The 1st International Conference on Business and Engineering Management (IConBEM)
February 1st 2020, Institut Teknologi Sepuluh Nopember, Surabaya, Indonesia

Inventory Waste Management In Micro Scale-Food Industry

Asnawi Mangku Alam and Desy Anisya Farmaciawaty
School of Business and Management, Institut Teknologi Bandung, Bandung
e-mail: Asnawi.mangku@sbm-itb.ac.id

***Abstract*—Micro-businesses in the culinary industry often experience management constraints. Poor management leads to many losses and wastes, such as inventory waste that arises due to mismatch of production level with demand level. This research aims to learn how the micro-business conditions in the culinary industry in Bandung deal with the problem of inventory waste and find suitable methods to overcome the problem. To carry out the research, we conduct a mix method technique. Data were collected through interviews with respondents who involved in micro-scale culinary businesses in Bandung and also from sales reports of internal data from Yama, a micro-scale company engaged in the culinary business. We analyzed the data using a qualitative method and a single-period inventory model. From the research, we found that the micro-business condition in the culinary industry has currently run their waste inventory management based on intuition without a scientific approach. Also, to solve the wasted inventory problem, the single-period inventory model can reduce the amount of inventory waste and can be implemented. It can significantly increase Yama's opportunity to make a profit and decreasing the possibility of inventory waste due to unsold inventory.**

***Keywords*—Micro Business, Food Industry, Inventory Waste, Management Inventory, Single Period Inventory Model.**

I. INTRODUCTION

NOWADAYS, most of micro businesses are facing problem to grow in this competitive era. Limited capital and the scarcity of raw materials are also become another problem to face with, it is reasonable for micro-entrepreneurs to utilize existing resources. Based on previous research, good management of the functional aspects of the company will have an impact on business effectiveness in MSME's. [1]. In order to feel the benefits of the right amount of inventory, increase product quality, lower costs, and increase the ability to meet demand, a company needs to identify and eliminate waste in inventory management in a systematic and sustainable manner. With inventory waste management, the company can increase efficiency, improve process productivity, and improve company competitiveness [2]. With good management process, micro business could also manage their resources better.

The objectives of this research are to find out the condition of the micro-scale food industry in Bandung in managing inventory waste, then find suitable method to be applied by the micro-scale food industry which has fresh and perishable product in Bandung, and to know about the possible impact that will occur after the method is applied

Yama Company, a micro business engaged in the food industry in Bandung. Yama's product is known as Bola Ubi or sweet potato balls and has various topping. The product has some characteristics, which are fresh and perishable. Yama's product cannot be stored for more than 3 days, and the finished goods cannot be stored for another day and become inventory waste. In 2018 Yama opened one of their booths on Tamansari Street and it was closed in April 2018. Within a period of four months, there were problems with demand and poor inventory management which caused a number of unsuitable supply and demand. In the end of March 2019, Yama open up new booth on Purwakarta Street, Antapani, Bandung.

Yama wants to increase the effectiveness of business by implementing good management process. Based on Yama's current condition, Yama has an obstacle in providing the optimum stocking level of inventory to meet the amount of demand so that it does not cause waste for each sales period. Data from Yama shows that inventory waste occurs quite influentially. In dealing with these problems Yama wants to examine the cost and focus on improving inventory management. Therefore this research will study about inventory waste that occurs in the micro-scale food industry in Bandung by referring to the data from Yama Company as a case study.

The data shown the total inventory waste in 2018 for 20 days is IDR 1.863.750, this amount is calculated based on the price from the product per piece. In 2018 Yama sell their product 10 pieces per portion and in 2019 their sell the product 8 pieces per portion. Wasted inventory that arises is considered a cost because inventory cannot be used or sold later. Wasted costs are quite large because they can cover the salary of one employee which is 50 thousand rupiah per day per employee or around 1.5 million rupiah per month per employee. These costs can also cover the cost of raw materials for around 2 or 3 weeks. With that large amount which could obtained within 20 days. The total inventory waste within 51 days in 2019, the amount is IDR 1.381.250 which still high and could cover salary expense. The number in 2018 greater than 2019, that known because at the beginning of the sale Yama was too optimistic to produce the inventory and could not measure the amount of demand.

