

THE FACTORS THAT CAUSE PRODUCT DEFECT ON MOFFEE COFFEE STORE MANADO

FAKTOR-FAKTOR YANG MENYEBABKAN KERUSAKAN PRODUK PADA TOKO KOPI MOFFEE MANADO

by

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Abstract: The purpose of this research is to analyze factors that cause product defection on the product making processes at Moffee Coffee Store were the factors that contribute to the defection of the product need to categorize based on the affection of the factors in order to understand the real problem of product defection. This research conducting a qualitative approach with descriptive analyses. Therefore, this research designing the methodological processes of research with Fishbone diagram that can elaborate factors that caused product defection with quantification value to determined affection causes of the product defection and through the results of the interview this research conducting further interviews for the better conclusions with Pareto analysis. The findings indicate the factors that affect product defection are Man Power, Method, Management, and Machine. The most significant factor of defection at Moffee Coffee Store products is material stock errors, that is why Moffee Coffee Store needs to replace them with lower quality ingredients or eliminate one ingredient even if it is not following operational standards. The results of the Pareto analysis show the different and more in-depth details related to the dominant factors that cause product defect at the Moffee Coffee Store as human resource factors, especially on the durability of their employees work. The use of qualitative methods in this research is sufficient to limit researchers to use other statistical analytical tools because of different types of data that cannot be quantified and not conducting surveying to customers to collect their opinions about the factors that they think can be the root of the problem of product defection on the Moffee Coffee Store.

Keywords: *Product defection, Moffee Coffee Store, Fishbone, Pareto analysis*

Abstrak: Tujuan dari penelitian ini adalah untuk menganalisis faktor-faktor yang menyebabkan kerusakan produk pada proses pembuatan produk di Toko Kopi Moffee yaitu faktor-faktor yang berkontribusi terhadap produk rusak perlu dikategorikan berdasarkan afeksi dari faktor-faktor tersebut agar dapat memahami masalah yang sebenarnya dari produk rusak. Penelitian ini melakukan pendekatan kualitatif dengan analisis deskriptif. Oleh karena itu, penelitian ini merancang proses metodologi penelitian dengan diagram Fishbone yang dapat menguraikan faktor-faktor yang menyebabkan kerusakan produk dengan nilai kuantifikasi untuk menentukan penyebab terjadinya produk rusak dan melalui hasil wawancara, penelitian ini melakukan wawancara lebih lanjut untuk mendapatkan kesimpulan yang lebih baik dengan analisa Pareto. Hasil penelitian menunjukkan bahwa faktor-faktor yang menyebabkan kerusakan produk adalah Sumber Daya Manusia, Metode, Manajemen, dan Mesin. Faktor rusak yang paling signifikan pada produk Toko Kopi Moffee adalah kesalahan stok bahan, oleh karena itu Toko Kopi Moffee perlu menggantinya dengan bahan yang lebih berkualitas atau menghilangkan satu bahan walaupun tidak mengikuti standar operasional. Hasil analisis Pareto menunjukkan adanya perbedaan dan detail yang lebih mendalam terkait dengan faktor dominan penyebab cacat produk di Toko Kopi Moffee sebagai faktor sumber daya manusia, terutama pada ketahanan kerja karyawannya. Penggunaan metode kualitatif dalam penelitian ini cukup membatasi peneliti untuk menggunakan alat analisis statistik lainnya karena adanya perbedaan jenis data yang tidak dapat dikuantifikasi dan tidak melakukan survei kepada pelanggan untuk mengumpulkan pendapatnya tentang faktor-faktor yang menurut mereka dapat menjadi faktor penentu akar masalah cacat produk di Toko Kopi Moffee.

Kata Kunci: *Kerusakan Produk, Toko Kopi Moffee, Fishbone, Analisis Pareto*

INTRODUCTION

Research Background

In recent years, many businesses are competing to improve and develop the quality of the operational system of the business. This is done to achieve a competitive advantage so that the performance of the business becomes more effective and efficient.

