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LAUNDRY BUSINESS QUALITY CONTROL USING THE DMAIC METHOD (CASE STUDY: DETER_GENT LAUNDRY NUSA DUA BRANCH)

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Abstract

The laundry business is one of the rapidly growing businesses in Indonesia. This development is due to factors such as the increasing busyness of the community, urbanization, and lifestyle changes. Deter_gent Laundry is one of the businesses that experienced a decrease in income and the number of customers from October to November in 2023 due to errors in recording the number of clothes, clothes fading, clothes shrinking, clothes lacking fragrance, and others. This study aims to analyze the problems that occur in the laundry process at Deter_gent Laundry and provide solutions to improve the quality of laundry services. This research uses the DMAIC method (Define, Measure, Analyze, Improve, Control). The results of this study indicate that the problems that occur are caused by several factors, namely human factors, method factors, material factors, and machine factors. To overcome these problems, it can be done by increasing the accuracy of employees, providing explanations, establishing and revising appropriate SOPs, and periodically controlling performance that deviates from SOPs. By implementing these solutions,

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it is hoped that the quality of laundry services at Deter_gent Laundry can improve and achieve the specified targets.
Keywords: Laundry business, Quality, DMAIC.

Introduction

Technological developments and globalization have changed the economic structure and living needs, encouraging individuals to engage in more intensive work and high mobility(Kumparan, 2023). The impact is a change in lifestyle patterns and lifestyles in society, which tends to want everything to be done quickly and practically, considering the limited time to fulfill daily needs, such as washing clothes.

As people's busy lives increase, demand for efficient and practical laundry services continues to increase. This increase in demand is supported by data on the growth of the laundry business in Indonesia, which has increased by 50 percent during the 2021 to 2022 time period.(Liputan6, 2023).With lots of itlaundry service business(laundry) available, business competition becomes increasingly fierce, demands every laundry service provider toprovide high quality standards to gain customer trust.

Deter_gent Laundry is a business that operates in the field of washing and ironing services for clothes, carpets, dolls andsshoes. This business is often called laundry or laundry. This business is located in the Taman Giri area, Nusa Dua, Bali. This laundry business has been established since 2018 and was built by Mrs. Kristina Prabandari. Deter_gent Laundry operates every day and only closes during major holidays. Deter_gent Laundry opens from 07.00 WITA and closes at 21.00 WITA. Currently the Deter_gent Laundry business has two employees who do work from receiving clothes to packaging clean clothes. Every laundry business generally charges rates based on the weight of the customer's laundry or kilos. The rate charged per kilo at Deter_gent Laundry is IDR 7,000.

The Deter_gent Laundry business generates attractive income because its laundry services are really needed by everyday people. This high level of interest results in consistent customer visits, which has the potential to increase revenue significantly. However, keep in mind that in business, fluctuations in income are common. This means there is no guarantee that earnings will continue to increase over time, and there may be periodswhenincome has decreased.

Table 1. Data on Income and Number of Customers

No	Month	Number of Customers (People)	Income Per Month (Rupiah)
1	Septembe	448	21,537,500

	r		
2	October	421	20,541,600
3	Novembe r	397	17,797,300

Source: Laundry Deter_gent data (reprocessed)

According to the data listed in Table 1, it can be seen that there was a decline in revenue and the number of customers from October and November. This decline also caused a decrease in revenue in both months. Therefore, attention and in-depth quality control analysis are needed to improve Deter_gent Laundry's performance in increasing the number of customers and revenue in the future. AnalyQuality control systems play a very important role in improving process performance and increasing efficiency by reducing rework(Rezki Renanda et al., 2023). Apart from that, quality control also helps a business to achieve product consistency that meets customer specifications and expectations(Awaj et al 2013). For this reason, quality control will really help improve the performance of the Deter_gent Laundry business.

