

OPTIMIZATION OF INVENTORY IN A SINGLE SPECIALITY (MATERNITY, WOMEN & CHILD CARE) HOSPITAL

SUBMITTED TO

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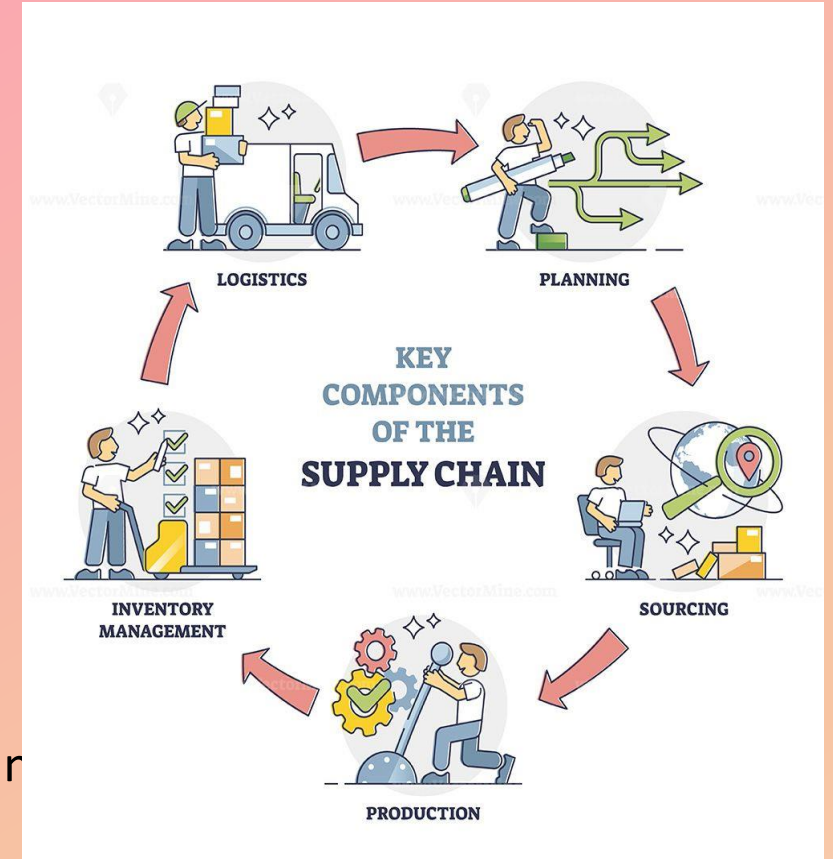


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INTRODUCTION

- **SUPPLY CHAIN MANAGEMENT & INVENTORY MANAGEMENT**

- Supply Chain Management can be explained as the supply chain management (SCM) deals with a system of procurement (purchasing raw materials/components) involving operations, logistics and marketing channels, through which raw materials can be developed into finished products and delivered to their end customers.
- Inventory management and control in a hospital are crucial for ensuring that medical supplies, pharmaceuticals, and equipment are available when needed, without excessive overstocking that can lead to waste and increased costs.

