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FLEXIBLE INVENTORY MANAGEMENT AND VALUE CREATION

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ABSTRACT

In this paper, it is attempted to review role of flexibility in inventory management, particularly such methods that may serve as alternative to complicated models and with much less computational difficulties. One such practical approach is application of Lagrangian multipliers in inventory management which helps determine ordering policies for repetitive stock items, but with simple optimization restriction that total number of orders in the year would be the same as during the previous year. Advantage of this approach is that it is possible to determine optimum redistribution of number of orders for each item to be placed keeping last years numbers of orders as benchmark to achieve substantive savings in the ordering costs but without any hassle to determine ordering costs, carrying costs and shortages costs, which are difficult to estimate but always needed in using most inventory control models.

Keywords: *Inventory management, ordering costs, carrying costs, regression analysis, moving average, exponential smoothing, Lagrangian multipliers, value creation.*

Introduction

As material cannot be instantly sourced, all organizations, whether service or manufacturing, private or public, national or multinational, need to maintain some inventory. While maintaining inventory of some items between certain maximum and minimum levels is an unavoidable necessity, at the same time some select items can be purchased 'just on time' when the need arises. Inventory management is thus governed by several factors and variables such as which items to be stocked under what minimum and maximum levels and how much safety reserves, from which supplier in available lead time which items to be sourced, what should be the ordered quantity and number of orders to be placed, etc. Inventory management thus involves choices, trade-offs, identifying limits, policy experimentation, developing policies, documenting and fixing system parameters such as average demand rate, procurement lead time, demand during lead time, projected demand during planning horizon, etc. and from time to time compute ordering costs, carrying costs, shortage costs, etc.

In an era of increasing global competition when technology is advancing rapidly and product obsolescence rates is high, flexible inventory management policies become important in order to adjust to demands for new product development or efficient services to the market place. Beyond this definition, a truly flexible firm can also proactively change market through its ability to create new and innovative products and services. Delineation, documentation, improvement and automation of inventory management processes such as new product development and more efficient customer care services, interface and extend to several

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departments within the organization in the supply chain such as marketing, engineering, production, inventory, warehousing, logistics, transportation, etc; and also across value chain in which company's trading partners are also members. Inventory management function in an organization cuts across several internal functional boundaries, and even goes beyond to all trading partners in a supply chain.

In a supply chain context, not only organization's internal inventory management processes are interlinked but several other functions such as IT-enabled processes also interface with functions within organizations and those of company's trading partners in the value chain. In fact, this IT-enabled linkage is central to modern supply chain management, which facilitates all trading partners to function with sufficient flexibility within competitive and regulatory framework. Trading partners (vendors) have to be in constant touch for supplies and as soon as order for some existing products is placed, or when new product design is ready for starting production, vendors can immediately swing into action for material supplies when order is placed, and not before when it is actually needed for avoiding any unnecessary money blockage in inventory stocks. Necessary flexibility in inventory processes is important not only within the organization but across the entire supply chain.

All inventory management techniques aim that inventory should ideally arrive in the organization as close to the time when it is actually needed and in limiting case, just-on-time, but with sufficient safety margin that it would not make production to suffer for want of requisite material. It is in this context that when numbers of options are available, and varieties of techniques are available and standard solutions don't always work, flexible inventory management policies may work. This apart, flexibility in inventory policies is anyway needed to adjust to market demands of new product development in wake of rapid technological advancements and obsolescence rate of existing products.

This is not that the significance of flexibility did not exist in earlier periods but renewed focus on it is largely due to the fact that despite large number of models and approaches of inventory management already developed, inventory professionals in corporate world are still not attracted towards them due to complexities and computational difficulties involved in their applications. Inventory professionals in the corporate world are generally more accustomed to using short-cut solutions, rules of thumb, heuristic methods and IT-solutions, and above all, flexible policies with a combination of all these approaches or a simple common sense solution, that may effectively work in situations where no standard approach may be specifically suited.

Flexible Methodology Employed

Economic order quantity (EOQ) in inventory management represents a case when ordering and carrying costs equalize. This can be done if the norms of ordering and carrying costs are known which however are not easy to estimate. Flexible inventory control carried out with the help of Lagrange Multipliers partly alleviates the problem of precise knowledge of ordering and carrying costs norms. If one fixes the condition that this year's total number of orders for the same group of items, would be the same as in the previous year, it is possible to determine revised distribution of number of orders individually for each of the items covered in the group.

