ANALYSING THE BOTTLENECKS IN LAUNDRY SERVICE OPERATION USING CAUSE AND EFFECT DIAGRAM (CASE STUDY ON FRESH & CLEAN COIN LAUNDRY IN MANADO)

ANALISIS BOTTLENECKS PADA OPERASI LAYANAN LAUNDRY MENGGUNAKAN DIAGRAM SEBAB-AKIBAT (STUDI KASUS PADA FRESH & CLEAN COIN LAUNDRY DI MANADO)

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Abstract: Fresh & clean coin laundry experienced the complaint from customer because delay in completion the customer laundry as the promised time. The slowdown of the operation processes usually happens because there are bottlenecks. Figuratively, bottleneck refers to any obstruction that slows down a flow or process. The aims of this research is to identify and analyze the causes of the bottlenecks in laundry service operation of Fresh & clean coin laundry. This research is descriptive research and uses qualitative method. Based on the result, this research is found 15 possible causes of the laundry service operation slowdown by using cause and effect diagram and than by using pareto analysis it is found that there is 2 significant causes that cause the bottlenecks in laundry service operation which is Fewer Steam Ironswith 24% causes contribution and Fewer Coin Laundry Machine is 21%. So these two causes are responsible for 45% of total causes of laundry service operation slowdown. Fresh & clean coin laundry needs to add more steam irons and coin laundry machine because the causes of delay to completion the customer laundry as the promised time is because there is bottlenecks in ironing and washing workstation that limiting the output.

Keywords*: service operation, bottlenecks, cause and effect diagram, pareto analysis.*

Abstrak: *Fresh & Clean coin laundry mengalami keluhan dari pelanggan karena keterlambatan dalam penyelesaian laundry pelanggan seperti waktu yang dijanjikan. Tujuan dari penelitian ini adalah untuk mengidentifikasi dan menganalisis bottlenecks dalam operasi layanan Fresh & Clean coin laundry. Secara kiasan, bottleneck mengacu pada obstruksi yang memperlambat aliran atau proses. Penelitian ini merupakan penelitian deskriptif dan menggunakan metode kualitatif. Berdasarkan hasil penelitian, ditemukan 15 kemungkinan penyebab lambatnya operasi layanan laundry dengan menggunakan diagram sebab-akibat dan dengan menggunakan analisis pareto ditemukan bahwa ada 2 penyebab signifikan yang menyebabkan bottlenecks dalam operasi layanan laundry yaitu kurang setrika uap dengan kontribusi 24% dan kurang mesin koin laundry adalah 21%. Jadi dua penyebab ini bertanggung jawab 45% dari total penyebeb lambatnya operasi layanan laundry.Fresh & Clean coin laundry perlu menambah setrika uap dan mesin koin laundry lebih karena penyebab keterlambatan untuk menyelesaikan laundry pelanggan seperti waktu yang dijanjikan karena adanya bottlenecks di stasiun kerja menyetrika dan mencuci yang membatasi hasil.*

Kata Kunci: *operasi layanan, bottlenecks, sebab-akibat diagram, analisis pareto.*

INTRODUCTION

Research Background

The densities of the urban society activity make it difficult to get time to do homework, such as cleaning the house, cooking, and especially washing clothes. Because of this, businesses focusing on home-based work began appear, for example laundry business. Laundry business is a business that provides services laundering the customer clothes. Laundry service is one of the service businesses that are rising at this time. In densely populated urban areas or in suburbs, this laundry business always seems to grow and flourish. Laundry business has become the most popular business of urban society lately. The reason for practicality is the main reason for the busy people.

Because this services business has a very good business opportunity, so many business competitors as well. The competition in the work world is so tight and business competition happens everywhere. Therefore the business process is required a competitive advantage to make it more effective and efficient as what a customer need to win the competition.

Over the past few decades, laundry technology has improved dramatically. Currently in Indonesia, many laundry business used a coin-operated machines or coin laundry. Coin laundry also known as laundromat, it is laundry facility where in people pay to use washing machines and dryers to wash or launder their clothes. Coin laundry services work like vending machines. Rather than dispensing goods, laundry machines process them. Laundry business that used a coin laundry usually provide a self-services and full-services. Self-service in laundry allow the customer to use washing machine and dryers their clothes by them self without much personalized professional help and full-service laundry is all the services do by the employee.

