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Application of Raw Material Inventories Using the ABC Class Classification Method and the EOQ Method in Raw Material Inventories Based on POM QM For Windows (Case Study on Surabi Gapura Purwakarta 2023)

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Abstract

The quality of a product depends on how the manufacturer applies the supply of raw materials used. The application of a good supply of raw materials can expedite the production process. There are many factors that affect the smooth production process. One of the factors that can affect the smoothness of the production process is the supply of raw materials. Raw materials in the production process include raw materials, semi-finished materials and finished goods. In running its business, Kedai Surabi Gapura experiences difficulties in terms of implementing raw material supplies considering the large number of orders that the shop receives every month so that Kedai Surabi Gapura cannot determine the number of priority raw material needs that must be purchased according to production needs. Surabi Gapura requires an appropriate method of supplying raw materials for production. By applying the raw material inventory classification method, it is hoped that Kedai Surabi can find out the priority classification of raw materials used based on raw material prices, in this case related to capital. Shop owners need to implement raw material inventory planning and control because to find out what the difference is between the costs incurred for purchasing raw materials and the amount of raw material requirements according to the daily production target. In addition to the raw material inventory classification method needed in an effort to expedite the production process, the shop also needs to apply the right raw material ordering method in order to save costs incurred such as transportation costs for sending raw materials, raw material storage costs, ordering costs, raw material maintenance costs arising from inventory. By applying the EOQ method for reordering raw materials, it is hoped that the Surabi Gapura Shop will place orders in economical quantities to determine the point of reordering raw materials so that the costs incurred by the Surabi Gapura Shop are efficient.The research method used in this study is to use a quantitative descriptive method. In this study the method used aims to determine the appropriate method of inventory of production raw materials with the raw material inventory classification method and the correct raw material ordering method in order to save costs incurred such as transportation costs for sending raw materials, raw material storage costs, ordering costs, maintenance costs for raw materials arising from inventory. By applying the EOQ method for reordering raw materials.From the results of calculations using the POM QM For Windows software based on the results of data processing using the ABC class classification analysis method for raw materials from 15 types of raw materials, they can be classified based on their respective classes according to the amount and investment value or rupiah spent to obtain these raw materials. Then by using the calculation of the EOQ method with the POM QM For Windows software, business owners can find out the optimal number of orders in the production process, namely the optimal number of orders is at 8,869.52 units, that is, if the demand in one day is 250 units.

Keywords:raw material inventory, raw material classification, EOQ, POM-QM.

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INTRODUCTION

Business actors and businesses that are included in Micro, Small and Medium Enterprises (UMKM) must currently manage their businesses by paying attention to standards that refer to the Indonesian National Standard (SNI) given the intense competition in the business world where the number of UMKM in Indonesia is increasing every year. This is in line with the efforts made by the Ministry of Cooperatives and SMEs in order to increase the competitiveness of UMKM at the national and global levels. The Indonesian National Standard is expected to be a reference for UMKM actors so that they can easily penetrate the global market and as a preparation for global supply chains.

Referring to Government Regulation Number 28 of 2021 concerning Implementation of the Industrial Sector regarding the provision of non-fiscal facilities to UMKM in the framework of standardization. Business actors or UMKM along with increasing public demand and knowledge of product quality, business actors are required to produce products with good quality and be competitive.

Good product quality is determined by the selection and use of good quality raw materials. Business actors who use good quality raw materials are able to produce good products and meet product quality standards.(Erdi1 & Haryanti, 2022)

The quality of a product depends on how the manufacturer applies the supply of raw materials used. The application of a good supply of raw materials can expedite the production process. There are many factors that affect the smooth production process. One of the factors that can affect the smoothness of the production process is the supply of raw materials. Raw materials in the production process include raw materials, semi-finished materials and finished goods.

