Balance: Jurnal Akuntansi dan Manajemen

Reducing Defects Product at M.E. Bag and Purse Production Process Using DMAIC Method

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ARTICLE INFO

ABSTRACT

ME bag and purse merupakan usaha kecil menengah yang bergerak di bidang fashion dan telah beroperasi sejak september 2017 di Yogyakarta, dalam rangka memperbaiki kualitas produk maka dilakukan penelitian dengan menggunakan metode DMAIC dan analisis proses bisnis untuk menganalisis penyebab pemborosan dan cacat produk Tas. Proses pendefinisian menggunakan diagram SIPOC, CTQ (critical to quality), menentukan nilai DPU, DPMO, dan sigma untuk mengetahui seberapa besar produk yang cacat dan diagram fishbone untuk mengetahui penyebab produk cacat pada proses produksi. Solusi dari masalah sesuai dengan 6Ms (manusia, mesin, material, metode, lingkungan, pengukuran). Berdasarkan temuan masalah maka ditentukan target KPI (key performance index) sebagai alat kontrol dalam 1,5-2 tahun dengan DPU level dari 0.140 turun ke 0,03, DPMO level 140338.98 turun ke 30000.00 dan Six sigma value 2.58 meningkat ke 4.24. Solusi lainnya, melakukan pelatihan menjahit dan pembuatan pola, melakukan perawatan mesin jahit secara berkala, menerapkan konsep 5S untuk workstation, dan penggunaan untuk mengetahui sejauh mana rekomendasi perbaikan berjalan dan membuat jadwal lebih teratur.

ME bag and purse is a small enterprise operating in the fashion sector and has operated in Yogyakarta since September 2017. In order to improve product quality, this study employs the DMAIC methodology and business process analysis to identify the causes of waste and defects in bag products. The define phase utilizes SIPOC diagrams and Critical to Quality (CTQ) characteristics. Product defect levels are measured by calculating DPU, DPMO, and the sigma level to determine the extent of product defects. Furthermore, a fishbone diagram is applied to identify the root causes of defects occurring in the production process. Improvement solutions are formulated based on the 6M framework, consisting of manpower, machinery, materials, methods, environment, and measurement. Based on the identified problems, Key Performance Indicator (KPI) targets are established as control tools over a period of 1.5–2 years. The results indicate a reduction in the DPU level from 0.140 to 0.03, a decrease in the DPMO level from 140338.98 to 30000.00, and an increase in the Six Sigma value from 2.58 to 4.24. Additional improvement strategies include conducting sewing and pattern-making training, performing regular maintenance of sewing machines, implementing the 5S concept in workstations, and applying monitoring mechanisms to evaluate the effectiveness of improvement recommendations and to develop a more structured production schedule.

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INTRODUCTION

In an increasingly advanced industrial era, businesses are required to be able to survive and always improve their effectiveness and efficiency in carrying out the production process. In small and medium enterprises that produce handmade goods and there are many requests, then there is one problem in the production process, namely the existence of defect products that cause losses both in terms of customer value, loss of the company itself, and customer dissatisfaction. This finding can be detrimental to the company because it will take up production time and incur additional costs that shouldn't have occurred. Companies often lose consumers because they cannot meet a number of consumer demands (Pertiwi, et al, 2016). Because of this, businesses must overcome these problems as early as possible to avoid large losses. Thus, the presence of high defect products must be minimized.

ME bag and purse is a small and medium-sized business that is engaged in women's fashion bags

and purses. With the shifting of lifestyles, the current complementary needs are needed, one of which is the need for fashion. The fashion industry is currently a potential sector in the creative industry sub-sector and contributes 28.29% to Indonesia's GDP (www.kemenperin.go.id, 2015). Bags are included in the creative fashion industry category. The following is a figure that shows the items most often purchased online and offline, and bags rank third, namely 20% and 17%. ME bag and purse was establish in May 2017. For the beginning, in the first year, there were no significant problems with the production process. As the time goes by, there are many defect product found such as seams on the bag are slanted and untidy, there are thread residue on the fabric, reverse accessories installation, and the wrong handling of the material so that when sewing there are holes in the bag. If not handled immediately, it will affect the customer satisfaction and the brand reputation since our brand is handmade product. Therefore, ME bag and purse should conduct research on how to reduce defective products in the production process.

To minimize the level of defect, it is necessary to make an effort to reduce this to no more than 3.4 DPMO (defect per million opportunities) of the amount of production produced (Gaspersz, 2011). In order to improve product quality, this study employs the DMAIC methodology and business process analysis to identify the causes of waste and defects in bag ME bag and purse products and achieve these goals, a strategy is needed to get there, one of which is DMAIC (define, measure, analyze, improve, control). The objectives to be achieved from this research, are To find the defect product causes at ME bag and purse and To propose new strategy to minimize defecects product at ME bag and purse. This research is expected to be able to help reduce product defects that occur in ME bag and purse.