The coin laundry business is already entering Manado city. This business is a fairly new business in Manado and still rarely found. One of the coin laundry business in Manado is Fresh & Clean coin Laundry.

Fresh & Clean coin laundry is establish since 2017 and located at Kawasan Megamas Manado. The location of Fresh & Clean coin laundry is a strategic place for this new business since it easier to reach the customers because closer with many offices, school, hotels, apartement, salon that need their service. Fresh & Clean coin laundry used the recent laundry machines technology made in USA and providing 8 washing machines with 8 dryer machines. Fresh & Clean coin laundry prioritized the customers satisfaction with promising the customer with free pickup and delivery, free detergen, wifi, full facilities, hygiene, and the laundry will done in 90 minutes.

When the urban societiy is getting busy it is requires everything to be done immediately, practically, and efficiently. That is why customers prefer to trust their clothes to laundry business such as Fresh & Clean coin laundry because it is known as a faster services compare with the other laundry businesses that still using the old techniques but Fresh & clean coin laundry experienced the complaint from customer because delay in completion the customer laundry as the promised time. As time goes by there would certainly appear more competitiors in this business. It is make Fresh & Clean coin laundry must always pay attention to its service operation activities.

Processes describe the method and sequence in which service operating systems work and specify how they link together to create the value proposition promised to customers. In high-contact services, customers are an integral part of the operation, and the process becomes their experience. Badly designed processes are likely to annoy customers because they often result in slow, frustrating, and poor-quality service delivery.

The slowdown of the operation processes usually happens because there are bottlenecks. Figuratively, bottleneck refers to any obstruction that slows down a flow or process. A bottleneck is defined as departement, facility, machine, or resource already working at its full capacity and which, therefore, cannot handle any additional demand placed upon it (Businessdictionary.com). A bottleneck in other words is a process that limits throughput. The aim of this thesis is to "Analysing the bottlenecks in laundry service operation using cause and effect diagram on Fresh & Clean coin laundry". It has to be identified, analyzed and needs to be resolved. Once the bottleneck is identified correctly and efficiently, it helps to improving the performance.

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Research Objectives

The objectives of this research is:

1. To identify and analyze the bottlenecks of the laundry service operation.

2. To identify the causes of the laundry service operation slowdown.
3. To give a solution to the bottleneck in the laundry service operation.

THEORETICAL REVIEW

Operation Management

According to Chase, Jacobs and Aquilano (2008), operations management identifies all the activities necessary to plan, develop and improve the business processes involved in the manufacturing of a product or in the provision of a service.

Bottleneck

When a process consists of asset series of operation, its capacity is determined by the slowest operation in the sequence. According to Noori et al. (1995), the capacity-limiting operation is called the bottlenecks operation.

Cause and Effect Diagram (Fishbone)

The design of the diagram looks much like the skeleton of a fish. Watson (2004) state that the Fishbone diagram is an analysis tool that provides a systematic way of looking at effects and the causes that create or contribute to those effects. According to Juran (1999), the Fishbone diagram (also called the Ishikawa diagram) is a tool for identifying the root causes of quality problems. It was named after Kaoru Ishikawa. Fishbone diagram is a tool that provides a systematic and graphic way of identifying possible causes for a problem, using categories to focus and structure the thinking, in order to work toward determining root causes.

Pareto Analysis

Haughey (2011) defines Pareto analysis as a statistical technique in decision-making that is used for the selection of a limited number of tasks that produce 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.

Service Quality

Generally, business goal of every company is success in doing business. That success is shown through customer recognized quality of company's products and services. Service business operators often assess the service quality provided to improve their service, to quickly identify problems and to better assess client satisfaction. Babakus and Boller (1992) defined service quality is an important antecedent of consumer assessment of value, which in turn influences customer satisfaction, which then motivates loyalty. High service quality motivates positive customer behavioral intention to repurchase, and in turn, promotes customer retention. Quality is indirectly linked to repurchase intention and customer loyalty through customer perceived value.

