the core primary and secondary metrics that are used to measure success and its relationship with the company's goals and business, profits for customers, financial benefits for the company, project

stages, team members and regulations, and other resources needed to complete the project (Montgomery, 2009).

G. Measure

The measure phase consists of finding and executing data that has been collected to measure CTQs as process targets (Mandahawi, 2012). To start this stage, the information needed must be collected to be analyzed in the next step. This information is in the form of product types, raw material types, machine parameters, waste types with various comments.

According to Montgomery (2009), the purpose of this stage is to evaluate and understand the current process, including collecting data to measure quality, cost, and cycle time. Data collected during the measure phase can be displayed in the form of histograms, steam-and-leaf diagrams, run charts, scatter diagrams, and pareto diagrams. Histogram is a statistical tool that provides an overview of an operating process at one time (Yuri, 2013: 65). The purpose of the histogram is to determine the spread or variation of a set of data points in graphical form.

H. Analyze

In analyzing, data from the measure stage is used to find cause-and-effect relationships in the process and to understand different sources of variability (Montgomery, 2009). This stage looks for potential causes of reject, quality problems, customer issues, cycle time, or waste and inefficiency of a process. At this stage quality tools that can be used include cause and effect diagrams and FMEA analysis.

I. Improve

In his book, Montgomery (2009) explains that at the improve stage it takes creativity to think to determine changes that can be made in the process and other things that can be done to improve the performance of the process. The purpose of this stage is to develop a solution and confirm it. At this stage, a quality tool that can be used is 5W + 1H.

J. Control

This stage forms and implements monitoring and subsequent plans for continuous improvement, develops research results in other parts of the organization, and documents SOP (Standard Operating Procedure) (Mandahawi, 2012). The purpose of the control phase is to fulfill the entire project and continue the process that has been upgraded to a standard process through the process control plan and other procedures needed to ensure the implementation of the process (Montgomery, 2009). Furthermore, improvements made in the project can be applied in other similar processes.

K. Productivity

According to Stevenson and Chuong (2014), productivity is an index that measures output (goods and services) compared to the inputs (labor, raw materials, energy and other resources) used to produce output. Productivity is usually expressed as the ratio of output to input.

Increased productivity can be achieved in two ways, namely reducing input while maintaining constant output, or increasing output while maintaining constant input. Output results are influenced by factors in the production process, including defects or rejects and waste (Faritsy and Suseno, 2015).

Because productivity is the ratio of output to the use of inputs, a strategy to increase company productivity can be done in the following ways that must be adapted to the situation and condition of the company, among others (Gaspersz, 2014): Implement a cost reduction program.

According to Sumanth (1984: 10), the elements of productivity are as follows: 1. Efficiency, 2. Effectiveness, 3. Quality.

L. FMEA

Failure mode and effects analysis (FMEA) is an analytical technique that combines technology and experience to identify possible product or process failures and plan the elimination of the causes of failure (Parsana and Patel, 2014).

According to Degu and Moorthy (2014), FMEA has 4 key parameters to prioritize corrective actions, namely: 1. Severity, i.e. the seriousness of the effects of failure on customers, 2. Occurence, namely the possibility that these causes will occur causing failure, 3. Detection, which is the possibility that the current control will detect the cause of failure so as to prevent reaching the customer, 4. Risk Priority Number (RPN), which is the multiplication of severity (S), occurrence (O), and detection (D). The RPN presents priority processes or product improvements. RPN = S x O x D.

M. Framework

Based on the background of this study, the volume of native chicken production has not yet reached the production target. This causes the productivity value of native chickens to be small. After tracing, the main cause of the production volume has not reached the target is the amount of defect produced. According to the theory discussed in the previous sub-chapter, the approach taken to increase productivity by reducing defects is the Six Sigma approach using the DMAIC method. At each stage, interrelated actions are carried out starting with the identification of the process with SIPOC diagrams and identification of critical to quality charasteristics (CTQs) as part of the define stage, up to the control stage in the form of standardization and the determination of subsequent corrective steps as a form of continuous improvement. The framework for this research can be seen in the following figure:

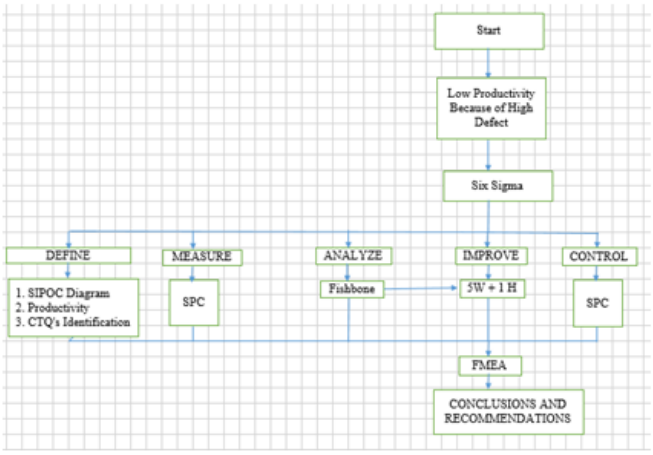

Fig 1:- Framework

III. METHODOLOGY

Research conducted using qualitative descriptive research. According to Sugiyono (2011), qualitative research methods are research methods that are based on the philosophy of post positivism, used to examine natural conditions of objects, (as opposed to experiments) where researchers are as key instruments, the sampling of data sources is done by purposive and snowball, tri-anggulation (combined) collection techniques, data analysis is inductive or qualitative, and qualitative research results emphasize more on meaning than generalization.

