PERISHABLE INVENTORY POLICY FOR MINIMIZATION WASTED INVENTORY AND TOTAL INVENTORY COST USING PERIODIC REVIEW AND OUTDATE EXPECTATION AT DEPOT SARI PATIN BANJARMASIN

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Abstract

Depot Sari Patin Banjarmasin is a culinary company (restaurant) that produces or distributes fish-based cuisine. The fish falls under the category of perishable food. The component of product age is what distinguishes perishable inventory from other types. Periodic review and outdate expectations are used to determine the policy of fish raw materials inventory, as well to reduce wasted inventory and total inventory. An inventory policy based on periodic review and outdate expectation can be used to reduce wasted inventory and total inventory by determining optimal review or replenishment interval, proper re-order point and maximum inventory level. Calculation result of proposed total inventory cost is Rp469.928.491. It is 79% less than existing condition, Rp2.222.120.721. Calculation result of proposed outdate cost is Rp4.242.501. It is 51% less than existing condition Rp.8.585.000

Keywords : Perishable inventory,periodic review,SCM,outdate,fish,

I. Background

The city of Banjarmasin, the capital city of South Kalimantan, known by the nickname "city of a thousand rivers", has an area of 72km², although according to data from the Banjarmasin Kimprasko Office, in 1997 there were 117 rivers in the capital of South Kalimantan, then in 2002 it was reduced to 70 rivers, then from 2004 until now only 60 rivers remain. Fish is one of the important sources of nutrition for the process of human survival (Telo,2015). The many restaurants, depots and / or restaurants that sell river fish make it easy for Banjarmasin people to get the protein contained from these fish. As in Depot Sari Patin Banjarmasin which is located on Jl Brigjend H. Hasan Basri Banjarmasin City sells a lot of food menu based on ikan patin, Ikan Haruan (ikan gabus), Ikan Nila, ikan mas etc. Ikan patin for the Banjarmasin community, which belongs to the genus Pangasius, has become one of the favorite fish as Banjarmasin's main food menu. As in the Depot Sari Patin located in Banjarmasin City that sells food menus with catfish raw materials. Available menu of Ikan Patin Bakar, ikan patin goreng, pepes ikan patin which are customers favorite from Depot Sari Patin Banjarmasin.

Inventory is an asset that includes goods belonging to the company with the intention to sell within a certain period or inventory of raw materials that are waiting for its use in a process of production (Rangkuti, 2007). Planning and controlling of raw materials is an important matter that too much supply can cause overstocks which can result in high costs for storage. Inventory exist in the supply chain because of a mismatch between supply and demand (Chopra, 2016, p. 49)

The fish are included in the type of perishable food (Paul R. Dittmer, and J. Desmond Keefe. 2009). The main thing that distinguishes perishable food from others is the component of product age (Parwati et al., 2016). Product life is defined as the difference between products that can be used up to the time when the product can no longer be used (Janssen 2018). Depot Sari Patin Banjarmasin is a culinary company (restaurant) that produces or sells food made from fish.

Storing fresh fish using ice or other refrigeration systems has a limited ability to keep fish fresh, usually 10–14 days.(Syarifuddin, 2017). The obsolescence (or spoilage) cost estimates the rate at which the value of the stored products drop because its market or quality falls. Perishable products have high obsolescences rates (Chopra, 2016, p. 272). For storing raw materials, fish must use perishable inventory management because fish have a lifetime or expired in a certain time.

The amount of fresh raw material availability becomes very important for the Depot Sari Patin to avoid excess stock of raw material (loss material) and the increase in the total inventory cost of the Depot Sari Patin Banjarmasin.

II. Theoritical Based

II.1 Definition Of Perishable Inventory

The fish are included in the type of perishable food (*Paul R. Dittmer, and J. Desmond Keefe. 2009)*. The main thing that distinguishes perishable food from others is the component of product age (*Parwati et al., 2016)*. Product life is defined as the difference between products that can be used up to the time when the product can no longer be used (*Janssen 2018)*.