Customer Satisfaction

Customer satisfaction, happen when company can fulfill the customer expectation with the good performance quality. Gerson (1993) Customer Satisfaction may be considered as a base line standard of performance and a possible standard of excellence for any Business organization. Customer will feel satisfied and will consider to re purchase and customer satisfaction can lead to customer loyalty.

Previous Research

This part describe all the journals as references that use to support study. All these journals will be particularly utilized for achieving all objectives in this research. Ferencíková (2012) was processed the short analysis of other research works in the field of Theory of Constraints based production planning and bottleneck management where authors describe some difficulties with production planning in discrete batch production.

Sriram and Tang (2017) the study analyses the operations status, bottlenecks, and the interdependence of the manufacturing activities between machines. In the simulation modeling and analysis, the efficiency of machines, reliability, quality, and setup time are considered. The simulation identifies the operation bottlenecks and WIP status, and proposes process changes for improved production efficiency.

Mohiuddin and Ahmad (2011) study is An Application of Pareto Analysis and Cause-and-Effect Diagram for Minimizing Rejection of Raw Materials in Lamp Production Process. With the help of Pareto diagrams, which are mostly used to identify critical areas, the manufacturing process defects in the each stage of

the production belt have been prioritized by arranging them in decreasing order of importance. Then cause and effect diagram is being applied to explore possible causes/factors of defects and to determine the causes/factors, which has the greatest effect.

Heena and Suri (2017) study is to apply Quality control tools in production process to reducing the rejection and rework by identifying where highest rejection occur at and to go give suggestions for improvement. This study is conducted from one of theLeading Manufacturing industries in Noida which manufactures Low voltage Panel board products. The approaches used in this study are such as Pareto chart, Fishbone diagram which have been applied to improve the quality of the products and minimize rejections.

Wedel, Hacht, Hieber et al. (2015) identify the momentary bottleneck of serial production lines with finite buffers is still a challenge in the automobile industry. In literature there are already some detection methods. However, these methods lack the applicability for a real-time fault repair prioritization. A newmethod is being developed because of this disadvantage to detect the bottlenecks by analyzing the increase and decrease of buffer levels. This method has the benefit of detecting the real-time bottlenecks as well as giving a forecast bottleneck emerging in the near future by indicating the remaining time until a machine becomes one. The new fault repair prioritization method was validated in a material flow simulation of aproduction line. This simulation indicates a significant output increase. In the following steps, the new method is going to be implemented in a case study.

Conceptual Framework

Conceptual framework explain about how to identify and analyze the Bottlenecks in laundry service operation of Fresh & Clean coin laundry.

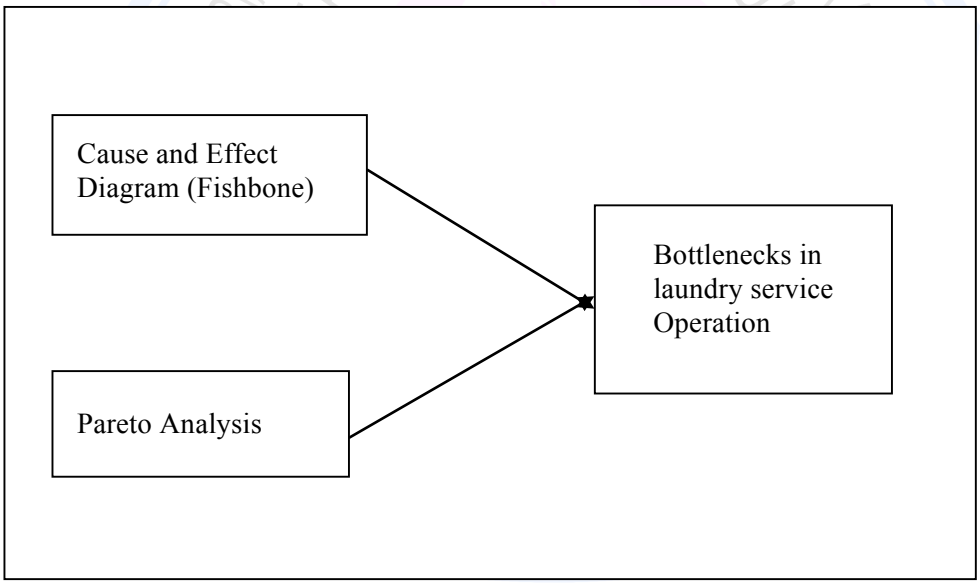

Figure 1. Conseptual Framework
Source: Data Analysis Method (2018)

To analyze the bottlenecks in laundry service operation in Fresh & Clean coin laundry, the data will be analyzed with cause and effect diagram or called as fishbone and pareto analysis as shown as the Figure 1.