To carry out this research, we performed both of the qualitative method and quantitative method. Qualitative data were obtained from literature review and also by interviewing micro business entrepreneurs engaged in culinary in Bandung. Quantitative data were obtained directly from Yama Company in the form of a sales report in 2019. To solve the problem, We compare the suitability of the characteristics of Yama and its products with the methods of inventory management. Then the appropriate method, namely the single period inventory model, to overcome the problem of inventory waste. To perform the research, we limit the scope of the micro business interviewed, which is engaged in food

Table 1.
Yama's Characteristic

Characteristic		Yama
Demand	Independent	Yes
	Dependent	No
Product	Make to order	No
	Make to stock	No
	One time order	Yes
Model	Probabilistic	Yes
	Deterministic	No

and is domiciled in Bandung. Every business has the same opportunity to be interviewed so we choose randomly with the consideration that the business is believed to have a closeness or similarity in characteristics with the Yama Company.

The next part of this paper is organized as follows. Section 2 explains the data collection methods and the methods used in processing data. Section 3 presents the results and discussion of inventory management problems. Section 4 presents a conclution of inventory management problems faced by Yama Company and also an overview of micro business in the food industry in Bandung.

II. METHOD

This section will explain data collection methods and data processing methods. The data obtained for research purposes is divided into two main parts, namely primary data and secondary data. Then the premier and secondary data that has been obtained and collected in a certain way will be processed to achieve the objectives of the research. The first method is to make coding to describe the conditions of micro-business. Other data obtained from the Yama Company will be analyzed for their characteristics and matched with the available methods of the results of the literature review in a rubric. The final step is to simulate the method that best suits the conditions of the Yama Company to find out the possible impacts after the method is applied.

A. Primary Data

Primary data obtained through qualitative approach, which is interview. In collecting data for a qualitative approach, this research uses in-depth interviews. In-depth interviews are one of the qualitative research techniques that conduct interviews with a small number of respondents in order to explore opinions, perspectives, experiences, beliefs, and other things in detail [3]. Questions raised by researchers are semi-structured.

In conducting semi-structured interviews, the questions asked need not always be fixed on questions that have been prepared beforehand [4]. So in interviews, researchers do not depend on the order of questions that have been prepared previously because the follow-up questions depend on the questions.

In deciding who to be interviewed, researchers used judgment sampling. Judgment sampling is a sampling technique that is based on the specified target elements that are tailored to the objectives or research problem [4]. In this research the authors took four samples because there were no minimum and maximum limits for the number of respondents in the qualitative method. In this research the authors conducted interviews with food businesses including; Bakso Tahu, Sweet Potatoes, Fruit Salad, and Molen. Sampling is conducted with the assumption that every micro business engaged in culinary in Bandung has the same opportunity to be chosen. The reason for choosing the four businesses is because the characteristics of the business and their products, after observation, have criteria that are almost the same as Yama Company and Yama's product.

Table 2.
Symbols Description

Symbol	Description
$\sum$	Sum or the amount of equation
X	Value in the data set
μ	Mean / average
N	Number of data points in the population

The primary data obtained is in the form of audio, so the first step is to do a transcript. The next step is coding. Coding is a method in which the researcher organizes data, so that the message the researcher gets from the informant can be clearer [5]. The coding technique itself consists of three phases to analyze text data and is also used to conduct this research. The first step which is open coding is the phase of providing keywords which can summarize important data. The second stage is axial coding, this stage is to identify and analyze the relationship between open codes and also to find the main analytic groups. Last is selective coding, aiming to find core variables that can cover all code and categories [6]. The last step is data mapping, a process by which researchers formulate the results of selective coding that has been done in data analysis.

B. Secondary Data

Secondary data were obtained from literature and from Yama Company in the form of reports. This secondary data will be used as a reference to answer the second research question, which is a suitable method to be applied so as to reduce the amount of inventory waste. This data will also be used as a reference to the third objective regarding the impact that might arise after implementing inventory management, especially the impact on inventory waste.

C. Methods Selection.

Method selection is the process where the reasearcher match the characteristics of Yama and Yama's product also their company condition with the criteria for each method of inventory management by using rubric assessment. The objective of this process is to know which method/s is/are suitable with micro-scale food industry that has similar condition with Yama.

