STUDY OF MATERIAL PLANNING OF SUPPLY CHAIN MANAGEMENT IN A HOSPITAL.

Dissertation submitted to

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For the partial fulfillment for the award of the degree of

Master of Business Administration (MBA)

in

Pharmaceutical Management

by

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Under the supervision and guidance of

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Acronyms and abbreviations

1.	CBU	Central Buying Unit
2.	SCM	Supply Chain Management
3.	PO	Purchase Order
4.	GRN	Goods Receipt Note
5.	PC	Purchase Committee
6.	HOD	Head of the Department
7.	MDM	Master Data Management
8.	MC	Medical Consumables
9.	PH	Pharmaceutical Product.
10.	SPV	Stock positioning value
11.	OTIF	On time in full
12.	PPO	Pending purchase order
13.	BRM	Business Relationship Management
14.	PR	Purchase Requisition
15.	CCU	Critical Care Unit
16.	ICU	Intensive Care Unit
17.	MIS	Management Information System
18.	NABH	National Accreditation Board for Hospitals
19.	CAG	coronary artery angiography
20.	PTCA	percutaneous transluminal coronary angioplasty
21.	PTMC	percutaneous transvenous mitral commissurotomy
22.	PPI	permanent pacemaker implantation
23.	CTO	Chronic Total occlusion

SELF-DECLARATION

I hereby declare that the training report on “Supply Chain Management” in Narayana Health, Bangalore being submitted by me in original & independent research work.

All the information in this project is the best of my knowledge & interest. The data & information provided in this project is also truly original and valid & was not influenced by another work done in the same field before. It is prepared by my observation and discussion with the staff & executives of the concerned department. And even the fact and the findings presented in this project reports are true to my best of knowledge and belief.

PLACE: - Narayana Health, Bangalore

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Nigamananda satapathy

(Signature of student)

Acknowledgement

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My profound gratitude to also my Project Mentor **Mr Manas Bhattacharya** (Senior General Manager in Supply chain Management) for coming up with such a wonderful idea and binding thoughts into a compiled version to provide as much as information possible regarding Hospital Management at Narayana Health, Bangalore. I would also love to extend my sincere thanks to **Mr Gururaj Hebbar** (Deputy General Manager – supply chain management), **Mr Pridhvi Kumar Jenu** (Deputy General Manager – supply chain management), **Mr Deepak kumar** (Senior manager), **Mr Srinivasa R** (Manager) and **Ms Shipra V Rai** (Manager)**.**

Lastly, thankful to the Almighty, for whom my "State of being" exists.

INTRODUCTION

Supply Chain Management (SCM) is the practice of incorporating a company's social, environmental, and economic goals into the coordination of inter-business processes to improve the long-term economic performance of the individual company and its supply chains. Material management is a core function of supply chain management where it involves in supply Planning and execution of supply chain to meet the requirement and in which time what product required for the organization. Particularly in a hospital material management department plays a significant role by providing material planning, inventory management for drugs, medical consumable, general consumable, printing and stationery, medical equipment & instruments, housekeeping, linen, and computers. There are two major factors in material planning – macro factor & micro factor. Macro factor includes business cycle, import & export and in micro factor includes on time in full (OTIF), inventory holding, acceptable inventory levels. Material planning carried out by requirement based on forecasting of past consumption. The process of material planning is to identifying requirements to meet demand, checking inventory and allocating resources, identifying issues, and making recommendations. Material planning asking three question – what is needed, how much needed, when is it needed?

In material management, information technology play an important role for smooth running of Supply chain management in hospital for collecting the relevant data and break down it for proper analysis and then execute it in the way of output which is helps for optimum performance of the hospital supply chain management. In past, agriculture is the only source for wealth creation and then manufacturing industry sector comes and now service sector become leader for wealth creation. Agriculture, manufacturing, services, knowledge are the sources of wealth creation where service sector is booming now due to efficient data sources & analysis. Agriculture sectors provide 20.19%, Manufacturing industry provide 25.92% and Service sector provide 53.89% to Indian GDP (source – ministry of Statistics and Programme Implementation).