RESEARCH METHOD

Research Approach

This research is descriptive. This research uses qualitative research methodology to discover the customers response and behavior toward the bottlenecks in laundry service operation. According to Punch (1998) qualitative research is empirical research where the data are not in the form of numbers. This research in field of operation management will analyze the bottlenecks in service laundry operation with Fresh & Clean coin laundry as a case study.

Population, Sample and Sampling Technique

According to Sekaran (2003) population refers to the entire group of people, events, or things of interest that the researcher wishes to investigate. The population in this research is all workers and the self-service customers of Fresh & Clean coin laundry in Manado. The sample in this research is consisting of 10 respondents. This research applying the purposive sampling to obtain the information according to criteria which is considered who are understand the matter and can be trusted or people who has authority that will make it easier for the researcher to investigate the laundry service operation.

Type and Source of Data

The data used in this research consist of two types of data, which is primary and secondary data. The primary data are gained from in-depth interview with the worker and self-service customer and observation at Fresh & clean coin laundry, the secondary data taken from books, journal, and relevant literature from library and internet to gain more of supportive information regarding with this research.

Testing of Research Instrument

Reabilityoften refers to the stability of responses to multiple coders of data sets. Creswell (2007) defined reability can be enhanced if this study obtains detailed field-notes by employing a good-quality tape for recording and by transcribing the tape. Validity as validation in qualitative research to be an attempt to assess the "accuracy" of the findings, as best described by the researcher and the participants.

RESULT AND DISCUSSION

Result

The interview is conducted from informants who know well the process of the laundry on Fresh & Clean coin laundry. The second part of this chapter explains about the discussion after the interview.

Informant 1, worker

Informant 1 as a cashier in Fresh & Clean coin laundry and already working since 2017 on july. According to Informant 1, they experienced the complaint from customer but that is something that rarely happen because the worker worked well and usually the complaint come from the full service customer because the self-service customer handle their own laundry. She explains that Fresh & clean coin laundry had a lot customers and sometimes the receive the laundry more that the capacity of the machine can handle.

Informant 2, worker

Informant 2 as the second cashier in Fresh & Clean coin laundry has the similar answer with informant 1 said that the causes of the delay of finishing the laundry as the promised time is because sometimes the order is more than the capacity of the machine can handle per day and the complain is from the full service customer. She think the problem that cashier face it is when the have many customers or when the customer bring many laundry so queune will happen because they need more time to separate which one discolour clothes and which one is not, also to counting every piece of customer clothes and than weighing all and put the data into computer. She also said if the worker coming late it is also become one of the causes of the delay because its slowing down the laundry to be handle. Informant 2 said "if comparing the laundry machine with the ironing, the ironing process need more time to be done because washing or drying process had more machines and operators than ironing process that only had 2 steam irons and 2 operators".

Informant 3, worker

The informant 3 has the same opinion with informant 1 and 2 about the causes of delays in order completion the laundry which is because the machine capacity is not enough to handle the laundry. Informant 3 see that if the machine is broken and need to be fix it also slowing down the process. The machine that Fresh & Clean coin laundry used is the machine that using coin to operate and if they already used all the coins to operated it means they running out of coins because all the coins is in the machines so they need to wait the owner to come to open the coins bank beacause only the owner have the key for the coin bank.

Informant 4, worker

Informant 4 think that the ironing process is the causes of the complain but not because the work of the worker of ironing not good but because the laundry machines can washing clothes more than the worker of

ironing can handle. The other reason is because the the worker need to wait the steam irons to be hot before ready to use and also if the gas for the steam irons is run out it need to wait for the restock.