Assuming that Q denotes EOQ, C_2 is ordering cost, C_1 is inventory carrying cost, Z_i is the item demand rate, then Q is equal to $\sqrt{2Z_i C_2 / C_1}$

$$\text{Total average inventory is} = \sum_i \frac{Q_i C_i}{2}$$

$$\text{Total number of orders} = \sum_i \frac{Z_i}{Q_i} = x$$

The individual item's utility is maximized when the following Langrangean expression is maximized:

$$L = \sum_i \frac{Q_i C_i}{2} + \lambda \left(\sum_i \frac{Z_i}{Q_i} - x \right)$$

Where λ is the Langrangean multiplier. The relevant maximizing condition is

$$\frac{\partial L}{\partial Q_i} = \frac{C_i}{2} - \frac{\lambda Z_i}{Q_i^2} = 0$$

$$\frac{\partial L}{\partial \lambda} = \sum_i \frac{Z_i}{Q_i} - x = 0$$

Solving the first equation for Q gives

$$Q_i = \sqrt{2\lambda} \sqrt{\frac{Z_i}{C_i}}$$

and following substitution, it is easy to see

$$\lambda = \left(\sum_i \sqrt{Z_i C_i} \right)^2 / 2x^2$$

It is to be seen that reduction of inventory costs occurs due to redistribution of total number of orders for different items in optimum ways, keeping total number of orders same as in the previous year.

Analysis and Results

The present study relates to 51 repetitive stock items which are maintained by an industrial organization in India regardless of their order position. Demand projections of the items were made on the basis of trend analysis as demand was constantly growing and also showing some cyclic variations. As the consumption data for most of the materials was observed to rise gradually with reasonable degree of stability in values, regression analysis was applied for all the items with multiplicative trend correction. Table 1 summarizes demand projection based on trend analysis but with cyclic corrections also applied. The table also includes lead time data in two parts, i.e., between period of indent till the placement of purchase order and between placement of purchase order and actual receipt, and the total lead time as the sum of these two components, and standard deviation of the forecasting error.

TABLE 1
ESTIMATION OF MATERIAL DEMAND, LEAD TIME AND SAFETY STOCK DURING FORTHCOMING YEAR FOR PURPOSES OF MATERIAL PROCUREMENT