D. ingle Period Inventory Model

After conducting methods selection the next process is calculate and simulating the choosen method which is single period inventory model. The objective of this process is to know what is/are possible/'s impact in the future after the method applied, especially the impact for inventory waste

Single period inventory model is a model that is used to find optimum amount of order iventory or raw material at once. This method is adopted from a seasonal method which means the item will have a little or not have any value if it has passed the season [7]. There are several assumptions have been made to model perishable inventory management [8]:

Table 3.
Rubic of Management Method Selection

Methods	Characteristics of Yama	
	Pass	Reason
EOQ	No	Yama's product is not made based stock condition
POQ	No	Yama's production is one time order
Quantity Discount	No	There is not discount for purchasing in large scale
Single period	Yes	The method is suitable for use because it can provide the optimal amount for each order needed and also has no constraints for perishable products.
Q-model	No	Yama's product is not made based on stock condition
P-model	No	Yama's product is not made according to schedule / time
ABC inventory	No	In Yama, there is only 1 type of product. This method used for classification not for calculate optimum level to order.
Safety stock	No	Yama does not build a stock for WIP product and finished product. Other than raw materials cannot be stocked until further production

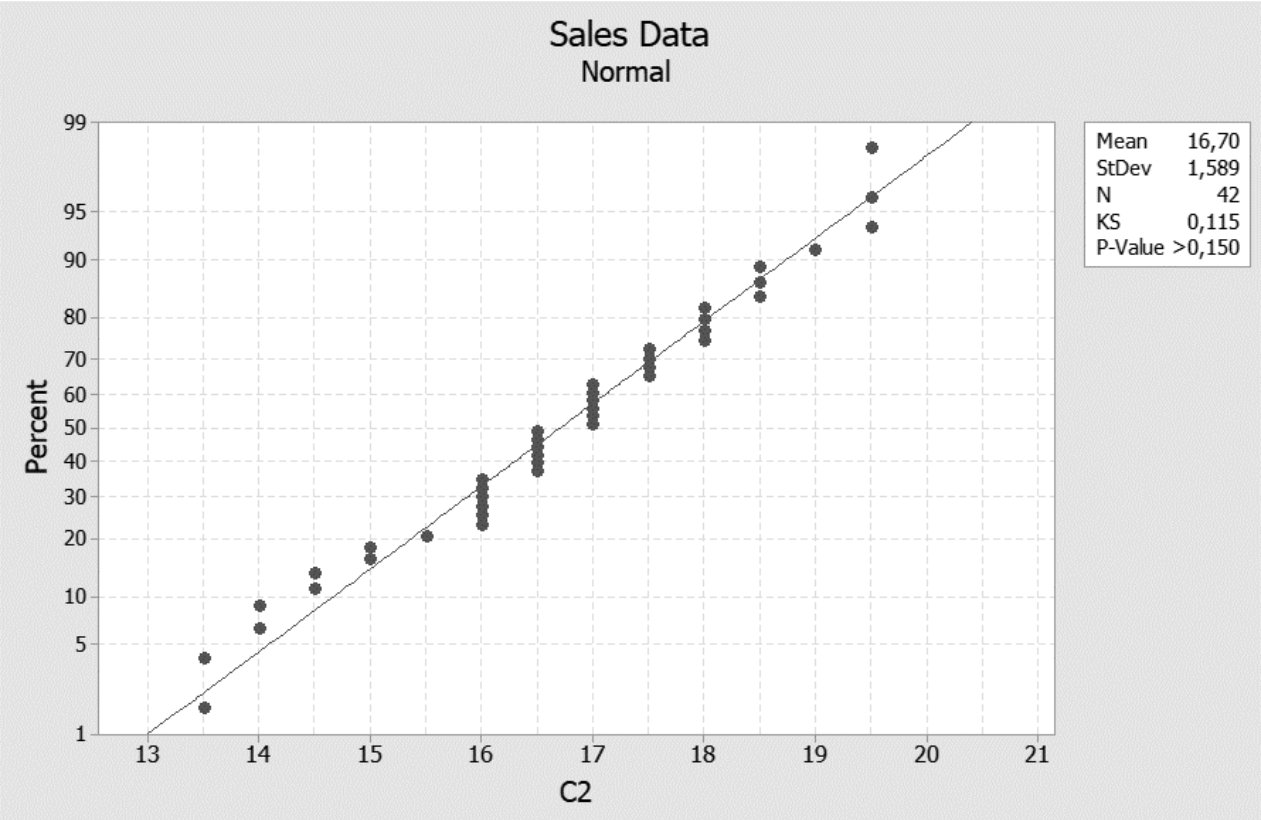

Figure 1 Normality Test

This model is intended for one item that has a limited lifetime. The item cannot be sold after its life-time is complete. However, in some circumstances, it is possible to save some value from expired items and initial inventory is zero. The demand is a random variable and is not known with certainty. There are no order costs incurred. The probability distribution of demand is known. Following are the steps in using the single period method.

The first thing to do is to consider two marginal costs:
Cost of Shortage

$$C_s = Cost\ of\ Shortage\ (underestimated) = Sales\ price\ per\ unit - cost\ per\ unit \quad (1)$$

Cost of Overage

$$C_o = Cost\ of\ overage\ (Overestimated) = Cost\ per\ unit - Salvage\ value\ per\ unit \quad (2)$$

After we found cost of shortage and cost of overage, next step is to find the service level to calculate the optimal order.

Service Level

$$\frac{C_s}{C_s + C_o} \quad (3)$$

Mean

$$\mu = \frac{sum\ of\ data\ population\ value}{number\ of\ data\ items\ in\ population} = \frac{\Sigma\chi}{\mathrm{N}} \quad (4)$$

Standard Deviation

$$\sigma = \sqrt{\frac{\Sigma|\mathrm{X}-\mu|^2}{\mathrm{N}}} \quad (5)$$

Table 4.
Optimum Stocking Level

Mean	S.Deviation	Z score	Optimum level
17	2	0,84162	19

Find the z score and then the optimum order quantity,
Optimum Order Quantity

$$= (\mu) + (\text{Z Value x } \sigma) \quad (6)$$

The stockout risk also can be calculated,
Stockout Risk

$$= 1 - \text{service level} \quad (7)$$

III. RESULTS AND DISCUSSION

This section will explain how the results obtained from data processing. The discussion includes how micro-business conditions in the culinary field in Bandung in running their business and what happens. The next discussion about what methods can solve the inventory problems of the Yama Company as a model of micro business in the culinary field in Bandung and then what are the possible impacts that can occur.