Supply Chain Management (SCM) is the practice of including a Organization's social, tangible, and financial aims into the arrangement of inter-trade processes to upgrade the general financial performance of the individual party and allure supply chains. The goal of SCM in Hospitals and health-located structure search out find the dangers in different areas and suggest measures to decrease ruling class. It focuses to recognize vulnerable regions to attain target health results and increases properties in all-encompassing well-being. The supply chain guarantees availability of cures and accompanying healing products at official time of region, lowering stock use without thought, magnifying patient care, coordination comprehensively areas deteriorating human wrong/medication mistakes.

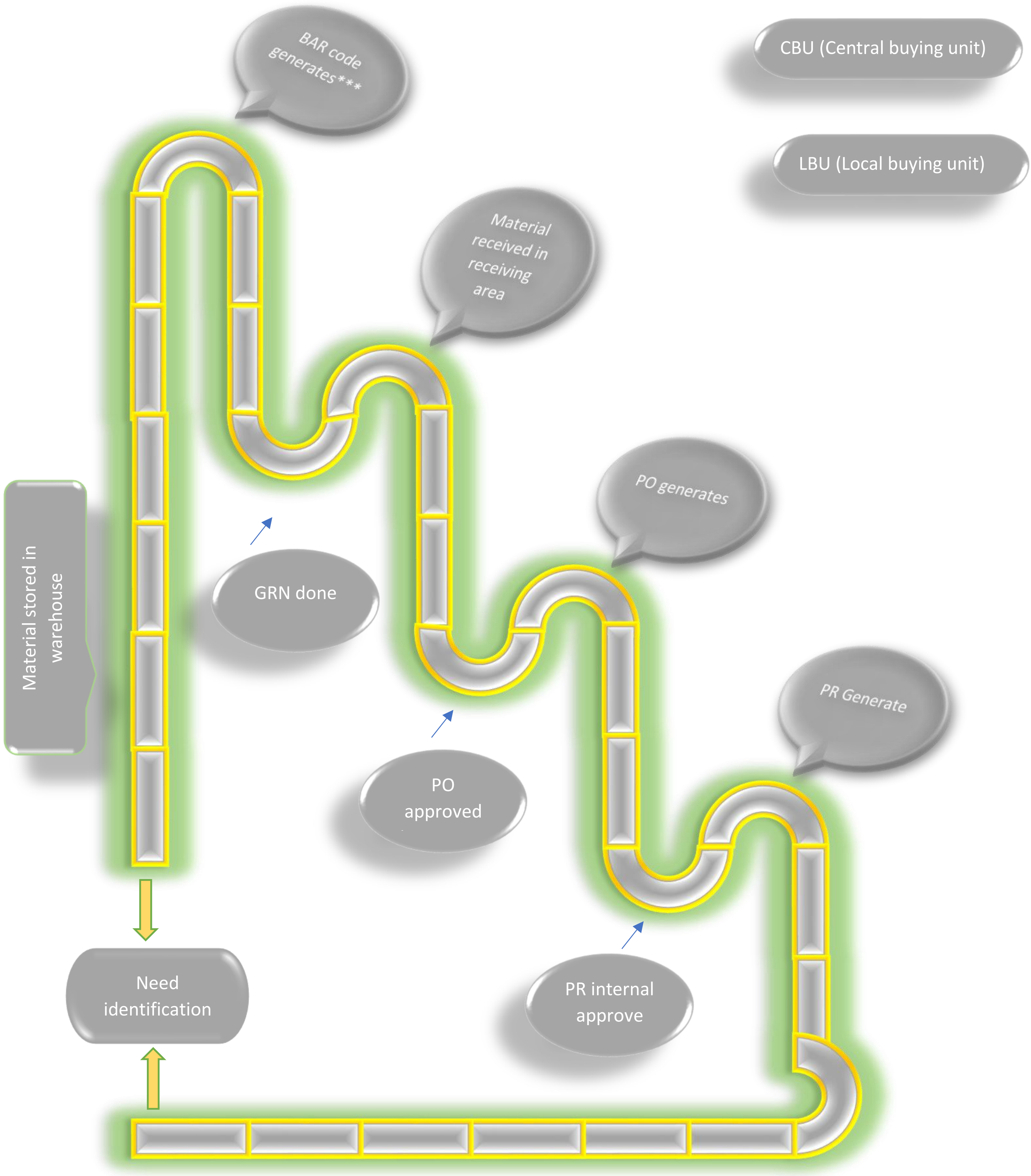
Procurement Management:-

Procurement Management is expressed as "It is a calculated approach to optimizing administrative spend. It invoices sourcing, requisitioning, organizing, check, and conciliation. It method getting your merchandise and services from chosen merchants, inside your persistent budget, either on or before the cutoff."