Surabi Gapura, which is located in Babakan Cikao District, Purwakarta, West Java, is an UMKM engaged in the culinary field. The resulting product is a typical Sundanese snack food in the form of Surabi. The following is the Gapura surabi demand data each month as presented in table 1 below:

Table 1 Data on Total Demand and Sales of Surabi Gapura

Average Selling Price	Total Production/Month	Total Income/Month
IDR 9,125	7,500 pcs	IDR 68,437,500

Source: data processed in 2023

Based on table 1.1, it can be described as follows, namely the selling price of surabi varies from Rp. 6,500, Rp. 7,500, Rp. 10,000 and Rp. 12,500 the selling price varies according to the different flavors. In one day Kedai Surabi Gapura produces 250 pcs of surabi so that in 30 days the total production produced is 7,500 pcs of surabi with a total revenue of Rp. 68,437,500 per month.

In running its business, Kedai Surabi Gapura experiences difficulties in terms of implementing raw material supplies considering the large number of orders that the shop receives every month so that Kedai Surabi Gapura cannot determine the number of priority raw material needs that must be purchased according to production needs.

In this case the Surabi Gapura tavern requires an appropriate method of supplying raw materials for production. By applying the raw material inventory classification method, it is hoped that Kedai Surabi can find out the priority classification of raw materials used based on raw material prices, in this case related to capital. Shop owners need to implement raw material inventory planning and control because to find out what the difference is between the costs incurred for purchasing raw materials and the amount of raw material requirements according to the daily production target.(Widodo et al., 2020)

In addition to the raw material inventory classification method needed in an effort to expedite the production process, the store also needs to apply the right raw material ordering method in order to save costs incurred such as transportation costs for sending raw materials, raw material storage costs, ordering costs, raw material maintenance costs arising from inventory. By applying the EOQ method for reordering raw materials, it is hoped that the Surabi Gapura Shop will place orders in economical quantities to determine the point of reordering raw materials so that the costs incurred by the Surabi Gapura Shop are efficient. In this study the method used to determine the raw material inventory classification method and the EOQ method or economical reorder point uses the help of POM-QM For Windows software.

THEORETICAL REVIEWS

Raw Material Inventory

Inventory of raw materials in the production process greatly determines the smoothness of the production process. Inventory can include goods owned by the company in the form of raw

materials, semi-finished goods or finished goods in the form of products that can be used, namely for raw materials and semi-finished goods for the next production process, while finished goods in the form of products can be sold by the company within a certain period of time according to demand. Inventory has the following functions: inventory in transportation, inventory cycle, inventory in terms of safety and inventory in anticipation. Apart from the function, there are also factors that affect inventory, in this case raw material inventory.(Hartono & Setyo Prabowo, 2023)

Inventory Cost

Control of raw materials in the production process is a factor that can affect the smooth production process in a manufacturer or company. The raw material control strategy in a business needs to be implemented properly starting from planning, analyzing raw material needs, ordering raw materials, costs arising from inventory by implementing raw material control the company will save costs incurred so that it is more efficient.(Umami et al., 2018)

Inventories include raw materials, semi-finished goods and finished goods owned by companies stored in inventory. In inventory control, various plans are needed, starting from the planning process to storage. In terms of supply of raw materials in the production process is a series of processes to provide raw materials used to support the success of the production process. The process starts from the availability of raw materials at suppliers, searching for suppliers, ordering processes, shipping processes, to storage in warehouses or inventories, of course, this series of processes creates costs that must be incurred by the company. The costs incurred due to inventory include ordering costs, shipping costs and storage costs. Ordering costs are costs incurred when a company orders raw materials such as raw material purchasing costs, costs incurred for ordering raw materials, checking costs, packaging costs. Shipping costs are costs incurred by the company to obtain raw materials such as shipping costs, freight costs, transportation costs. Next is storage costs, namely costs that must be set aside by the company in storing raw materials in storage. These costs include maintenance costs, insurance costs, electricity costs, security costs. Shipping costs are costs incurred by the company to obtain raw materials such as shipping costs, freight costs, transportation costs. Next is storage costs, namely costs that must be set aside by the company in storing raw materials in storage. These costs include maintenance costs, insurance costs, electricity costs, security costs. Shipping costs are costs incurred by the company to obtain raw materials such as shipping costs, freight costs,

transportation costs. Next is storage costs, namely costs that must be set aside by the company in storing raw materials in storage. These costs include maintenance costs, insurance costs, electricity costs, security costs.(Handra & Rangian, 2017)

ABC Raw Material Classification Method.