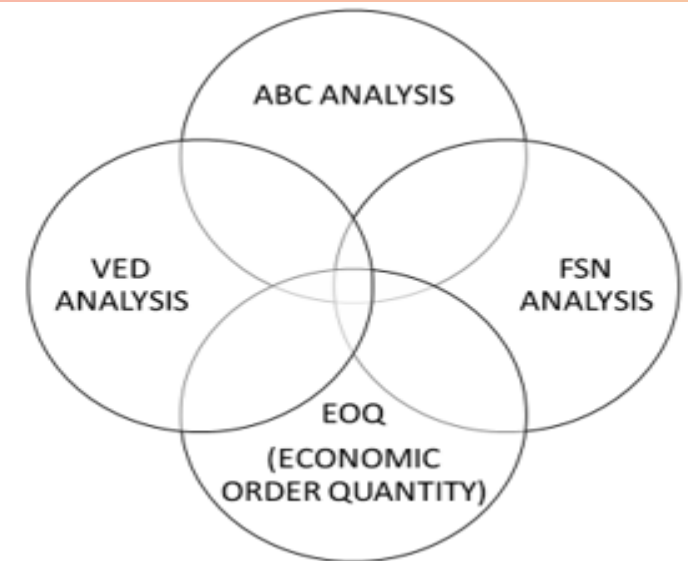


KEY TERMINOLOGIES INVOLVED

- **1. Procurement:** The process of acquiring goods, services, or works from an external source, often via a tendering or competitive bidding process.
- **2. Bidding:** Bidding is the process by which multiple parties, often referred to as bidders, submit proposals or offers to procure goods, services, or contracts.
- **3. Inventory:** Inventory refers to the raw materials, work-in-progress goods, and finished products that a business holds to support production, sales, and delivery.
- **4. Demand Planning and Forecasting:** The process of planning required inventory for required use and predicting future customer demand using historical data, market trends, and statistical methods
- **5. Supplier and Vendor:** A supplier is an individual or company that provides raw materials, components, or finished products to other companies for production or resale and a vendor is an individual or company that sells goods or services to another company or consumer. Vendors are typically the final link in the supply chain and deal directly with customers, providing products for sale
- **6. Lead Time(LT):** The time taken from the initiation of a process or order to its completion, particularly the time from placing an order to receiving the goods.
- **7. Turn Around Time (TAT):** Turnaround time refers to the total time taken to complete a process or fulfill a request. Particularly in hospital settings, TAT is the period from the initiation of a request (such as a purchase order) to the completion of the process (such as the delivery of goods).
- **8. Purchase Request(PR):** A Request Proposal for purchase of a specified item/items.
- **9. Purchase Order(PO):** A Order initiated to supplier/vendor for request of a specified item/items.
- **10. Re-Order Label:** The inventory level at which a new order should be placed to replenish stock before it runs out.
- **11. Economic Order Quantity (EOQ):** The optimal order quantity that minimizes total inventory costs, including ordering and holding costs
- **12. ABC, VED & FSN:** Inventory Control Techniques

HOSPITAL SUPPLY CHAIN MANAGEMENT (HSCM)

- Administration of all activities related to the **flow of goods and services from suppliers to the healthcare providers** within a **hospital** including **procurement, storage, and distribution of medical supplies, pharmaceuticals, surgical instruments**, and other necessary items to ensure efficient and effective patient care.
- **Inventory management** and control in a hospital are crucial for ensuring that medical supplies, pharmaceuticals, and equipment are available when needed, without excessive overstocking that can lead to waste and increased costs.



COMMONLY USED INVENTORY CONTROL TECHNIQUES USED IN HOSPITALS

ABC ANALYSIS			ABC-VED ANALYSIS				
CLASS/CATEGORY	NO OF ITEMS	CONSUMPTION VALUE	CLASS/CATEGORY	A	B	C	
A	20%	70%	V	AV	BV	CV	
B	30%	25%	E	AE	BE	CE	
C	50%	5%	D	AD	BD	CD	
TOTAL	100	100	EOQ (Economic Order Quantity) $\sqrt{2DS/H}$ D=DEMAND RATE H=HOLDING COST PER UNIT PERIOD S=ORDERING COST				
VED-FSN ANALYSIS							
CLASS/CATEGORY	F	S					N
V	FV	SV					NV
E	FE	SE					NE
D	FD	SD	ND				

OPTIMIZATION OF INVENTORY: COST REDUCTION AND REDUCING INVENTORY HOLDING PERIOD

- **Inventory Holding Period:**
- In broader terms, it refers to the **duration for which inventory is held by a company or organization before it is used or sold.**
- It is a crucial metric in inventory management that impacts **cash flow, storage costs, and overall operational efficiency.**

