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MANAGING WASTE LEVEL OF FRESH FOOD MATERIALS: A CASE STUDY OF FAST FOOD RESTAURANT IN BANDUNG

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Abstract. Restaurant X is a restaurant located in Bandung. It is well known as one of the branches of a very famous fast food brand. The management of Restaurant X stated that they are currently facing the problem related to the waste level of fresh food materials, which is 9.15% from their total revenue. This becomes a serious problem since the high waste level will decrease the revenue because of waste cost and increase the additional production cost. This will lead to the decrease of profit. Meanwhile, profit is one of key successes in restaurant business and Restaurant X also has the objective related to the profit maximization. This research is done to fulfil three objectives, which are to calculate the waste level of fresh food materials at Restaurant X, to identify what factors affect the high level of fresh food materials waste at Restaurant X, and to identify and explain the most appropriate solution to reduce the level of fresh food materials waste at Restaurant X. The researcher will use DMAIC stages of Six Sigma as the methodology and also use the two level of classification analysis to determine the reduction number of each fresh material with the data collection of historical data from Restaurant X, depth interview result with several stakeholders of Restaurant X, and the questionnaire survey for customers.

Keywords: Restaurant X, DMAIC, Waste Management

INTRODUCTION

Culinary industry in Indonesia has been growing very fast each year. Based on data, culinary industry contributes 41.4% of the total revenue in creative economy, with the amount of 922 trillion by the year 2016, which is the highest number among the other 16 sectors in Badan Ekonomi Kreatif (Agmasari, 2018). It is also stated that culinary industry is one of the biggest supports in creative industry. Over the total 8.2 million units in creative industry, 68% of them are running on culinary industry (Agmasari, 2018). In culinary industry, there are many type of business. One of the most popular types is restaurant.

Related to social perspective, restaurant provides a space where people can enjoy the interpersonal exchange (Gustafsson et al., 2006; Riley, 1994) while consuming the dishes from various countries provides the people to engage with various cultures as well (Beldona et al., 2010; Riley, 1994). A survey stated that in year 2013, Indonesians had their food or drink in restaurants 380 millions times and spent US$1.5 billion (The Jakarta Post, 2014). There are several types of restaurant. Fast food restaurant is one of the most famous types of restaurant. Based on the data from Fast Food Industry Analysis (2018), fast food restaurants reach about more than 50% of the total sales in the entire restaurant sector. Indonesia is one of those countries, which most of the citizens are interesting to consume fast food in their daily life. The sales of fast food in Indonesia are predicted to reach US$1.5 billion (Bland, 2013).
Restaurant X is one of fast food restaurants based in Bandung. Restaurant X is one of the branches of a famous fast food brand. As a profitable business, Restaurant X has the objective to always increase their profit. Marketing and hospitality literature has been studying about the customer satisfaction since a long time ago due to its importance. The study result shows that customer satisfaction creates long-term benefits for organization, such as customer and brand loyalty, sustained revenue, and increase the profit (Homburg et al., 2006). In order to reach their objective in terms of profit maximization, Restaurant X always wants to satisfy their customers by serving a good quality dish. In order to serve a good quality dish, Restaurant X has to maintain their raw materials to always be in fresh condition. Based on previous study, waste from food and beverage not only contributes to increase production cost, but also increase additional waste cost (Kishore et al, 2011). According to that statement, the possibility of waste will be the obstacle for Restaurant X in reaching their objective related to the profit maximization.

With their current condition, Restaurant X has to face the problem regarding to waste of the fresh materials. Food waste is a loss of a number of nutritional food qualities, which have purpose to be human consumption and usually caused by the inefficiency in the supply chain (FAO, 2011). According to the Food and Agriculture Organization (FAO, 2016), about one third of the food produced in the world have became wasted (about 1.3 billion tones). Through the calculation from the researcher based on the historical data of waste from Restaurant X, the researcher found that from January 2019 until April 2019, the average waste level of fresh materials at Restaurant X reached the number of 9.15%. It is stated previously that waste problem will decrease the decrease of revenue because of waste cost and increase the additional production cost, and will lead to the decrease of profit.

