ANALYSIS OF QUALITY CONTROL IN EFFORTS TO REDUCE THE LEVEL OF PRODUCT DEFECTS AT PT. MAG

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Abstract

The increasing number of bag factories throughout Indonesia that have well-known brands and every manufacturer is required to provide products of good quality. Poor product quality will cause consumers to move to other similar products. So in the production of bags, the thing that must be considered by the company is the quality of its products. In this study the authors aim to analyze quality control in a production process and identify several factors that cause disability in the product, PT. MAG is a bag company that is demanded to control the quality of the production process. This study uses a six sigma analysis tool consisting of five steps, namely using the DMAIC method (Define, Measure, Analyze, Improve, and Control). Based on the results of the study there are three types of disabilities in the production process, including cutting, zippers and broken bag straps with an average sigma value of 2.48 with a DPMO value of 20256.92. Factors affecting the production process are human, machine, environment, equipment, raw materials, and methods. In this case the company can use the Six Sigma method because it is still in the medium category.

Keywords: Quality Control, Defective Products, Six Sigma.

The bag is a closed container that can be carried travelling. Material for making bags are paper, plastic, leather, cloth, etc. In the past, bags were only made from simple materials such as synthetic leather, cloth, and vinyl. Because genuine leather is quite expensive and rare, it is made synthetic leather as the raw material of the bag. In addition to these materials there are also paper bags or thick paper that was originally used by the Chinese during the Tang dynasty. At first, the world community initially started to know the bag as a wrapper bread, it appeared plastic bags that marketed about 25-35% and finally circulated in a massive market. Nowadays, plastic bags are easily found in various corners of the world. (https://koperasipuldapii.com/artikel-179-pengertian-tas-dan-sejarahnya)

At this time there are many factories that can be found in various parts of Indonesia, which has a famous brand that establishes a magnificent building and has thousands of employees. These factories are usually established in large cities with the aim of facilitating operations, reducing costs. In one day the factory bag can produce hundreds and even thousands of untite ready in market to all over Indonesia, each factory racing to produce bags with the latest models to attract the attention of consumers.

Poor product quality will result in consumers moving to other similar products. Therefore, the company is required to maintain the quality of products so that later can compete with other companies. If the company has a positive impact, one of them is increasing the revenue of the company. In the production process that has been obstacles that cause damage or deviations in the resulting product so that the product cannot be sold or marketed to the customer (Triawan, Prostrate: 2004). Where the quality of the products produced suffered damage/disability. This is due to deviations from various production factors, both from the raw material, labour and performance of the machines used in the production process.

According to Jeff Madura in Anita (2017) Quality Control is the process of determining whether the quality of the product/service meets the expected level of quality and identifies the improvements

that need to be made to the production process. According to Vincent Gasperz (2005), control is an activity undertaken to monitor activity and ensure that the actual performance performed is in accordance with the planned. Meanwhile, according to Sofjan Assauri in his book production and Operations Management (2004) said that "Quality Control is the activity of ensuring whether the policy in terms of quality (standard) can be reflected in the final outcome, or in other words the effort to maintain the quality or the qualities of the goods produced to conform to the product specifications that have been established based on leader policy"

According to J. Willey and Sos in Yusuf Latief (2009), several methods of approach that have been used to guarantee a quality that is appropriate standards have been developed many of which are TQM (Total Quality Management), CI (Continous Improvement), Kaizen, Process Reengineering, Failure Mode and Effect Analysis, Design Reviews, Voice of the Customer, Cost of Quality (COQ), have varying degrees of success and even 80% of TQM implementations experience past failures.

According to Gita Febiola (2015), Six Sigma corresponds to the meaning of sigma, i.e. distribution or dissemination (variation) of the average (mean) or procedure, Six Sigma is applied to minimize the variation (sigma). According to Hidayah (2018), Six Sigma's goal is to "improve business performance by reducing various adverse process variations, reduction of product or process failures, suppressing product defects, increasing profits, boosting moral personnel or employees and enhancing product quality at maximum levels."