S.No.	Item Description	Unit	Regression Equation Used	Quarter wherein x=0	Demand During Forecasting Period (t+1)				Lead time in months			Forecasting error (σ)
					Qr. I	Qr. II	Qr. III	Qr. IV	Between In-stock & P.O.	Between P.O. & Actual Receipt	Total	
1.	Babbit metal	Kg	Y=9854356X	Qr. I (t-1)	4093	4002	8107	4972	1.00	3.00	5.00	1108
2.	Calcium carbide	Kg	Y=22932+622X	Qr. II (t-2)	23137	33348	36177	43687	2.00	1.25	3.25	4478
3.	Acetylene gas	M	Y=2605+220X	Qr. I (t-3)	6224	5854	659	8636	1.00	2.00	3.00	396
4.	Cross cotton tape	Roll	Y=2142+205X	Qr. I (t-2)	4103	5361	966	8171	1.00	0.75	3.75	2229
5.	Indrex circulating oil-35	Litre	Y=23000-115X	Qr. I (t-3)	19921	24166	18279	21128	1.50	4.25	5.75	5795
6.	Indrex circulating oil-85	Litre	Y=21459-341X	Qr. I (t-3)	21855	20339	17000	16302	1.50	4.25	5.75	8462
8.	Carbon steel billets	Kg	Y=1058+295X	Qr. I (t-3)	4866	4916	857	7416	0.50	1.50	2.00	830
9.	Welding electrode	kg	Y=134280-137X	Qr. I (t-3)	122431	132384	104362	147090	1.00	2.75	3.75	28202
10.	HR carbon steel	Kg	Y=613+227X	Qr. III (t-2)	1973	4656	3079	6099	3.00	8.00	11.00	2537
11.	DTE oil medium	Litre	Y=32497-90X	Qr. I (t-3)	22050	28421	1681	21851	1.50	4.75	6.25	15186
12.	Electrode ferrusse	kg	Y=(4376+7579X	Qr. I (t-3)	17748	12114	20825	240177	2.00	1.50	5.50	29335
13.	Main cord solder	Kg	Y=1937-49X	Qr. II (t-1)	1525	708	184	960	2.50	3.00	5.50	799
14.	Carbond-oxide gas	Kg	Y=11240+750X	Qr. I (t-3)	22923	27443	19380	30646	2.00	0.75	2.75	8658
15.	Cotton waste	Kg	Y=178+70X	Qr. I (t-3)	10256	12503	1367	12689	2.00	2.50	4.50	4476
16.	Co. welding wire	Kg	Y=484+187X	Qr. I (t-3)	7293	7487	756	10175	4.00	5.00	9.00	6036
17.	DTE oil heavy sodium	Litre	Y=15448-961X	Qr. I (t-3)	19975	14418	12284	13924	1.50	4.75	6.25	2847
18.	Solvac cutting oil	Litre	Y=1546+225X	Qr. I (t-3)	7879	8056	751	7085	1.75	6.50	8.25	1073
19.	Unvarnished glass tape	Roll	Y=747+492X	Qr. II (t-1)	5149	3206	579	9854	1.00	1.75	2.75	520
20.	Fibre glass cloth	M	Y=1076+543X	Qr. II (t-1)	7885	507	1596	494	3.5	2.0	5.50	2501
21.	Unvarnished glass cord	M	Y=11270+1160X	Qr. I (t-3)	78675	80279	17708	241677	2.25	3.75	6.00	17488
22.	Bracing alloy	Kg	Y=43+20X	Qr. III (t-2)	34.2	99	465	371	2.20	3.25	5.95	89
23.	Carbon steel	Kg	Y=3498+167X	Qr. I (t-3)	4585	8150	2804	10883	6.25	7.80	14.05	7157
24.	Ammonia printing paper	Roll	Y=2508-67X	Qr. IV (t-2)	1975	1718	1393	1233	4.50	1.50	6.00	659
25.	Welding electrode	kg	Y=95780+450X	Qr. I (t-3)	83698	103782	63125	112980	1.00	3.50	5.50	57467
26.	Oxygen gas	M ³	Y=4473-15X	Qr. III (t-2)	4938	13940	3091	4528	0.75	0.75	1.50	2357
27.	Special steel round	Kg	Y=3905+600X	Qr. I (t-3)	6491	4329	729	3019	1.90	5.00	6.00	50029
28.	Welding electrode	kg	Y=10614+3571X	Qr. III (t-3)	50799	60240	75550	94085	2.00	4.00	6.00	15827
29.	Mobil oil -88	Litre	Y=1248+35X	Qr. I (t-3)	5296	4058	426	4679	1.75	4.00	5.75	1235
30.	DA grey paint dark	Litre	Y=637+62X	Qr. I (t-3)	1293	2348	139	1758	1.15	3.50	4.65	492
31.	Air tool model FA-38	No	Y=53+0.4X	Qr. II (t-1)	9	11	6		2.00	3.00	5.00	5
32.	Meaphalt	Drum	Y=420-14X	Qr. I (t-3)	488	18	55	572	1.75	4.00	5.75	145
33.	Fibre glass sleeves	M	Y=1733+20X	Qr. III (t-3)	20602	25636	2469	34412	1.00	5.00	6.00	12457
34.	Wren glass tape	Roll	Y=706-10X	Qr. IV (t-2)	536	432	106	1062	1.00	1.50	2.50	398