- **Item Master Creation**-For every existent part expected obtained or new part expected introduced skilled must be an Item code for the unchanging. The unit checks the requested item if by any means it is present in the Master Data Management (MDM) tool. For Items not existing in MDM tool, a request for item concoction is expected produced in MDM tool. Requisite approvals for the task/production expected captured as per the workflow approval matrix. The unit Single Point of Contact (SPOC) fills up the facts in the MDM tool and comply for further processes. For Central Buying Unit (CBU) items, the CBU group fills up the need fields in the MDM tool and comply the request and for LBU items, MDM tool devises the item in FMO accompanying the analyses wanted for one unit.

- **Procurement**- The procurement of the required materials and services is done at the lowest rate within the specified time. They generally don't compromise with the quality and service parameters. Stock Keeping Units (SKU) are items typically procured on historical demand and stocked at the unit of consumption. Items are stocked to avoid procurement lead times, meet variations in demands and achieve economies of scale while purchasing. In case of Monopoly, Other Emergency Materials (OEM) product or doctor's preference three quotation requirements would not be applicable. In such cases an e-mail documentation to be maintained or the Quotation Comparison Purchase Approval Form (QCPAF) should mention the remarks about the monopoly or OEM vendor items. In case of CBU items is made as LBU due to any price change, QCPAF has to be made for that item mentioning that "CBU converted to LBU" and the comparative of existing similar CBU or LBU items to be included the QCPAF for Global Account Management (GAM) approval.

  For CBU items, the CBU or Central Buying Unit consolidate the PRs and releases Purchase Orders on approved vendors, approved rates and approved commercial terms. All approved QCPAF on basis of which the POs are raised, to be retained and filed suitably with relevant quotations and documentation for audit trail. For Oracle units QCPAF and supporting documents can also be uploaded in the system.



Narayana Health SCM Roadmap

Inventory Management: -

"Inventory management is a part of the SCM. Inventory management includes the aspects such as controlling and overseeing purchases from vendors as well as to the customers, maintaining the storage of stock, keeping the amount of product sale in control and fulfil the required order."

Material Requirement Planning: -

1. **Bounce check and order material**: -

Bounce checking and Prepare the PR and raise it for required days in oracle ERP by 15 days of consumption report, SPV, PPO and then make PR quantity.

Item Code	Item Name	Qty	Store	UOM	15 Days Cons	SPV	PPO	PR Qty
M-N-SG-L149-04256	ATS SYSTEM PROCEDURE SET-.-.-TX/175 04256 LIVA NOVA-	2	OT 2F	EACH	3.75	1	0	2.75
M-N-SG-A006-00011	DRAPE KIT-KIDNEY TRANSPLANT(DONOR)-ADULT-3101 AMARYLLIS-	1	OT 4F	EACH	1	0	0	1
M-N-SG-B008-00124	URETERAL STENT-DOUBLE J PIGTAIL CLOSE END-4FR X 16CM-BIORAD-	3	STOCK	EACH	2.75	1	0	1.75

Table 1.1– consolidated bouncing

PR quantity is calculated by 15 days of consumption – spv – ppo then we will get PR qty. UOM (Unit of measurement) plays an important role. Some item is in strip of one or box of 10, in that time PR quantity is not considerable. We must calculate actual PR quantity by adding one column after UOM then make name as UOM 1. According to UOM, UOM 1 will mention then add a column after PR quantity as a name of Actual PR quantity.

Actual PR quantity = PR quantity * UOM 1

Item Code	Item Name	UOM	UOM 1	15 Days Cons	SPV	PPO	PR Qty	Atual PR Qty
M-N-SG-L14	ATS SYSTEM	EACH	1	3.75	1	0	2.75	2.75
M-N-SG-A0	DRAPE KIT-	EACH	1	1	0	0	1	1
M-N-SG-B0	URETERAL S	EACH	1	2.75	1	0	1.75	1.75

Table 1.2 – Actual PR Qty

While doing PR, we must check UOM is correct or not. In oracle ERP we must enter the item code and Actual PR quantity, and it will collect all data like item name UOM and all. Daily consolidated bouncing report should be stored in a file as name mention with date.

