

CHAPTER 5

EVALUATION



5.1 Costs Evaluation

The main objective expected development in industry policy is the cost saving. It is look like the benefits from develop policy but, in fact, everyone want to save cost is the most for survive in the business.

The costs saving are divided into three main costs that are carrying cost, ordering cost, and material cost. The sums of these three costs are called total material cost (TMC) and the sums of carrying cost and ordering cost are called total stocking cost (TSC).

Cost saving is the different costs between cost of old policy and cost of new policy so total material cost is not necessary to use because the different of material cost (unit cost multiply by demand usage) between the old policy and new policy is equals to zero.

Total stocking costs are separated into two types: for fixed-order quantity and for fixed-time period.

5.1.1 Total Stocking Cost for Fixed Order Quantity

The equation is:

$$TSC = C_o \left[\frac{D}{Q} \right] + C_h \left[\frac{Q}{2} \right]$$

where C_o = ordering cost (443 Baht/order)

C_h = holding cost = $i * p = 11.5\%(6 \text{ months}) * \text{unit cost}$ (unit cost of each raw material is shown in Table 4.1 in Chapter 4)

Q = order quantity (Q of old policy (Q_o) and Q of new policy (Q_n))

D = forecast demand in 6 months

(Note: value of Q and D shows in Table 5.1)

Table 5.1: Variables for calculation TSC in Q model for Class A and B

Raw Material In	EOQ		Old Order Quantity	Demand Quarter 1-2	Demand Quarter 3-4
	High Season	Low Season			
Class A					
RS-022	2900	2600	6000 Kg	36084.62	28421.67
HP-18	900	825	6000 Kg	9310.36	7415.81
M-50	275	250	1000 Kg	2454.03	1882.81
IP-820	1400	1300	3000 Kg	9175.91	7377.73
IP-333	27200	23875	30000 Kg	144123.38	111058.24
Raw Material In	EOQ		Old Order Quantity	Demand Quarter 1-2	Demand Quarter 1-2
Class B	High Season	Low Season			
IP-222	13050	11500	20000 Kg	61842.61	48142.45
T-47/A	900	900	2250 Kg	4288.68	3406.22
M-56	150	150	500 Kg	799.75	627.99
IP-555	13725	12025	15000 Kg	56262.09	43138.02
M-10	150	125	500 Kg	558.07	444.95
IP-28	4700	4100	6000 Kg	17187.45	13169.59
M-32	300	275	700 Kg	967.55	773.77

(Note: the amounts of EOQ used from Table 4.10 multiply by the raw materials size in Appendix B)

For raw material RS-022,

In high demand season, total stocking cost (TSC_h) is:

For $Q_o = 6000$, total stocking cost of old policy (TSC_{ho})

$$TSC_o = 443 \left[\frac{36084.62}{6000} \right] + (0.115 * 33) \left[\frac{6000}{2} \right] = 14049.25$$

For $Q_n = 2900$, total stocking cost of new policy (TSC_{hn})

$$TSC_n = 443 \left[\frac{36084.62}{2900} \right] + (0.115 * 33) \left[\frac{2900}{2} \right] = 11014.99$$

In low demand season, total stocking cost (TSC_l) is:

For $Q_o = 6000$, total stocking cost of old policy (TSC_{lo})

$$TSC_{lo} = 443 \left[\frac{28421.67}{6000} \right] + (0.115 * 33) \left[\frac{6000}{2} \right] = 13483.47$$

For $Q_n = 2600$, total stocking cost of new policy (TSC_{ln})

$$TSC_{ln} = 443 \left[\frac{28421.67}{2600} \right] + (0.115 * 33) \left[\frac{2600}{2} \right] = 9776.12$$

Therefore cost saving in high demand season is $14049.25 - 11014.99 = 3034.26$ baht, and for low demand season, cost saving is $13483.47 - 9776.12 = 3707.35$ baht. Cost saving through a year is $3034.26 + 3707.35 = 6741.61$ baht.