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The decrease of profit will not be in line with the objective of Restaurant X in terms of profit maximization. Therefore, the management of Restaurant X stated that they want to reduce the waste level of fresh food materials in order to maximize the profit. Through the observational activity and depth interview with several stakeholders, the researcher found that this waste problem occurred because of two possibilities. The first one is from environment factor, which is related to the supplier. When Restaurant X gets the fresh materials that do not fulfil the standard, Restaurant X has to throw it away and buy the new ones from another store, which cause the additional cost. The second one comes from method factor, which is related to the chef. Even though Restaurant X already had the formula to calculate the amount of fresh materials, the chef often still uses the subjective opinion to decide it. That causes an excessive amount in fresh materials preparation and will lead to waste. Based on that problem, this research is conducted in order to calculate how many the level of waste of fresh food materials at Restaurant X and also the factors that affect the problems occurred. This research is also conducted to provide recommendation in order to solve the problem related to the decrease of waste level of fresh materials.

LITERATURE REVIEW

Six Sigma relates to the proportion of error or defect in a business process (Godfrey, 2002). Six Sigma is an innovative method in order to generate the process improvement continuously and a Total Quality Management (TQM) methodology (Desai, Shrivastava, 2008). The objective of using Six Sigma is reducing the variation. There are two methodology options in implementing Six Sigma. The first one is known as DMAIC (Define, Measure, Analyze, Improve, and Control) process, while the second one is known as DMADV (Define, Measure, Analyze, Design, Verify) process. There is a difference between those two methods. DMAIC process will improve the existing business process, while DMADV will generate the new process that has not implemented previously. According to that explanation, the research will use DMAIC process in this research since the researcher wants to improve the existing business process of Restaurant X. as stated previously, DMAIC process consists of five stages, which are define, measure, analyze, improve, and control (Cudney, LeMahieu, Nordstrum, 2017).

As stated previously, food waste is a loss of a number of nutritional food qualities, which have purpose to be human consumption and usually caused by the inefficiency in the supply chain (FAO, 2011). According to the explanation of waste, we can conclude that waste is a serious problem and needs to be solved. Several researches mentioned about how to manage the waste, which includes reduce, reuse, recycle, and disposal of waste (Sushil, 1990). Waste elimination is needed for the company to reach their profit maximization. In order to eliminate the waste, it is important for the company to firstly know what the defect is and what are included in defects. The seven categories of waste are overproduction, waiting, transporting, uncontrolled processing, uncontrolled inventory, motion, and defect (McBride, 2003). In this case, the category of waste occurs at Restaurant X is related to the uncontrolled inventory, since Restaurant X often keeps the fresh materials more than the needs that leads to the unused fresh materials and creates waste.

METHODOLOGY

In order to get this research done, the researcher will implement the Six Sigma method, specifically DMAIC Process. As stated previously, there are five stages in DMAIC Process, which are Define, Measure, Analyze, Improve, and Control. In define stage, the researcher will map the whole operational process at Restaurant X in order to identify the problem occurs in the company. The researcher will also define the definition of waste for Restaurant X. After understanding the whole operational process at Restaurant X, the researcher will continue to the next stage, which is the measure stage. The objective of measure stage is to measure the current operational system in Restaurant X. Measure stage is divided into two activities. The first one is measuring the waste level and waste cost of each fresh food materials by using the several related historical data of Restaurant X. From the historical data, the researcher can define which materials have the high level of waste. The second one is observational activity by collecting the data of voice of customer. The voice of customer data consists of customer's preferences data and customer's interest data. In order to collect the data of voice of customer, the researcher will use questionnaire survey and then compare the data between the questionnaire survey result and the restaurant assumption.

After measuring the problem through the steps in measure stage as stated below, the researcher would try to analyse the root cause of the problem stated. The researcher would conduct the cause and effect analysis using Fishbone Diagram to identify the root cause. With the result from cause and effect analysis, the researcher would find the most appropriate root cause for the waste problem of fresh food materials at Restaurant X. After analysing the data and identifying the root cause, the researcher would propose the most appropriate solution for Restaurant X in solving the waste problem of fresh food materials. After proposing the solution, the researcher supposed to conduct the control stage in order to maintain and evaluate the implementation of the solution. However, due to the limited time and sources, Restaurant X has not conducted the control stage yet. Therefore, in this research, the researcher will not discuss more about the control stage.

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In conducting this research, the researcher would need several data. There are three types of source of the data needed. The first one is the historical data of Restaurant X related to the fresh food materials and waste management at Restaurant X. The second one is the depth interview result with several stakeholders of Restaurant X to support gathered historical data and validate the historical data in order to make accuracy between primary and secondary data. The third one is the voice of customer data, which will be gathered by conducting questionnaire result to get the information about customer's preferences and customer's interest toward the dish at Restaurant X.