The increasing population growth has an impact on increasing consumer needs for goods and services. This is what drives companies in the industrial sector to improve the quality of the company's operational system. This treatment is solely carried out to meet the needs and increase customer satisfaction.

In achieving a competitive advantage of market segmentation, companies must be able to outperform several aspects of quality. This identifies that the company not only focuses on product quality but also improves quality in other aspects included in the company system. Like the quality of raw materials from suppliers, quality of labor, quality of machinery and technology used, effective marketing systems, and timely presentation systems. These quality improvements are carried out based on effective efficient methods.

The importance of this quality can be seen from operational perspectives. Viewed from the perspective of operational management, product quality is one of the important policies in improving product competitiveness which is expected to exceed or at least be equal to the quality of products from competitors.

In the production process that has been carried out by a company, sometimes some obstacles cause defects or deviations in the product that is produced so that the product cannot be sold or marketed to customers (Triawan, Sujud. 2004). The defect or deviation in question is the existence of a defective product. Defective products are products that are produced not following predetermined quality standards. Good quality standards according to consumers are those products that can be used according to their needs. If the consumer already feels that the product cannot be used as needed, the product will be said to be a defective product (Khodijah and Rahardjo, 2015).

Product defect in the industry is sometimes caused by 6 (six) categories of causes they are machine, method, material, manpower, measurement, and environment. If there is a discrepancy from one of the categories above, it will cause the production process not to be in a controlled condition and the product produced is not acceptable (Kusnadi, E in Khodijah and Rahardjo 2015).

Moffee Coffee Store is one of the well-known coffee shops in Manado. Moffee Coffee Store offers a special menu and flavor for drinks made from espresso coffee. It also offers coffee origin drinks from various regions in Indonesia and drinks made from chocolate, lemon, taro, and matcha. Moffee Coffee Store sets operational standards to obtain and maintain the quality of its products. Among them are the type and number of raw materials, the length of the manufacturing process, the machinery and equipment used. All menus are prepared and served by Baristas who have speed, accuracy, friendliness, and skills. The speed in question is the speed in terms of producing, because of limited tools and equipment while there are many customers. Besides that, it also makes customers more comfortable because they don't wait too long for the ordered menu. Secondly, baristas have timeliness that is barista must be right in making the menu because if there is a slight error, the quality of the taste will be reduced. Third, baristas have friendliness that is a friendly attitude that is given directly to customers when customers arrive until customers finish enjoying the menu and leave. Barista also has skills, namely all the barista's expertise, from menu creation to menu presentation. This service from baristas and the place atmosphere increasingly makes customers interested in coming to the Moffee Coffee Store again.

Moffee as one of the coffee shop Pioneers in Manado sometimes has errors for making the coffee such as managing the stock for materials or using materials that are many used by others and make the materials are sold out. For that problem, Moffee took action by changing the materials with alternative ones. But the result was the taste quite different compared to using the materials that always be used and that made the product has defected because it was not according to the quality standard by Moffee Coffee Store.

Research Objective

To know the factors that cause product defect and the factor that contributes the most defect to the product.

THEORETICAL FRAMEWORK

Product Defect

Bastian Bustami and Nurlela (2007) defined product defects are products that are produced in the production process, where the products are not following standards determining quality, but economically the product can be

repaired at certain cost, but the costs incurred tend to be greater than the sale value after the product is repaired. This defective product is generally known after the production process is complete.

Root Cause Analysis

According to Mahto and kumar (2008) Root Cause Analysis (RCA) is the process of identifying causal factors using a structured approach with techniques designed to provide a focus for identifying and resolving problems. Tools that assist groups or individuals in identifying the root causes of problems are known as root cause analysis tools, every equipment failure happens for several reasons. There is a definite progression of actions and consequences that lead to failure. Root Cause Analysis is a step-by-step method that leads to the discovery of faults or root causes. An RCA investigation traces the cause-and-effect trail from the end failure back to the root cause.