For Raw material HP-18;

In high demand season, when $D=9310.36$ kg, $Q_o = 6000$ kg, $Q_n= 900$ kg so $TSC_{ho} = 30012.42$ Baht and $TSC_{hn}= 8981.52$ Baht so it saves 21030.90 Baht

In low demand season, when $D = 7415.81$ kg, $Q_o = 6000$ kg, $Q_n= 825$ kg so $TSC_{lo} = 29872.53$ Baht and $TSC_{ln}= 8014.25$ Baht so it saves 21858.28 Baht

Therefore cost saving in a year equals to $21030.90 + 21858.28 = 42889.18$ Baht

For Raw material M-50;

In high demand season, when $D = 2454.03$ kg, $Q_o = 1000$ kg, $Q_n= 275$ kg so $TSC_{ho} = 15462.14$ Baht and $TSC_{hn}= 7906.34$ Baht so it saves 7555.80 Baht

In low demand season, when $D = 1882.81$ kg, $Q_o = 1000$ kg, $Q_n= 250$ kg so $TSC_{lo} = 15209.09$ Baht and $TSC_{ln}= 6930.09$ Baht so it saves 8275.97 Baht

Therefore cost saving in a year equals to $7555.8 + 8275.97 = 15831.77$ Baht

For Raw material IP-820;

In high demand season, when $D=9175.91$ kg, $Q_o = 3000$ kg, $Q_n= 1400$ kg so $TSC_{ho} = 7219.98$ Baht and $TSC_{hn}= 5640.52$ Baht so it saves 1579.46 Baht

In low demand season, when $D = 7377.73$ kg, $Q_o = 3000$ kg, $Q_n= 1300$ kg so $TSC_{lo} = 6954.45$ Baht and $TSC_{ln}= 5055.6$ Baht so it saves 1898.85 Baht

Therefore cost saving in a year equals to $1579.46 + 1898.85 = 3478.31$ Baht

For Raw material IP-333;

In high demand season, when $D=144123.38$ kg, $Q_o = 30000$ kg, $Q_n= 27200$ kg so $TSC_{ho} = 4715.72$ Baht and $TSC_{hn}= 4693.3$ Baht so it saves 22.42 Baht

In low demand season, when $D = 111058.24$ kg, $Q_o = 30000$ kg, $Q_n= 23875$ kg so $TSC_{lo} = 4227.46$ Baht and $TSC_{ln}= 4119.9$ Baht so it saves 107.56 Baht

Therefore cost saving in a year equals to $22.42 + 107.56 = 129.98$ Baht

For Raw material IP-222;

In high demand season, when $D=61842.61$ kg, $Q_o = 20000$ kg, $Q_n= 13050$ kg so $TSC_{ho} = 4589.81$ Baht and $TSC_{hn}= 4200.38$ Baht so it saves 389.43 Baht

In low demand season, when $D = 48142.45$ kg, $Q_o = 20000$ kg, $Q_n= 11500$ kg so $TSC_{lo} = 4286.36$ Baht and $TSC_{ln}= 3706.03$ Baht so it saves 580.33 Baht

Therefore cost saving in a year equals to $389.43 + 580.33 = 969.76$ Baht

For Raw material T-47/A;

In high demand season, when $D=4288.68$ kg, $Q_o = 2250$ kg, $Q_n= 900$ kg so $TSC_{ho} = 6019.39$ Baht and $TSC_{hn}= 4180.98$ Baht so it saves 1838.41 Baht

In low demand season, when $D = 3406.22$ kg, $Q_o = 2250$ kg, $Q_n= 900$ kg so $TSC_{lo} = 5845.65$ Baht and $TSC_{ln}= 3746.62$ Baht so it saves 2099.03 Baht

Therefore cost saving in a year equals to $1838.41 + 2099.03 = 3937.44$ Baht

For Raw material M-56;

In high demand season, when $D = 799.75$ kg, $Q_o = 500$ kg, $Q_n = 150$ kg so $TSC_{ho} = 7896.08$ Baht and $TSC_{hn} = 4518.18$ Baht so it saves 3377.9 Baht

In low demand season, when $D = 627.99$ kg, $Q_o = 500$ kg, $Q_n = 150$ kg so $TSC_{lo} = 7743.90$ Baht and $TSC_{ln} = 4010.91$ Baht so it saves 3732.99 Baht

Therefore cost saving in a year equals to $3377.9 + 3732.99 = 7110.89$ Baht

For Raw material IP-555;