This research focuses on the production process and matters related to the production process. It is limited by the scope of the research. While finance, marketing, human resource, and any other aspect will not be discussed in this research, but the data might be include as a supporting data

LITERATURE REVIEW

Define

At the define stage, a problem is formulated and defined in the research object, and defines the problem. At the define stage, analysis is carried out with the SIPOC diagram as shown below that has a relation with business process analysis, then determine the CTQ and identify the types of defects.
1. SIPOC diagram

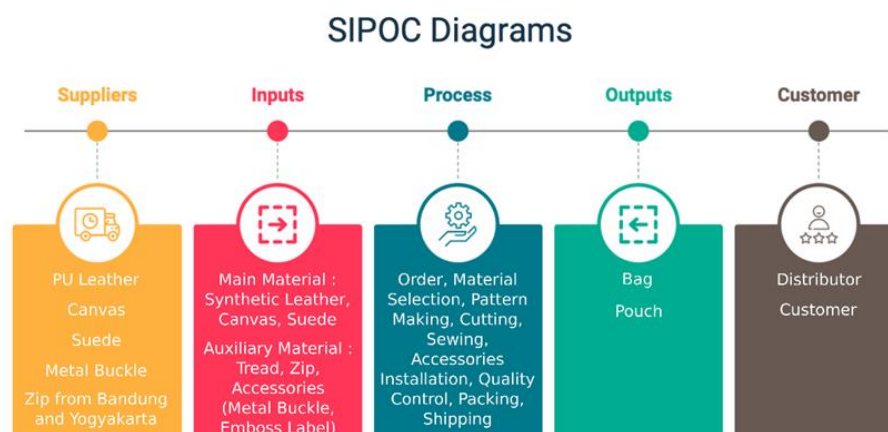To find out the big picture production flow, it is illustrated with the SIPOC diagram as below.

Figure 1. SIPOC diagram
(Source : Imamara, 2021)

Based on the SIPOC digram above, the following is an explanation of each section:
a. Supplier

Supplier is the party that supplies the main raw materials and auxiliary materials used by ME bag and purse. The main raw materials and auxiliary materials come from Bandung and Yogyakarta.

b. Input

In the input section, namely the material used to process the product in the ME bag and purse. The main ingredients are synthetic leather, suede material, and canvas. As well as accompanying materials, namely accessories such as metal buckles, embossed labels, threads, zip, and furing fabrics.

c. Process

In the process activity begins with an order notification, then the materials are made according to the order or restoring empty stock. The process is by selecting materials according to the product and product specifications to be made, then making a pattern based on the dimensions of the product to be made, then installing complementary accessories such as metal buckles, embossing labels, then checking the quality, then packing and shipping to the customer.

d. Output

The output of the ME bag and purse production process are bags with various models as mentioned in the product types and multipurpose pouches

e. Customer

The finished good that has been packaged is then delivered to distributors and customers directly.

2. CTQ (Critical to Quality Control) Identification

In order to determine the achievements regarding the characteristics in terms of product quality, in the define process, it is necessary to identify the CTQ. The key quality characteristics defined should relate directly to specific customer needs which are derived directly from output and service requirements (Gaspersz, 2002).

By setting the CTQ, it is expected that the defects found next can meet the standard specifications desired by the customer, set CTQ criteria by interviewing expertise and skilled workers that have worked as a craftsman for more than 30 years and other bag company owner and also the craftsman who experienced 26 years as a craftsman and 15 years as owner bag company, as listed in appendices. The following are the CTQ that obtain from the interviewee statements categorized based on the material.

3. Identification of Defects that Affect Product Quality

Product quality is an observation in this study, in the production process in ME bag and purse, there are not a few defects found in the product and there are several types of defects that are often encountered which will clearly reduce quality and affect customer satisfaction. Some of these defects are consistent with the key qualities listed in the CTQ.

Measure

In this phase, namely the measurement phase of the research object. Measurement data is taken from the process of observing and recording the points of observation, namely data on the number of defects that occur in ME bag and purse in certain months, and determining the amount of DPU, DPMO, and sigma values.

1. Calculation of DPU dan DPMO level

The problem that exists in the ME bag and purse is that there are many defects and items that are not in accordance with specifications, and if they are not immediately repaired and analyzed it will decrease customer satisfaction.

To minimize, it is necessary to evaluate how much defect is generated during the production process. For the method research er using, an assessment of DPU (defect per million unit) and DPMO (defect per million opportunities) was also conducted to determine the sigma value (Gaspersz & Fontana, 2011).

a. $$DPU = \frac{\text{total number of defects found in a sample}}{\text{sample size}}$$

DPU meas   it. It's found by dividing the total number of defects found by the number of units.

b. $$DPMO = \left(\frac{\text{total number of defects found in a sample}}{\text{total number of defect opportunities in the sample}} \right) \times 1{,}000{,}000$$

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Determine six sigma value

from the table 2.3 in sub chapter 2.6.1, the DPMO calculation results are 140338.9831 then matched with the six sigma table in appendix., and the result is 2.58. From this figure it is known that the capability of the ME bag and purse production process is 2.58 sigma and our target within 1.5-2 years reach 4 sigma instead of 6. Therefore, a strategy is needed to reduce defects and improve optimization of the production process.

Conceptual Framework

To understand more deeply how to do this research, a conceptual framework is needed. Conceptual framework help researcher to set the stage of presentation of the particular research question based on the problem statement. And this has been arranged in an orderly and structural manner for the analysis as a whole.
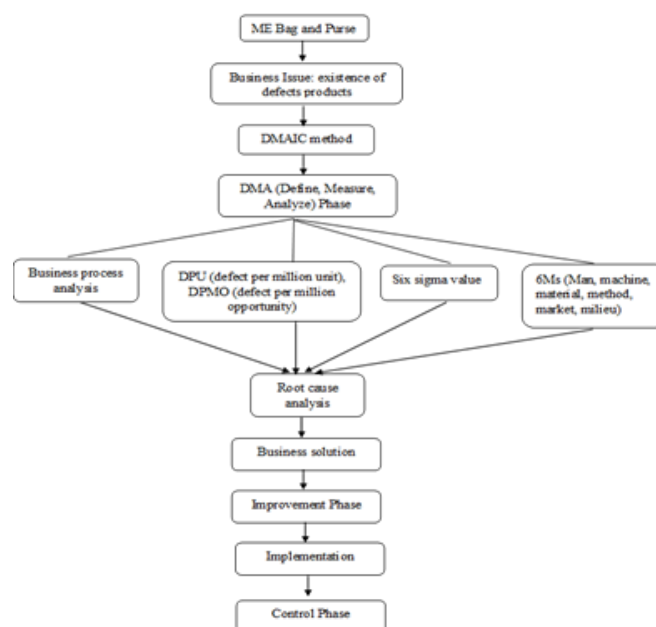