Quality Tools

Quality Tools cannot remedy every quality problem but they certainly are a means for solving problems. Quality tools are described to practical methods, skills, means, mechanisms used for a specific circumstances (McQuater, Scurr, Dale and Hillman, 1995).

Cause and Effect Diagram (CED)

According to Mahto and Kumar (2008) this diagram, also called Ishikawa or Fishbone Diagram, is used to associate multiple possible with a single effect. The diagram is constructed to identify and organize the possible causes for a particular single effect. Causes in CED are frequently arranged in four major categories. For manufacturing cases it is Manpower, Methods, Materials and Machinery. Administration and service sectors, it is Equipment, Policies, Procedures, and People. Ishikawa advocated the CED as a tool for breaking down potential causes into more detailed categories so they can be organized and related into factors that help in identifying the root cause.

Pareto Analysis

Haughey (2011), defines Pareto analysis as a statistical technique in decision making that is used the selection of limited number of tasks that produce a significant overall effect. This tool is useful in establishing priorities by showing which are the most critical problems to be tackled or causes to be addressed. Comparing the Pareto diagram of a given situation over time can also determine whether an implemented solution reduced the relative frequency or cost of that problem or cause. Pareto diagrams can therefore be particularly useful in defining the targets.

Conceptual Framework

To find the factors that cause product defect in Moffee Coffee Store, the data will be processed by using root cause analysis with the help of fishbone diagram and pareto analysis is shown in Figure 1 below. Root cause analysis helps to identify the root cause of problems.

