THE ANALYSIS OPTIMAL ORDER QUANTITY FOR CARTON BOX CASE STUDY ABC COOPERATIVE LIMITED

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ABSTRACT

The objective of this research is to study an inventory management for ABC Cooperative Limited. At the present, purchasing lacks of a good system and inappropriate calculation method of ordering quantity. Mostly they have a problem either overstock which increases the company's cost. The purpose of this research is to analyze order quantity of materials control inventory policy in company in case of products requirement, ordering cost and holding cost for developing inventory strategy. Thus, this research is to study Continuous Review System (s, Q*) to compare between the present policy and new policy that is the lowest cost. The regularly demand which is 11 raw materials in 2016 - 2017 is tested to find distribution and variability of a demand. Then there are analyze Economic order quantity, safety stock, and reorder point.

The result of this research when there are compare between the present policy and 2 news policies on January 2018 – November 2018 found that (s, Q*) policy has lower total cost than present policy which is 54,224.51 Baht or 51.10 %.

Keywords: Inventory Management, Optimal Order Quantity, Continuous Review System Policy.

INTRODUCTION

Nowadays, in the most industries business are critical competitive that made them create strategies to be advantage competitive to get larger market share. The important strategy is using in many firms are focus on maintain quality of products and services, price, reduce cost, meet customers need and satisfy customers. Thus reduce cost processing in organization is one procedure to support capacities in market competition. Many organization concentrate on build to reduce cost strategy in management which is best process to reduce cost in inventory and purchasing operations.

This research studied a company is processed milk factory. This company is purchase material that carton box for milk. In addition the company has stock material in inventory for satisfying customer requirements. Now this company has main raw material is 11 material types. From the study of raw material procurement process, it was found that their policy concerns inventory found this company lack of controlling stock inventory, order point and order quantities.

So they often faced over stock of raw material problem and reorder in many times that affect to cost of raw materials inventory and cost of order is higher. This research aims to find policy for controlling appropriate quantity of raw material by using theory inventory management to support reducing cost in purchasing including total cost.

Thus this study, researcher learnt more research of (Panwipa Puthipad and Pornthipa Ongkunaruk, 2011) for studying to adjust purchasing policy and find appropriately management by gathering data and group type of product accord ABC Analysis. After that, select 2 raw materials of raw materials which are highest valve annually and highest valve in inventory. There are 2 raw materials selected divided 2 types are raw material normal distribution and raw material other distribution. [1].

The purpose of this research is to analyze order quantity of materials control inventory policy in company in case of products requirement, ordering cost and holding cost for developing inventory strategy. Then calculate the data in each policy to compare costs. The results found normal distribution method should use in continuous policy such as determine highest and lowest inventory policy, reused raw material should calculate with simulation method.

OBJECTIVE

1. Analyze order quantity of materials control inventory policy in company in case of products requirement.
2. Analyze ordering cost and holding cost for developing inventory strateg

METHODOLOGY

The research used information about carton box demand of company which is 11 material types in 2016 - 2017 is tested to find distribution and variability of a demand. Then there are analyze Economic order quantity, safety stock, reorder point and order up to level.

1. Examine Coefficient of Variation of Material demanding.

Examine coefficient of Variation of Carton Box demand in year 2016-2017 by measuring coefficient of Variation to calculate demanding. [2]

Coefficient of Variation = SD/X

Ref. SD = Standard Deviation

X = Mean

Measurement as below

1) If CV is less than 0.25 means Carton Box demand is stable, so it can be used EOQ to calculate ordering quantity.

2) If CV is more than or equal 0.25 means Carton Box demand is variance, so it can be used other methods to calculate such as Silver-Meal or forecasting demand to calculate ordering quantity.

2. Study expense of ordering cost and holding cost in case of the company.

Study expense of ordering cost and holding cost in case of raw materials from supplier separated by expenses as below.

1) Fixed cost in ordering per time

Fixed cost will be included issuing purchase order documents until received material inventory.

2) Holding cost in inventory

Estimate material holding cost depends on kinds of materials and owner consideration.