Research Methods

This research was conducted using qualitative descriptive analysis. Qualitative descriptive analysis is a research approach to understanding the meaning of a particular phenomenon through qualitative data (non-numerical data)(Sutikno & Prosmala Hadisaputra, 2020). Data collection was carried out through an interview process and using transaction data documentation which included total customers (people) and total income (rupiah) from Deter_gent Laundry. The data analysis stages carried out include data collection, data analysis using the DMAIC (Define, Measure, Analyze, Improve and Control) approach which includes data visualization using the Seven Quality Control Tools, as well as drawing conclusions.

DMAIC isa structured problem solving procedure that is often used in maintaining quality and controlling an improvement process. DMAIC is an abbreviation for define, measure, analyze, improve, and control(Montgomery, 2012).Define is the initial stage of the DMAIC process, namely to clearly establish improvement goals and understand problems or opportunities for improvement. Measure is the measurement and data collection stage to assess the performance and characteristics of existing processes. Analyze is the stage of data analysis and determining the root cause of the problem or factors that influence process performance. Improve is the stage of developing and implementing solutions to overcome problems or improve process performance.At this

stage, Improve aims to identify, test, and implement solutions to some or all of the problems. This stage will be adjusted to the conditions of each business to find creative solutions to eliminate the root causes of the problems that arise(Simanová & Gejdoš, 2015).*Controls*(control) is the final stage of the DMAIC process, namely creating a control plan to ensure that the changes implemented remain sustainable and provide the desired results. DMAIC provides a systematic and structured approach to the improvement process with a focus on measurement and data analysis, so that each improvement step is based on clear evidence. Therefore,DMAIC is a tool for implementing strategies that are based on measurement and focus on improvement and minimizing errors(Ishak et al., 2019).

*Seven Tools Quality Control*is a tool or method used in implementing quality control (QC) which consists of Pareto diagrams, fishbone diagrams, histograms, control charts, scatter diagrams, check sheets and flowcharts(Neyestani, 2017). In this research, flowcharts, histograms and fishbone diagrams were used as data analysis and visualization tools. Flowcharts are a QC tool that is used to visually describe the work process of a system or activity. Flowcharts use standard symbols to describe the flow of data, information, or processes. Histogram is a QC tool used to visualize data distribution or data frequency patterns in a process. Histograms group data into classes arranged along the horizontal axis, with the frequency or number of observations plotted on the vertical axis. Histograms provide visualization that can make it easier to interpret data and make decisions. A fishbone diagram is a QC tool that can be used to identify and describe the root cause of a problem. Fishbone diagrams can help categorize the causes of problems into several categories, such as man, method, material, mother nature, measurement, and machine. This diagram is shaped like a fishbone, where each bone represents a category of potential causes.

Results and Discussion

Regarding the problems described previously, these problems were analyzed using the DMAIC (Define, Measure, Analyze, Improve, Control) method. With this method, we are able to analyze the root causes of problems based on data and determine the right solution so that quality control can be carried out on Deter_gent Laundry.

Define

The first step in the Six Sigma method is called define. Define involves identifying key quality characteristics that relate directly to specific customer needs and setting goals. The results of the define stage include a clear statement about the improvements

to be made, as well as a process map in the form of a work flow diagram. Process maps are used to understand the laundry service production process better.

At the define stage, identification is carried out regarding the process of washing clothes at Deter_gent Laundry. The process for washing clothes at Deter_gent Laundry is as follows:

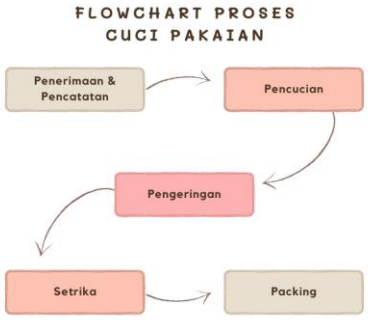

Figure 1. Flowchart of the Clothes Washing Process

1. Receiving & recording

This stage is receiving clothes from customers which includes weighing and counting clothes, then recording clothing data such as the number of clothes and total laundry costs.

2. Washing

At this stage the clothes will be separated into three groups according to their color, namely white, light colored and dark colored clothes, then the washing process will continue according to the color groups.