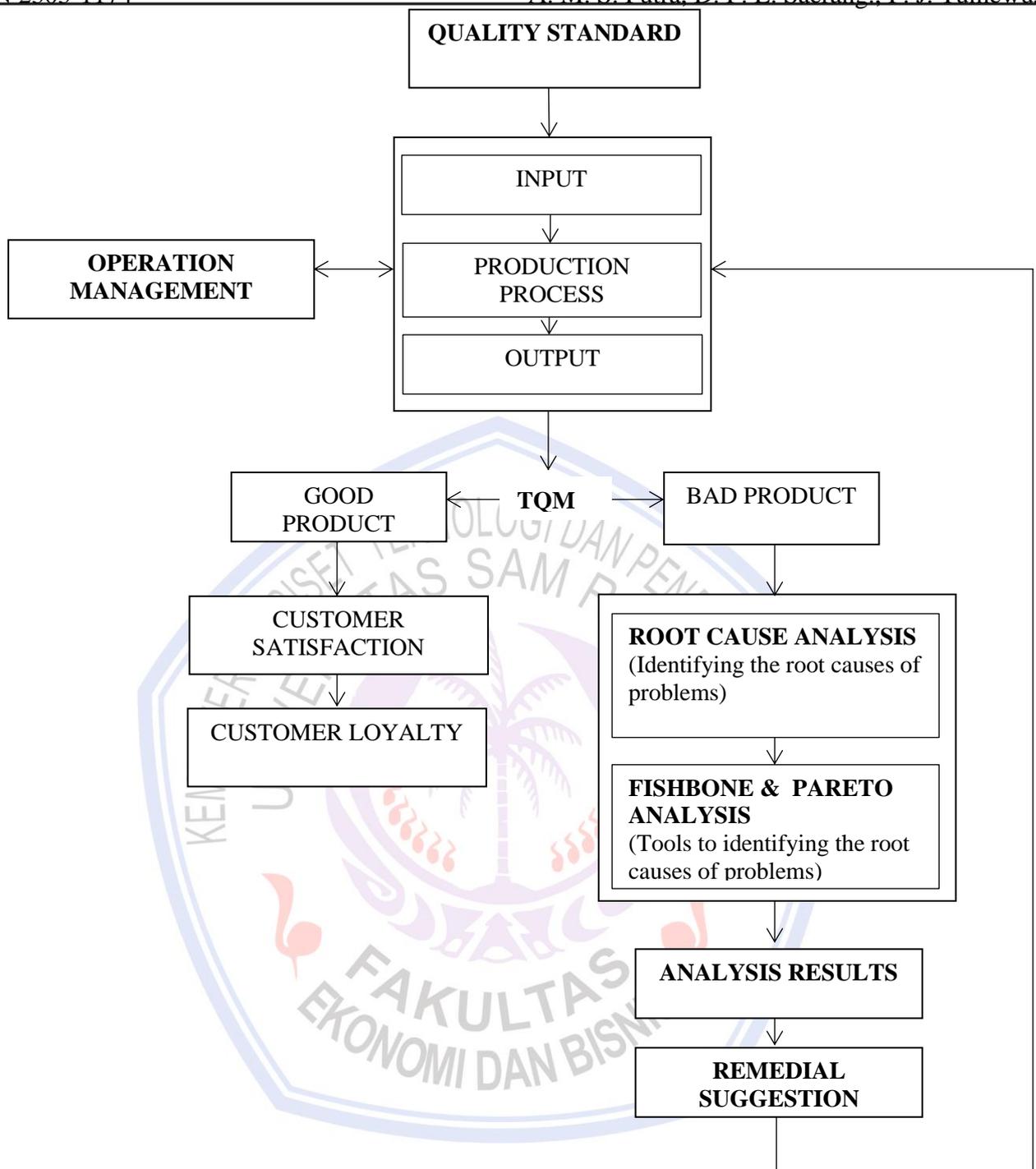


Figure 1. Conceptual Framework

Source: Data Processed, 2018

RESEARCH METHOD

Research approach

This research uses a qualitative research approach with descriptive and case study research analysis. Qualitative research involves the studied use collection of a variety empirical materials case study, personal experience, introspective, life story interview, observational, historical, interactional, and visual tests that describe routine and problematic moments and meaning in individuals’ lives (Denzin and Lincoln, 1994).

Population, Sample Size, and Sampling Technique

The population of this research is the worker of Moffee Coffee Store. The sample is part of the number and characteristics possessed by the population that uses purposive sampling technique. Purposive sampling is a sample determination technique with certain considerations. Which is determining the sample based on the criteria. The criteria are:

1. Management indicator of Moffee Coffee Store.
2. Measurement indicator of Moffee Coffee Store.
3. Material indicator of Moffee Coffee Store.
4. Machine indicator of Moffee Coffee Store.
5. Maintenance indicator of Moffee Coffee Store.
6. Mother Nature indicator of Moffee Coffee Store.
7. Man Power indicator of Moffee Coffee Store.
8. Method indicator of Moffee Coffee Store.

Data Analysis Method

In this research the activities in qualitative data analysis were carried out interactively and took place continuously at each stage of research so until it is complete. The component in data analysis as follows:

1. Data reduction
Data that collected from a report the amount is much enough, for that it needs to be noted carefully and in detail. Reducing data means summarizing, choosing basic things, focusing on important things, finding the theme and pattern.
2. Data Presentation
Data presentation on qualitative research can be done into brief description form, chart, relationships between categories, etc.
3. Verification of data conclusion
The initial conclusion that paraphrased is still temporary and will change if strong evidence is found supporting the next stage. But if the conclusion that paraphrased in initial stage is supported by valid pieces of evidence and consistent when researcher backs to the field to collect the data, so the conclusion that paraphrased is credible.

RESULT AND DISCUSSION

Result

Interview Result

The interview results show that several important things are often the reason for the frequentness of the products made at Moffee Coffee Store. When researchers interview employees, especially Barista and Head Barista, they provide information that product defect usually occurs due to human error factors and the replacement of materials that are not standard due to miscalculations in material stock calculations (understock). To get more in-depth information about each of the factors that can cause product defects, the researchers then asked about the employee requirements process, especially the baristas. To get the workers, the owner of Moffee Coffee Store opens job openings through the Internet by utilizing Social Media because this method is more effective. The owner assumes that people who can access job information via the internet usually have a minimum high school education background. After getting applicants, they usually do a screening with a few interviews which will be continued in the training. The training usually lasts for one week and has a month-long trial and follow-up training with head baristas and cafe owners as tutors.