INVENTORY HOLDING PERIOD	AVERAGE INVENTORY
	COST OF GOODS SOLD (COGS) PER DAY

BENEFITS AND ADVANTAGES

- **1. COST MINIMIZATION:** Inventory Holding period reduction by proper inventory demand planning and proper purchase.
- **2. WASTAGE/EXPIRY REDUCTION:** Reduction in Inventory Holding period causes timely utilization of Items procured and hence minimize waste reduction.
- **3. SPACE UTILIZATION:** Reduction in Inventory Holding Period leads to reduction in overstocking and dumping of items in pharmacy and warehouse, leading to proper space utilization and having proper storage practices.
- **4. INCREASE IN OPERATIONAL EFFICIENCY:** Optimum Amount of inventory leads to proper functioning of pharmacy and personeel involved.

METHODOLOGY

- **Procedures:** The procedure is explained step by step-

1. A random Sample Size of **100 Items**, used in the Hospital Pharmacy was taken from the **Hospital Item Master**.
2. The Items were **arranged and labeled** according to **VED Classification and FSN Classification**, depending upon two factors:

(a) **Relevance of the Item used or its Importance in the Pharmacy**

(b) **Consumption pattern of the Item**

and where

V= Vital Items (high urgency item which is most important for survival (mostly **IV Fluids, vaccines and injections**,etc),

E=Essential Items (always required items which are important but may not be very **urgent**, like **fever tablets, pain killers**) and

D=Desirable Items (may or may not be required, depending upon situations, like **moisturizers, skin creams, lotions**,etc),

F=Fast Moving Items (always used, having moderate to highest consumption value)

S=Slow Moving Items (not always used or sometimes used having low to moderate consumption value)

N= Non Moving Items (ocassionally used or rarely, depending upon the condition, having least consumption value)

- 3. After Categorising as VED or FSN, the Consumption Value and Purchase Value of the Items was tracked for a 3 months period.
- 4. The VED-FSN Matrix was categorizes Relevance and Consumption pattern of items:

VED-FSN ANALYSIS			
CLASS/CATEGORY	F	S	N
V	FV	SV	NV
E	FE	SE	NE
D	FD	SD	ND

DATA COLLECTION AND ANALYSIS:

- The following data is collected and Analysed:
- Only **10** Samples are used for better understanding:-
- **Analysis:**
- (i) Only those classified as both **Vital-Fast Moving** would be kept for excess of **5 Days** to reduce **Purchase Value and Inventory Storage**.
- (ii) Those Items classified as **Vital-Slow Moving** would be kept for excess of **3 Days** to reduce **Purchase Value and Inventory Storage**.
- (iii) Those Items classified as **Vital-Non Moving** would be kept upto 1 day maximum.
- (iv) Same applies for all categories