Figure 2. flowchart research framework
(Source : Imamara, 2021)

The flowchart above explains how the ME bag and purse conceptual framework works
a. Existing business conditions
   Collecting data, analyzing problems from existing business situations, determining issues to be raised or which occur based on the business situation.
b. Business issue exploration
   Exploring and identifying problems that exist in the business by finding internal and external factors using DMAIC methods and 6Ms (Man, Material, Method, Machine, Milieu, Measurement)
c. Root causes analysis
   Analyze the various causes of the problem using a root cause analysis in the form of a fishbone diagram. Which contains various problems and their causes from the problems found
d. Implementation plan
   After finding a solution, execute the repair plan and create a ganttchart containing a schedule to make it more timely and orderly.

METHODS

To find a solution ME care business issue researcher using data analysis techniques, from the various opinions of experts, it can be concluded that data analysis technique is a method or way to process data into information so that the data becomes easy to understand and useful for finding solutions to research problems (Moleong, 2000). Source of primary data will be collected by writer through observation on business situation analysis and external data from journal and other references. Approaches to Six Sigma dictate the use of models to foster a disciplined approach to quality problem solutions. The most commonly used model is the five-phase model known commonly by the acronym DMAIC (Define, Measure, Analyze, Improve, Control). Furthermore, data obtained from the internal operations of ME Bag and Purse, including reject reports and other relevant records, are analyzed.

Six sigma acts as a comprehensive and flexible system to achieve, maintain, and maximize business success (Pande, 2002). The main concern of Six Sigma is variation, because with variations it does not meet specifications, thereby affecting market retention and even revenue growth. Six sigma can be applied in many fields, one of which can be applied to evaluate the quality of product development.

Figure 3. six sigma DMAIC
(Source: six-sigma-solutions.com)

Six Sigma is a statistical measure with a failure rate of 3.4 per million opportunities (DPMO) or that 99.9996 percent of what is expected is in the product (Milad, 2015). Meanwhile, The sigma value can be used as a measure of how the company's performance targets good transaction processes between suppliers and customers. The greater the sigma value meaning that the better the performance of the production process (Gaspersz, 2007).

RESULT

Business situation analysis

The following is production data from the period May 2018- May 2019 based on customer requests. The following figure shows the production volume of ME bag and purse.
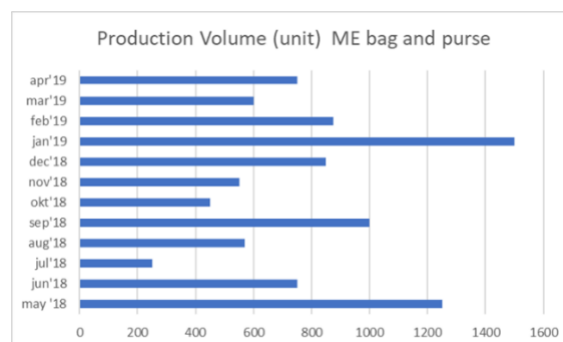

Figure 4. production volume ME bag and purse
(Source : ME bag and purse, 2019)

Business Process Analysis

In ME bag and purse, there are several products that are made using three types of materials,

namely canvas, suede, and PU leather. To be used as a product, these three materials have different treatments and methods of manufacture, such as suede, which when it comes from suppliers, it must be cleaned first because there are some suede materials whose fibers are dead. Therefore we need special treatment for this. Whereas for PU leather which is sensitive to needle punctures, in making patterns it is necessary to add paper so that the parts of the bag that are sewn are not perforated, as well as in bags with canvas material that are easy to move and when sewn slightly shrinks, straight pins and patterns are needed interlining fabric, and each material is given a size tolerance of 2 cm. for details, the process will be broken down one by one with the chart processing operation. The operation process chart (OPC) is a diagram depicting the process steps that raw materials will experience regarding the sequence of operations and checks from the start to become a complete finished product or as a component (Sutalaksana, 2006).