3. Determine order quantity and reorder policy used Continuous Review System (s, Q*).

Reorder policy used replenishment system which is determine material inventory reorder point and quantity of order stability in each time at 99%. [3]

1) Calculate to Economic order quantity (EOQ)

$$Q^* = \sqrt{\frac{2kD}{h}}$$

as Q^* = Order Quantity per time (Q^*)

D = Demand per year (unit)

k = Ordering cost per year (Baht)

h = Holding cost per year (Baht)

2) Calculate to Safety stock

$$ss = \sigma_D \times k \times \sqrt{L}$$

as ss = Quantity of safety stock

σ_D = Standard deviation

L = Lead time

k = Standard variable under curve

3) Calculate to Re-order point

$$ROP = (\mu_D \times L) + ss$$

as ROP = Reorder point (Unit)

μ_D = Used rates (Unit per month)

L = Lead time

ss = safety stock

4. Comparing between (s, Q*) and old policy inventory cost.

Bring total cost of (s, Q*) and old policy to calculate for finding lowest cost.

RESULTS

1. Examine coefficient of Variation of Carton Box demand

Examine coefficient of Variation of Carton Box demand in year 2016-2017 by measuring coefficient of Variation to calculate demanding from Table 1.

Table 1

Coefficient of Variation of Carton Box demand quality

No.	Raw materials	Mean per month	S.D.	C.V.
1	DM UHT Prebio Proteq Plain 180 ml.	5,648.42	1,074.59	0.19025
2	DG1+ Plain 180 ml. (Super Mixed)	13,634.32	2,295.07	0.16833
3	DG3+ Plain 180 ml. (Super Mixed)	11,550.98	2,153.19	0.18641
4	H1+ Prebio Proteq Plain 180 ml.	34,444.42	4,963.40	0.14410
5	H1+ Prebio Proteq Plain 180 ml. (Pack12)	32,858.74	5,453.75	0.16598
6	H1+ Prebio Proteq Vanilla 180 ml.	7,928.20	1,551.66	0.19571
7	H1+ Prebio Proteq Honey 180 ml.	14,305.71	2,557.49	0.17877
8	H3+ Prebio Proteq Plain 180 ml.	14,907.44	2,930.94	0.19661
9	H3+ Prebio Proteq Plain 180 ml. (Pack12)	24,756.94	3,870.87	0.15635
10	H3+ Prebio Proteq Vanilla 180 ml.	8,356.43	1,591.13	0.19041
11	H3+ Prebio Proteq Honey 180 ml.	18,981.54	3,096.17	0.16312

The results from Table 1 that coefficient of Variation of Carton Box demand quality below 0.20

2. Ordering cost and holding cost in case of the company

Total fixed cost in ordering per time total is 135 baht per time. And holding cost in inventory be calculated from opportunity cost investment 7.38% per year when calculated formula h = ic price of Carton Box demand quality from Table 2.

Table 2

Holding cost of Carton Box demand quality

No.	Raw materials	Cost (Baht/Pc)	Holding Cost (Baht/Pc/ Year)	Holding Cost (Baht/Pc/Month)
1	DM UHT Prebio Proteq Plain 180 ml.	4.70	0.3466	0.0289
2	DG1+ Plain 180 ml. (Super Mixed)	4.65	0.3429	0.0286
3	DG3+ Plain 180 ml. (Super Mixed)	4.65	0.3429	0.0286
4	H1+ Prebio Proteq Plain 180 ml.	4.65	0.3429	0.0286
5	H1+ Prebio Proteq Plain 180 ml. (Pack12)	4.65	0.3429	0.0286
6	H1+ Prebio Proteq Vanilla 180 ml.	4.65	0.3429	0.0286
7	H1+ Prebio Proteq Honey 180 ml.	4.65	0.3429	0.0286
8	H3+ Prebio Proteq Plain 180 ml.	4.65	0.3429	0.0286
9	H3+ Prebio Proteq Plain 180 ml. (Pack12)	4.65	0.3429	0.0286
10	H3+ Prebio Proteq Vanilla 180 ml.	4.65	0.3429	0.0286
11	H3+ Prebio Proteq Honey 180 ml.	4.65	0.3429	0.0286

3. New policy in order and holding inventory.

Ordering in new policy use Continuous Review System (s, Q*) and quantity control inventory in level 99% Ordering quantity have lead time 2 week and S.D. as table 1 and determined services 99%. Then use Z, z =99% refer to k = 2.33. [4]. Calculating of Reorder point able to bring all value calculated before instead of formula and the results are found Reorder point can calculate as Table 3.