STOCK ANALYSIS																													
Sl No.	Items	VED	Rate (PACK)	APR(First Month-Reference	APR(First Month-Consumpti	Daily Consumpti on	Excess /Shortage	Excess Stock Value	Status	FSN	VED-FSN	VED-FSN- PURCHASE STATUS	Minimum Stock Kept(Emer	Minimum Stock To be Kept	Return Stock	MAY- Purchase(Last Month	MAY- Consumpti on	Daily Consumed	Excess/Sh ort	Safety Stock	Excess/Sh ort Status	TOTAL MONTHLY CONSUMP	AVERAGE MONTHLY CONSUMP	AVERAGE SAFETY STOCK	AVERAGE SAFETY STOCK	JUNE- Purchase	JUNE- Consumption	TOTAL QUANTITY PURCHASE	TOTAL 3 MONTH CONSUMPTIO
1	GONAL-F[P&G] 300 I.U PFP (0.5 mL)	Vitals	3916.01	250	275	9	-25	-97900	Short Pur	F	Vitals F	Vitals F Short	3	28	Not Need	300	295	10	5	5	Excess Pur	570	285	33	16	301	290	851	860
2	VAXIFLU-4[ZYDUS] 1 UNIT PFS (0.5 mL)	Vitals	546	280	300	10	-20	-10920	Short Pur	F	Vitals F	Vitals F Short	3	30	Not Need	320	300	10	20	20	Excess Pur	600	300	50	25	325	300	925	900
3	ORGALUTRAN[ORGANON] 0.25 MG PENFIL	Vitals	1384	90	50	2	40	55360	Excess Pur	S	Vitals S	Vitals S Excess	3	5	Not Need	50	20	1	30	15	Excess Pur	70	35	20	10	45	70	185	140
4	INFANT BONNET 22-25CM [BC303-05] (FISH)	Vitals	1232.64	120	55	2	65	80122	Excess Pur	S	Vitals S	Vitals S Excess	3	6	Not Need	90	40	1	50	5	Excess Pur	95	48	11	5	53	100	263	195
5	TUBERVAC[SERUM] 1 MILLION UNITS INJ (1	Vitals	85	110	45	2	65	5525	Excess Pur	S	Vitals S	Vitals S Excess	3	5	Not Need	80	25	1	55	20	Excess Pur	70	35	25	12	47	110	237	180
7	MENOPUR[FERRING] 1200 IU INJECTION (1	Vitals	27385.51	95	10	0	85	2327768	Excess Pur	N	Vitals N	Vitals N Exces	3	1	Not Need	105	0	0	105	10	Excess Pur	10	5	11	6	11	105	211	115
8	PARIETEX COMPOSITE MESH [PC015FX] 150	Vitals	28116	75	5	0	70	1968120	Excess Pur	N	Vitals N	Vitals N Exces	3	1	Not Need	45	0	0	45	5	Excess Pur	5	3	6	3	5	55	125	60
9	NEW BORN BABY DRESS SINGLE (SV APPAR	Essential	510	100	105	4	-5	-2550	Short Pur	F	Essential F	Essential F Sh	2	11	Not Need	110	145	5	-35	0	Short Pur	250	125	11	5	130	105	340	355
10	GARDASIL 9[MSD] PFS (0.5 mL)	Essential	7898.8	65	75	3	-10	-78988	Short Pur	F	Essential F	Essential F Sh	2	8	ReOrder	85	95	3	-10	15	Short Pur	170	85	23	11	96	75	246	245
11	POWD NAN EXCELLA PRO 2[NESTLE] 1 UNIT	Essential	668.83	110	115	4	-5	-3344	Short Pur	F	Essential F	Essential F Sh	2	12	Not Need	120	125	4	-5	20	Short Pur	240	120	32	16	136	115	366	355
12	MANFORCE CONDOMS 3'S (MANKINND)	Essential	22.8	80	10	0	70	1596	Excess Pur	N	Essential N	Essential N Ex	2	1	ReOrder	120	20	1	100	25	Excess Pur	30	15	26	13	28	110	228	140
13	PAMPERS PREMIUM CARE PANTS BABY DIA	Essential	2248.4	50	15	1	35	78694	Excess Pur	N	Essential N	Essential N Ex	2	2	Not Need	0	0	0	0	30	Excess Pur	15	8	32	16	23	40	73	55
14	INTRAOSSEOUS INFUSION NEEDLE 15G -AD	Essential	1533	40	15	1	25	38325	Excess Pur	N	Essential N	Essential N Ex	2	2	Not Need	0	0	0	0	30	Excess Pur	15	8	32	16	23	32	63	47
16	BABY BATH TUB (GOKIDZ)	Desired	595	10	20	1	-10	-5950	Short Pur	F	Desired F	Desired F Sho	1	2	Not Need	0	5	0	-5	7	Short Pur	25	13	9	5	17	7	27	32
17	VARILRIX[GLAXO] 1 UNIT INJ (0.5 mL)	Desired	1524.64	15	25	1	-10	-15246	Short Pur	F	Desired F	Desired F Sho	1	3	Not Need	0	7	0	-7	12	Short Pur	32	16	15	7	23	12	38	44