2. Less than 5 days Vs PPO working: -

For fulfilment & OTIF, follow up is required to get benchmark. The entire Material Planning work is failure if the organization didn't get benchmark and for creating more revenue, decreasing Lead time and fulfil the end user demand, less than 5 days Vs PPO working is required.

After download the PPO from Oracle, save it in a excel binary format in a folder. Copy all data in a new sheet. Filter the required "PO created by" & make PPO Grater than zero. Copy all data into new sheet and remove unnecessary data. Make a new column after po date and make it as a "today". In last of the column make a 3 new column with name as Aging, Average, And Exact.

Po Date	today	Item Code	Item Name	Pending Qt	Aging	Average	Exact
26-04-2022	02-05-2022	M-N-SG-M	ABDOMINA	2	6	5	
28-04-2022	02-05-2022	M-N-SG-V	ABDOMINA	1	4	4	
30-03-2022	02-05-2022	M-N-SG-S0	ACIDIC SOL	1600	18.5	18.5	Exact

Table 2.1 – PPO working

Aging will help us for getting how many numbers of days are pending form po date of that material. It is calculated by "**Today – PO date".** Same as Average is calculated by average formula of aging 1st & 2nd row and then drag. Make Item Name in A-to-Z order with applying duplicate value. Filter the colour and make the average. Those average same make it as an Exact and do the pivot of that sheet.

Download the spv from Athma and make a pivot of that. Open updated OCR report from desktop and apply the VLOOKUP formula in aging, ppo, spv & then copy as a value. Click the ctrl+f and replace #N/A as 0. Take filter of greater than zero and PR to be Raised, move the data into new sheet and remove the unnecessary data.

Item Code	Item Name	5 Days	Regular Y/N	Vital	MSH OT 4F - MSQ	Vendor Name	SPV	PPO	PPO Aging	Remarks
M-N-S(	AV FISTU	756.67	Y	0	0	Aims	50	1040	22	Required for Nephrology
M-N-S(	ET TUBE	3.17	Y	0	3	Aims	0	23	22	Required for NICS WARD & MSH IP4

Table 2.2 – less than 5 days working

Item code, item name, 5 days, spv, ppo, and remarks will send to the purchase team for follow up the item.

3. Fulfilment & OTIF Report: -

Every business need profit and ultimately supply chain management is work for increasing the profit. Fulfilment which is basically done by planning team but here a measure player is purchase team. Without follow up it will be difficult to achieve OTIF and fulfilment in benchmark. There are some certain KPIs for certain percentage to get Benchmark.

KPI	Benchmark percentage
OTIF	85-100%
Fulfilment	95-100%

Table 3.1 – KPI

Download the stock request from athma Application (Inhouse application) then add four columns.

1. Quantity pending = quantity issued – quantity indented.
2. Issued Y/N = IF(P2<>“ ”, “Y”, “N”).
3. Issued status = IF (K2=I2, “No”, IF (K2=0, “Full”, “Partial”)
4. Percentage column = J2/I2

Where, P2 = Issue number

J2 = Quantity Issued

I2 = Quantity Indented

K2 = Quantity Pending

From Issue store to Quantity Indented take data to another sheet and remove duplicate. For remove duplicate the shortcut key is alt+A+M and add two column.