3. Drying

At this stage, the clothes are put into the spinner to reduce the water content of the clothes that have been washed. Next, the clothes are dried in the sun for 4-6 hours. After 80% of the clothes are dry, the clothes are then dried to 100% using a dryer machine. At each stage, the number of clothes will always be counted to minimize the occurrence of lost or mixed clothes.

4. Iron

At this stage the clothes will undergo a smoothing and compacting process. This process is used to remove wrinkles on clothes so that the clothes look neat. After the clothes have been ironed, they will be left to sit until the heat from the iron disappears. This is done to prevent evaporation of the fragrance during the packing process.

5. *Packing*

Once the clothes are at normal temperature, the clothes will be scented. Then the clothes will be counted. If the number of clothes is correct, the clothes will be packed. However, if there is an incorrect amount of clothing, a check will be carried out again.

From several clothes washing processes in Figure 1, problems will arise either caused by human error or problems with the machine used. Some common problems include unsatisfactory cleaning quality, damage or loss of clothing, andswapped clothes. Therefore, analysis is needed to reduce the level of problems that occur. In this case, a fishbone diagram can be used to analyze common problems.

Measure

1. Monthly Income Data

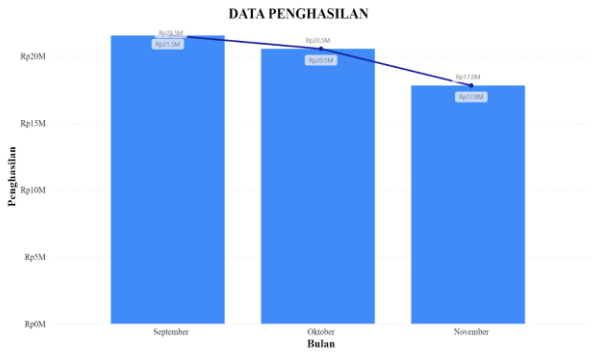

Figure 2. Income data per month

Based on the histogram in Figure 2, it can be concluded that the income generated by Deter_gent Laundry is experiencing a downward trend. The highest income was recorded in September at IDR 21,537,500, but in October it decreased by 4.6% compared to income in September with income of IDR 20,541,600. There was another decrease of around 13.4% or Rp. 2,744,300 in November compared to income in October, so that income in November was the month with the lowest income at Rp. 17,797,300.

2. Customer Data per Month

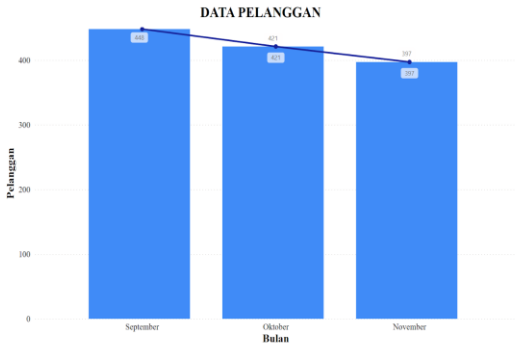

Figure 3. Customer Data per Month

Based on the histogram in Figure 3, it can be seen that there has been a decrease in the number of Deter_gent Laundry customers. In September, the number of customers reached 448. However, there was a decline in October to 421 customers. The decline in the number of customers occurred again in November with a decrease of 24 customers from the previous month. So, in November the number of customers using laundry services at Deter_gent Laundry was only 397 customers.