The best and most ordered products at Moffee Coffee Store are milk coffee and single origin. Of these two products, the single-origin is the most vulnerable to defect because it requires special expertise from the manufacturer so it is very risky to suffer defect due to human error. Coffee milk itself because of the manufacturing procedure is quite simple only at risk of experiencing the greatest defect in terms of material availability. In addition to these two excellent products, Moffee Coffee Store also has dozens of other menus that have the risk of defect from these two main factors. Based on information from informants, the ingredients most susceptible to defect are drinks that use fresh milk. The fresh milk storage period of only one week is the main reason for the vulnerability of this material to be defective.

Moffee Coffee Store operates for 6 days every week and closes on Monday. On Tuesday to Saturday, they open at 9 am while Sunday they open at 2 pm and close at 11 pm. With the number of operating hours reaching 14 hours, Moffee Coffee Store adapted the model of division of working hours into 2 shifts, namely morning and

evening except on Sunday where all workers start working hours at the same time, which is 2 pm. With a two-shift mechanism, the workers are usually made alternately to enter the morning or afternoon with the division of working hours an average of 8 to 9 hours per day. The reason for this rolling is so that there is a balance in the workload of each worker because based on information from the owner of Moffee Coffee Store, this Cafe is usually crowded when the night starts from 8 to 10 pm.

For monthly operational costs, Moffee Coffee Store incurred the cost of the main raw materials for making drinks. Beyond the cost of raw materials, there are costs for electricity and gas. For disposable raw materials, usually in monthly stock, while food is stocked for weekly and even daily needs. For material stock calculations usually seen from the results of monthly recap. If there is an increase or decrease in the release of certain raw materials, it will usually be adjusted to the stock cycle to prevent overstocking. For raw materials that have a long service life, income switches are usually carried out by prioritizing expenditures for employee salaries. Moffee Coffee Store usually does maintenance for the equipment by taking into account the depreciation of the equipment. Depreciation of equipment such as containers for serving products also occurs when a defect occurs or is lost. Equipment and equipment are usually checked by the amount recorded in the logbook if there is a decrease in the amount that will be covered from existing costs. If there is no shrinkage, the Moffee Coffee Store considers its profit. Especially for coffee-making equipment, there is usually a lifespan. An indicator replacement tool is usually twice the service if there has been more defect than that usually the tool will be replaced with a new device. Moffee Coffee Store conducts periodic documentation of the tools to compare the physical condition. Checking the change in performance will usually be recorded related to the length of time of production if a new device is used can produce products with 10 seconds. Usually, after a year of use will increase from 1 second to 11 seconds. For electronic devices when there is a change in time or measurement value (electric scales) it will usually be returned to its original condition by recalibration.

Observational Result

In addition to conducting interviews, researchers also made observations related to the production process and environmental conditions where the product was made to get a more comprehensive view of what factors could cause the defect to the product. The observation process is documented by photographing the production process. From the observations, it can be seen that the Moffee Coffee Store already has clear and well-structured operational standards. Every material to be used will be weighed to get consistent product results. The position of the cafe location which is in an area far enough from the urban center makes the room temperature low enough so that drinks served in a warm state more quickly drop in temperature. The condition of the bar and kitchen of Moffee Coffee Store is made quite roomy to facilitate the movement of the baristas and chefs in doing their work.