Table 1.0 Reference Data

ANALYSIS AND BUDGET ALLOCATION

SI No.	Items	VED	TOTAL 3 MONTHS PURCHASE QTY	TOTAL 3 MONTHS CONSUMPTION QTY	PERCENTAGE UTILIZED	FSN Analysis	VED-FSN	Unit Cost Price	Purchase Value	ConsumedValue	Percentage Value Utilized	Requirement
1	GONAL-F[P&G] 300 I.U PFP (0.5 mL)	Vitals	851	860	101%	FAST	Vitals FAST	₹ 3,916.01	₹ 33,33,503.51	₹ 33,67,768.60	101%	Excess Required and Allocate Budget
2	VAXIFLU-4[ZYDUS] 1 UNIT PFS (0.5 mL)	Vitals	925	900	97%	FAST	Vitals FAST	₹ 546.00	₹ 5,05,050.00	₹ 4,91,400.00	97%	Optimum Required
3	ORGALUTRAN[ORGANON] 0.25 MG PENFILL (1 mL)	Vitals	185	140	76%	FAST	Vitals FAST	₹ 1,384.00	₹ 2,56,040.00	₹ 1,93,760.00	76%	Optimum Required
4	INFANT BONNET 22-25CM [BC303-05] (FISHER & PAYK)	Vitals	263	195	74%	SLOW	Vitals SLOW	₹ 1,232.64	₹ 3,23,876.16	₹ 2,40,364.80	74%	Optimum Required
5	TUBERVAC[SERUM] 1 MILLION UNITS INJ (1 mL)	Vitals	237	180	76%	FAST	Vitals FAST	₹ 85.00	₹ 20,166.25	₹ 15,300.00	76%	Optimum Required
7	MENOPUR[FERRING] 1200 IU INJECTION (1 vial)	Vitals	211	10	5%	NON MOVING	Vitals NON MO	₹ 27,385.51	₹ 57,64,649.86	₹ 2,73,855.10	5%	Not Required and Stop Procurement
8	PARIETEX COMPOSITE MESH [PCO15FX] 15CM (COVID)	Vitals	125	5	4%	NON MOVING	Vitals NON MO	₹ 28,116.00	₹ 35,21,529.00	₹ 1,40,580.00	4%	Not Required and Stop Procurement
9	NEW BORN BABY DRESS SINGLE (SV APPAREL)	Essential	340	355	104%	FAST	Essential FAST	₹ 510.00	₹ 1,73,527.50	₹ 1,81,050.00	104%	Excess Required and Allocate Budget
10	GARDASIL 9[MSD] PFS (0.5 mL)	Essential	246	245	99%	FAST	Essential FAST	₹ 7,898.80	₹ 19,45,079.50	₹ 19,35,206.00	99%	Optimum Required
11	POWD NAN EXCELLA PRO 2[NESTLE] 1 UNIT POWDER	Essential	366	355	97%	FAST	Essential FAST	₹ 668.83	₹ 2,44,624.57	₹ 2,37,434.65	97%	Optimum Required
12	MANFORCE CONDOMS 3'S (MANKINND)	Essential	228	30	13%	NON MOVING	Essential NON	₹ 22.80	₹ 5,198.40	₹ 684.00	13%	Not Required and Stop Procurement
13	PAMPERS PREMIUM CARE PANTS BABY DIAPERS M 10	Essential	73	15	20%	NON MOVING	Essential NON	₹ 2,248.40	₹ 1,64,695.30	₹ 33,726.00	20%	Not Required and Stop Procurement
14	INTRAOSSEOUS INFUSION NEEDLE 15G -ADJUSTABLE	Essential	63	15	24%	NON MOVING	Essential NON	₹ 1,533.00	₹ 96,962.25	₹ 22,995.00	24%	Not Required and Stop Procurement
16	BABY BATH TUB (GOKIDZ)	Desired	27	32	119%	FAST	Desired FAST	₹ 595.00	₹ 16,065.00	₹ 19,040.00	119%	Excess Required and Allocate Budget
17	VARILRIX[GLAXO] 1 UNIT INJ (0.5 mL)	Desired	38	44	115%	FAST	Desired FAST	₹ 1,524.64	₹ 58,317.48	₹ 67,084.16	115%	Excess Required and Allocate Budget