In an inventory management that includes raw materials, semi-finished goods and finished goods, it is necessary to have good management. Inventory management has the function of knowing how much inventory is owned or often referred to as on hand material or material handling when it is needed for the production process and is ready for use. This ABC method has the concept that the company divides or classifies raw materials based on the number of units and the costs incurred or the price to obtain these raw materials. Classification of raw materials with the ABC method is divided into three classes. Class A, namely the type of raw material which is a small number of units, ranging from 15% to 20% which, if the total of all items of raw material is added up, has a total of 70% with the highest rupiah rate of the total inventory investment. Class B is a type of raw material that has a number of units ranging from 10 to 15 percent and if the total items of raw materials are added up, it has a moderate level of 20 percent of the total inventory investment. Then class C is a type of raw material that has a number of units ranging from 5 to 10 percent and has a total raw material of 10 percent with a low level of total inventory investment. Class B is a type of raw material that has a number of units ranging from 10 to 15 percent and if the total items of raw materials are added up, it has a moderate level of 20 percent of the total inventory investment. Then class C is a type of raw material that has a number of units ranging from 5 to 10 percent and has a total raw material of 10 percent with a low level of total inventory investment. Class B is a type of raw material that has a number of units ranging from 10 to 15 percent and if the total items of raw materials are added up, it has a moderate level of 20 percent of the total inventory investment. Then class C is a type of raw material that has a number of units ranging from 5 to 10 percent and has a total raw material of 10 percent with a low level of total inventory investment.(Indrajaya, 2018)

EOQ method.

EOQ (Economic Order Quantity) is a method of calculating the most economical ordering quantity of raw material purchases at each order. The EOQ principle is to determine the point of ordering raw materials so that it is more economical and costs incurred are low. Using the EOQ

method will reduce stock buildup in inventory thereby reducing costs incurred due to inventory buildup in warehouses. EOQ also assists companies in determining the re-order point and how much to order.(Dewi et al., 2019)

The EOQ method is a method for determining the optimal number of orders mathematically and statistically which is a tool in solving problems that arise in the production process of a product and can be a solution in making decisions and determining a policy that must be taken by the company.(Rasjidin & Prabowo, 2016). This EOQ method can help determine:

1. Number or economical size in one order
2. Total costs incurred by the company in meeting the needs of raw materials for production.

In determining the EOQ, some data is needed to be able to determine the number of orders economically, such as the number or level of demand in each period, storage costs and waiting time for orders.(Sukendar et al., 2022)

POM QM For Windows.

POM QM Software For Windows is a software launched by Prentice Hall which can be installed on a computer. This POM QM application or software has many benefits that can be used in making decisions on operations and production issues. By using this software, you can determine the optimal solution for problems that arise in a company, especially in terms of production and operations.(Astutik et al., 2022)

METHODS

This research was conducted at an UMKM engaged in the culinary field, namely at the Surabi Gapura shop located in Kbaupaten Purwakarta, West Java. The research method used in this study is to use a descriptive quantitative method, namely data in the form of numbers or numerics and these numbers can be carried out by mathematical operations.

In this study the method used aims to determine the appropriate method of inventory of production raw materials with the raw material inventory classification method and the correct raw material ordering method in order to save costs incurred such as transportation costs for sending raw materials, raw material storage costs, ordering costs, maintenance costs for raw materials arising from inventory. By applying the EOQ method for reordering raw materials.

The data used in this study are primary data, namely data obtained from informants through interview techniques. In this case, interviews were conducted with the owner of the Surabi Gapura

shop and employees in the production department. The data analysis technique uses software assistance, namely POM QM for Windows 3 to calculate the ABC analysis method and the EOQ method.