In high demand season, when $D = 56262.09$ kg, $Q_o = 15000$ kg, $Q_n = 13725$ kg so $TSC_{ho} = 3645.36$ Baht and $TSC_{hn} = 3631.10$ Baht so it saves 14.26 Baht

In low demand season, when $D = 43138.02$ kg, $Q_o = 15000$ kg, $Q_n = 12025$ kg so $TSC_{lo} = 3257.76$ Baht and $TSC_{ln} = 3179.51$ Baht so it saves 78.25 Baht

Therefore cost saving in a year equals to $14.26 + 78.25 = 92.51$ Baht

For Raw material M-10;

In high demand season, when $D = 558.07$ kg, $Q_o = 500$ kg, $Q_n = 150$ kg so $TSC_{ho} = 6963.20$ Baht and $TSC_{hn} = 3588.79$ Baht so it saves 3374.41 Baht

In low demand season, when $D = 444.95$ kg, $Q_o = 500$ kg, $Q_n = 125$ kg so $TSC_{lo} = 6862.98$ Baht and $TSC_{ln} = 3194.09$ Baht so it saves 3668.89 Baht

Therefore cost saving in a year equals to $3374.41 + 3668.89 = 7043.3$ Baht

For Raw material IP-28;

In high demand season, when $D = 17187.45$ kg, $Q_o = 6000$ kg, $Q_n = 4700$ kg so $TSC_{ho} = 3339.01$ Baht and $TSC_{hn} = 3241.51$ Baht so it saves 97.50 Baht

In low demand season, when $D = 13169.59$ kg, $Q_o = 6000$ kg, $Q_n = 4100$ kg so $TSC_{lo} = 3042.36$ Baht and $TSC_{ln} = 2837.46$ Baht so it saves 204.90 Baht

Therefore cost saving in a year equals to $97.50 + 204.90 = 302.40$ Baht

For Raw material M-32;

In high demand season, when $D = 967.55$ kg, $Q_o = 700$ kg, $Q_n = 300$ kg so $TSC_{ho} = 4033.57$ Baht and $TSC_{hn} = 2895$ Baht so it saves 1138.57 Baht

In low demand season, when $D = 773.77$ kg, $Q_o = 700$ kg, $Q_n = 275$ kg so $TSC_{lo} = 3910.94$ Baht and $TSC_{ln} = 2590.54$ Baht so it saves 1320.40 Baht

Therefore cost saving in a year equals to $1138.57 + 1320.40 = 2458.97$ Baht

5.1.2 Total Stocking Cost for Fixed Time Period

The equation is:

$$TSC = C_h \left[\frac{DT}{2} \right] + \left[\frac{C_o}{T} \right]$$

where $C_o =$ ordering cost (443 Baht/order)

$C_h =$ holding cost = $i * p = 23\% * \text{unit cost}$

$D =$ annual demand of forecasting

$T =$ Time between review ($T = 3$ months or 0.25 year)

Due to an industry didn't use T (time between period) to order raw materials quantities but an industry use Q to order raw materials quantities. Therefore, to compare the cost saving, it compares between total stocking cost of fixed order quantity and total stocking cost of fixed time period.

A Table 5.2 shows the variables for calculation in fix order quantity model and fixed time period model.

Table 5.2: The variables for calculation in Class C

Raw Material In Class C	Unit Cost (Baht)	Old Order Quantity (Kg)	Annual Demand (Kg)
WDOR-100	550	200	335.49
T-27	55	950	2107.23
M-85	205	400	459.08
M-92	110	200	622.23
M-75	58	540	938.66
WDYE-32	370	200	131.43
LP-100	45	600	884.67
M-46	40	500	1008.15
M-95	195	200	199.81
M-87	50	500	645.34
WDYE-75	570	100	65.61
WDCE-15	350	100	30.06
M-48	12	440	1219.12
WDYE-180	140	100	109.80
WDBE-690	340	100	25.47
WDBK-50	100	100	67.68

For raw material WDOR-100,

TSC for fixed order quantity is: (D = 335.49 kg and Q = 200 kg)

$$TSC = 443 \left[\frac{335.49}{200} \right] + (0.23 * 550) \left[\frac{200}{2} \right] = 13393.11$$

TSC for fixed order period is: (D = 335.49 kg and T = 0.25 year)

$$TSC = (0.23 * 550) \left[\frac{335.49 * 0.25}{2} \right] + \left[\frac{443}{0.25} \right] = 7076.94$$

Therefore when an industry changes the policy from fixed order quantity of Class C to fixed order period, it can be saved $13393.11 - 7076.94 = 6316.17$ Baht.