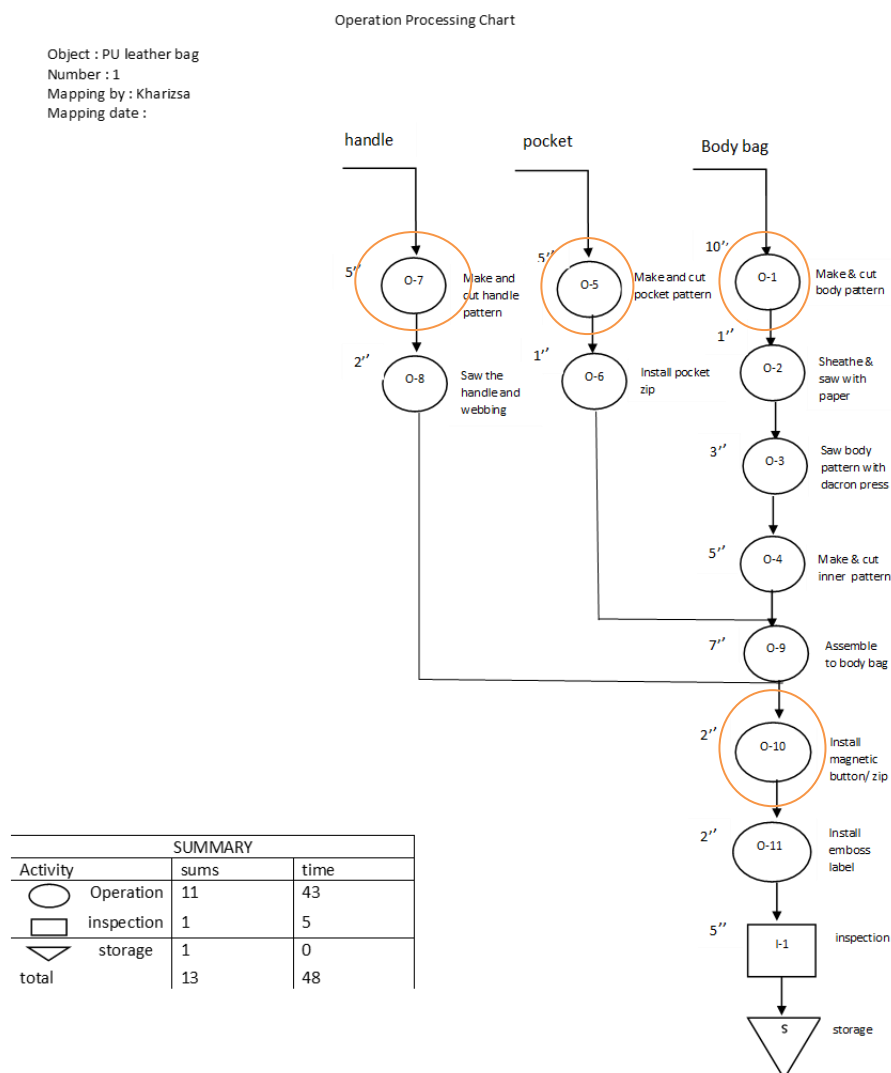The following figure is a chart processing operation for each material.

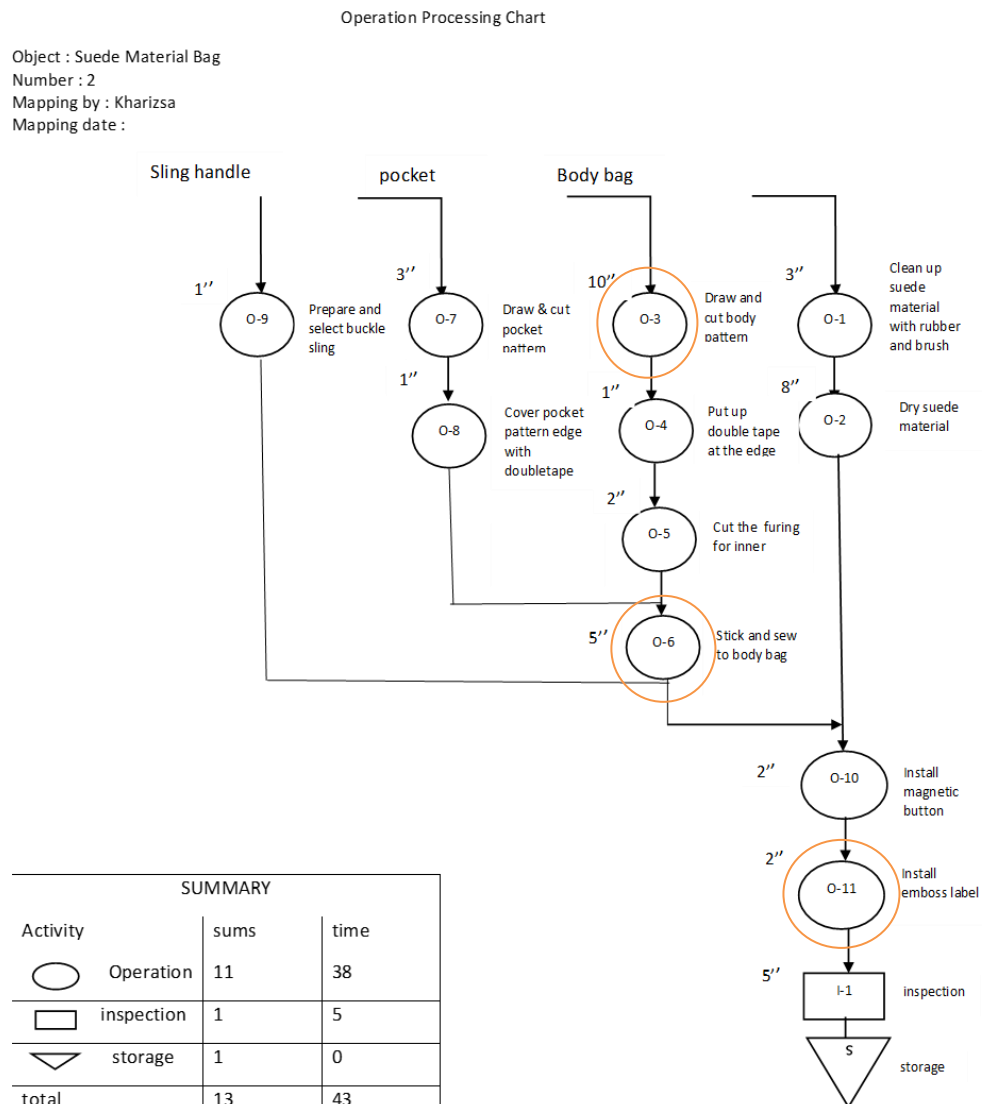Figure 5. OPC PU leather
(Source : Imamara, 2021)

Figure 6. OPC suede material bag
(Source : Imamara, 2021)