RESULTS AND DISCUSSION

1. Class Classification Method Calculation With ABC Analysis Method

Based on the results of interviews conducted with the owner of Surabi regarding the need for raw materials needed in the production process, data on raw material requirements can be obtained as presented in table 2 below:

Table 2 Raw material requirements for production of Surabi/day

No.	Raw Material Name	Unit	Needs in one production process	Unit price	Total cost
1.	Rice flour	kg	16 kgs	Rp. 28,500	Rp. 456,000
2.	Coconut	grain	16 grains	Rp. 8,000	Rp. 128,000
3.	Flour	kg	12 kgs	Rp. 29,000	Rp. 348,000
4.	Egg	kg	16 kgs	Rp. 28,000	Rp. 448,000
5.	Meat	kg	3 kgs	Rp. 120,000	Rp. 360,000
6.	White milk	Can	10 cans	Rp. 18,000	Rp. 180,000
7.	Chocolate milk	Can	5 cans	Rp. 17,500	Rp. 87,500
8.	Cheese	Wrap	10 packs	Rp. 15,000	Rp. 150,000
9.	Sausage	Wrap	5 packs	Rp. 20,000	Rp. 100,000
10.	Peanut	kg	5 kgs	Rp. 23,000	Rp. 115,000
11.	Strawberries	kg	3 kgs	Rp. 10,000	Rp. 30,000
12.	Messiah	Wrap	5 packs	Rp. 6,500	Rp. 32,500
13.	Mayonnaise	Wrap	5 packs	Rp. 14,500	Rp. 72,500
14.	Oncom	kg	5 kgs	Rp. 3000	Rp. 15,000
15.	Salt	Wrap	5 packs	Rp. 3,500	Rp. 17,500

Data source: results of data interviews processed in 2023

Based on table 2 of the raw material requirements above, it can be seen that in every single production process, Kedai Surabi requires various kinds or types of raw materials to be able to produce as many as 250 pieces per one production per day.

By using the raw material classification method with the ABC analysis method, business owners can determine the priority of the most important raw material needs based on the classification of raw material classes according to the value of each class. In this study the class classification method for each raw material will use calculations with the help of the POM QM

For Windows software so that the shop owner is able to implement a control plan for the need for raw materials to be used in the surabi production process.

The following are the results of data processing using the POM QM For Windows software to determine class classification analysis in raw materials using the ABC Analysis method as presented in Figure 1 below:

Figure 1 Classification results of the ABC Class Analysis POM QM For Windows

Inventory Results

Hasil Analisis Metode Klasifikasi Inventory Bahan Baku Surabi Solution

Item name	Demand	Price	Dollar Volume	Percent of $-Vol	Cumultv $-vol %	Category
Tepung Beras	16	28500	456000	17.95	17.95	A
Telor	16	28000	448000	17.64	35.59	A
Daging	3	120000	360000	14.17	49.76	A
Tepung Terigu	12	29000	348000	13.7	63.46	B
Susu Putih	10	18000	180000	7.09	70.55	B
Keju	10	15000	150000	5.91	76.46	B
Kelapa	16	8000	128000	5.04	81.5	B
Kacang	5	23000	115000	4.53	86.02	C
Sosis	5	20000	100000	3.94	89.96	C
Susu Cokelat	5	17500	87500	3.44	93.41	C
Mayonaise	5	14500	72500	2.85	96.26	C
Mesis	5	6500	32500	1.28	97.54	C
Strawberry	3	10000	30000	1.18	98.72	C
Garam	5	3500	17500	.69	99.41	C
Oncom	5	3000	15000	.59	100	C
TOTAL	121		2540000			

Data Source: Data processing with POM QM For Windows

Based on the results of data processing using the ABC class classification analysis method for raw materials, it can be seen that of the 15 types of raw materials, they can be classified based on their respective classes according to the amount and investment value or rupiah spent to obtain these raw materials. Rice flour, eggs and meat are included in the classification of class A goods where the total percentage of the three raw materials is 49.76 percent. Furthermore, the raw materials for wheat flour, white milk, cheese and coconut are included in the class B classification category with a total percentage of 31.74 percent and raw materials such as nuts, sausages, chocolate milk, mayonnaise, mesis, strawberries, salt and noncom are included in class C classification with a total percentage of 18.5 percent. By using the class classification of raw materials using the ABC class analysis method, it is hoped that business owners will be able to identify raw material inventories to meet raw material needs which will affect the smooth

production process at the Surabaya Gapura Shop. Based on class classification with ABC analysis, it can also make it easier for business owners to determine priority purchases of raw materials that have a high level of investment or cost relative to production costs.