FINDINGS AND ARGUMENT

As stated previously, this research used the DMAIC process, which contains of five stages (Define, Measure, Analyze, Improve, and Control). The researcher implemented those stages and got the result for each step in terms of solving the waste problem of fresh food materials at Restaurant X.

Define

After mapping the business process at Restaurant X, the researcher found that there are four main operational activities, which are planning, purchasing & receiving, storing, and cooking. The problem of fresh food materials waste detected because of the process in the purchase & receiving step, which is the materials from supplier that do not fulfil the standard. Besides, the waste problem also detected because of the process in the cooking step, specifically in cooking preparation step.

The researcher also measured the definition of waste for Restaurant X. At Restaurant X, there are two types of materials, which are frozen materials and dry materials. Frozen materials are the materials needed to be in frozen condition in order to keep the freshness and have a shorter expired date, while the dry materials are the materials that are not needed to be in frozen condition and have the longer expired date. The materials included to the frozen materials are beef, chicken, sausage, etc. The materials included to the dry materials are vegetable, fruit, can food, etc. For the frozen materials, when the chef put out the material from the freezer for the cooking preparation in a day, it means that the material is in fresh condition and will be considered as not waste. At the end of the day, if there is any left over frozen materials, it cannot be allocated to the next day and will be considered as waste. Then, the chef will throw away those left over frozen materials. For the dry materials, when the chef separates the material for cooking preparation in a day, it means that the material is in fresh condition and will be considered as not waste. The dry materials are differentiated into two kinds. The first one are the materials that do not have to be in frozen condition to keep the freshness but still have a short expired date, such as vegetable and fruit. For this kind of material, at the end of the day, if there is any left over material, these materials will be considered as waste and cannot be allocated to the next day. The chef will throw away these materials at the end of the day. Meanwhile, the second kind of dry materials are the materials that have a long expired date, such as can food. For this kind of dry materials, at the end of the day, if there is any left over material, the material will be still considered as not waste and will be allocated to the next day since those materials have a long expired date. The chef will use these materials on the next day.

Measure

In this stage, the researcher wanted to calculate how many the level of waste of fresh food materials at Restaurant X. To calculate the waste level, the researcher used the formula as stated below.

$$\textbf{Waste Level} = \frac{Total\ Waste\ (Rupiah)}{Expected\ Revenue\ (Rupiah)}$$

Where,
Total Waste = Total calculation of waste in Rupiah (Rp)
Expected Revenue (from January 2019 to April 2019) = Average amount per bill per transaction (Rp) x Average quantity of bill

With that formula, the researcher calculated the waste level of fresh food materials based on the total 325 items and found that the waste level of fresh food materials at Restaurant X was 9.15%. It means Restaurant X had to lose 9.15% from their total revenue for the waste cost of fresh food materials.

After gathered the data about the waste level of fresh food materials, the researcher also conducted the survey through online questionnaire survey for the people who have ever consumed the dish from Restaurant X. The researcher was conducted from 1st June 2019 until 8th June 2019. From the sample size calculation, the researcher found that the minimal sample that should be collected is 96 samples, and researcher collected the data from the total 125 respondents. With the voice of customer data, the researcher got the data about customer's preferences and customer's interest toward the dish at Restaurant X. Then, the researcher compared the data from questionnaire result and the restaurant assumption. With this comparison, the researcher transformed the data of favourite dish comparison to the fresh food materials and finally got the data about fresh food materials rank.

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Analyze

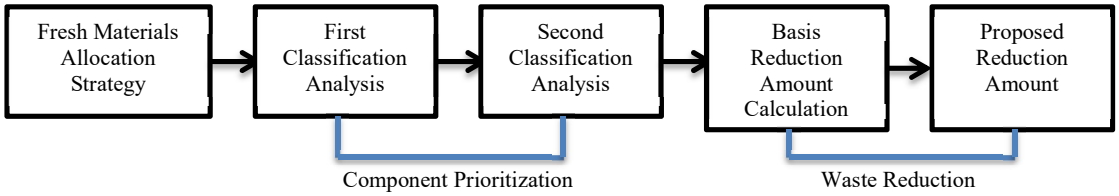
In this stage, the researcher got the data about the root cause of the problem through cause and effect analysis using Fishbone Diagram. After conducting observational activity and depth interview with the stakeholders, the researcher found that the causes of this symptom come from two different sectors. The first one came from man sector, which was the excessive preparation amount. The second one came from environment sector, which were the thrown away fresh food materials.