Cause and Effect Diagram (Fishbone)

To find out the cause of defect to milk coffee products at Moffee Coffee Store, it is necessary to use the Fishbone diagram by analyzing as below:

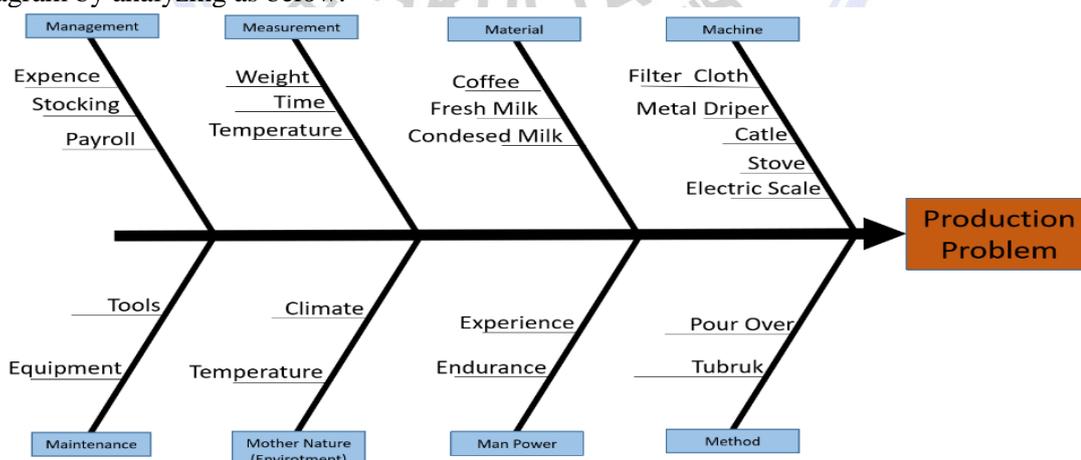


Figure 2. Diagram Fishbone on Moffee Coffee Store

Source: Data processed, 2019

Table 1. Summary of Fishbone Diagram Discussion

Possible Root Cause	Explanation	Root Cause
Human Resource		
Procedure error	New baristas who lack experience so wrong in the coffee-making procedure	YES
Durability	Baristas must stand for approximately 5-6 hours each shift so that at the end of working hours reduce the focus on the effectiveness and efficiency of work	YES
Method		
Pour Over	The pour-over method requires concentration and good barista skills so it is very risky for defect if it is not done correctly.	YES
Tubruk	Tubruk coffee is the most common way to make coffee by mixing coffee grounds with hot water.	NO
Mother Nature		
Climate	Weather is one of the factors that can affect the taste quality of dairy coffee products. During the rainy season, the quality of coffee beans produced by farmers can have an impact on the taste of the coffee that will be served. The rainy season can also have an impact on the scarcity of quality coffee beans which can have an impact on prices.	NO
Temperature	Room temperature can accelerate the oxidation process of stored coffee beans. If the coffee has been roasted for too long it can reduce the quality to taste of the coffee produced	NO
Maintenance		
Tools	The tools used in the process of producing milk coffee are always checked for performance every month up to a matter of seconds the completion time of making coffee.	NO
Equipment	Equipment used as a container is considered to experience periodic depreciation so that in addition to cleaning the stain is also replaced every time there is a defect. Moffee Coffee Store also has spare parts for equipment that is most often defect	NO
Management		
Expense	Management for monthly fixed costs expenses can be covered well	NO
Stocking	Overstock/understock occurs in materials such as fresh milk, and other materials such as gas.	YES
Payroll	Paying employees prioritizes even if they have to reduce the profit target	NO
Material		
Coffee	The taste of coffee is determined by the quality of the coffee beans used. Moffee Coffee Store is very concerned about the quality of seeds that will be used even if it has to pay extra.	NO
Full Cream Milk	The use of full-cream milk in dairy coffee products aims to add a savory taste. Usage errors usually occur because of too much or too little or even forget to add.	NO
Condensed Milk	Condensed Milk used is not seen in terms of price but quality.	NO
Machine		
Filter Cloth	The filter cloth used gives a strong coffee flavor but repeated use can create the aroma of a wet wool cloth besides that this type of filter still leaves a fine coffee powder that escapes the filter. But maybe some people do like the taste of coffee like this	YES
Metal Dripper	The use of Dripper made from metal (stainless) is much better than Dripper made from plastic and gives a more consistent taste.	NO
Kettle	Moffee Coffee Store store uses a kettle made from metal which is quite durable	NO
Stove	Moffee Coffee Store store uses a gas stove to heat water for milk coffee	NO
Electric Scale	The use of Scale Electric aims to get a gram size of coffee more precisely	NO