The business owner of Kedai Surabi can apply a classification of raw materials with the benefit of being able to find out which types of raw materials have a high use value. In addition to the class classification method for raw materials, forecasting is also needed for the needs of each raw material.(Nababan et al., 2019). Forecasting of raw material requirements also needs to be applied in the production process because it can determine the number of requests or orders received with the needs of raw materials and the inventory of raw materials owned, this is also an initial resistance in planning and controlling the production process.(Zakaria et al., 2020)

2. Inventory Cost

Based on the results of interviews with business owners, data was obtained regarding the costs incurred to purchase the raw material requirements used in the production process. The following are the costs incurred in raw material inventory as presented in the table below:

1. Cost of Ordering Raw Materials

Table 3 Cost of Ordering Raw Materials

No.	Fee Type	Amount
1.	Raw Material Costs	Rp. 2,540,000
2.	Order Fee :	
	a. Credit Fee	Rp. 200,000
	b. Packaging Fees	Rp. 75,000
	c. Check Fee	Rp. 25,000
	d. Freight Fees	Rp. 30,000
3.	Shipping Costs	Rp. 100,000
	Total	**Rp. 2,970,000**

Data source: results of data interviews processed in 2023

2. Raw Material Storage Costs

Storage costs that arise as a result of inventories that must be incurred by business owners are used for raw material maintenance costs and storage costs such as electricity costs, security costs, insurance costs and others. In this case the business owner determines the inventory storage cost of IDR 2% of the total price per unit as presented in table 4 below:

Table 4 Storage costs

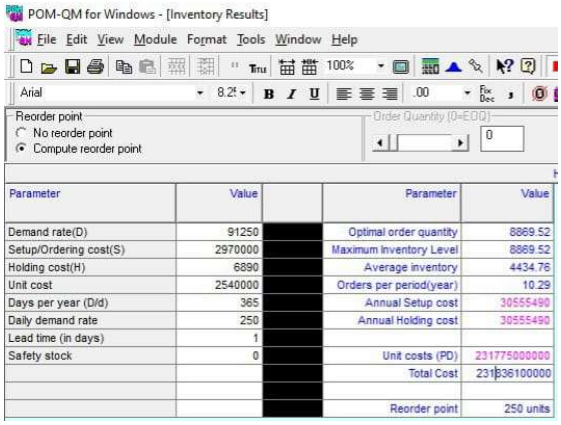
No.	Raw Material Name	Unit price	Cost Storage (2%)	Needs in one production process
1.	Rice flour	Rp. 28,500	Rp. 570	16 kgs
2.	Coconut	Rp. 8,000	Rp. 160	16 grains
3.	Flour	Rp. 29,000	Rp. 580	12 kgs
4.	Egg	Rp. 28,000	Rp. 560	16 kgs
5.	Meat	Rp. 120,000	Rp. 2,400	3 kgs
6.	White milk	Rp. 18,000	Rp. 360	10 cans
7.	Chocolate milk	Rp. 17,500	Rp. 350	5 cans
8.	Cheese	Rp. 15,000	Rp. 300	10 packs
9.	Sausage	Rp. 20,000	Rp. 400	5 packs
10.	Peanut	Rp. 23,000	Rp. 460	5 kgs
11.	Strawberries	Rp. 10,000	Rp. 200	3 kgs
12.	Messiah	Rp. 6,500	Rp. 130	5 packs
13.	Mayonnaise	Rp. 14,500	Rp. 290	5 packs
14.	Oncom	Rp. 3000	Rp. 60	5 kgs
15.	Salt	Rp. 3,500	Rp. 70	5 packs

Data source: results of data interviews processed in 2023

3. EOQ Method Calculation with POM QM Software For Windows

With the calculation of the EOQ method using the POM QM For Windows software, it can be seen in table 5 below:

Table 5 EOQ Calculation Results with POM QM For Windows



Data Source: Data processing with POM QM For Windows

Based on table 5 above, it can be seen that the optimal number of orders is 8,869.52 units, the order period every year is 10.29 times the order and the reorder point can be known as 250 units.