Processed materials fall into two main categories. :

1. Fresh products (perishable products). Vegetables, fruits, meat, cheese, eggs, fish, and other materials that are easily damaged by their properties. This item should be stored for each proper cooling facility and number of items.

2.Groceries Product, No need to store food such as rice, sugar, oil, dried herbs, coffee, spaghetti. Also, it is not enough to store at low temperature, cold air is enough. Next, the origin of these materials is classified as local and imported. Both have large price differences and should be handled with care. Based on the level of preparation to process, the material is divided into three levels :

1. Raw Product that still requires weeding and treatment.
2. Semi-finished product that has been cooked.
3. The Finished product, there are the same standard for types of ingredients used in food production:

a. Good quality and fresh
b. Hygienic and clean
c. Pricing and clear scales
d. The right way to store
e. Rational in the amount of inventory
f. The stock is not empty
g. Easily distinguished from other goods. In the operation of warehouses, all criteria are endeavored to be fulfilled in order to support the production that will be sold.

II.1.2 Perishable Inventory Management

Proper storage methods can increase the durability of the material and withstand the damage process. Conversely, wrong storage can easily damage damaged materials and make a costly kitchen. Appropriate and appropriate storage variables (Parwati et al., 2016):

Then from the above description for storing perishable raw materials Fish

Fish can be stored in fish refrigerators or drainers at temperatures between -1 and 1 ° C (30 ° C) and 1 ° C (34 ° C). While frozen fish are stored at BC -18 °, it is necessary to isolate all types of fish. C (34˚F). Fish should be stored frozen at -18 ° C, but all types of fish should be separated.

Storing fresh fish using ice or other refrigeration systems has a limited ability to keep fish fresh, usually 10–14 days(Syarifuddin, 2017). container and air until it is close to or equal to the temperature of the fish and then maintains it at the lowest possible temperature, usually 0° C. The ideal refrigeration container should be able to keep the temperature cool, strong, durable, watertight and easy to clean. For that we need a container that has good insulation (Sulastri, 2011).

II.2 Probabilistic Inventory

II.2.1. Probabilistic Inventory Policy

In a probabilistic inventory system demand from customers can be fluctuating depending on their needs. However this uncertainty has a path that can be characterized with central value, distribution value and distribution path that can be predicted.

In probabilistic inventory system, uncertainty comes from : (Bahagia, 2006)

1. User in the form of fluctuating demand that is reflected by demand variation or standard deviation.
2. Supplier in the form of distribution time's uncertainty that is reflected by lead time (L).
3. Management system in the form of acknowledge in facing the problem that occurs that reflected by risk factor (Zα)

Because of uncertainty that occurs in the inventory system, not just operating stock that matters in the probabilistic inventory model. But also safety stock. In general, probabilistic inventory model explained into 3 decisions : (Bahagia, 2006)

1. Determine lot size (q0)
2. Determine reorder time (s)
3. Determine safety stock (ss)

II.2.2. P Model

P Model frequently mentioned as periodic review model. Similar to the Q model, this model is related to determining the size of operating stock and also safety stock. More specific, major problem from this model explained by 3 questions as a focus to answer : (Bahagia, 2006)

1.How many goods will be ordered in every order?
2.When will the order be executed?
3.How much safety stock?

The P model is different from the Q model. In the P model, before determining the number of goods to order, it needs to determine the interval between order (T). So the order that will be executed is the order every interval (T). Number of goods ordered will be different. Safety stock (ss) needs to be determined to muffle demand fluctuating (Bahagia, 2006).