Source: Data processed, 2019

Pareto Analysis

Through the results of the interview above which continues to fishbone analysis, then the researcher conduct further interviews to get better conclusions with Pareto Analysis. Concerning the frequency of product defect every week the researcher found out the condition of the distribution of the damage causes as below:

Table 2. Distribution of Cause

#	Causes	Defects	Cumulative Percentage:
			80%
1	Durability	24	45.3%
2	Stocking	7	58.5%
3	Procedure Error	6	69.8%
4	Pour Over	4	77.4%
5	Filter Cloth	3	83.0%
6	Experience	2	86.8%
7	Equipment	2	90.6%
8	Payroll	2	94.3%
9	Metal Dripper	2	98.1%
10	Stove	1	100.0%
11	Tubruk	0	100.0%
12	Climate	0	100.0%
13	Temperature	0	100.0%
14	Coffee	0	100.0%
15	Kettle	0	100.0%

Source: Data Processed, 2019

The data above can be made in form of a chart like Figure 3. From the chart, it can be seen that the endurance factor of the workers is the most dominant factor that causes product defects.

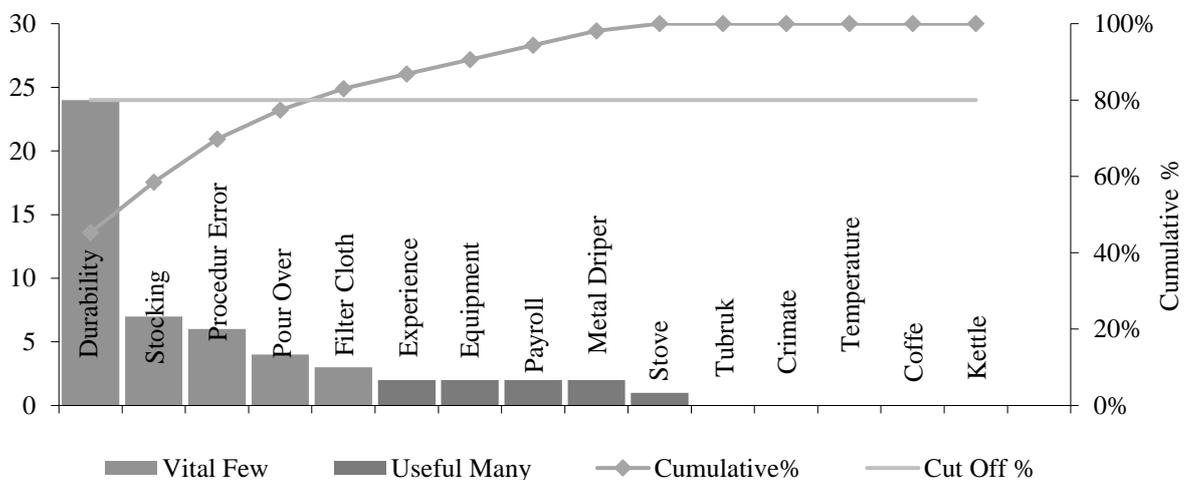


Figure 3. Pareto Distribution Chart

Source: Data Processed, 2020

Discussion

From the analysis of the fishbone diagram above, we can find out that the cause of defect to coffee products at Moffee Coffee Store is the material stock errors that is why Moffee must have use lower quality ingredients. Also, the risk of defect can occur from human error where new baristas made mistakes that can affect the taste. Workers also find it easier to make mistakes when endurance decreases because during peak time due to fatigue and long working hours. Errors in the procedure of stock materials and supporting materials for making milk coffee can also be a source of product defects. The use of filter equipment made from fabric is also quite significant in contributing to the possibility of quality loss. The root of the problem is the defection to the coffee product that researchers summarized in Table 3.