Informant 5, worker

Informant 5 said that the possible reason is because the steam irons need to be hot before can be used so it is takes time and that is become more slower compare than the coin laundry machine that ready to use anytime.

Informant 6, worker

The informant 6 said that the coin laundry machine is working good and if the order more than the capacity of the machine can handle that is one of the reason why the delay happen but the worker will call the customers to reminds them if their laundry is already or delay, if the worker not do it and that is the worker fault that not work properly. The other causes of the delay is the ironing worksation is only had fewer steam irons and worker. Coin laundry machine is working depand on electricity so if the blackout happen that can be the one of the possible reason for the slower working and can make the machine broken. Fresh & Clean coin laundry not have delivery driver.

Informant 7, self-service customer

She is the customer of Fresh & Clean coin laundry because her boarding house not provide a laundry service and if she not going back home on weekend she will washing her clothes there using self-service once a week. Informant 7 think Fresh & Clean coin laundry only had fewer machine to handle their orders that is make the self-service customers need to wait to using the machine.

Informant 8, self-service customer

Informant 8 know that Fresh & Clean coin laundry provide delivery service but when she want to use it, the worker said that they not have the delivery driver yet.

Informant 9, self-service customer

Informant 9 see the steam irons is only 2, she think it is not enough because the workers had a lot of clothes that need to handle. She is satisfied with what Fresh & Clean coin laundry provided which is the wifi that can used while waiting, the clothes good-smelling and also the laundry done faster but she think the worker needsmile more to make the customers feel comfortable.

Informant 10, self-service customer

Since the day she using Fresh & Clean coin laundry service she is satisfied with the service, same like the informant 9 opinion. Informant 10 had experinced when the packaging is out of stock, so she need to wait but luckyly the worker quickly restock the packaging.

Cause and Effect Diagram

After got the information from in depth interview with the informants, the researcher categorize the causes which is the people, machine, material, and environment and than brainstorming with the workers to identify the possible causes of the problem. The implemantion of cause and effect diagram are constructed as shown in Figure 2.

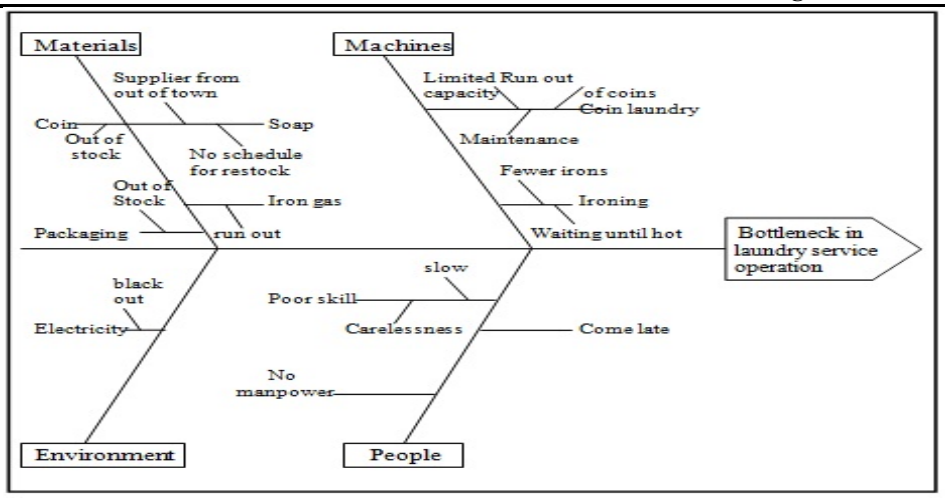

Figure 2. Implementation of Cause and Effect Diagram
Source : Data Processed (2018).