The population studied in this study were "ayam kampung" in CV. Pinang Makmur Food from January 2017 to July 2018, there are 2000 "ayam kampung".

"Ayam kampung" that is ready to be sent on the CV. Pinang Makmur Food from January 2017 to July 2018 with the amount calculated based on the Slovin formula (Sutawidjaya, 2015: 45). Because the results of these calculations are the minimum number of samples taken, the samples studied were 333 native chickens produced in CV. Pinang Makmur Food from January 2017 to July 2018.

Types and sources of data used in this study are primary data. Primary data obtained are observation and interviews. The author made observations by going from beginning to end. The author conducted an interview with the owner or owner and employees regarding the production of "ayam kampung". Data collected during the observation are as follows: flowchart

a) How to obtain DOC from suppliers to companies
b) Information flow schedule for feeding to DOC
c) How to delivery native chicken from the company to the restaurant
d) Flow of information on vaccine delivery schedule to DOC.

Secondary data is data obtained from indirect sources that have been made previously and used for the research process. Sources of data needed in the study include:

a. The flow process of "ayam kampung" production
b. Monthly production of "ayam kampung" products
c. Monthly target of "ayam kampung" products
d. Total defect of "ayam kampung"
e. Specifications defect "ayam kampung" and their numbers
f. "Ayam kampung" head tilted defect product next door
g. Product defect less "ayam kampung" weight
h. "Ayam kampung" high defect product is less
i. "Ayam kampung"wing defect products have not yet grown
j. "Ayam kampung" defect products are sick

The study was conducted with primary and secondary data collection techniques obtained from existing information and in the form of reports or historical data that has been collected.

➢ *Primary data collection includes:*

This data will be taken from observations or direct observations of the production process, the process of interviews with owners and employees and through brainstorming methods or brainstorming advice from several sources related to the production process.

➢ *Secondary Data Collection Includes:*

- *Study of Documents*

The document study was carried out by searching for information on the documents of the "ayam kampung" production department for the period of January 2017 to July 2018.

- *Literature Review*

Literature study is done by collecting information from books and articles.

To get a clear picture in the process of solving the problem at hand, the data analysis technique used is as follows:

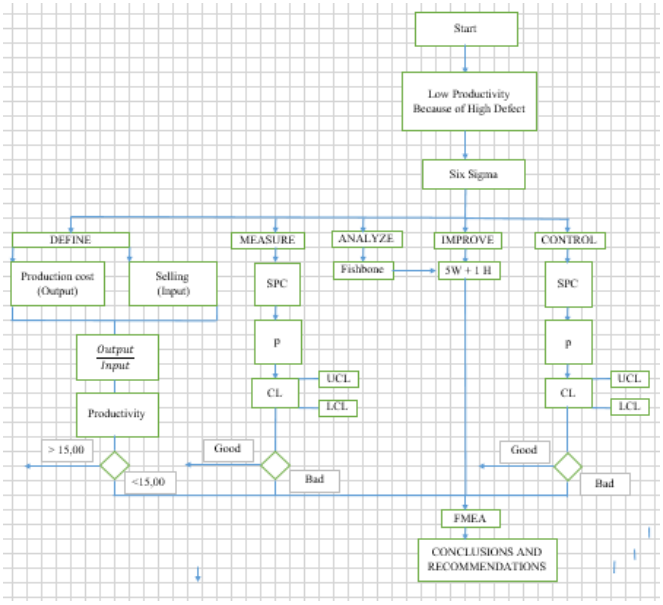

Fig 2:- Flow chart of Framework

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IV. RESULTS AND DISCUSSION

Preliminary research explains that during January 2017 to July 2018, production results have not reached the target so productivity is low. After tracing, a high number of defects is the cause of the low production yield.

Month	Material "Ayam Kampung" (Tail)	Defect	Selling	"Ayam Kampung" Price	Defect Percent	Selling Rp
January	1815	185	1630	Rp 35000	10,19%	Rp 57,050,000
February	1880	120	1760	Rp 35000	6,38%	Rp 61,600,000
March	1475	525	950	Rp 35000	35,59%	Rp 33,250,000
April	1840	160	1680	Rp 35000	8,69%	Rp 58,800,000
May	1505	495	1010	Rp 35000	32,89%	Rp 35,350,000
June	1735	265	1470	Rp 35000	15,27%	Rp 51,450,000
July	1530	470	1060	Rp 35000	30,71%	Rp 37,100,000
August	1760	240	1520	Rp 35000	13,63%	Rp 53,200,000
September	1130	870	260	Rp 35000	76,99%	Rp 9,100,000
October	1550	450	1100	Rp 35000	26,16%	Rp 38,500,000
November	1720	280	1440	Rp 35000	16,27%	Rp 50,400,000
December	1280	720	560	Rp 35000	56,25%	Rp 19,600,000

Table 1:- Production and Defect Results for January 2017 - December 2017

Based on table 1. Production and Defect Results for January 2017 - December 2017, it can be concluded that the selling of “ayam kampung” decreased from January to December but the defect of “ayam kampung” increased from January to December.