The intent of quality control is a way or method to suppress failures in production. Therefore, PT. MAG need to do quality control, by conducting quality control of the company can determine what action should be taken to suppress the number of defective products in the production process. PT. MAG is one of the industry that is engaged in the fashion bag consisting of two brands/brands namely MAG and Gekko. PT. MAG stands from the year 2009 which focuses more on casual bags and school bags. With a variety of designs and qualities provided by PT. MAG has a high standard of quality in the production process, therefore the company sure can satisfy the wishes of consumers. In that way PT. MAG hopes to be able to dominate national and international market share.

In one day, PT. MAG has a bag production capacity of 2,500 units, including with rework products are ready to be delivered to the department stores and often the company receives orders with an uncertain amount. The Target of PT. MAG is among teenagers, therefore the model offered by the company is very important. Some of the problems faced by PT. MAG during the production process, among others, are the number of defective products from year to year starting from the cutting of the pattern that does not match the unsuitable stitches, but unfortunately PT. MAG does not have a standard defect of the product. Thus causing defects in bag products produced by PT. MAG more and more, this is caused by a wide range of factors that lead to a reduction of quality that impacts the company's losses. In addition, the company suffered other losses such as the cost incurred by the company will increase larger.

The problems arising in the PT. MAG because production planning made based on the provisions of the company does not match what is produced by the employees. And the lack of thoroughness of employees on the cutting process, installing zipper and sewing bag straps that do not correspond to what has been planned by the company.

Product defects are divided into three types namely product defects in the process of cutting, zipper mounting, and a broken bag strap. The highest overall defect was in October, and a defect in the cutting process occurred in November as much as 267 units. Then in the highest zipper mounting process was in June of304 units, and the product defect on the broken bag straps occurred in January as many as 200 units.

The defective product is then separated with good quality products, then it will be done rework or work again by the employees. But the rework product is still sold at a price lower than the original product price. The rework process raises losses for the company because the large number of defective

products will affect how much cost the company has to expend, inhibiting the production process and confidence in consumers began to decline because the company was unable to complete the production in time in fulfilling the consumers ' wishes.

Tested Research

The objectives of these adherness are:

1. To know what kind of defective product in PT. MAG
2. To determine the process of control to reduce the level of defects of products produced by PT. MAG.
3. To provide improvement proposal results aimed at reducing the level of disability.

Benefits of research

The benefits of this research are:

1. Practitioners

This research is expected to be beneficial for consideration in continuous improvement especially regarding the control of product quality.

2. Academics

As a reference material for similar research in order to provide an overview of the problem and how to solve the problem discussed in this research.

METHODS

The research method according to Sugiyono (2017) is a scientific way to obtain data with specific purpose and usability. The research method used in this research is a descriptive method. In this study is research with qualitative and quantitative approaches (mixed). These research data is collected and processed and analyed, here are the types of data:

1. Qualitative Data

Qualitative data is data that can include virtually any non-numeric. This Data can use words to describe facts and observable phenomena. Qualitative Data used is the result of interview, and observation results.

2. Quantitative Data

Quantitative data is data that can be input into a statistical measurement scale. The facts and phenomena in this data are not expressed in natural language, but rather by numerical. Quantitative data used is 2015-2018 period product data, with disability data experienced by company PT. MAG.

Data types acquired are qualitative and quantitative data. Qualitative data i.e. data that is written information is information about the type of product defect, the cause of defects in the product, the production part, and the raw materials used. While QUANTITAFIF data is a number of data, namely data about the amount of production and data of defective products.

Data Collection Methods

The method of collecting data in this study is through interview methods, observation, documentation and library studies.

1. Interview method

It is one way to get data or information by directly questioning the person who knows about the object being researched. In this case, researchers are conducting interviews with owners/employees of the company that is about the types of defective products and the cause, the production process and raw materials used.

2. Observation methods

It is the observation or review directly at the research site in PT. MAG by observing the sietem or the workings of the existing officers, observing the production process from start to finish.

3. Documentation method

That is by studying the company's documents that form the report of production activities, reports on the production amount and number of defects and work plans.

4. Library Study Method

It is a way of studying the literature related to the topic of research, such as books, journals, or other materials related to this research.