In P model or periodic review model, there are 2 major classification :

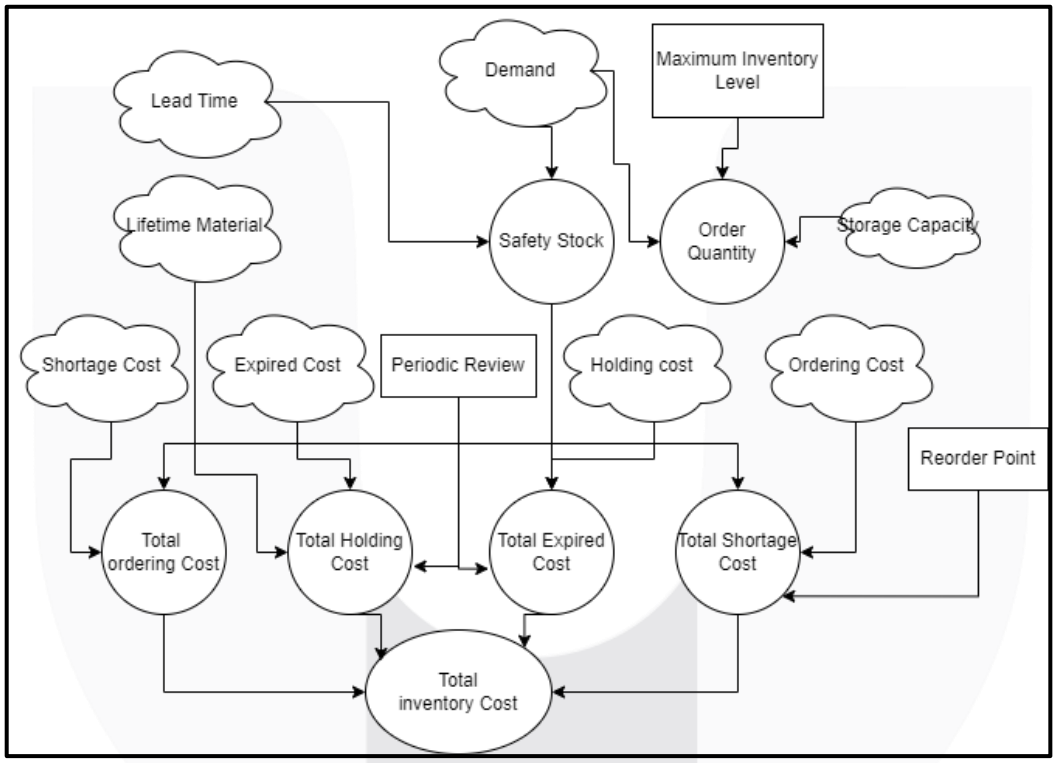
a. Periodic review (R,S) model

(R,S) model is used when the order is executed in every period (R) and the number of goods ordered will maximize inventory level (S).

b. Periodic review (R,s,S) model

(R,s,S) model is used when the order is executed in every period (R). But if the inventory level is still above (s) level the order will not be executed. The number of goods to be ordered will maximize inventory level (S).

III. Method



Gambar III. 1 Model Konseptual

source Bima Brahatika 2021

IV. Analysis

IV.1 Periodic Review

Review Period (RP)(Lifetime)	Lead Time (LT)	Mean (Miu)	Standar deviation	service level	z score	Mean during LT	RP+LT (days)	MEAN during RP+LT	SD during RP+LT	Safety Stock (ss)	Maximum Inventory Level (S)	Reorder Point (s)
1	1	9,780555556	0,35318417	95%	1,64	9,780555556	2	19,562	0,5	0,82	20,382	10,60055556
2	1					9,780555556	3	29,342	0,612	1,004	30,346	10,78455556
3	1					9,780555556	4	39,123	0,707	1,16	40,283	10,94055556
4	1					9,780555556	5	48,903	0,79	1,296	50,199	11,07655556
5	1					9,780555556	6	58,684	0,866	1,421	60,105	11,20155556
6	1					9,780555556	7	68,464	0,935	1,534	69,998	11,31455556
7	1					9,780555556	8	78,245	0,999	1,639	79,884	11,41955556
8	1					9,780555556	9	88,025	1,06	1,739	89,764	11,51955556
9	1					9,780555556	10	97,806	1,117	1,832	99,638	11,61255556
10	1					9,780555556	11	107,587	1,172	1,923	109,51	11,70355556
11	1					9,780555556	12	117,367	1,224	2,008	119,375	11,78855556
12	1					9,780555556	13	127,148	1,274	2,09	129,238	11,87055556
13	1					9,780555556	14	136,928	1,322	2,169	139,097	11,94955556
14	1					9,780555556	15	146,709	1,368	2,244	148,953	12,02455556