A. Current Condition of MSMEs Management Inventory

The results of the analysis of each variable can be concluded that the micro-scale food industry still uses traditional ways of handling its business. Intake based on intuition and estimation. Reference is also gained from knowledge since starting a business. In running their business they create their own management system by adopting it gradually or copying it to other existing businesses. Losses such as inventory waste in small amounts even though they have high processing intensity often do not get attention. The reason could be due to lack of understanding so looking at it is something normal. However, waste inventory management is an urgent matter because the data and conditions in the field state that, so do respondents who want to develop more and get more profitable income. Therefore it is also important for Yama to apply good inventory management methods to deal with the problem of inventory waste.

B. Inventory Management Method Selection

Yama's product categorized as independent because it does not depend on selling of other items of its product. Production activities are categorized as one time orders because Yama products will only be produced once a day and also not produced based on the number of stocks and based on orders. Yama's products are also only produced for the same day and are not stored for the next day. So Yama's production process is included in one time order because the order or production is only limited for one day and the condition of the stock cannot last more than the next production period [7]. Demand and lead time in Yama's operational activities are uncertain or cannot be known in advance, so Yama's demand and lead time have characteristics as probabilistic models. The selection of the eight methods that have been found, shown in Table 3.

C. Single Period Inventory Model

In this chapter, the researcher wants to analyze the problem of waste inventory at Yama Company. The method used is the single period method, which is a method that has been assumed to be suitable to be applied based on the results of the previous analysis. The analysis in this chapter aims to answer the third research question, which is about the possible impacts that can occur after the method is applied. The data used comes from historical sales data from the period May to August 2019 which is 51 days.

1) Normality Test

Based on the Figure 1, the data shows normal distribution after removing 13 outliers. P-value indicates a number greater than 0.05. Then the calculation process can be continued after the normal distribution. Here are the data that have been made after normality test. Based on the results of the analysis, the authors found that the distribution several times was not normal. Some conclusions of the causes that might occur is because the data obtained is insufficient, it could be due to the intensity of sales every week is different or also because of the short sales period (only 51 days). In addition, the assumptions can be supported by the results of data analysis totaling approximately 70 days as a result of the merging of sales data in 2018 and 2019 shows that the data can be normally distributed.