Operation Processing Chart

Object : kanvas Material Bag
Number : 3
Mapping by : Kharizsa
Mapping date :

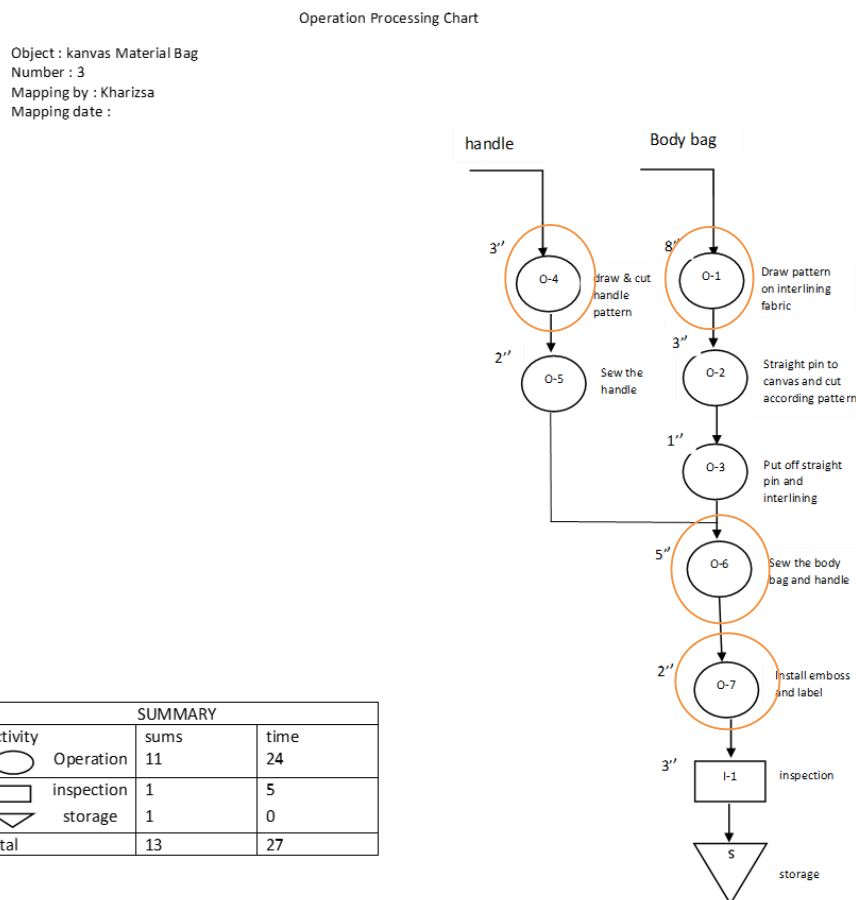| SUMMARY			
Activity		sums	time
◯	Operation	11	24
▭	inspection	1	5
▽	storage	1	0
total		13	27

Figure 7. OPC Canvas material bag
(Source : Imamara, 2021)

The descriptions on each image will be explained as follows:
1. OPC PU leather material bag
   The process is not perfect and causes defects in bags made from pu leather, namely in the process of making basic patterns, bag patterns, and handle patterns that do not match specifications where there are often wrong sizes and skewed patterns, and cutting does not match the line in addition, the stitching on the bag compartment body is not neat and the handle and webbing sewing, and the process of installing accessories such as the slanted label and accessories that not match the bag model. For all process it average take 48 minutes, this number obtain from obseravtion.
2. OPC suede material bag
   The process that contributes to defects in suede material is the making of the wrong size pattern, the oblique pattern so that when it is sewn on to other components, the slope will be very clear, as well as the problem of installing inappropriate accessories. Then, Time process per each average take 43 minutes.
3. OPC canvas material bag
   The process that contributes to the defect in this process is more or less the same as the two materials above, namely in making and cutting patterns, as well as sloping and untidy stitches on the body of the bag, and the last is in installing accessories and labels that are slanted and imprecise. From the observation, each bag have processing time 27 minutes averagely.

The following are the types of defects in the ME bag and purse:

- The surface of the material is damaged (there are holes, fibers on dead suede, dirty canvas).
  The cause of this defect, is in the production raw material that is already a defect from the supplier, besides that it is usually caused by workers who are not careful in the work process. For example, there is a hole in the PU leather because when sewing, the base paper shifts, the suede material is dead and unidirectional fibers, and major stains on the canvas.

Figure 8. Material Defect
(Source : 99.co)

- Patterns that are not straight and untidy
  This type of defect is an attribute where the pattern mismatches with the size, that is, it can be bigger or smaller than the pattern whose size has been set with tolerance, the results of cutting that are not neat and not straight in accordance with straight lines in the sketch of the pattern. This is usually caused by workers who are not careful, lack of skills for material identification, workers who are not focused, etc. So this is a bottleneck in the next activity, sewing.

Figure 9. pattern defect
(Source : ME bag and purse, 2018)

- Stitch
  This type of defect has an indication that there are stitches that are not straight according to the specified pattern or on the sewing object, as well as irregular stitches along parts of the bag. This is common, and is clearly visible on the surface of the bag. These defects are usually caused by workers who are not careful, lack of focus, sewing machine jams, incorrect thread installation, and broken needles in the middle of the process.