DISCUSSION

Analyzing company data by using a control map

Calculation of P, CL, UCL, LCL values

Period of January-December 2018

Months	Observation	Number of products (units)	Amount P. Defects (Units)	P	CL	UCL	LCL
Jan	1	6.364	521	0,081	0,057	0,066	0,049
Feb	2	5.973	504	0,084	0,057	0,066	0,048
Mar	3	7.589	536	0,07	0,057	0,065	0,049
Apr	4	8.574	567	0,066	0,057	0,065	0,049
May	5	12.043	651	0,054	0,057	0,064	0,051
Jun	6	9.870	552	0,055	0,057	0,065	0,051
Jul	7	13.516	537	0,039	0,057	0,063	0,051
Agst	8	13.349	530	0,039	0,057	0,063	0,051
Sept	9	12.259	507	0,041	0,057	0,0634	0,051
Oct	10	9.329	653	0,069	0,057	0,0645	0,05
Nov	11	9.907	641	0,064	0,057	0,064	0,05
Des	12	9.485	620	0,065	0,057	0,065	0,051
Amount		**118.258**	**6.819**				

As the rule of thumb (Prawirosentono, 2002) used the following criteria:

A. If P is < LCL, then all the samples are in the Receive area (LCL) then check the cause. B. If LCL <P> UCL, then all samples are in the area of the receipt of normal valid samples or good capability.

C. If P > UCL. Means the sample jumps upwards outside the receive area (UCL) or can be said the low process capacity of the meal examine its cause and take corrective action through improved performance in production process activities.

DISCUSSION

SIPOC Diagram

Based on the SIPOC diagram explains the process of starting from the supplier to the customer in producing apparel. Pt. MAG has 3 fixed supliers that each supply the necessary raw materials to make the bag. After the purchase is done the next step is to check all the raw materials that have been received from the supplier, then go into the storage of PT. MAG to be ready to go to the next process. The inputs used in this process is fabric, zipper, sewing thread, bag strap, and label. Process of bag production in PT. MAG begins with the creation of a pattern of past fabric cutting, further sewing and

sewing bag straps, and the last stage of zipper mounting. So the Output or finished goods until the sale to the Customer.

Full Map

Based on picture 5.2 above the value of P in January, February, March, April, September, October, November is outside the UCL limit, while the value of P in July, and August is outside the limit of LCL.

Pareto Chart

Based on the Pareto diagram 5.4 The type of defective product is caused by 3 things namely, process cutting, sewing bag straps, zipper mounting. The mounting of Resleting became the highest cause by generating 2,749 units of defective products, at the cutting stage generating 2,586 untite defective products, and breaking straps producing 1,484 units of defective products.

DPO, DPMO, and Sigma values

According to the table 5.4 can be seen the total number of units produced by PT. MAG during the period from January to December 2019 as many as 118,258 units of bags. Total number of defective products contained in the production of 6,819 units of bags caused by 3 types of causes defective products namely Cutting, zipper, and breaking bag straps. Defect Per Opportunities (DPO) on average in production from 2019 to 0.020257. Defect Per Million Opportunity (DPMO) on average production in 2019 is 20256.92. The average sigma on the production year 2019 is 2.48. The largest sigma value occurs in July, August, September, and the smallest sigma value of 2.47 is present in January and February.

Fishbone Diagram

1. Cutting

In this type of defect there are 3 factors causing defects namely, machinery, environment, and equipment. The machine-induced factor is the less focused employee that is sometimes caused by employees who experience fatigue and employees are sick. Environmental factors can be caused by less illumination due to limited number of lamps/lighting, and less precise vision of the employee. And on the equipment factor can be caused by scissors that have been blunt because the scissors are not subjected to maintenance and have long been not replaced, because the supervisor is not routinely supervise the employees.

2. Zipper Mounting

In this type of smallpox there are 2 factors causing defects namely, machinery and raw materials. The factors caused by the machine are the employees who chat a lot sometimes this happens because the employees feel saturated, and the carelessness that often happens if the absence of supervisors who supervise, feel rushed due to the many orders that must be fulfilled by the company with the target in accordance with the order at that time and the lack of accuracy of the employee. The factors caused by raw material are damaged zipper sometimes this zipper undergoes poor quality.