RESULT

OPTIMUM PURCHASE STATUS								
Sl No.	Items	VED	PERCENTAGE QUANTITY UTILIZED	FSN Analysis	VED-FSN	Unit Cost Price	Usage Value	Requirement
1	GONAL-F[P&G] 300 I.U PFP (0.5 mL)	Vitals	101%	FAST	Vitals FAST	3916.01	101%	Excess Required and Allocate Budget
2	VAXIFLU-4[ZYDUS] 1 UNIT PFS (0.5 mL)	Vitals	97%	FAST	Vitals FAST	546	97%	Optimum Required
3	ORGALUTRAN[ORGANON] 0.25 MG PENFILL (1 mL)	Vitals	76%	FAST	Vitals FAST	1384	76%	Optimum Required
4	INFANT BONNET 22-25CM [BC303-05] (FISHER & PAYKEL)	Vitals	74%	SLOW	Vitals SLOW	1232.64	74%	Optimum Required
5	TUBERVAC[SERUM] 1 MILLION UNITS INJ (1 mL)	Vitals	76%	FAST	Vitals FAST	85	76%	Optimum Required
7	MENOPUR[FERRING] 1200 IU INJECTION (1 vial)	Vitals	5%	NON MOVING	Vitals NON MOVING	27385.51	5%	Not Required and Stop Procurement
8	PARIETEX COMPOSITE MESH [PCO15FX] 15CM (COVIDIEN)	Vitals	4%	NON MOVING	Vitals NON MOVING	28116	4%	Not Required and Stop Procurement
9	NEW BORN BABY DRESS SINGLE (SV APPAREL)	Essential	104%	FAST	Essential FAST	510	104%	Excess Required and Allocate Budget
10	GARDASIL 9[MSD] PFS (0.5 mL)	Essential	99%	FAST	Essential FAST	7898.8	99%	Optimum Required
11	POWD NAN EXCELLA PRO 2[NESTLE] 1 UNIT POWDER (400 gram)	Essential	97%	FAST	Essential FAST	668.83	97%	Optimum Required
12	MANFORCE CONDOMS 3'S (MANKINND)	Essential	13%	NON MOVING	Essential NON MOVING	22.8	13%	Not Required and Stop Procurement
13	PAMPERS PREMIUM CARE PANTS BABY DIAPERS M 108'S (P&G)	Essential	20%	NON MOVING	Essential NON MOVING	2248.4	20%	Not Required and Stop Procurement
14	INTRAOSSEOUS INFUSION NEEDLE 15G -ADJUSTABLE LENGTH 24-48MM [DIN1515X] (BD)	Essential	24%	NON MOVING	Essential NON MOVING	1533	24%	Not Required and Stop Procurement
16	BABY BATH TUB (GOKIDZ)	Desired	119%	FAST	Desired FAST	595	119%	Excess Required and Allocate Budget
17	VARILRIX[GLAXO] 1 UNIT INJ (0.5 mL)	Desired	115%	FAST	Desired FAST	1524.64	115%	Excess Required and Allocate Budget

REPORT AND RESULT ANALYSIS

VED-FSN ANALYSIS			
CLASS/CATEGORY	F	S	N
V	FV(5 day excess)	SV(3 day excess)	NV (1 day excess)
E	FE(3day excess)	SE (1 day excess)	NE (0 day excess)
D	FD(1 day excess)	SD (0 day excess)	ND (0 day excess)

CONCLUSION

- In Conclusion, there is an attempt to Optimize Inventory, by using shown strategies and thus increasing in Operational efficiency, leading to compliance and cost-benefit ways to run the Hospital Pharmacy effectively.

THANK YOU