1. Day
2. Item type

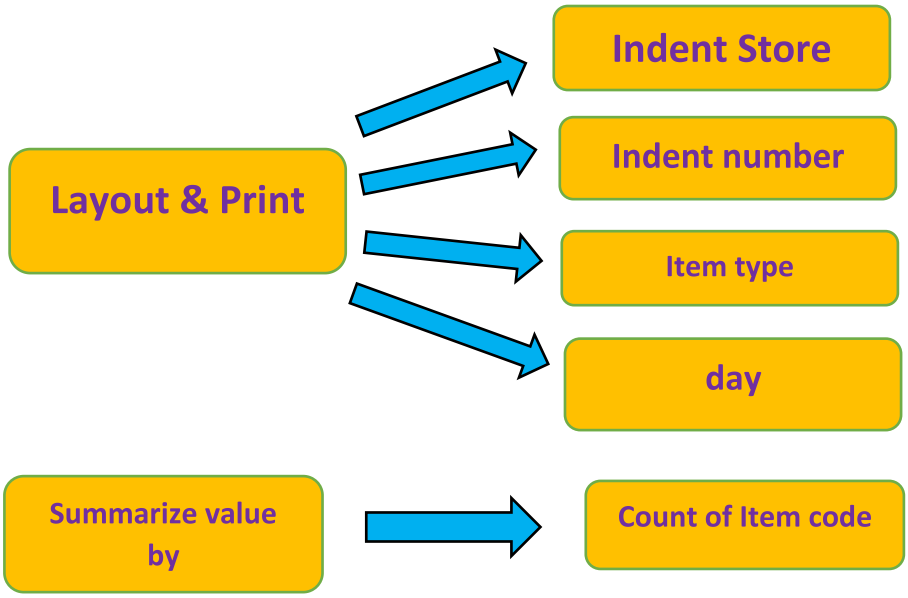
Issue Store	Indent Store	Indent No	Indent Date	Indent Approval Date	Item Code	Item Name	Issue Item Name	Qty Indented	Day	Type
Main Store	IP PHARMA	SRQ-1002-	19-04-2022	19-04-2022	M-N-SG-BO	ABSORBEN	ABSORBEN	20	19	SG
Main Store	IP PHARMA	SRQ-1002-	16-04-2022	16-04-2022	M-N-PH-SO	ACAMPROS	ACAMPROS	24	16	PH
Main Store	IP PHARMA	SRQ-1002-	18-04-2022	18-04-2022	M-N-PH-IO	ACECLOFEN	ACECLOFEN	60	18	PH
Main Store	IP PHARMA	SRQ-1002-	18-04-2022	18-04-2022	M-N-PH-W	ACETAZOLA	ACETAZOLA	150	18	PH
Main Store	IP PHARMA	SRQ-1002-	18-04-2022	18-04-2022	M-N-PH-CO	ACETYLCYS	ACETYLCYS	120	18	PH
Main Store	IP PHARMA	SRQ-1002-	18-04-2022	18-04-2022	M-N-PH-CO	ACETYLCYS	ACETYLCYS	50	18	PH
Main Store	IP PHARMA	SRQ-1002-	18-04-2022	18-04-2022	M-N-PH-CO	ACETYLCYS	ACETYLCYS	120	18	PH

Table 3.2 - Indent Working

In day column put = day(E2), where E= Indent approval day and in Item type column apply mid formula = Mid(F2,5,2) where F is Item code.

Then put Pivot by taking Indent store, Indent number, Day, Item type and item code.

In Indent store of Pivot Table do the Subtotal is none and in layout and print check the repeat item labels and do that in 2 item more in pivot table.



Then take According day wise or maximum Indent Quantity in another Table and with the help of Indent No identify the partial fulfilment and no fulfilment by Alternative or same item issued in different time.

Indent Store	Indent No	Day	Type	Total no of line items
IP PHARMACY STORE- 4F KA-B62-143692/93/94	SRQ-1002-2205420	19	SG	192
IP PHARMACY STORE -7F KA-B62-143814/143815	SRQ-1002-2205344	18	SG	39
OT STORE-4F KA-B62-143695/143696	SRQ-1002-2205340	18	SG	125

Table 3.3 – Indent Pivot

After Indent Pivot and individual Working on Partial and No fulfilment then Fulfilment report is done by the help of Excel and this Report is send to every team member.