S.No.	Item Description	Unit	Regression Equation Used	Quarter wherein x=0	Demand During Forecasting Period (t+1)				Lead time in months			σ
					Qr. I	Qr. II	Qr. III	Qr. IV	Between In-stock & P.O.	Between P.O. & Actual Receipt	Total	
35.	Air tool model FA-22	No	Y=52-4.47X	Qr. I (t-2)	12	9	30	105	3.00	3.00	6.00	27
36.	Bracing alloy wire	Kg	Y=21.4+0.3X	Qr. I (t-2)	1578	1437	1539	1743	1.50	1.50	3.00	425
37.	Red oxide paint	Litre	Y=1516+6.3X	Qr. IV (t-2)	224	137	187	379	2.00	4.00	6.00	52
38.	Duvarnished glass braided sleeves	M	Y=2665+2087X	Qr. I (t-1)	18358	32284	97148	53468	1.25	3.75	5.00	30638
39.	Nylon laminated sheets	Kg	Y=368+129X	Qr. I (t-3)	1393	1687	1714	1646	1.00	3.00	4.00	629
40.	Welding electrode	kg	Y=34399+125X	Qr. I (t-3)	52340	76099	43666	57437	1.75	1.50	3.25	14807
41.	Special steel round	Kg	Y=579+454X	Qr. I (t-3)	1883	445	880	430	1.80	4.50	5.50	650
42.	Cable welding alum	M	Y=642+107X	Qr. I (t-3)	1871	2421	2121	3576	3.00	2.50	5.50	1447
43.	Welding electrode	kg	Y=4452+318X	Qr. I (t-3)	60779	148122	103729	146218	1.90	3.00	4.50	44739
44.	Welding cable copper	M	Y=289+50.5X	Qr. II (t-1)	649	682	1090	392	3.00	3.50	5.00	219
45.	Sodium hydro-oxide/flakes	Kg	Y=736-22X	Qr. I (t-3)	5787	7030	6052	6314	1.50	4.50	6.00	22905
46.	Soft tin lead solder	Kg	Y=8+13X	Qr. III (t-2)	134	303	180	312	3.85	2.80	6.65	139
47.	Rectified spirit	Litre	Y=504+20X	Qr. I (t-3)	389	391	407	591	2.00	3.00	5.00	86
48.	Soft tin lead solder	Kg	Y=304+2X	Qr. I (t-1)	352	348	354	251	3.00	2.25	5.25	163
49.	Kerosene oil	Litre	Y=16064+567X	Qr. I (t-3)	18955	29720	28000	38199	4.25	7.80	14.05	28906
50.	Armature for AG 7,9 grinders	No	Y=30+0.87X	Qr. I (t-1)	44	29	35	48	3.25	1.50	4.75	13
51.	Khadi cloth	M	Y=308+9979X	Qr. III (t-2)	14228	16409	18446	14000	1.50	1.00	2.50	149