Figure 10. defect stitch
(Source : ME bag and purse, 2018)

- There is leftover sewing thread

This type of defect is found to have a joint thread or sewing residue that is outside the surface of the bag and is clearly visible. Leftover sewing threads can be long or short. This is caused by workers who are not careful when cutting stitches, machines die when working so stitches must be joined, workers who are not focused, etc.
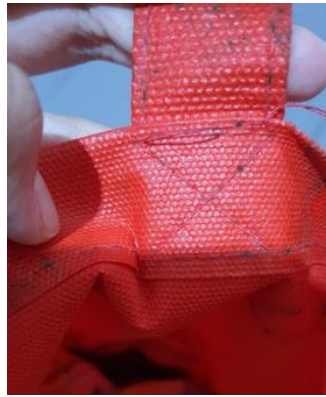

Figure 11. defect stitch thread
(Source : ME bag and purse, 2019)

• Accessories, labels and fittings
This defect in accessories and fittings occurs when the labeling is reversed, the installation of accessories and fittings that do not match the bag model, and the labels or accessories are slanted. This usually happens because workers who are not focused, not careful and careful, scattered equipment, etc.

Figure 12. defect label
(source : fitinline.com)

Table 1. Defect summary
Defect Summary Feb-Mar 2019 Data

Week	Total Order	Stitch Defect	Pattern Defect	Material Defect	Accessories Installation Defect	Total Defect
I	250	10	8	5	5	28
II	200	7	4	3	3	17
III	100	5	3	2	4	14
IV	150	6	6	4	5	21
V	300	8	12	15	8	43
VI	175	7	9	8	6	30
VII	100	5	5	5	10	25
VIII	200	10	7	7	5	29
Total	1475	58	54	49	46	207

(Source : ME bag and purse, 2019)

The table above has been sorted based on the four defect criterion in CTQ in order to production processes in ME bag and purse . Of the total production during February-March 2019, as many as 1475, there were 207 defects. Following are the results of calculations using the DPU and DPMO formulas, then the results are matched with the six sigma value.

Table 2. DPU and DPMO

week	total order	total defect	CTQ	DPU	DPMO
I	250	28	4	0.112	112000
II	200	17	4	0.085	85000
III	100	14	4	0.14	140000
IV	150	21	4	0.14	140000
V	300	43	4	0.143333333	143333.3333
VI	175	30	4	0.171428571	171428.5714
VII	100	25	4	0.25	250000
VIII	200	29	4	0.145	145000
Total	1475	207	4	0.140338983	140338.9831

(Source : Imamara, 2020)

Analyze

The data collected and processed has shown the problems that occur in internal ME bags and purses, especially in the production process, namely the cause of the defects that occur. For that, it needs further analysis to find the right solution next. In the Analyze Phase, the aim is to find the priority causes of quality problems in product packaging defects in the production process, which is a critical process based on defect summary and CTQ data. The tools that will be used to analyze the pareto chart, which has a concept of 20%, can affect 80%. This means that 20% of the improvements can have an impact on the remaining 80%. According to the expert, pareto chart is the process of ranking opportunities to determine which of the many potential opportunities must be pursued first (Pyzdek, 2002).

	stitch	pattern	material	accessories
Series1	58	54	49	46
Series2	28%	54%	78%	100%

Figure 13. Pareto chart defect
(Source : Imamara, 2021)

From the Pareto diagram above, solve the problem of sewing and patterns by further analyzing

the cause with 6MS (Man, Material, Method, Machine, Milieu, Measurement). 6Ms is easier to map with a fishbone diagram or Ishikawa diagram. Ishikawa fishbone used to identify all of the contributing root causes, likely to be causing a problem (Ishikawa, 1976). This diagram shows the causes of defects in ME bag and purse.
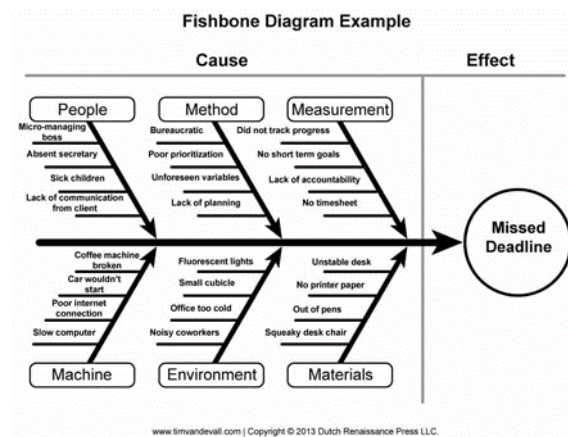

Figure 14. Fishbone diagram example
(Source : timvandevall.com, 2013)

DISCUSSION

Root cause Analysis

To clarify the root of the problem in the ME bag and purse, namely by using the Fishbone or Ishikawa diagram tools. The business issue in ME bag and purse is the existence of defect products that can be said to be quite a bit in each process. Following up on the DMAIC method that will be applied to the ME bag and purse, the researcher tries to root the issue with this diagram and it will be divided per CTQ (material aspect, pattern making aspect, sewing aspect and accessories installation aspect). The following is a fishbone diagram figure of each process that has been set to CTQ.
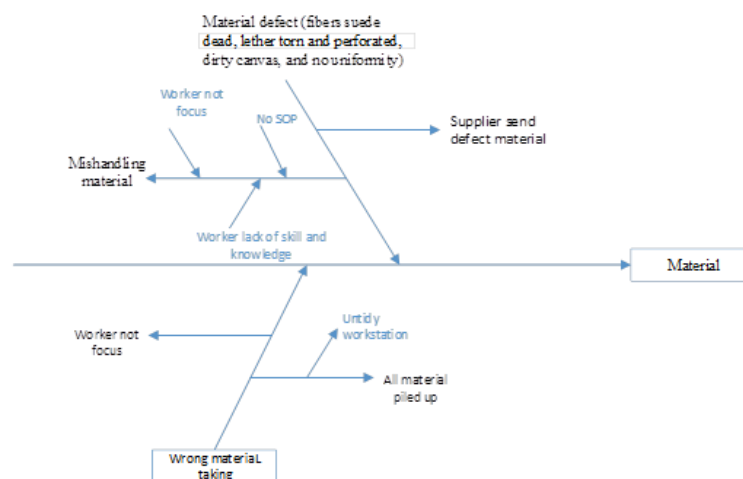