Basically, the distribution of Yama's sales is normally distributed. To ensure this, here are some characteristics of data with a normal distribution [9]: Data can be measured, the amount of data with extreme values is that the value is too high and too low is available in small quantities, the majority of data is almost close to the average value of the whole data, average values, median values, and mode values have short intervals.

When reviewed from the available data and comparing it with the characteristics mentioned above of course the data can be measured easily. The possibility of the extreme value could be due to operational conditions during the sales process such as during Islamic holidays, working hours and sales time becomes shorter. Weather conditions also affect the number of shop visitors so that it indirectly affects sales conditions. Then on other national holidays which then makes the number of sales is too high compared to the others.

The data shows a lot of outliers because sales data has a cut cycle and also the data available is still relatively small. This is evidenced by the results of the normality test on sales data combined from 2018 and 2019 can be distributed normally because it contains enough data so that it can describe demand properly. The average of the data is 17, if reviewed again, most of the data are indeed close to 17. Therefore, based on the characteristics mentioned above, the data analyzed are included in the normal distribution.

2) Cost of Shortage and Cost of Overage

In calculating the cost of shortage and cost of overage, we need some special data. The data needed for the cost of shortage is the selling price of the unit and the cost of the unit. The data needed for the cost of overage is the perunit cost and the perunit salvage value. In the case of Yama, the product is not stated in unit items, but in unit units.

By calculating the cost of the shortage, the researchers will know how much the cost will be received by Yama by not serving customers if on that day Yama can not meet customer demand. The amount of the loss is 8,000 multiplied by the number of customers lost or demand that cannot be met or the quantity of order.

Table 5.
Service Level

Service level	Mean	S.Deviation	Z score	Optimum level	Profit	Cost of Overage
80%	17	2	0,84162	19	Rp152.000	Rp38.000
85%	17	2	1,03643	19	Rp152.000	Rp38.000
90%	17	2	1,28155	20	Rp160.000	Rp40.000
95%	17	2	1,64485	20	Rp160.000	Rp40.000

Table 6.
Data Sales Simulation 1.

No	Optimum level	Stock	Sales		Waste	lost of potential sales	
			1	½		Quantity	Rp.
1	152	144	18			8	Rp64.000
2	152	134	14		22		
3	152	150	16	1	18		
4	152	133	14	1	17		
5	152	135	14		23		
6	152	142	16	1	10		
7	152	120	13	1	12		
8	152	124	14	1	8		
9	152	148	18	1		4	Rp32.000
10	152	108	13	1		44	Rp352.000
11	152	142	16		14		
12	152	144	16	1	12		
13	152	143	16		15		
14	152	148	17	1	8		
15	152	136	17			16	Rp128.000
16	152	134	15	1	10		
17	152	149	17		13		
18	152	152	16		20		
Average		139			15	Total	Rp576,000

By calculating the cost of overage, researchers will know how much the loss that Yama gets if the amount of stock is more than customer's demand per day. Because Yama's product does not have a salvage value, if Yama produces more supply than demand, Yama will pay the excess usage fee for each unsold portion per period. The amount of loss that may be received is IDR 2,000 multiplied by the amount of leftover / unsold inventory.

3) Service level

By calculating the costs of shortages and overage, researchers can calculate the level of service to see how many demand can be fulfilled by Yama and how many opportunities for being stockout that lead to unmet demand. Based on available data shows that Yama products have a service level of 80% which means Yama has the possibility to serve 80% of customer demand with a 20% chance for being stockout and cannot meet demand.

4) Optimum Stocking Level

By calculating the optimal stock, researchers can calculate the optimum level or optimum portions that must be made every day to minimize the possibility of inventory waste.

Based on the results of these calculations (see Table 4) it can be seen that the optimum amount that should be produced per day is as much as 19 portions or in the amount of 152 pieces to minimize inventory waste and fulfill most customer demand. With a service level of 80% and also an optimum level of 19, Yama has a possible monthly income IDR 3,952,000.