Month	Material "Ayam Kampung" (Tail)	Defect	Selling	"Ayam Kampung" Price	Defect Percent	Selling Rp
January	1815	185	1630	Rp 35000	10,19%	Rp 57,050,000
February	1880	120	1760	Rp 35000	6,38%	Rp 61,600,000
March	1475	525	950	Rp 35000	35,59%	Rp 33,250,000
April	1840	160	1680	Rp 35000	8,69%	Rp 58,800,000
May	1505	495	1010	Rp 35000	32,89%	Rp 35,350,000
June	1735	265	1470	Rp 35000	15,27%	Rp 51,450,000
July	1530	470	1060	Rp 35000	30,71%	Rp 37,100,000

Table 2:- Production and Defect Results for January 2018 - July 2018

Based on table 2. Production and Defect Results in January 2018 - July 2018, it can be concluded that the selling of “ayam kampung” decreased from January to July but the defect of “ayam kampung” always increased from January to July.

The population in this study is “ayam kampung” produced in CV. Pinang Makmur Food from January 2017 to July 2018, which is 2000 “ayam kampung”, and samples used in the study according to the Slovin formula are 333 “ayam kampung” produced in May - July 2018 (data attached), can be simplified in the following table:

Month	Material "Ayam Kampung" (Tail)	Defect	Selling	"Ayam Kampung" Price	Defect Percent	Selling Rp
May	1505	495	1010	Rp 35000	32,89%	Rp 35,350,000
June	1735	265	1470	Rp 35000	15,27%	Rp 51,450,000
July	1530	470	1060	Rp 35000	30,71%	Rp 37,100,000

Tabel 3:- Production and Defect Results for May 2018 - July 2018

A. Fishbone

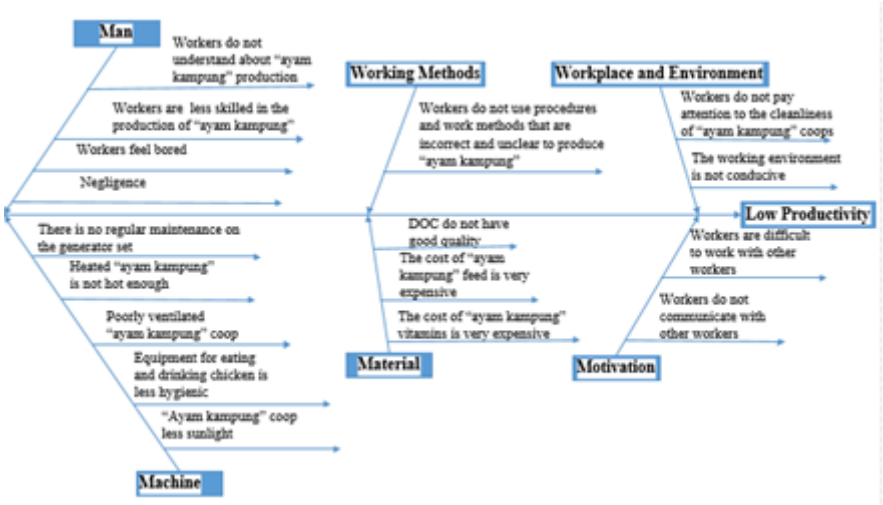

Fig 3:- Fishbone Diagram

B. DMAIC

➢ *Define*

This stage focuses on mapping processes, identifying customers, identifying the greatest impact of the characteristics of CTQs (Critical to Quality Characteristics). In the define stage, the statistical tool used is the SIPOC diagram.

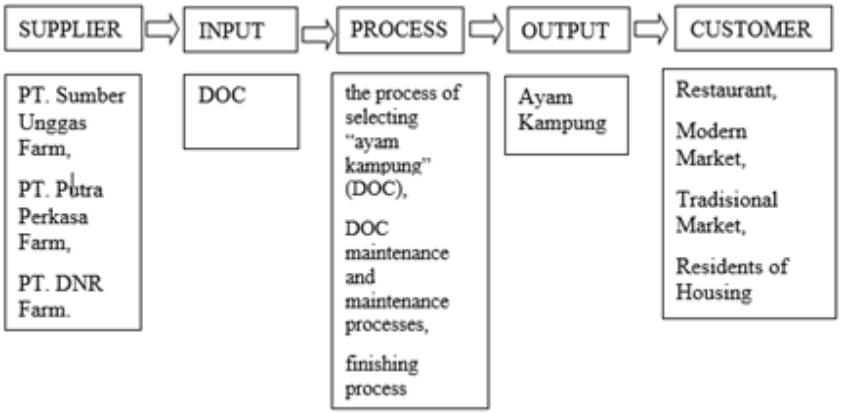

Fig 4:- SIPOC Diagram

➢ *Productivity*

The productivity of "ayam kampung" can be seen from the number of inputs from January 2017 to December 2017 can be seen from the following table:

Month	Selling	"Ayam Kampung" Price	Sales results	Production cost	Productivity
January	1630	Rp35,000	Rp 57,050,000	Rp 43,882,500	1.300
February	1760	Rp35,000	Rp 61,600,000	Rp 44,139,000	1.396
March	950	Rp35,000	Rp 33,250,000	Rp 42,531,400	0.782
April	1680	Rp35,000	Rp 58,800,000	Rp 44,352,300	1.326
May	1010	Rp35,000	Rp 35,350,000	Rp 43,864,500	0.806
June	1470	Rp35,000	Rp 51,450,000	Rp 42,458,500	1.212
July	1060	Rp35,000	Rp 37,100,000	Rp 43,815,600	0.847
August	1520	Rp35,000	Rp 53,200,000	Rp 43,873,200	1.213
September	260	Rp35,000	Rp 9,100,000	Rp 43,882,500	0.207
October	1100	Rp35,000	Rp 38,500,000	Rp 42,545,500	0.905
November	1440	Rp35,000	Rp 50,400,000	Rp 43,734,800	1.152
December	560	Rp35,000	Rp 19,600,000	Rp 43,899,200	0.446
Total					11.591

Table 4:- Productivity of "Ayam Kampung" Month January 2017 - December 2017

Based on table 4. Productivity of "Ayam Kampung" Month January 2017 - December 2017, it can be concluded that the productivity of "ayam kampung" from January to December increased.

Month	Selling	"Ayam Kampung" Price	Sales results	Production cost	Productivity
January	1630	Rp35,000	Rp 57,050,000	Rp 43,882,500	1.300
February	1760	Rp35,000	Rp 61,600,000	Rp 44,139,000	1.396
March	950	Rp35,000	Rp 33,250,000	Rp 42,531,400	0.782
April	1680	Rp35,000	Rp 58,800,000	Rp 44,352,300	1.326
May	1010	Rp35,000	Rp 35,350,000	Rp 43,864,500	0.806
June	1470	Rp35,000	Rp 51,450,000	Rp 42,458,500	1.212
July	1060	Rp35,000	Rp 37,100,000	Rp 43,815,600	0.847
Total					7.668

Table 5:- Productivity of "Ayam Kampung" Month Januari 2018 – Juli 2018

Based on table 5. Productivity of "Ayam Kampung" Month Januari 2018 – Juli 2018, it can be concluded that the productivity of "ayam kampung" from January to July decreased compared to the productivity of "ayam kampung" from January 2017 to December 2017.

At the CTQ (Critical to Quality) identification stage, several things need to be defined based on the input from consumers on the desired quality of native chicken products. Based on observations and data collection it is known that the product quality characteristics and defect criteria are as below:

Quality Characteristics	Criteria for "Ayam Kampung" Defect	Defect type
"Ayam Kmapung" is a week old	DOC die	Sick, oppressed, and trampled
"Ayam Kampung" is month old	"Ayam Kampung" is deformed	Blind, Limping, Cold, Sniffles (Chicken legs tilted to the side)
"Ayam Kampung" is two old	The growth of "Ayam Kampung" is not optimal	Weight of "Ayam Kampung" does not reach 0.8 ounces / 0.9 ounces

Table 6:- Critical to Quality (CTQ) "Ayam Kampung" Products

➢ *Measure*

The measure phase consists of evaluating and understanding the processes that occur by collecting data to measure quality. The data that has been collected is used as material for the calculation of p-chart control values.

Samples (tail)	Defect type			Total Defect (Tail)	Percent Defect
	DOC Dead (Sick, Being Squeezed, etc.)	Chicken Growth Not Maximum	Disabled Chicken, etc. (Blind, Limping, etc.)		
2000	45	105	5	155	0,08
2000	275	165	25	465	0,23
2000	175	325	25	525	0,26
6000	495	595	55	1145	0,57

Table 7:- Defect of "Ayam Kampung" Production

Month	Sample	Total Reject	P	CL	UCL	LCL
August	2000	240	0.12	0.19354167	0.220044021	0.167039312
September	2000	870	0.435	0.19354167	0.220044021	0.167039312
October	2000	450	0.225	0.19354167	0.220044021	0.167039312
November	2000	280	0.14	0.19354167	0.220044021	0.167039312
December	2000	720	0.36	0.19354167	0.220044021	0.167039312
January	2000	300	0.15	0.19354167	0.220044021	0.167039312
February	2000	330	0.165	0.19354167	0.220044021	0.167039312
March	2000	40	0.02	0.19354167	0.220044021	0.167039312
April	2000	270	0.135	0.19354167	0.220044021	0.167039312
May	2000	155	0.0775	0.19354167	0.220044021	0.167039312
June	2000	465	0.2325	0.19354167	0.220044021	0.167039312
July	2000	525	0.2625	0.19354167	0.220044021	0.167039312