Table 3

EOQ, Safety Stock and ROP of Raw materials

No.	Raw materials	EOQ	Safety Stock	ROP
1	DM UHT Prebio Proteq Plain 180 ml.	7,266	1,254	4,078
2	DG1+ Plain 180 ml. (Super Mixed)	11,350	2,678	9,495
3	DG3+ Plain 180 ml. (Super Mixed)	10,391	2,512	8,288
4	H1+ Prebio Proteq Plain 180 ml.	18,039	5,791	23,013
5	H1+ Prebio Proteq Plain 180 ml. (Pack12)	17,619	6,363	22,792
6	H1+ Prebio Proteq Vanilla 180 ml.	8,655	1,810	5,774
7	H1+ Prebio Proteq Honey 180 ml.	11,626	2,984	10,137
8	H3+ Prebio Proteq Plain 180 ml.	11,868	3,420	10,873
9	H3+ Prebio Proteq Plain 180 ml. (Pack12)	15,294	4,516	16,895
10	H3+ Prebio Proteq Vanilla 180 ml.	8,838	1,856	6,035
11	H3+ Prebio Proteq Honey 180 ml.	13,392	3,612	13,103

4. Comparing between new and old policy inventory cost.

Bring the results of EOQ, ROP above instead of formula Continuous Review System (s, Q*) by modified to compare total costs is demand of products since January 2018 to November 2018 as table 6 show comparing between old and new policy.

The old and new policy summarize from ordering cost and holding cost included all cost occurred in 11 months in year 2018 from Table 4.

Table 4

Total costs

No.	Raw materials	Total Costs	
		Old policy	Old policy
1	DM UHT Prebio Proteq Plain 180 ml.	6,664.19	2,970.45
2	DG1+ Plain 180 ml. (Super Mixed)	7,838.88	4,434.60
3	DG3+ Plain 180 ml. (Super Mixed)	9,837.83	4,475.45
4	H1+ Prebio Proteq Plain 180 ml.	12,207.43	7,838.74
5	H1+ Prebio Proteq Plain 180 ml. (Pack12)	21,011.30	8,431.50
6	H1+ Prebio Proteq Vanilla 180 ml.	7,503.97	3,543.93
7	H1+ Prebio Proteq Honey 180 ml.	8,768.00	4,684.04
8	H3+ Prebio Proteq Plain 180 ml.	8,322.10	5,114.17
9	H3+ Prebio Proteq Plain 180 ml. (Pack12)	12,428.37	6,325.93
10	H3+ Prebio Proteq Vanilla 180 ml.	6,177.54	3,525.48
11	H3+ Prebio Proteq Honey 180 ml.	10,135.22	5,326.04
total		110,894.83	56,670.32

Total costs both old and new policy of company as above can be compared new policy will higher cost is 54,224.51 Baht or 51.10 %.

CONCLUSION AND SUGGESTION

This study was found 11 raw materials qualities get coefficient of Variation of demand lower than 0.25 that made to analysis Continuous Review System of each raw materials quality in year 2016-2017 for calculating new policy in inventory and comparing between costs of new and old policy. Then applied both of policies use in January to November 2018 that refer to new policy able to reduce cost in January to November 2018 is 54,224.51 Baht or 51.10% and no lack of raw materials. So the reason why costs are very difficult because old policy lack of planning in ordering and controlling high costs problem.

Thus if company has plan in ordering and holding will encourage to reduce inventory costs that related to research of (Varathorn Punyangarm, 2008) studied demanding raw materials in production to forecast demand of products aims to find economic order quantity EOQ, reorder point , Safety stock quantity and total costs. The results that can be reduce costs in production and decrease quantity of safety stock. In this case of steel tank firm should to manage new policy which is Continuous Inventory System Perceptual (s, Q*) instead of old policy because new policy can reduce total costs and no lack of inventory. [5]

However, company has plan by forecasting that related to research of (Piyamas Klakhaeng, 2018) studied An Application of Forecasting Technique for Process Management Case Study of ABC Company Limited. The

forecasting is the one of equipment which can be received the information in the future to making the component of effective job operation planning. [6]

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