The excessive preparation amount occurred because of two things, the first one was because the chef does not follow the amount based on the calculation to decide the number of fresh materials preparation. The second thing was because of the inaccuracy between the material calculation and the number of sales. Beside the excessive amount of preparation, Restaurant X also often throws away the materials that do not fulfil the standard when it just came from the supplier.

Improve

After analyzing the data and identifying the root cause, the researcher will try to find the most appropriate solution for the problem stated. For the root cause related to the chef that does not follow the amount based on the calculation to decide the number of fresh materials preparation, the researcher proposed the solution related to the operational activities improvement. The purpose of those strategies is to make the chef of Restaurant X wanted to follow the calculation result to define the amount of prepared fresh food materials and would lead to decrease the excessive amount of prepared fresh materials.

Moreover, for the root cause related to an inaccuracy between the calculation of prepared fresh materials and the number of sales, the researcher propose the solution called fresh materials preparation reduction. In this case, the inaccuracy occurred when Restaurant X prepared some amount of fresh materials for a day and turned out the number of sales is below the prepared materials. It would lead to the some amount of unused fresh materials and create waste of fresh materials. Therefore, the researcher proposed this strategy to reduce the amount of prepared fresh materials. In conducting the fresh materials preparation reduction, the researcher developed the flow diagram as stated below.



Before identify the reduction amount for each fresh food materials, the researcher would conduct the two level of classification analysis. The first one was to determine the level of importance of each fresh material and the second one was to determine the number of reduction of each fresh material related to its prioritization. The first classification analysis only considered the existing condition inside Restaurant X (internal factors), which were the waste level and the allocation possibility, to define the importance level of each material. However, in order to reduce the possibility of stockout during the reduction process of fresh food materials preparation, the researcher also had to gather the information about the most interested dishes through the data of customer's interest towards the dishes at Restaurant X because the customers are the people who will consume the output produced by Restaurant X. Therefore, the researcher conducted the second classification analysis to compare between the importance level and the ranking position of each material.

After conducting both level of classification analysis, the researcher would propose reduction amount for each fresh food materials and then calculate the new waste level of fresh food materials with the formula as stated previously. The new calculation showed that the waste level of fresh food materials after implementing the fresh food materials preparation reduction is 2.1%. This number showed that there is a reduction in waste level from 9.15% to 2.1%. This result means that the formula was successful to reduce the waste level. This also means that with the lower waste level, there would be a less additional production cost and also a less revenue cutting because of the waste cost, and would lead to the increase of the profit.

Control

As stated previously, due to the limited time and sources, Restaurant X has not conducted the control stage yet. Therefore, in this research, the researcher would not discuss more about the control stage.

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CONCLUSION

Restaurant X is currently facing a serious problem, which is the high level of fresh food materials waste. From January 2019 until April 2019, the average waste level of fresh food materials is 9.15%. The high waste level will increase the additional production and decrease the revenue because of waste cost. This will lead to the decrease of the profit, which will not be in line with the objective of Restaurant X in terms of profit maximization. Therefore, this research is conducted in order to calculate how many the level of waste of fresh food materials at Restaurant X and also the factors that affect the problems occurred. This research is also conducted to provide recommendation in order to solve the problem related to the decrease of waste level of fresh materials.

After conducting observational activity and depth interview with the stakeholders, the researcher found that the causes of this symptom come from two different sectors. The first one comes from man sector, which is the excessive preparation amount. The second one comes from environment sector, which are the thrown away fresh food materials. The excessive preparation amount occurred because of two things, the first one is because the chef does not follow the amount based on the calculation to decide the number of fresh materials preparation.

The researcher has proposed the recommendation to Restaurant X to solve the problem stated. The first one is the operational activities improvement. In this recommendation, the researcher recommends Restaurant X to replace the kitchen tools to take fresh materials and also cut or separate the materials that just came from supplier into the same size. The second one is reducing the amount of prepared fresh materials by classifying each material at first. The classification analysis was conducted by considering the waste level of each material, the material allocation possibility, and the customer's interest to the dishes. In proposing the recommendation, the researcher compared the existing condition of Restaurant X and the new condition if Restaurant X implements the proposed recommendation. From the comparison result as stated previously, the researcher can conclude that the proposed recommendation is better than the existing method, since it will reduce the waste level of fresh food materials from 9.15% to 2.1%

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