Table 8:- Calculation Results “Peta Kendali” p

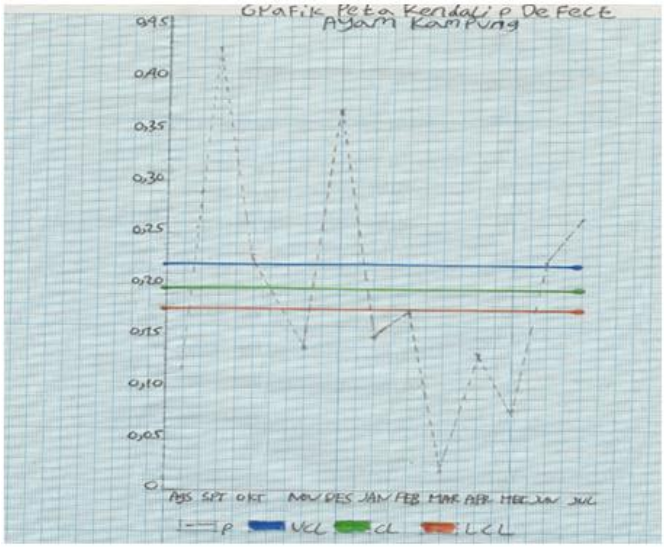

Fig 5:- “Peta Kendali” p Charts

Based on the graph in Figure 5. the defects in September, December, June and July depend on the upper limit, August, November, January, March, April, and May on the lower access limit. So the production process is still under control, but has not reached zero failure rate. The next stage is the stage of damage settlement with the Pareto Diagram. With this diagram, we can know the most dominant type of damage.

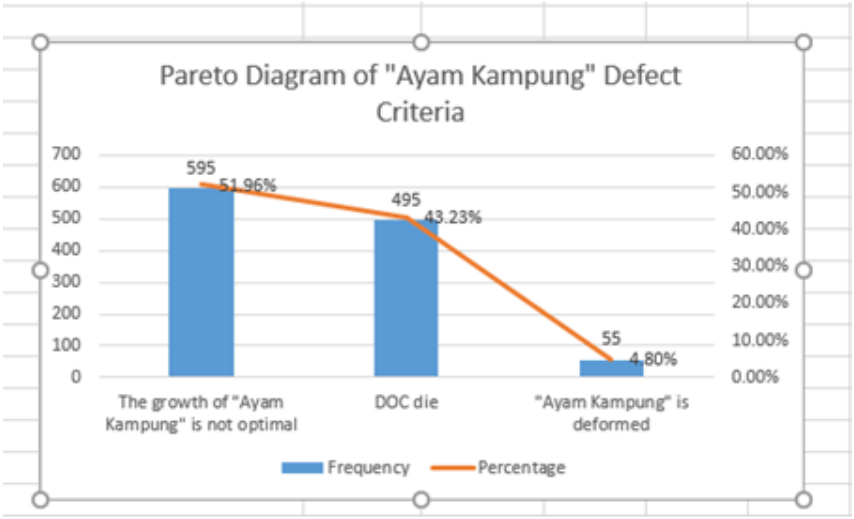

Fig 6:- Pareto Diagram of Defect Criteria for “Ayam Kampung” Products

The Pareto diagram above shows the highest frequency of defect criteria is that the growth of native chicken defects is not optimal with a number of 595 or 51.95% of the total defect criteria from May to July 2018. While the smallest defect criteria is defect of defective native chickens with a frequency of 55 or 4 , 80% of the total defect criteria from May to July 2018. According to the 80/20 rule, 20% of the types of defects can cause 80% of process failures. So for the Analyze stage, 80% of the biggest defect criteria will be taken to be analyzed to solve the problem.

➢ *Analyze*

From the pareto diagram at the measure stage, it was found that 51.95% of the biggest defect criteria was that the "ayam kampung" growth defect was not optimal. Then, for the three defect criteria, an analysis of various causes will be carried out based on a causal diagram that has 5 factors of analysis, namely Human, Material, Method, Machine, and Environment. Because the defect of native chicken growth does not optimally fit into the quality characteristics of two-month-old "ayam kampung", a causal diagram was made.

Cause and Effect Diagrams of Quality Characteristics of Two-Month "Ayam Kampung"

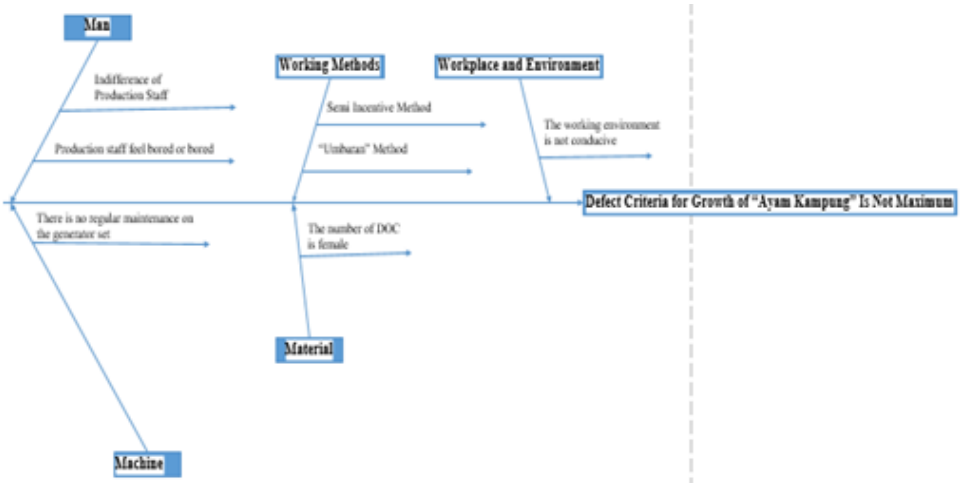

Fig 7:- Diagram of Cause and Effect of Defect Characteristics of "Ayam Kampung" Growth Not Maximum