3. Time Data for each Laundry Process

In every procedure carried out, time is a necessary element at each stage. The following is time data related to each process to see whether there is a laundry process that is not running optimally in terms of time:

1. Receiving & recording

Table 2. Reception & Recording Time

Clothing Weight (kg)	Time (minutes)
1-5	5
6-10	7
11-15	10

2. Washing

Table 3. Washing Time

Clothing Weight (kg)	Time (minutes)
1-5	30
6-10	60
11-15	75

3. Drying

Table 4. Drying Time

Clothing Weight (kg)	Time (minutes)
1-5	240
6-10	300
11-15	360

4. Iron

Table 5. Ironing Time

Clothing Weight (kg)	Time (minutes)
1-5	15
6-10	60
11-15	120

5. *Packing*

Table 6. Packing Time

Clothing Weight (kg)	Time (minutes)
1-5	5
6-10	7
11-15	10

Analyze

During the work process, several cases were discovered where the required time did not match the normal time specified. This shows inefficiency in the process. Based on the results of interviews with the owner of Deter_gent Laundry, several problems were found that occurred at each stage of the laundry process as follows.

Table 7. Problems at each laundry stage

Stages	Problem
Receiving & recording	• Error recording the number of clothes • Error recording total laundry costs
Washing	• Clothes fade • Clothes change color • Colored clothes exposed to bleach • Torn clothes
Drying	• Clothes shrink • Clothes with holes • Clothes gone • Clothes swapped
Iron	• Untidy clothes • Clothes peeling

Packing	• *Packing*slobbery • Clothes don't smell good

Based on the problems that have been identified, a fishbone diagram can be formed to find out the root of the problem. The problem is identified and isolated for le studyGo further and start analyzing to find potential causes of this problem(Ghazi & Jahangir, 2014).*Fishbone diagram*Thiscan be used to group these problems into several categories, namely method, material, machine, man, measurement, and mother nature.

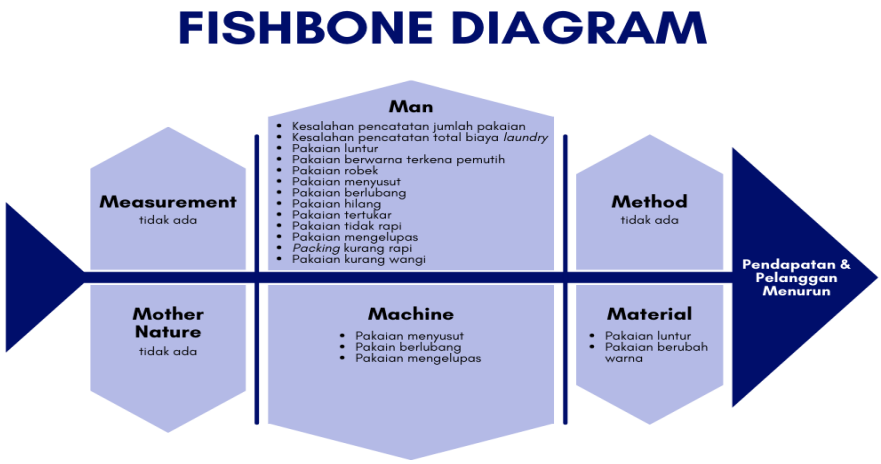

Figure 4. Fishbone Diagram

Improve

Based on the results of grouping problems into a fishbone diagram at the Analyze stage, it was found that the most frequent problems were problems caused by human factors. Therefore, efforts need to be made to improve human factors, namely laundry employees. These efforts can be made through providing training to employees and ensuring employees understand the standard operating procedures (SOP) that have been set. Apart from that, to overcome problems that occur at each stage of the laundry process, the following solutions can be done:

i. Receiving & recording

At this stage there are several errors that often occur, such as errors in recording the number of clothes and total laundry costs. Errors in recording the number of clothes are generally caused by employee error. For this reason, when calculating the number of clothes, workers can count carefully and not rush, then count again or double check. If

the second calculation is different from the first calculation, a recalculation can be carried out to ensure the correct amount.

Errors in total laundry costs can be caused by recording errors by employees. Employees can increase their accuracy in recording total costs, then double check them. Apart from that, a computerized system can be created with the necessary features so that it can avoid errors in recording total costs.

ii. Washing

At the washing stage, problems often occur, such as clothes fading, changing color and tearing. To prevent such damage from occurring, checks can be carried out at the receiving stage and provide information to customers regarding the condition of the clothes, whether in their original condition there were faded or torn clothes. Then, provide information to customers regarding the worst possibility that could happen, for example there are clothes that are very thin so there is a high possibility of this happeningtearon clothes.