Figure 15. Material Fishbone diagram
(Source : Imamara, 2021)

There are several factors of 6Ms that contribute to product defects in the ME bag and purse in material selection process. The following is an explanation in detail:
   a. Material defects (dead-fiber suede, torn and perforated leather, dirty canvas fabric, and no uniformity material)

One of the causes of defective material is suppliers who send defective material and are not immediately selected so that it cannot be returned immediately. When there is a defect, then due to wrong material handling, and each material has special handling such as canvas material because it is prone to getting dirty and stained on it. light color then it must be stored on the table immediately, then on the suede material if there are fibers that are almost dead then it must be brushed first. This is due to lack of skills and workers' ignorance of material handling.

b. Wrong material taking

Incorrect material taking, has an impact on the next process, namely making patterns. As a result of taking the wrong material, the pattern and subsequent processes will be wrong. This is caused by various materials that have accumulated on one workstation and the conditions of the workplace are not neat or have not been grouped, so they are prone to incorrect material picking. This is also supported by workers who are less focused on working.
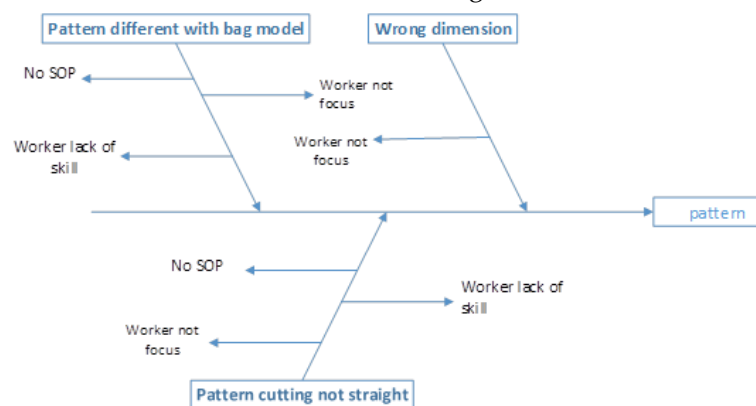

Figure 16. Pattern Fishbone diagram
(Source : Imamara, 2021)

In the pattern making process, the root of the problem will be explained as follows:

a. Wrong Dimension

Incorrect size causes the bag size to appear larger or smaller and causes the size of each bag to be non-uniform, as well as the risk of skewing in the cutting process. This is caused by workers who are less focused when looking at the size chart and making measurements when drawing patterns on the fabric.

b. Pattern Different with bag model

Often occurs, namely different patterns with the model and bag material that has been adjusted and drawn on the model guide. This is caused by workers who do not focus while working so that there is a wrong pattern, in addition, sometimes workers do not understand the patterns in new models, especially custom models and because there is no proper SOP, errors occur and the models made can be different.

c. Pattern Cutting slanted or not straight

Cutting the wrong pattern that does not match the pattern can cause different dimensions and different sewing results when the bag is finished and can make the bag asymmetrical, and this will be a bottleneck in the sewing process. This is caused by workers who lack skills, are not careful and don't focus, and the SOP is not enforced.
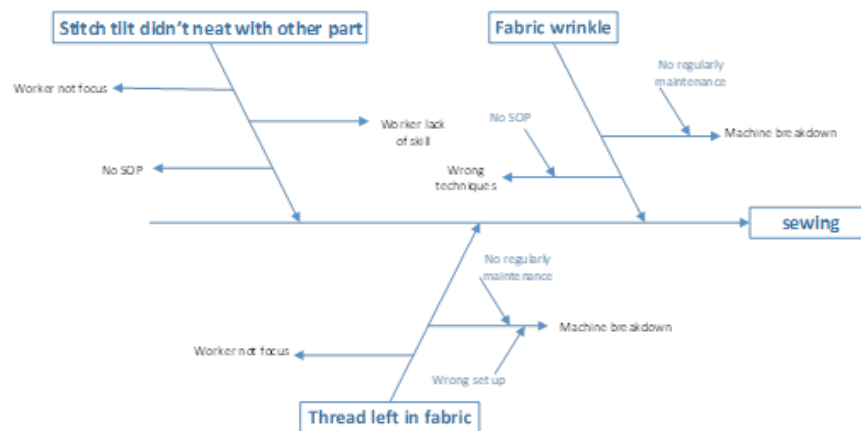
Figure 17. Sewing Fishbone diagram
(Source : Imamara, 2021)

Then, in the stitch result at sewing process, will be explain below :

a. Fabric wrinkle when sewn
    This is caused by a damaged machine because it is not repaired regularly when workers are off. Therefore a damaged machine can affect the results of stitches and incorrect sewing techniques in certain materials will affect the results of stitches, this is due to workers' ignorance due to lack of skills and improperly applied SOP

b. The stitches are not neat
    Unclean stitches with other parts can cause the surface of the bag to tilt or show visible defects. This is caused by workers who are not focused, lack skills and are not enforcing SOPs properly.