By using the calculation of the EOQ method with the POM QM For Windows software, business owners can find out the optimal number of orders in the production process, namely the optimal number of orders is at 8,869.52 units, that is, if the demand in one day is 250 units, then 8,869.52 units is the total production in 35 days, so business owners should order raw materials every time they order raw materials in order to save expenses on the cost of ordering raw materials. The surabi shop has not used the optimal ordering calculation method, orders are still made by manual calculation, namely by buying raw materials according to the number of requests each day. By using optimal ordering calculations with the EOQ method, the owner can determine how much raw material needs to be ordered in order to save on raw material ordering costs and when to reorder or reorder raw material supplies. From the results of the calculation of the EOQ method using POM QM For Windows, business owners can order one time in the optimal number and place an order again when the number of units produced is 250 units, which is done on the 34th day, thus business owners can save on ordering costs. The following is a comparison of the calculation of costs incurred when the owner uses the EOQ method in ordering raw materials as presented in table 5 below:

Table 6 Cost Comparison Results Before EOQ and After EOQ

No.	Before		POM QM results		Difference
	Optimal Order Quantity	Annual average cost	Optimal Order Quantity	Average cost per year	
1.	-	Rp. 35,640,000	8,869.52	Rp. 30,555,490	Rp. 5,084,510

Data Source: Data processing with POM QM For Windows

Based on table 5 above, it can be seen by applying the EOQ method calculation, the business owner will ben saving costs incurred for ordering raw materials of Rp. 5,084,510 thus that it looks very different before applying the calculation of the optimum number of orders for raw materials with the average cost incurred annually for ordering raw materials compared to if the business owner applies the calculation of the optimal number of orders with the EOQ method and the average cost per year incurred, the business owner will save on costs so that it is more efficient.

CONCLUSION

From the results of this study it can be concluded that the strategy of implementing raw material inventory in the production process is very important for every business owner in carrying out his business activities because by implementing a raw material inventory strategy the business owner can find out how much raw material is needed for the production process and when to place an order again for raw material inventory because it will affect the costs that will be incurred by business owners related to costs that will arise due to inventory such as the cost of ordering raw materials, shipping costs to the cost of storing raw materials.

With the data obtained from interviews with the business owner of Kedai Surabi, it can be concluded that the business owner in meeting the needs of raw materials still applies manual calculations to the purchase of raw materials and has not been able to determine when to order back raw materials. In addition, the business owner has also not been able to determine the priority of the types of main raw materials that must always be available because if the main raw materials are not available, it will hinder the smooth production process, so this research is expected to contribute to the smooth production process at Kedai Surabi by applying raw material inventory with the raw material classification method with the ABC analysis method and the EOQ method to calculate the optimal number of orders and determine the reorder point of raw material supplies.

From the results of calculations using the POM QM For Windows software based on the results of data processing using the ABC class classification analysis method for raw materials from 15 types of raw materials, they can be classified based on their respective classes according to the amount and investment value or rupiah spent to obtain these raw materials. Rice flour, eggs and meat are included in the classification of class A goods where the total percentage of the three raw materials is 49.76 percent. Furthermore, the raw materials for wheat flour, white milk, cheese and coconut are included in the class B classification category with a total percentage of 31.74 percent and raw materials such as nuts, sausages, chocolate milk, mayonnaise, mesis, strawberries, salt and noncom are included in class C classification with a total percentage of 18.5 percent.

Then by using the calculation of the EOQ method with the POM QM For Windows software, business owners can find out the optimal number of orders in the production process, namely the optimal number of orders is at 8,869.52 units, that is, if the demand in one day is 250 unitsit can be seen by applying the calculation of the EOQ method, the business owner will save costs incurred for ordering raw materials of Rp. 5,084,510

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