Pareto Analysis

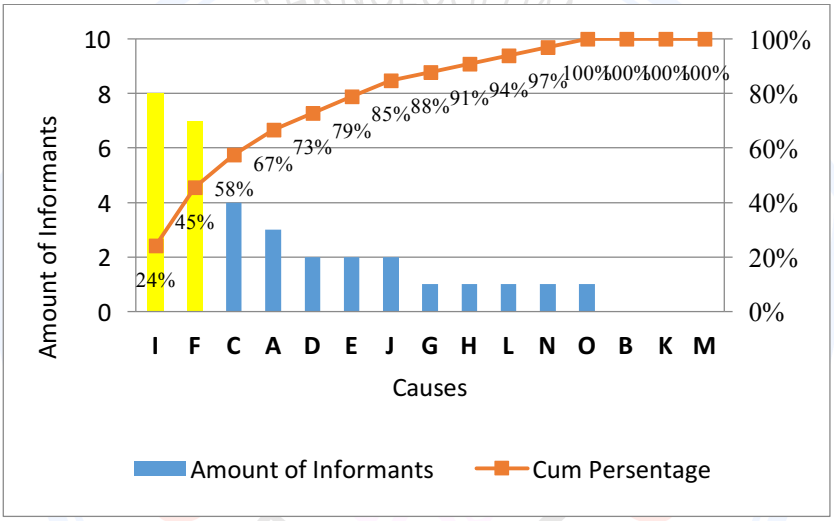

Figure 3. Pareto Chart Analysis
Source : Data Processed (2018)

The result of the pareto analysis that shown in Figure 3. Is Fewer Irons (I) is the most critical cause with 24%, among other causes contribution of Fewer Coin Machine (F) is 21%. So these two causes are responsible for 45% of total causes of the bottlenecks in laundry service operation.

Observation Result

The other tool that the researcher used is doing observation to gain the information which is the amount of capacity in each workstations can handle with reference to the time required on each workstation within 720 minutes or 12 hours of operational hour in a day.

No.	Work stations	Time (m)	Capacity (kg)
1	Sorting	720	500
2	Weighing	720	500
3	Washing	315	360

4	Drying	405	360
5	Finishing	720	500
6	Ironing	720	100
7	Folding	720	500
8	Packing	720	500

Table 1. Observation Result

Source : Data processed (2018).

Based on the observation result the researcher make the ilustration of the laundry process and put the data on it to identify the bottleneck in each work station. The result as shown in Figure 4.

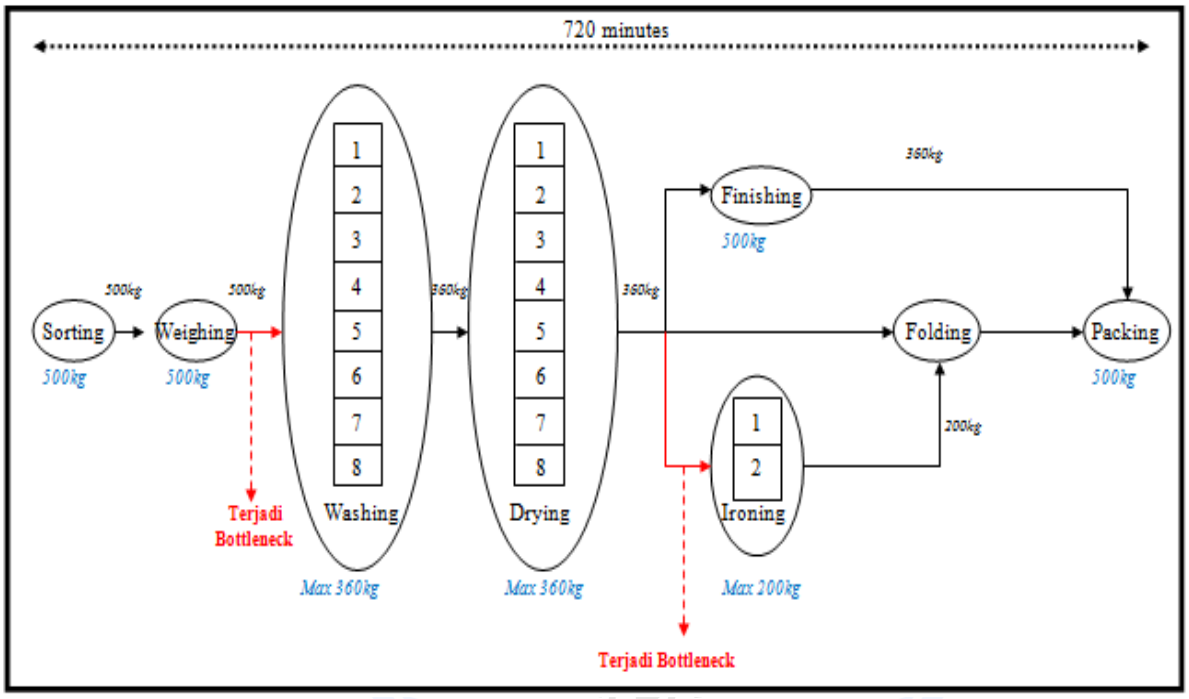

Figure 4. Mapping

Source : Data Processed (2018)