TABLE 2
AGGREGATE INVENTORY CONTROL OF SELECT GROUP OF REPERITIVE STOCK ITEMS IN AN INDUSTRIAL ORGANISATION

Item Description	Unit	Unit cost (C ₁) (Rs)	Annual Demand (D ₁)	Annual Demand (D ₂) in Money Terms (Rs)	Order Size (Q ₁) ⁽²⁾ in Money Terms as per New Policy (Rs)	No of Orders per year as per New Policy (n)	Average Inventory as per New Policy (Rs)	No of Orders per year as per Old Policy	Average Inventory as per Old Policy (Rs)	Average Inventory as per Old Policy (Rs)
1. Babbit metal	Kg	112.76	21174	2387580.2	605872.9	3.9 = 4	30296.5	3	397930.0	397930.0
2. Calcium carbide	Kg	5.89	126549	806273.4	251406.3	2.3 = 2	13917.6	2	201988.4	201988.4
3. Acetylene gas	M ³	16.89	22273	374900.5	262159.1	1.7 = 2	131079.0	1	225500.2	225500.2
4. Cross cotton tape	Roll	18.66	27701	505704.7	278822.3	1.8 = 2	158411.2	1	228852.3	228852.3
5. Indrex circulating oil-35	Litre	4.16	83444	347127.0	230980.1	1.5 = 1	115493.1	1	173583.5	173583.5
6. Bracing alloy	Kg	562.53	54	30376.4	68343.0	0.4 = 1	36171.5	2	5798.1	5798.1
7. Indrex circulating oil-95	Litre	4.97	73496	372215.1	240141.7	1.6 = 2	100660.6	1	187407.5	187407.5
8. Carbon steel billets	Kg	132.18	23555	3642219.0	748283.4	4.9 = 5	274441.8	1	3821109.9	3821109.9
9. Welding electrode	kg	0.47	506975	237855.2	191337.2	1.2 = 1	95413.6	1	118427.6	118427.6
10. HR carbon steel	Kg	25.82	16707	431374.7	257531.3	1.6 = 2	128765.6	1	135687.3	135687.3
11. DTE oil medium	Litre	4.99	84756	422932.4	254982.4	1.6 = 2	127491.3	1	211466.2	211466.2
12. Electrode ferrusse	kg	0.72	480184	496932.5	974391.3	1.8 = 2	130195.6	1	248466.2	248466.2
13. Main cord solder	Kg	40.05	5007	200530.4	175502.1	1.1 = 1	87791.2	1	100005.2	100005.2
14. Carbon dioxide gas	Kg	2.73	100192	273524.2	205088.3	1.3 = 1	102534.2	1	126762.1	126762.1
15. Cotton waste	Kg	4.19	48395	202775.9	176542.6	1.1 = 1	88281.3	1	101387.5	101387.5
16. Co. welding wire	Kg	8.07	32116	259136.1	199458.1	1.3 = 1	99809.1	1	125588.0	125588.0
17. DTE oil heavy sodium	Litre	4.30	54608	234814.4	189932.5	1.2 = 1	94864.2	2	107033.6	107033.6
18. Solvac cutting oil	Litre	6.48	30591	198229.7	174542.9	1.1 = 1	87281.5	1	101114.8	101114.8
19. Unvarnished glass tape	Roll	25.16	23998	603789.7	304661.7	1.9 = 2	153330.9	1	301894.8	301894.8
20. Fibre glass cloth	M	16.36	24282	402109.9	248659.6	1.6 = 2	128315.3	1	204464.9	204464.9
21. Unvarnished glass cord	M	0.63	398337	250355.3	236671.6	1.3 = 1	118335.8	1	149636.1	149636.1
22. Bracing alloy	Kg	212.20	1257	266735.4	202519.7	1.3 = 1	101259.8	1	133747.7	133747.7
23. Carbon steel	Kg	3.94	26512	104457.3	126726.7	0.1 = 1	63365.4	1	52228.6	52228.6
24. Ammonia printing paper	Roll	11.23	6859	77026.4	108807.8	0.7 = 1	54403.9	3	12837.7	12837.7
25. Welding electrode	kg	0.29	363985	105439.4	127314.9	0.8 = 1	63627.4	1	75719.8	75719.8
26. Oxygen gas	M ³	4.16	24079	100243.5	124138.8	0.8 = 1	62049.4	1	75021.7	75021.7
27. Special steel round	kg	6.27	21418	134290.8	143706.7	0.9 = 4	71852.3	2	33572.7	33572.7
28. Welding electrode	kg	0.69	280674	193465.1	172596.2	1.1 = 1	84381.6	1	94832.5	94832.5
29. Mobil oil-88	Litre	4.67	18287	85400.3	114440.1	0.7 = 1	57305.4	1	67590.1	67590.1
30. DA grey paint dark	Litre	16.44	6780	111445.3	130922.2	0.8 = 1	65461.1	4	139725.9	139725.9
31. Air tool model FA-38	No	371.62	30	29148.4	66931.5	0.4 = 1	33465.7	1	34574.3	34574.3
32. Meaphalt	Drum	83.34	1704	142043.5	147782.5	1.9 = 1	73891.2	1	71022.7	71022.7
33. Fibre glass sleeves	M	1.39	102559	146310.0	149979.3	0.9 = 1	74889.1	2	90577.5	90577.5
34. Unvarnished glass tape	Roll	17.94	3100	55757.5	92534.8	0.6 = 1	46207.4	1	27878.7	27878.7
35. Air tool model FA-22	No	1065.43	156	166207.1	159859.2	0.1 = 1	79929.6	1	83103.5	83103.5
36. Red oxide paint	Litre	10.65	6517	69406.1	103338.2	0.7 = 1	51659.2	2	17351.5	17351.5
37. Bracing alloy wire	Kg	192.99	927	178901.8	165819.1	1.1 = 1	82909.5	1	89450.1	89450.1
38. Unvarnished glass braided sleeves	M	0.42	20238	89112.3	117041.9	0.8 = 1	58550.9	2	22278.1	22278.1