Cause and Effect Diagram of Quality Characteristics of a Week-Old "Ayam Kampung"

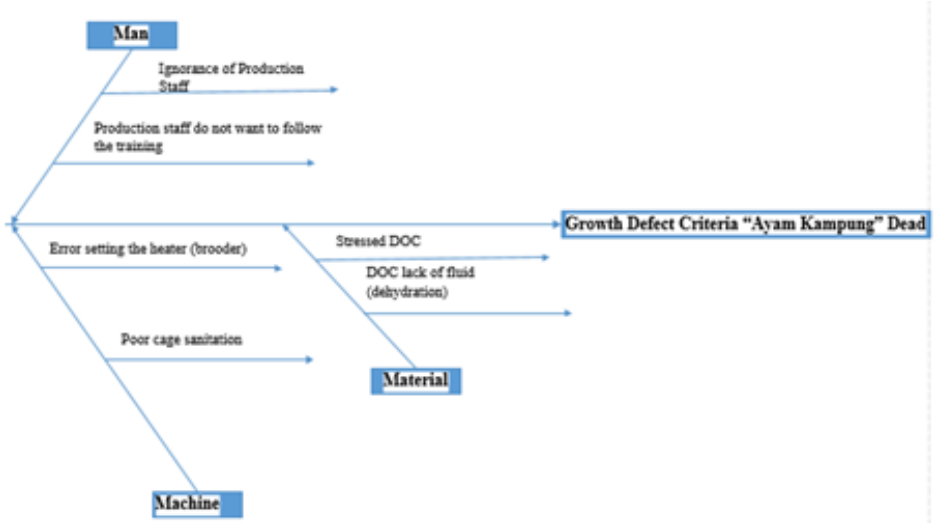

Fig 8:- Cause and Effect Diagram of the Characteristics of Defects in the Development of Dead "Ayam Kampung"

Quality Characteristics of a Month Old "Ayam Kampung"

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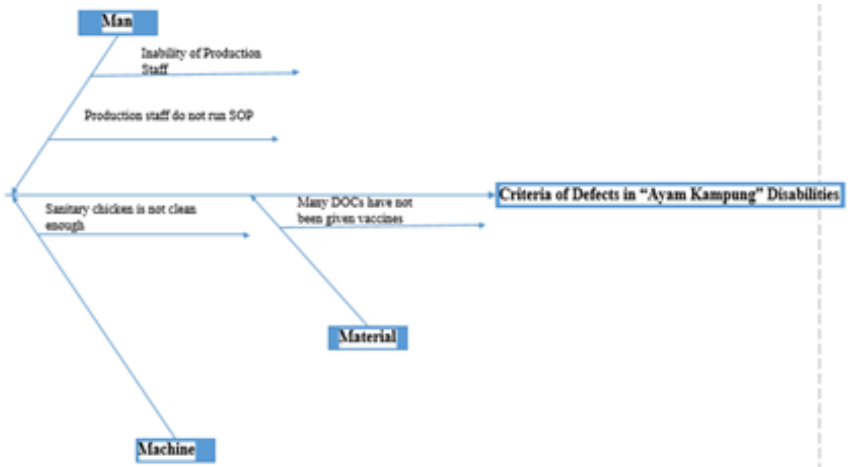

Fig 9:- Cause and Effect Diagram of Defective "Ayam Kampung"Defect Characteristics

➢ *Improve*

The improve phase is an action plan to carry out corrective actions and improve the quality of the products produced after knowing the causes of defects in the occurrence of types of defect of native chicken products, then a recommendation or recommendation for general improvement is made in an effort to reduce the defect level of native chicken. The solution is sought from the main problems found in the analyze phase using the 5W + 1H tool which is described as follows:

No	Factor	Problems	Why	What	Where	When	Who	How
1	Man	The indifference of the production staff is very low	Production staff does not care about "ayam kampung" production	Briefing of production staff	Cage area	At the beginning of the shift every day	Leader	Refreshment regarding SOPs for "ayam kampung" production
2	Man	Production staff feel bored or bored	Production staff has no intention of working	Briefing of production staff	Cage area	In mid shift every day	Leader	Refreshment regarding SOPs for "ayam kampung" production
3	Machine	There is no regular maintenance on the generator set	Generators are never serviced regularly	Generator repair	Cage area	When a problem occurs	Leader	Generator repair is followed by periodic checking
4	Method	Incentive method	DOC "ayam kampung" does not get sick and die	Briefing of production staff	Cage area	When a problem occurs	Leader	Requires no small cost
5	Method	"Umbaran" Method	The productivity of "ayam kampung" is very low	Briefing of production staff	Cage area	When a problem occurs	Leader	Requires very low costs
6	Material	The number of DOC is female	DOC growth of old "ayam kampung"	Complaints to suppliers through QC	Cage area	When a problem occurs	Leader	Return DOC by providing data on the number of female DOCs