Based on the data in Table 5, it can be seen that if Yama wishes to increase service level and then produce at least 19 to 20 servings per day, the best possibility is to earn a profit of at least IDR 152,000 per day or a maximum of IDR 160,000 per day. Besides that, the worst possibility is that if it is not sold at all, the worst loss received will be IDR 40,000.

If the optimum level is simulated, from the total amount of the data that has been normalized (see Table 6), there are 18 sales data that have stock level less than the optimum level which is 152 pieces. But 14 of them are still experiencing the remaining inventory waste. Four of the 18 data experienced a stockout but the total stock was less than 152 so there were losses due to demand that could not be fulfilled. The following are statement that can be taken: The stockout losses is = 72 x IDR 8,000 = IDR 576,000, the average stock is 139, the average of leftover if the number of stock reach otimum level is 15 pieces, and the probability for being leftover or overage is 14:18.

If the optimum level is simulated, it can be seen in the Table 7, 25 data that the level of stocking level is greater than the optimum stock level, which is 152. Statements that can be taken from the table are; the overage cost is IDR 1,346,000, the average stock is 166, the average of leftover product is 27 pieces, and the posibility for being leftover is 25:25

From the analysis results above it can be concluded that the potential impact arising after Yama applies this method is to increase the amount of revenue and reduce the amount of costs. With existing data, Yama's condition currently has a high enough service level of 80% so that more demands can be fulfilled, in addition to that the stockout level is at 20%. By applying this method Yama has the possibility of a daily profit of IDR 152,000 and monthly to IDR 3,952,000. The biggest risk of loss by setting this is that Yama will bear a loss of IDR 40,000 per day.

Table 7.
Data Sales Simulation 2.

No	Optimum level	Stock	Sales		Waste	Cost of overage
			1	2-Jan		
1	152	168	17		32	Rp64.000
2	152	152	16	1	20	Rp40.000
3	152	163	17	1	23	Rp46.000
4	152	154	17	1	14	Rp28.000
5	152	159	18	1	11	Rp22.000
6	152	159	16	1	27	Rp54.000
7	152	202	19	1	46	Rp92.000
8	152	167	19	1	11	Rp22.000
9	152	160	17	1	20	Rp40.000
10	152	160	18	1	12	Rp24.000
11	152	199	16	1	67	Rp134.000
12	152	163	19		11	Rp22.000
13	152	167	16	1	35	Rp70.000
14	152	155	16		27	Rp54.000
15	152	154	17		18	Rp36.000
16	152	160	18		16	Rp32.000
17	152	159	17		23	Rp46.000
18	152	155	15		35	Rp70.000
19	152	202	19	1	46	Rp92.000
20	152	165	16		37	Rp74.000
21	152	154	18		10	Rp20.000
22	152	171	16		43	Rp86.000
23	152	157	17	1	17	Rp34.000
24	152	167	18		23	Rp46.000
25	152	169	15		49	Rp98.000
Total		4141	427	13	673	Rp1.346.000
Average		166			27	Rp53.840

From the comparison between the calculation of a table containing a stock of less than or equal to 152 (optimum level) with a table containing more than 152 stock data (optimum level) shows a significant difference. In the table with more stock, it has caused greater inventory waste and loss with a nominal value of IDR 1,346,000. The level of intensity of waste inventory is also higher, 25:25 with an average waste inventory that is also high, 27 pieces. So it can be concluded that by applying the single period inventory mode, Yama could minimize the impact of inventory waste and also maximize potential revenue.

IV. CONCLUSION

This research is conducted to learn about how the condition of the micro-scale food industry in handling inventory waste problems and how the management works. This research has used Yama as a model in the problem of inventory waste. Inventory waste is very vulnerable to arise in the culinary business. As experienced by Yama, losses due to inventory waste have a significant impact to its revenue.

After the research has been carried out, the results of the analysis can be seen that the condition of the micro-scale food industry is not consider inventory management as one of their focus and problem, this is because the system that is already running makes them fearful of risks, accustomed to the problem or because of their lack of knowledge and ability to apply management methods in scientific approach. Their management is conducted based on personal thoughts and experience without scientific support. Decision making is mostly the result of intuition and forecasting, so there is no definite solution in dealing with the problem of inventory waste. Although two out of four respondents said that inventory management was not important, they showed several statements that indicated indirectly that they needed good inventory management. Based on their thoughts, actions, conditions and desires, it can be concluded that inventory management, especially to deal with inventory waste, is important to do. Therefore, it is also important for Yama and equally important for other business with the problem of inventory waste to establish suitable inventory management.