For raw material T-27

When let $D = 2107.23$ kg, and $Q = 950$ kg, TSC of fixed order quantity equals to 6991.38 Baht, and TSC of fixed order period is 5104.06 Baht. So cost is saved $6991.38 - 5104.06 = 1887.32$ Baht.

For raw material M-85

When let $D = 459.08$ kg, and $Q = 400$ kg, TSC of fixed order quantity equals to 9938.43 Baht, and TSC of fixed order period is 4477.70 Baht. So cost is saved 5460.73 Baht.

For raw material M-92

When let $D = 622.23$ kg, and $Q = 200$ kg, TSC of fixed order quantity equals to 3908.24 Baht, and TSC of fixed order period is 3739.8 Baht. So cost is saved 168.44 Baht.

For raw material M-75

When let $D = 938.66$ kg, and $Q = 540$ kg, TSC of fixed order quantity equals to 4371.85 Baht, and TSC of fixed order period is 3337.22 Baht. So cost is saved 1034.64 Baht.

For raw material WDYE-32

When let $D = 131.43$ kg, and $Q = 200$ kg, TSC of fixed order quantity equals to 8801.12 Baht, and TSC of fixed order period is 3170.09 Baht. So cost is saved 5631.03 Baht.

For raw material LP-100

When let $D = 884.67$ kg, and $Q = 600$ kg, TSC of fixed order quantity equals to 3758.18 Baht, and TSC of fixed order period is 2916.54 Baht. So cost is saved 841.64 Baht.

For raw material M-46

When let $D = 1008.15$ kg, and $Q = 500$ kg, TSC of fixed order quantity equals to 3193.22 Baht, and TSC of fixed order period is 2931.37 Baht. So cost is saved 261.85 Baht.

For raw material M-95

When let $D = 199.81$ kg, and $Q = 200$ kg, TSC of fixed order quantity equals to 4927.58 Baht, and TSC of fixed order period is 2892.19 Baht. So cost is saved 2035.40 Baht.

For raw material M-87

When let $D = 645.34$ kg, and $Q = 500$ kg, TSC of fixed order quantity equals to 3446.77 Baht, and TSC of fixed order period is 2699.68 Baht. So cost is saved 747.09 Baht.

For raw material WDYE-75

When let $D = 65.61$ kg, and $Q = 100$ kg, TSC of fixed order quantity equals to 6845.65 Baht, and TSC of fixed order period is 2847.18 Baht. So cost is saved 3998.47 Baht.

For raw material WDCE-15

When let $D = 30.06$ kg, and $Q = 100$ kg, TSC of fixed order quantity equals to 4158.17 Baht, and TSC of fixed order period is 2074.48 Baht. So cost is saved 2083.69 Baht.

For raw material M-48

When let $D = 1219.12$ kg, and $Q = 440$ kg, TSC of fixed order quantity equals to 1834.63 Baht, and TSC of fixed order period is 2192.60 Baht. So cost is saved (-357.97) Baht.

For raw material WDYE-180

When let $D = 109.8$ kg, and $Q = 100$ kg, TSC of fixed order quantity equals to 2096.41 Baht, and TSC of fixed order period is 2213.95 Baht. So cost is saved (-117.54) Baht.

For raw material WDBE-690

When let $D = 25.47$ kg, and $Q = 100$ kg, TSC of fixed order quantity equals to 4022.83 Baht, and TSC of fixed order period is 2020.97 Baht. So cost is saved 2001.86 Baht.

For raw material WDBK-50

When let $D = 67.68$ kg, and $Q = 100$ kg, TSC of fixed order quantity equals to 1449.82 Baht, and TSC of fixed order period is 1966.58 Baht. So cost is saved (-516.76) Baht.