Flexible Inventory Management and Value Creation

Item Description	Unit	Unit cost (C _i) (Rs)	Annual Demand (r _i)	Annual Demand In Money Terms (Rs)	Order Size In Money Terms as per New Policy (Rs)	No of Order per year as per New Policy	Average Inventory as per New Policy (Rs)	No of Order as per Old Policy	Average Inventory as per Old Policy (Rs)
39. Nylon laminated sheets	Kg	22.76	6452	14684.3	150252.7	1.9 = 1	75126.4	-	73423.8
40. Welding electrode	So	0.31	229524	71138.0	106612.3	0.7 = 1	52306.1	-	35579.0
41. Special steel round	Kg	2.81	2756	7856.8	34740.1	0.2 = 1	17370.1	1	3928.4
42. Cable welding alum	M	8.46	9984	84464.7	113944.3	0.7 = 1	56972.1	1	42232.4
43. Welding electrode	No	0.37	454494	168976.8	181153.1	1	80576.6	1	84488.4
44. Welding cable copper	M	36.39	2813	10384.1	126373.8	-	43186.9	-	51942.1
45. Sodium Hydroxide flakes	Kg	2.19	25183	55150.8	92065.1	-	46032.5	5	5515.2
46. Self-tin lead solder wire	Kg	93.93	937	88012.4	116336.4	-	58188.2	-	44006.2
47. Rectified spirit	Litre	42.95	1779	76408.1	108376.4	-	54188.2	2	19102.1
48. Soft-tin lead solder	Kg	44.39	1305	57928.9	94378.5	-	47189.2	-	28964.4
49. Kerosene oil	Litre	0.98	114874	112576.5	131549.4	-	65774.8	2	28144.1
50. Armature for AG 7/9 grinders	No	364.87	154	56197.7	93555.1	-	46777.5	1	28459.8
51. Khadi cloth	M	1.43	63160	90233.0	117286.8	-	58893.4	1	45116.5
Total						61	4688751.8	61	6545934.6

Note: 1. Annual demand in money terms (Rs)	=	$r_i C_i$
2. Order size in money terms as per new policy	=	$\sqrt{\frac{(2\lambda r_i)}{C_i}}$
3. Number of orders per year as per new policy	=	$\frac{r_i C_i}{Q_i}$
4. Average inventory maintained during a year as per new policy (Rs)	=	$\frac{Q_i}{2}$
5. Average inventory as per old policy	=	$\frac{r_i C_i}{Orders}$
6. Estimation of Lagrangian Multiplier	$2\lambda =$	$\frac{[\sum_i \sqrt{r_i C_i}]^2}{x^2} = \frac{(23915)^2}{61^2} = 153715.4$
	$\sqrt{2\lambda} =$	392.1

In order to redistribute order quantity in optimum way, a number of quantities were estimated. This included: itemwise annual demand projection (z_i, c_i), order size in rupees ($Q = \sqrt{2\lambda z_i c_i}$), number of orders as per the new flexible policy (Z_iC_i / Q), average inventory as per the new flexible policy (Q / 2), number of orders as per the previous years policy, and the average inventory in the event of status-quo i.e. previous years policy still continuing and in place. In both the cases, a restriction was applied that total number of orders would continue to be the same, i.e. 61, which is the figure in the present study. However, due to rounding-off as number of orders to be placed cannot be fractional, a marginal increase in number of purchase orders from 61 to 67 was found unavoidable. Despite marginal readjustments in number of orders to be placed, however, gains in average inventory as per the revised flexible policy were still very impressive, considering that average inventory tended to decline from 65.65 lakhs in the previous year to Rs. 48.88 lakhs in next year as per flexible policy, 25.6 per cent improvement over previous year.

Concluding Remarks

This paper presents a comprehensive case of application of Langrangian multipliers for inventory control of 51 repetitive stock items in a business firm, with demand of individual items projected using a combination of forecasting methods with cyclic and seasonal corrections. There are two common methods of de-seasonalisation, additive and multiplicative, depending on whether the seasonal effect is best represented by a basic demand per month to which is added a different amount for each month, or a basic demand per month to which is added a different amount for each month, or a basic amount per month multiplied by a different factor for each month. In the present study, de-seasonalisation and subsequent re-seasonalisation was done using multiplicative process. This first involved quarterwise computation of actual and estimated figures for the past periods and then average of quarterwise variations obtained in moving verage way. These ratios are in fact correction factors, which can be used to de-seasonalize the past data or re-seasonalize the forecasts obtained. The methodology resulted in significant savings in average inventory ordering costs following demand forecasting and redistribution of number of orders of previous year in more optimum way, enabling release of money from unnecessary blockage in



K.M.Mital

inventory, to other value-adding activities of the organization in the area of its core competence.

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