Table 3. Defect Factors for Dairy Coffee Products at Moffee Coffee Store

Main Factor	Sub Factor	Level of Risk
Human Resource	The milk coffee is made by novice barista. Barista endurance decreases near peak time close to closing time.	high
Method	The pour-over method requires proficiency and a deeper understanding of coffee brewing.	medium
Management	Error in stocking materials that can affect the overall taste of the product.	high
Machine	Filter cloths are used frequently to decrease cost, however it is decrease quality.	low

Source: Data Processed, 2020

Although fishbone diagram has weaknesses such as Complex defects might yield a lot of causes which might become visually cluttering and interrelationships between causes are not easily identifiable, but this method makes it easier for researchers to brainstorm which can spark further examples of root causes and allow the researcher to see all causes simultaneously. The weakness of the fishbone diagram can be minimized by using a Pareto analysis that can show specifically how the damage distribution is given by each factor.

The ever-increasing cafe business has made competition among cafes even tighter where current store owners are not only competing in quality in the products they produce. Coffee shops today also almost resemble the service industry by offering convenient locations and services as an experience that cannot be separated from the products produced. Moffee Coffee Store uses a convenient service and location approach in addition to delicious coffee products. The highest cause of defect to the products at Moffee Coffee Store can be caused by material stock errors because it can directly affect product quality. However, this defect can be minimized by excellent environmental and service conditions.

In addition to stocking issues, Moffee Coffee Store also needs to evaluate the workload of each of their work positions. Product defect that occurs due to the durability of work from weak employees can affect many things. The weak working endurance of employees at Moffee Coffee Store is interrelated with factors that cause damage to their products as a whole. The excessive workload can indicate less effective Personnel Management and inefficient shift time allocation.

Research conducted by Eirene E. Sinsu in 2018 entitled Analyzing the Bottlenecks in Laundry Service Operations Using Cause and Effect Diagrams in Manado's Fresh & Clean Coin Laundry service business shows 15 possible root causes of bottlenecks with the most significant source presentations are found in the number of coins and Steam irons are limited to 45% of the bottleneck factor. The availability of the right tools and equipment is also a factor similar to what researchers found to occur at Moffee Coffee Store.

Research conducted by Naili Fauziah with the title Fishbone Analysis Application in Improving the Quality of Tea Production at PT Rumpun Sari Kemuning Karanganyar Regency also found factors similar to those that researchers found occurred at the Moffee Coffee Store. Research from Naili Fauziah shows that the lack of experience of workers, raw materials, and inappropriate methods is at the root of the problem of the decline in the quality of tea production at PT Rumpun Sari Kemuning.

CONCLUSION AND RECOMMENDATION

Conclusion

Based on the result of data gathering and discussion, the researcher concludes few points which are:

1. Factors that can cause a defect in milk coffee products at Moffee Coffee Store are Man Power, Method, Management and Machine.
2. The most significant factors for a defect factor for a defect in their products is material stock errors, that is why Moffee Coffee Store needs to replace them with lower quality ingredients or eliminate one ingredient even if it is not following operational standards.
3. The result of the Pareto analysis show different and more in-depth details related to the dominant factors that cause product defects at Moffee Coffee Store. Human Resource factors, especially the durability of their employee's work.

Recommendation

To prevent defects to the product the researchers suggest that Moffee Coffee Store do several things.

1. Improving the process of calculating the use of materials to avoid overstock because can affect the deterioration in the quality of ingredients due to the storage processor understock of materials which makes Barista must make products, not following the Procedure Operational Standard.
2. Cutting the profit from each coffee milk produced and replacing equipment especially filter cloth with filter paper so that the quality of the milk coffee produced will be more consistent.
3. Add workers and makeshift adjustments again because the highest number of visitors comes at night approaching closing time so that the accumulated workload can reduce the focus of the Baristas.

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