Micro-scale food industry conditions create difficulties in determining suitable management methods due to certain assumptions and due to special characteristics. In the case of Yama, Yama has many characteristic of product or its company, some of them are independent demand, one time production, perishable product, and with products without salvage value. To face inventory waste problem with match characteristic, single period model was chosen to help overcome the problem.

By applying the single period method, it is found that there are several possible impacts to the operational company especially on production and financial of production. The most important impact is this method could minimize the amount of inventory waste and can also increase profit potential. In the case of Yama, by applying this method, Yama could potentially reduce the intensity and average amount of the inventory waste and also Yama could save their time, energy and resources.

Based on the results of the study, it is important for entrepreneurs who want their businesses to grow to pay more

attention to details, such as creating a system which could track tiny things from daily operational activities. Yama and its inventory management can be used as a reference model that the application of scientific management is not difficult to apply. The impact obtained from waste inventory management are very positive, in addition to increasing the benefits of effective and efficient time, resources, and costs, this management can help add competitiveness because the funds saved from good management can be allocated to other profitable activities such as marketing and promotion purposes. In addition, the method is not limited to the single period inventory model, but there are many other methods that can be in accordance with the conditions of each business, the most important thing is to start paying attention to plan and implement better inventory management.

The thing that is highly recommended for further research is to expand respondents not only in Bandung but outside Bandung so that an understanding of the conditions of MSMEs deemed important by the government can be clearly illustrated. The data that is managed needs to be expanded more and more data, the better the data is in describing conditions in the field. The method needs to be explored more deeply, not limited to independent demand but can also be dependent demand so as to open new knowledge about the micro-business conditions that have many variations of dependent products. Business scale does not depend on micro business, small and medium business can also be considered with the importance of comparison in order to become a pilot for micro businesses to be more developed. Exploration of companies with different characteristics also needs to be done, because by doing so it will show different methods and steps that need to be taken in responding to problems that occur. Finally, identify problems that need to be deepened so that problems can be found that have the greatest impact on the course of operations or production of the company, not limited to inventory waste.

REFERENCES

[1] L. Bismala, "Model manajemen Usaha Mikro Kecil dan Menengah (UMKM) untuk meningkatkan efektivitas usaha kecil menengah model manajemen Usaha Mikro Kecil dan Menengah (UMKM) untuk Meningkatkan Efektivitas Usaha Kecil Menengah," *J. Entrep. dan Entrep.*, vol. 5, no. 1, pp. 19–26, 2016.

[2] I. A. Rawabdeh, "A model for the assessment of waste in job shop environments," *Int. J. Oper. Prod. Manag.*, vol. 25, no. 8, pp. 800–822, 2005, doi: 10.1108/01443570510608619.

[3] C. Boyce and P. Neale, *Conducting In-Depth Interviews: A Guide for Designing and Conducting In-Depth Interviews for Evaluation Input*. Watertown, Massachusetts: Pathfinder International, 2006.

[4] M. Saunders, P. Lewis, and A. Thornhill, *Research Methods for Business Students*, 5th ed. Harlow, England: Pearson Education, 2009.

[5] P. C. Smith, S. M. Schmidt, D. Allensworth-Davies, and R. Saitz, "A single-question screening test for drug use in primary care," *Arch. Intern. Med.*, vol. 170, no. 13, pp. 1155–1160, 2010, doi: 10.1001/archinternmed.2010.140.

[6] J. Saldaña, *The Coding Manual for Qualitative Researchers*. Los Angeles, California: Sage, 2009.

[7] J. Heizer, B. Render, and C. Munson, *Operations Management : Sustainability and Supply Chain Management*, 12th ed. Harlow, England: Pearson Education Limited, 2017.

[8] D. Shenoy and R. Rosas, *Problems & Solutions in Inventory Management*. Switzerland: Springer, 2018.

[9] E. M. Kuswandi, *Delapan Langkah dan Tujuh Alat Statistik untuk Peningkatan Mutu Berbasis Komputer*. Jakarta: Elex Media Komputindo, 2004.