an analysis of the research results will be carried out. The results of the research are determining the optimal review period (R), maximum inventory value (S), reorder point value (s), and comparative analysis of the total cost of the existing inventory with the proposed inventory cost.

The calculation of periodic reviews is carried out by considering the fixed lifetime of perishable products. Calculation of the optimal review period is carried out by considering the total cost of inventory for each review period on R≤m. The maximum inventory value is sought by considering the average value of demand and the standard deviation of demand in the review period and lead time. The reorder point value is sought based on the average demand in the lead time period by considering the service level value that is adjusted to the needs of the Sari Patin Depot Banjarmaasin, which is 95%.

Based on the results of research on catfish in the previous chapter, it is known that the optimal review period is 7, meaning that the company must review inventory every 7 days. To meet the demand during the review period 7 and leadtime for 1 day, the maximum amount of inventory that must be owned by the company is 79.884 kg the maximum inventory capacity it has. So that the review period 7 with a maximum inventory amount of 79,884kg is feasible. The reorder point calculation is based on leadtime and different safety stock values for each review period. The reorder point value obtained in review period 7 is 11.519kg, meaning that if on the 7th day the amount of inventory is reorder point, a reorder of supplies will be made. If on the 7th day the amount of inventory > reorder point then there will be no reorder of supplies and wait for the next review period to reorder supplies.

IV.2 Cost Comparison

Comparison of the total cost of the existing inventory with the proposed using periodic review calculations with values of R, s, S can be seen in the following figure based on the components of inventory costs

VARIABLE	PATIN		HARUAN		UDANG		PAPUYU	
	EXISTING	PROPOSED	EXISTING	PROPOSED	EXISTING	PROPOSED	EXISTING	PROPOSED
Periode Review (day)	1	7	1	8	1	8	1	8
Reorder Point (kg)	-	11,41955556	-	7,587888889	-	7,561	-	8,398
Maximum Inventory Level (kg)	-	79,884	-	61,699	-	61,961	-	64,598
Safety Stock (kg)	-	1,639	-	0,824	-	0,761	-	1,373
Total Ordering Cost (Rp/periode)	Rp 133.750.000	Rp 127.575.655	Rp 117.450.000	Rp 113.094.466	Rp 121.500.000	Rp 113.621.774	Rp 106.600.000	Rp 104.974.525
Total Holding Cost (Rp/periode)	Rp 722.284	Rp 1.025.776	Rp 330.469	Rp 799.364	Rp 297.818	Rp 802.180	Rp 256.460	Rp 841.382
Total Outdate Cost (Rp/periode)	Rp 4.515.000	Rp 1.043.422	Rp 4.275.000	Rp 856.966	Rp 4.140.000	Rp 791.149	Rp 4.240.000	Rp 1.268.900
Total Inventory Cost (Rp/periode)	Rp 138.987.284	Rp 130.970.338	Rp 122.055.469	Rp 115.310.817	Rp 125.937.818	Rp 115.732.646	Rp 111.096.460	Rp 107.914.691

V. Conclusion

Based on purpose of research and data processing results, conclusions of this research are:

1. Inventory policy that using periodic review and outdate expectation can be used to reduce wasted inventory and total inventory by determining optimal review or replenishment interval, proper re order point and maximum inventory level.
2. Calculation result of proposed total inventory cost is Rp469.928.491 It's 6% less than existing condition Rp.498.077.032
3. Calculation result of proposed outdate cost is Rp.4.242.501 it's 75% less than existing condition Rp.17.170.00

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