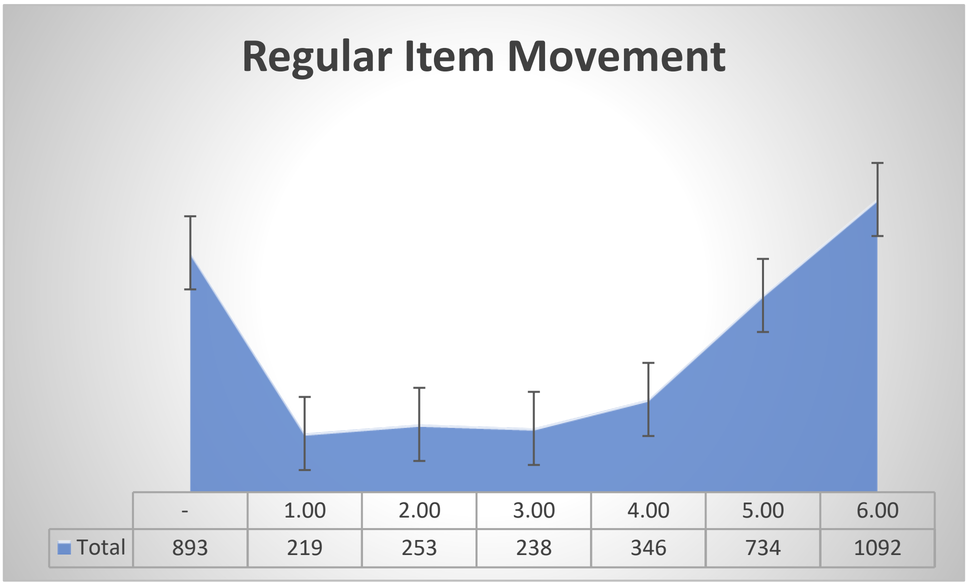
MSH SURGICAL FULFILLMENT							
Store Name	SG Indent	Total No. of SG Line items Indented	No. of Line Items Issued Full	No. of Line Items Issued partial	No. of Line Items Not Issued	Fill rate	OTIF
IP PHARMACY STORE 4F	SRQ-1002-2205772	193	150	12	31	77.72%	82.90%
IP PHARMACY STORE 7F	SRQ-1002-2205721	28	24	3	1	85.71%	85.71%
OT STORE 4F	SRQ-1002-2205741	226	191	16	19	84.51%	92.92%
					Average	82.65%	87.18%

Table 3.4 – Fulfilment Report

- Planning will do by 3-month consumption report, FSN analysis, ABC analysis, whether product is regular or not, what is the product value, alternative of that product, lead time of that product, spv, PPO, UOM.

- Regular Item Identification: -

Regular Material Identification is done by previous 6 month consumption data, if the material consumption in every 6 month then it consider as a regular Item.



Graph 3.1 – Regular Item Movement

- ABC Analysis: -

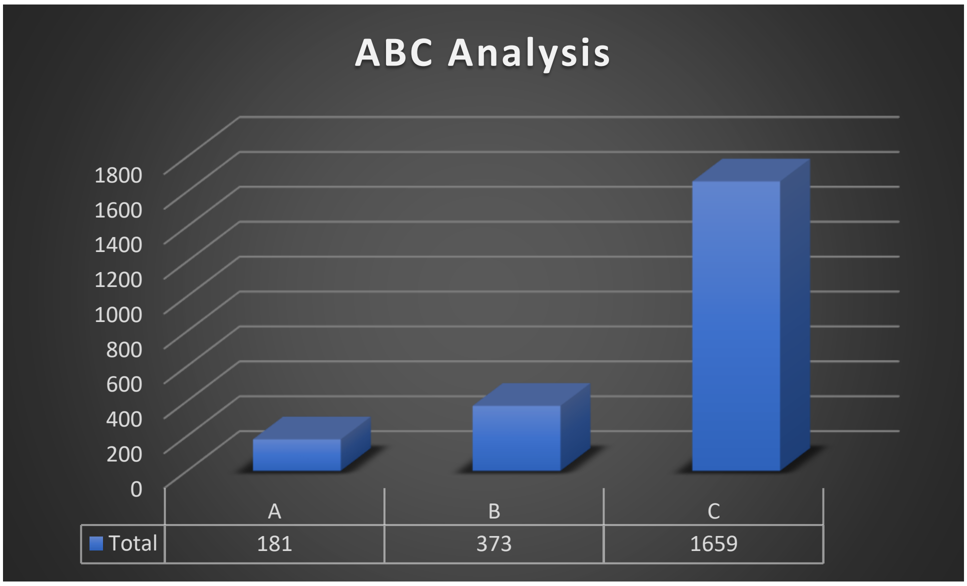
ABC reasoning is a stock administration technique that decides the advantage of stock parts established their significance to the business. ABC ranks parts on demand, cost and risk dossier, and stock mangers group parts into classes established those criteria.