From all of these, it can conclude that the new inventory system can save the cost but it has three raw materials cannot save the cost (M-48, WDYE-180, and WDBK-50) due to the time between orders is not appropriate and depends on the order quantity. Table 5.3 shows the cost saving of all Classes.

Table 5.3: Costs saving of all raw materials

Raw material	Cost (Before)		Cost (After)		Cost Saving		Total
	High Season	Low Season	High Season	Low Season	High Season	Low Season	Cost Saving
Class A							
RS-022	14049.25	13483.47	11014.99	9776.12	3034.26	3707.35	6741.61
HP-18	30012.42	29872.53	8981.52	8014.25	21030.9	21858.28	42889.18
M-50	15462.14	15209.09	7906.34	6930.09	7555.8	8279	15834.8
IP-820	7219.98	6954.45	5640.52	5055.6	1579.46	1898.85	3478.31
IP-333	4715.72	4227.46	4693.3	4119.9	22.42	107.56	129.98
Class B							
IP-222	4589.81	4286.36	4200.38	3706.03	389.43	580.33	969.76
T-47/A	6019.39	5845.65	4180.98	3746.62	1838.41	2099.03	3937.44
M-56	7896.08	7743.9	4518.18	4010.91	3377.9	3732.99	7110.89
IP-555	3645.36	3257.76	3631.1	3179.51	14.26	78.25	92.51
M-10	6963.2	6862.98	3588.79	3194.09	3374.41	3668.89	7043.3
IP-28	3339.01	3042.36	3241.51	2837.46	97.5	204.9	302.4
M-32	4033.57	3910.94	2895	2590.54	1138.57	1320.4	2458.97
Total	107945.93	104696.95	64492.61	57161.12	43453.32	47535.83	90989.15

Table 5.3: Costs saving of all raw materials (Continued)

Class C	Cost of Q model	Cost of P model	Cost Saving
WDOR-100	13393.11	7076.94	6316.17
T-27	6991.38	5104.06	1887.32
M-85	9938.43	4477.70	5460.73
M-92	3908.24	3739.80	168.44
M-75	4371.85	3337.22	1034.63
WDYE-32	8801.12	3170.09	5631.03
LP-100	3758.18	2916.54	841.64
M-46	3193.22	2931.37	261.85
M-95	4927.58	2892.19	2035.39
M-87	3446.77	2699.68	747.09
WDYE-75	6845.65	2847.18	3998.47
WDCE-15	4158.17	2074.48	2083.69
M-48	1834.63	2192.60	-357.97
WDYE-180	2096.41	2213.95	-117.54
WDBE-690	4022.83	2020.97	2001.86
WDBK-50	1449.82	1966.58	-516.76
Total	83137.39	51661.35	31476.04

From this table, in high season range of Class A and B, when an organisation changes the inventory system control, cost will be saved 43453.32 Baht or 40.26%. In low season, it can be saved 47535.83 Baht or 45.40%.

For Class A, it can be saved 48.92% and 30.68% for Class B. For overall of Class A and B, it can be saved 42.79%. For Class C, it can be saved 37.86%. For overall Classes, it can be saved 41.40%. Table 5.4 shows the percentage of cost saving.

Table 5.4: Percentage of cost saving

Class	Cost saving (Percent)
A	48.92
B	30.68
C	37.86
AB	42.79
ABC	41.40

5.2 New Ordering Policies

In the moment, an industry controls the inventory by using observation to control and order in a fixed large quantity with no time period of all raw materials. From this reason, an organisation cannot control the carrying cost and quantities of ordering.

Therefore when the new inventory control system applies with this stock, every raw material received the concentration in two levels.

First level is Class A and B that using fixed order quantity to control because it is important to inventory value. The policy of these classes is control raw materials by fixed order quantity. Moreover, always, keep record the inventory level.

Second level is Class C that using fixed order period to control due to less important. The policy of this class is control inventory level by fixed time to check in every three month.

5.3 Advantages and Disadvantages

The advantages from reinventory management are successful in optimal level in inventory with right management and minimize the cost of inventory. The other advantages effect to increasing the knowledge of worker, eliminate the shortage of ram materials through the delivery delay of products to customer, and produce the products continuously.

For disadvantage, it has to always keep record the level of inventory and takes a period of time to improve knowledge of workers for management by itself when without control by manager or foreman.