c. Thread left in fabric
    The presence of threads left that is very chaotic on the seam side causes the bag to be untidy and very obvious. This is caused by the sewing process which stops in the middle because the machine is damaged and has to be connected. Machines that are damaged due to unscheduled maintenance and wrong set-up on sewing machines, such as fitting needles, threads, etc. to certain materials. Besides that, it was due to the worker factor who was less focused.
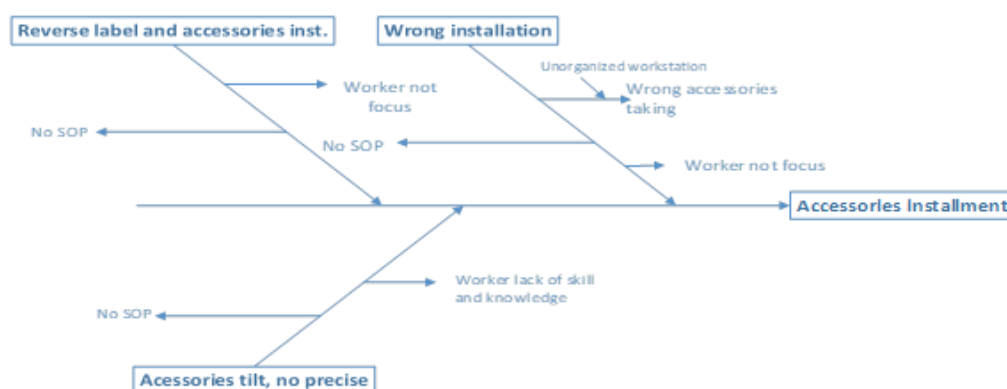

Figure 18. Sewing Fishbone diagram
(Source : Imamara, 2021)

Then the criteria for the last CTQ are the installation of accessories and labels for the completeness of the bag. This will be explained as follows:

a. Wrong accessories Instalation
   Incorrect installation of accessories is caused by incorrectly picking up accessories because they do not match the model specified on the bag. This is due to the untidy and poorly organized working conditions that are prone to taking materials incorrectly and not returning them to their original places after work. Then this is supported by SOPs that don't work well so that the results are not the same between workers, and the installation of accessories or labels that are reversed because workers are not focused and workers are less skilled and trained.

b. Installation tilt or not precise
   Inclined and imprecise installation of accessories will cause product defects because they are so obvious. This is due to the lack of skill workers and workers who are not focused so that the installation is skewed.

c. Reverse label and accessories
   Installation accessories and labels upside down, sometimes common, it is a defective product which is where labels and accessories functions will affect the final result on the bag. This happens because workers are less focused and do not go through successive and correct SOPs.

CONCLUSION

ME bag and purse is a start-up company engaged in women's accessories and souvenirs with bags, purses and pouches. ME establish since 2017 in the city of Yogyakarta with the customer segment for teenagers, students and young employees. The price of ME bag and purse is adjusted to the target customer. Even with affordable prices, ME bag and purse still pays attention to the details and quality of their products. Along with the increase in customer trust, the production of ME bags and purse souvenirs has also increased. Therefore, ME bag and purse also increases production capacity to fulfill incoming orders. However, there are new problems that must be faced by ME bag and purse, namely the discovery of product defects and inadequate production processes. Therefore, it is necessary to improve and proposing a new strategy to reduce defect product in the production process.

In this study, ME bag and purse uses several tools to analyze conditions and factors both inside and outside the company. ME bag and purse uses DMAIC methods to analyze the causes defects product. Defining the process using the SIPOC diagram, then measurement to determine the criteria of product defect using CTQ (critical to quality), identify the kind of defect then to measure then determine the DPU, DPMO, and the sigma value to find out how big the defect is. Thus, to find out the causes of defect product in the production process using fishbone diagram

After knowing the level of DPU, DPMO and the six sigma assessment, each cause of defect is analyzed using a fishbone diagram. After analyzing through the fishbone diagram, the next step is to find a solution to the problem with the method in accordance with 6Ms (man, machine, material, method, milieu, measurement).

Then as a manifestation of corrective measures, improvements and solutions were carried out with a new propose strategy based on recommendations for improvement, such as conduct training sewing and pattern making, performing maintenance on sewing machines, as well as utilizing the remaining defect material as value added items, applying the 5S concept for workstations so that goods do not pile up after processing. then, the control and maintenance process will be carried out continuously.

To control whether the recommendations for improvements have been made and to know how far it has gone, for the control process using the KPI (Key performance Indicator) and setting a timeline with a gant-chart to set a schedule to be more regular

1. Using KPI (key performance Indicator)
The performance management process with the KPI setup in the company will ensure the alignment of the improvement strategy, so that a continuous improvement cycle process occurs in order to achieve business achievement targets (Rokhim, 2017). In order to evaluate the performance and

achievement the target. Performance indicator that ME bag and purse have to pursue according to DMAIC and 6Ms:

Table 3. KPI Setting Target
KPI Setting Target

No	KPI	Achievement	Target within 1.5-2 years	Information
1	DPU level	0.140 (from 1475 production, there are 207 defect products)	0,03 (from 1500 production, there are 50 defect products)	Decrease
2	DPMO level	140338.98	30000.00	Decrease
3	Six sigma value	2.58	4.24	Increase

To realize KPI targets by reducing product defects that can reduce customer satisfaction, scheduling is made for the implementation of training which includes material identification training, material care and handling training, sewing and making patterns, then making visual control, making and implementing SOPs, and implementing 5S on the workstation.

2. Make timeline schedule

In an effort to realize solutions to problems to reduce defect product, we must consider all aspects such as man, machine, method, milieu, material. The following is a timeline schedule for implementing recommendations.

Table 4. Gantt-chart solution implementation schedule
Impementation Plan

Activity	Juli				Agustus			
	1	2	3	4	1	2	3	4
Identification material training								
Material care training								
Making visual control sticker								
Making SOP								
Implement SOP								
Sewing techniques training								
Pattern making training								
Implement 5s								

(Source : Imamara, 2020)

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