3. Breaking Bag Straps

On this type of defect is caused by 3 factors causing defects i.e., human, machine, and method. Ordinary human factors there are carelessness due to the lack of careful employees, and the rush that happens because the employees are too relaxed if not supervised by supervisors so that if the deadline is already the employees are getting overwhelmed. The next factor is the machine that occurs because the machine is damaged and caused by a lack of maintenance to the machine used. And the last factor is the method that is not strong stitching caused by one of the missed production processes and often occurs when the supervisor does not control the employees.

Comparison of results with previous research

Based on the results of this study, the researchers compared with the results of the previous researchers were used as reference to this study.

1. In research with the title of product quality analysis with Six Sigma approach (case study on Flexo machine) by Supriyadi, Gina Ramayanti, Alex Chandra Roberto (2017). Shows the DPMO value of 7,560 with the value of Sigma 3.93 and the value of sigma increased after it has been improved to 4.05. Based on the cause diagram and FMEA known cause of product defects is the Gap Printing unit and slotters of less precise, less precise pull roll setting, less control, round roll transfer sheet shake, lack of training, curved sheet, pull gear shake, flapped worm gear, pneumatic anilox not ride without flexo ink pump is often dead.

2. In research under the title of analysis of Super Absorbent Polymer quality control using Six Sigma method by Rosihin, Admiral Mujaddid Ulinnuha, and Dadi Cahyadi (2017). Indicating using Six Sigma method can be noted that the quality of the product produced is good enough that the 3.07 sigma with a damage level of 58,624 for a million production (DPMO). The main factors causing defects are machine factors for types of defects in color contamination, misprinting type defects in packaging labels and packaging damage, the main factor is human.

3. In research with the title of quality control of rope bag Batik in PT. XYZ using Six Sigma method by Amanda Intan Lady Deamonita, Retno Wulan Damayanti (2018) based on the calculation of the average DPMO value and the consecutive Sigma average value of 17333.74 and 3.61. After control measures and the average repair of the sigma increases with the average DPMO value and the consecutive Sigma average value of 14400.82 and 4.18. The most defective products occur in manual work statemen and are largely caused by the glueing process.

4. In this research with the title of the proposed quality improvement using Six Sigma method to reduce the number of defective products tile Teraso at PT. UBIN ALPEN by Adetia Harpensa, Ambar Harsono, Lisye Fitria (2015) DPMO calculation results and Six Sigma values prior to the repairs were 37761.905 and 3.280 after the DPMO repairs dropped to 14791.667 and Sigma values rose to 3.680. Based on the calculations against defective product data, it is known that defects in cracks and edge defects are two of the highest number of defects.

5. In the study titled Production Quality Control Analysis at PT. OMETRACO ARYA SAMANTA using Six Sigma method by Mohamad Redzky and H. Umar Wiwi (2017) The results of this research is PT. Ometraco Arya Samanta have a Sigma level of 3.13 with the possibility of a defective product of 51,399 for a million production. The types of defects that occur are: plates that do not shrink size, holes that are not suitable for size, and the connection of the plates are not perfect.

CONCLUSION

Based on the results of the research in the production process of PT. MAG can be known there are 3 (three) types of defects in the production process is cutting, zipper, and end strap. Resleting is the highest cause, hereinafter followed by cutting and the end cause is the breaking strap. In the process of zipper caused by machines that sometimes occur because the employees of one with the other often chat because it is too saturated, because the other is the carelessness of employees who are less careful in pairing the zipper for a hurry. And because the latter is the raw material with the possibility of reseleting to experience poor quality. On the cutting process caused by the machine because of the lack of focus of employees caused by the condition of the employee who suffered fatigue or pain, the next factor is the environment that is turned on by the lack of light due to the limited number of lamps and sharpness in the vision of employees In the final process there is a human factor caused by the carelessness of employees because of the less thorough and rushed in carrying out the work pursued by deadlines, the next factor is the machine because of the damage caused by the lack of maintenance of the machine because it is too often used (exceeding capacity). And the last factor is the method of stitching that is not strong because of the passage of one production.

In the company PT. MAG can perform the control process to reduce the level of disability by using the Six Sigma method because using this method is still in the medium category.

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