This will help minimize complaints due to clothing damage. Apart from that, accuracy can be increased in the sorting process, choosing the right detergent for the type of clothing fabric, and choosing the right mode or feature on the washing machine.

iii. Drying

At the drying stage, several problems often occur, such as clothes shrinking, holes, being lost or mixed up. The problem of clothes shrinking can be prevented by sorting clothes based on their material and paying attention to the care labels attached to the clothes. Only then is the right drying temperature selected.

For clothes with holes, you need to pay attention during the drying process to see if there are sharp objects or things that could damage the clothes, both looking at the condition of the clothes to be dried and the drying machine.

Lost and mixed clothes can be prevented by separating the drying area for each customer and checking the drying area and basket again before placing the clothes and after drying. Furthermore, recalculation can be carried out at each movement carefully.

iv. Iron

At the ironing stage, problems often arise, namely clothes that are not neat and clothes peeling. Untidy clothes can be prevented by using a temperature appropriate to the type of fabric and using a flat and stable ironing board to minimize untidy clothes. Peeling clothes can be prevented by avoiding ironing temperatures that are too high and using proper ironing techniques, for example not pressing too hard.

v. *Packing*

In the final stage, namely packing, problems often arise, such as packing not being neat and clothes not smelling good. Packing that is not neat can be prevented by choosing the right bag according to the amount of clothing and it is not recommended to force clothes if you feel there are not enough. This can also be overcome by standardizing packaging.

For clothes that are not fragrant enough, this can be prevented by choosing a quality perfume and if the ingredients are mixed, it can be made in the right proportion so that it does not reduce the fragrance of the fragrance. Apart from that, standardization of perfume spraying and certain points where perfume must be applied can also be established.

Controls

For this stage, Deter_gent Laundry needs to carry out supervision or audits which can be carried out by the owner or employees periodically and regularly. However, before monitoring is carried out, it is necessary to clearly determine the SOP (Standard Operating Procedure) for each stage of the laundry process. After monitoring, if things are found that deviate or are not in accordance with the SOP, corrective action can be taken so that the target can be achieved. If an error or deviation is found but the process has followed the existing SOP, it is necessary to review the SOP and so on.

Conclusion

Based on the results of research conducted at Deter_gent Laundry, it was found that the decline in income and number of customers was caused by several problems that occurred at each stage of the laundry process. These problems are grouped into six categories, namely method, material, man, machine, measurement, and mother nature. Of these six categories, the majority of problems that occur are caused by human factors. Therefore, efforts need to be made to improve human factors, namely laundry employees, by providing training and ensuring employees understand the SOPs that have been set.

Apart from that, to overcome problems that occur at each stage of the laundry process, the following solutions can be done:

1. At the receiving and recording stage, it is necessary to increase employee accuracy in calculating the number of clothes and total laundry costs. In addition, a computerized system can be created that has the features needed to avoid recording errors.
2. At the washing stage, it is necessary to check at the receiving stage and provide information to customers regarding clothes that may experience changes due to the washing process. Apart from that, it is necessary to increase accuracy in the sorting

process, selecting the right detergent, and selecting the right mode or feature on the washing machine.

3. At the drying stage, it is necessary to sort the clothes based on the material and pay attention to the care labels on the clothes. In addition, it is necessary to recalculate each movement carefully.
4. At the ironing stage, it is necessary to use a temperature that suits the type of fabric and a flat and stable ironing board. Apart from that, it is necessary to avoid ironing temperatures that are too high and apply the correct ironing technique.
5. At the packaging stage, it is necessary to choose the right bag according to the number of clothes and it is not recommended to force clothes if you feel they no longer fit. Apart from that, it is necessary to standardize the packaging and spraying of fragrances.

To ensure that these problems do not happen again, Deter_gent Laundry needs to carry out regular and routine supervision or audits to ensure that the laundry process is running according to the SOP.

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