No.	Factor	Problems	Why	What	Where	When	Who	How
7	Environment	The work environment is not conducive	Production staff always quarrel and get angry with other production staff	Briefing of production staff	Cage area	When a problem occurs	Leader	Refreshment regarding work SOP
8	Man	Ignorance low production staff	Production staff do not know the production of "ayam kampung"	Briefing of production staff	Cage area	At the beginning of the shift every day	Leader	Refreshment regarding SOP for "ayam kampung" production
9	Man	Production staff does not want to follow the practice	Production staff are not familiar with the contents of the training material	Briefing of production staff	Cage area	At the beginning of the shift every day	Leader	Refreshment regarding SOP for "ayam kampung" production
10	Material	The amount of DOC stress	DOC dies because DOC is less able to develop properly	Complaints to suppliers through QC	Cage area	When a problem occurs	Leader	Return DOC by providing data on the number of stressed DOCs
11	Material	The amount of DOC lack of fluids (dehydration)	DOC die as DOC insufficient fluids	Complaints to suppliers through QC	Cage area	When a problem occurs	Leader	Return DOC to provide data on the number of DOC lack of fluids (dehydration)
12	Machine	Error setting the heater (brooder)	"Ayam kampung" die because in the bladder the temperature of the heater (brooder) is very high or very low	Repair of heating devices (brooder)	Cage area	When a problem occurs	Leader	Refreshment of the SOP operation of the heating device (brooder)
13	Place	Bad cage sanitation	"Ayam kampung" are sick because of dirty cages	Cage cleaning	Cage area	When a problem occurs	Leader	Cleaning is followed by replacing the sanitary equipment enclosure
14	Man	The inability of low production staff	Production staff are less able to produce "ayam kampung"	Briefing of production staff	Cage area	At the beginning of the shift every day	Leader	Refreshment regarding SOP for "ayam kampung" production
15	Man	Production staff do not run SOP	Production staff do not understand and understand the SOP for "ayam kampung" production	Briefing of production staff	Cage area	At the beginning of the shift every day	Leader	Refreshment regarding SOP for "ayam kampung" production

No.	Factor	Problems	Why	What	Where	When	Who	How
16	Material	The number of DOC that has not been given the vaccine	DOC "ayam kampung" die and become sick because they do not have protection against disease	Complaints to suppliers through QC	Cage area	When a problem occurs	Leader	Return DOC by providing data on the number of DOCs that have not been given the vaccine
17	Environment	Poor cage sanitation	"Ayam kampung" are sick because "ayam kampung" coops lack lighting and ventilation	Improve ventilation of "ayam kampung" coops	Cage area	When a problem occurs	Leader	Refreshmen t regarding SOP for the chicken house sanitation

Table 9:- 5W+1H

➢ *Control*

At the control stage is seeing or measuring the performance of the process assuming the process is controlled and eliminating sources of variation that cause defects have been carried out. As a form of continuous improvement and improvement, the next step that can be done after the improvement is to analyze and run the proposed improvement for the defect criteria. The application of SOP is also needed to maintain the standardization of running processes. Actions that have been taken namely:

1. Checking the generator engine and heating engine before the production process is carried out and carried out regular maintenance, if there is a problem with the generator engine and the heating machine is carried out the replacement of elements contained in the machine. In order to work optimally during the course of the production process.
2. Supervise raw materials and employees of the production department so that the quality (quality) of goods produced is better.
3. Do the recording of all products recorded every day made by employees in the production process.
4. Report the results of recording defect products to the leader and the total damaged products within one month period are included in the montly manager.
5. Perform regular DPMO calculations and sigma values each period to determine the ability of the process to produce defective products per million opportunities.
6. Perform control map calculations to determine the stability of the process periodically each period.
7. Productivity

The productivity value of native chicken production before quality control has a value of 3.035% (see table 5). Then the calculation of productivity after quality control based on equation (2.3) in August to October 2018 is presented as follows:

Month	Selling	"Ayam Kampung" Price	Sales results	Production cost	Productivity
August	1700	Rp 35,000	Rp 59,500,000	Rp 43,873,200	1.356
September	1740	Rp 35,000	Rp 60,900,000	Rp 43,882,500	1.388
October	1820	Rp 35,000	Rp 63,700,000	Rp 42,545,500	1.497
Total	5260	Rp 105,000	Rp 184,100,000	Rp 130,301,200	4.241

Table 10:- "Ayam Kampung" Productivity in August 2018 - October 2018

C. FMEA

Failure mode and effect analysis (FMEA) are analytical techniques that combine technology and experience to identify possible product or process failures and plan for the elimination of the cause of failure. In FMEA, there are 4 main parameters used for quality control priorities, namely Severity, Opportunity, Detection, and RPN. Analysis of the four main parameters of disability criteria the DOC dead, "ayam kampung" with a defect, The growth of "ayam kampung" is not optimal, shown in the following table:

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Defect Criteria	Factors Causing Failure	Root Causes of Failure	As a result of failure	S	O	D	RPN
DOC die	Production staff is less thorough and less concentrated	Lack of discipline in production staff such as chatting and daydreaming while working	Loss of concentration at work so that no regard for work processes	9	9	10	810
"Ayam kampung" with a defect	Production staff lacks proper operating standards	The training process in the company also does not have standard standards and has not been implemented well, the lack of training and observation for new employees who are trained by leaders	So the production staff do not really understand the operating standards are good and right, causing defective products	9	9	9	729
The growth of "ayam kampung" is not optimal	Production staff who do not understand the quality standards of "ayam kampung"	Company Operational Standards (SOPs) are only written and pasted, lack of socialization to production staff to understand good quality and correct	Production staff can not know correctly about the quality standards of good products. Production staff assume that quality and product inspection issues are the responsibility of the QC department	9	10	10	900

Table 11:- FMEA

Based on the FMEA table above, it appears that the largest RPN value is 900 which is a problem of not optimal growth of native chickens. Followed by the problem of DOC die with RPN value of 810, up to the smallest RPN of 729 which is a problem of disabled "ayam kampung".