Discussion

The result of the in-depth interview with all the informants in this case 10 informants which is 6 workers and 4 self-service customers found 15 possible causes of the laundry service operation slowdown by using cause and effect diagram and categorize in people, machine, material, and environment. The 15 possible causes which is:

A. The worker coming late
B. Poor skills
C. Carelessness
D. No manpower
E. The machines maintenace
F. Fewer of coin-laundrymachine means less capacity
G. Run out of the coin to operate the machine
H. Run out of gas for steam irons
I. Fewer of steam irons

J. Need to wait until the steam irons is hot
K. Out of soap
L. Out of packaging
M. No restock schedule
N. No delivery service
O. blackout

Pareto analysis helps to focus on the small number of really important causes of the problem that need to be addressed. The result of Pareto analysis is Fewer Irons (I) is the most critical cause with 24%, among other causes contribution of Fewer Coin Laundry Machine (F) is 21%. So these two causes are responsible for 45% of total causes of laundry service operation slowdown. The data is base on the respondents opinion by asking the respondents to choose which causes is the main causes of the problem regarding their experiences.

The other tools that the researcher used is observation to got a data about the amount of capacity in each work stations can handle with reference to the time required on each work station within 720 minutes or 12 hours of operational hour in a day and than make the ilustration of the laundry process and put the data on it to identify the bottleneck in each work station as shown in Figure 4.Based on the obsevation result it is found the bottleneck happen in 2 work station which is the washing work station because in 720 minutes of operational hours, Fresh & clean coin laundry had the input of garments is 500 kg/day and the maximal capacity of the washing machines is only 360 kg for 315 minutes. The rest of 405 minutes is for drying process because the next activity of the washing machines only can start after the dryer activity has finished. The second bottleneck happen in ironing work station because the maximal capacity of the ironing work station can handle is only 200 kg/day which is each worker only can handle 100 kg/day.

CONCLUSION AND RECOMMENDATION

Conclusion

Based on the result from the previous chapter we can conclude some points which are:

1. There are 15 possible root causes of the laundry service operation slowdown which are because the worker coming late (A), poor skill (B), carelessness (C), no manpower (D), maintenance ((E), fewer coin laundry machine (F), run out of coins (G), running out of steam gas (H), fewer steam irons (I), need to wait the steam irons getting hot (J), the soap is out of stock (K) and packaging is out of stock (L), no schedule for restock (M), no delivery service (N) and blackout (O). Fewer Steam Irons (I) is the most critical cause with 24%, among other causes contribution of Fewer Coin Laundry Machine (F) is 21%. So these two causes are responsible for 45% of total causes of laundry service operation slowdown.
2. There is a bottleneck in laundry service operation of Fresh & clean coin laundry which is in washing and ironing work station.

Recommendation

This research has been conducted in order to identify and analyse the bottlenecks in laundry service operation of Fresh & clean coin laundry in Manado. Here some recommendation proposed and found with this research for the laundry businesses, universities, and the next researcher.

1. For laundry businesses it is really important to pay attention to the customer complain and improve the customer satisfaction because customers will judge that quality of the service is low if the performance does not meet their expectation. Especially for Fresh & clean coin laundry needs to add more steam irons and coin laundry machine because the causes of the complaint of delay in completion the customer laundry as the promised time is because there is bottlenecks in ironing and washing work station that limiting the output.
2. For universities, to give the students, lecturers and other parties especially economic and business faculty some knowledge and additional information about the bottlenecks in laundry service operation.
3. For the future researcher, it is recommended to conduct deep research not only using cause and effect diagram and pareto analysis but can using another tools to identify the problem and also the solution. Subsequent research can also do research about the bottleneck in production activity.

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