❖ *Discussion*

Research conducted found that defects that occur in native chickens have 3 characteristics of quality chicken products, namely one week old native chicken, one month old native chicken, two-month old native chicken. These three quality characteristics consist of 3 dead DOC criteria, defective Kampung Chicken and Kampung Chicken Growth is not optimal. From the Pareto diagram, it was found that the biggest defect criterion was that the defect of native chicken growth was not optimal with a percentage of 51.96%, followed by defective DOC defects and defective native chickens falling with a percentage of 43.23% and 4.80%, respectively.

Based on the Pareto diagram, an analysis is carried out using a cause and effect diagram for DOC to die, defective "ayam kampung" and "ayam kampung" growth is not optimal. In the cause and effect diagram for the growth of "ayam kampung" is not maximally found 7 main problems from human factors, machines, methods, materials, and the environment, namely the ignorance of low production staff, production staff feel bored or saturated, there is no periodic maintenance system on the generator, incentive methods, the slap method, the number of DOC females, and the work environment is not conducive. In the causal diagram for dead "ayam kampung" DOC found 6 main problems from human, machine, method, material, and environmental factors, namely the ignorance of low production staff, production staff not willing to follow the training, the number of stressed DOCs, the number of DOCs lacking fluids (dehydration), errors in regulating the heater (brooder), and poor sanitary enclosure. In the causal diagram for defective "ayam kampung", 4 main problems were found from human, machine, method, material, and environmental factors, namely the inability of low production staff, production staff not running SOPs, the number of DOCs that have not been given vaccines and poor enclosure sanitation.

In addition to using cause and effect diagrams, an analysis of 5W + 1H was carried out, 6 important points of quality control were successfully implemented, namely the ignorance of the production staff was very low, the production staff felt bored or fed up, the ignorance of the production staff was low, the production staff did not want to follow the training, the inability low production staff, production staff do not implement SOP. In addition, there are still 11 quality control points that are still in the working stage, namely the absence of a periodic maintenance system on the generator set, incentive methods, the method of flare, the number of female sex DOCs, the work environment is not conducive, the number of stressed DOCs, the number of DOCs that lack fluids (dehydration), errors in regulating heating devices (brooders), poor enclosure sanitation, the number of DOCs that have not been given vaccines and poor enclosure sanitation.

In addition to using cause and effect diagrams, an analysis was carried out using FMEA and it was found that

the main problem of "ayam kampung" growth defects was not optimal with an RPN value of 900, while the lowest RPN value was 729 which was a defect of defective "ayam kampung" because of the inability of low production staff, production staff does not run SOP, the number of DOC that has not been given vaccine and poor enclosure sanitation.

V. CONCLUSIONS

Based on the results of the discussion in the previous chapter, it can be concluded as follows:

1. Control the quality of "ayam kampung" products that increase productivity by using Fishbone, Six Sigma, FMEA and 5W + 1H.
2. Factors that cause product defects are the ignorance of low production staff, production staff feeling bored or bored, the absence of a regular maintenance system on the generator set, incentive methods, spreading methods, the number of female sex DOCs, the work environment is not conducive, staff ignorance low production, production staff do not want to follow the training, the number of DOCs that are stressed, the number of DOCs that lack of fluids (dehydration), errors in regulating the heater (brooder), poor enclosure sanitation, the inability of production staff is low, the production staff do not run SOPs, the number of DOCs that have not been provided with vaccines and poor sanitation.
3. Strategy to reduce defect of "ayam kampung" to increase productivity by using the value of the control map p, calculate the central line (Central Line (CL), calculate the upper control limit or Upper Control Limit (UCL) and calculate the lower control limit or Lower Control Limit (LCL). Then a Pareto diagram is made to determine the criteria for defect of native chicken with the largest frequency. Pareto diagram shows that the criteria for defect of "ayam kampung" growth is not maximal having the greatest frequency with 51.96%, followed by the criteria of reject fall and tilt cap with a percentage of 43.23% and 4.80% respectively. According to FMEA analysis, the main problem of "Ayam Kampung" Growth is not optimal with an RPN value of 900, while the lowest RPN value is 729 which is a disabled "ayam kampung".

Based on the conclusions above, the author tries to convey some suggestions for further research.

1. So that the defect of "ayam kampung" products that appear in the production process of "ayam kampung" can be minimized, it is recommended to make improvements gradually. To the main cause of the occurrence of defect products, so that the company's goals can be achieved, namely to save production costs, and this effort is most supportive of the smooth production process of "ayam kampung".
2. Providing training to production staff on "ayam kampung" production.
   Implementation of quality control of native chicken to improve company performance and the quality of native chicken products produced.
3. Formation of quality control team in order to facilitate the process of native chicken production from beginning to end so that the defect of native chicken products can be detected.

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