In a trade each stocked part (or SKU) does not have the unchanging value. Some parts will be more advantageous, urgent or detracting than possible choice, accordingly, will require more focus in conditions of predicting, management and renewal exercises. One way to help change and prioritise articles search out segment bureaucracy into types (A, B, and C). In ABC inventory categorization ultimate common habit to analyse stock is to rank parts established their usage advantage (this maybe based on buying or use). Usage advantage is calculated by reproducing an article's 'usage rate' by allure 'individual profit', or 'sales book' by allure 'part cost'.

A - classification parts are very main and sometimes trade fault-finding. They require ultimate cautious control.

B - categorization items are inferior to 'A' articles and more important than 'C' parts.

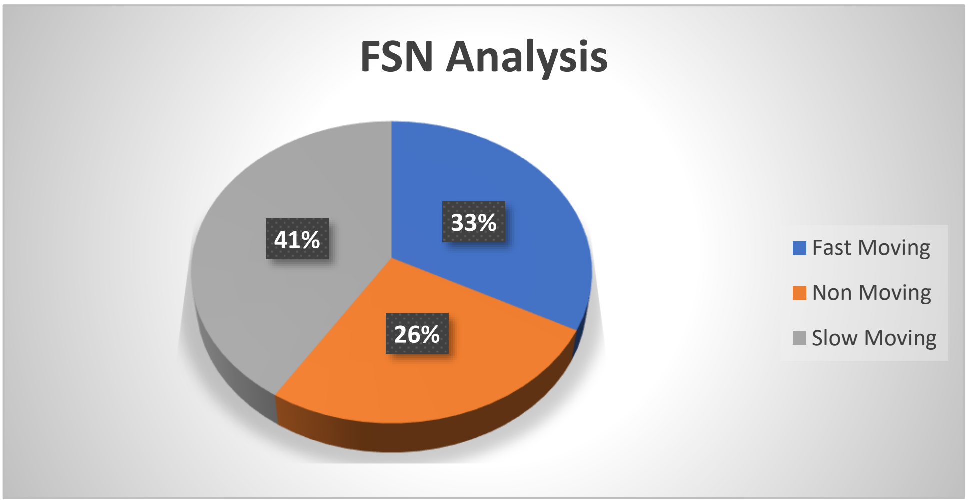
C - categorization items are a little main and need less consideration and control.



Graph 3.2 – ABC Analysis

- FSN Analysis: -

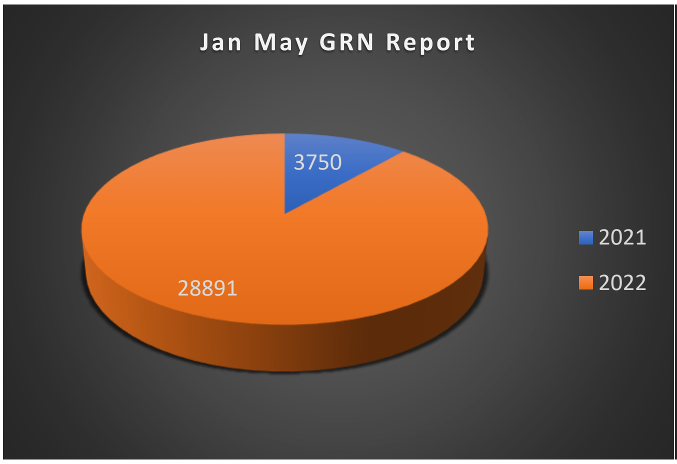
FSN signification Fast, slow, and non-Moving in inventory administration. FSN is individual of the stock administration methods, and it is about segregating merchandise established their consumption rate, abundance, and the rate at that the stock is second-hand. Fast-moving stock, as the name suggests, covers the stock that moves fast and needs expected stocked repeatedly. Generally, the stock that display or take public this type has an inventory change percentage of as well 3 and authorizes about 10-15% of the total stock. Slow-moving stock is the stock that crawls moderately through the supply chain and has an stock change percentage middle from two points 1-3. It is mainly 30-35% of the total stock. The stock that exceptionally moves accompanying the stock change percentage form 60-65% of the total stock is named the Non-Moving stock.



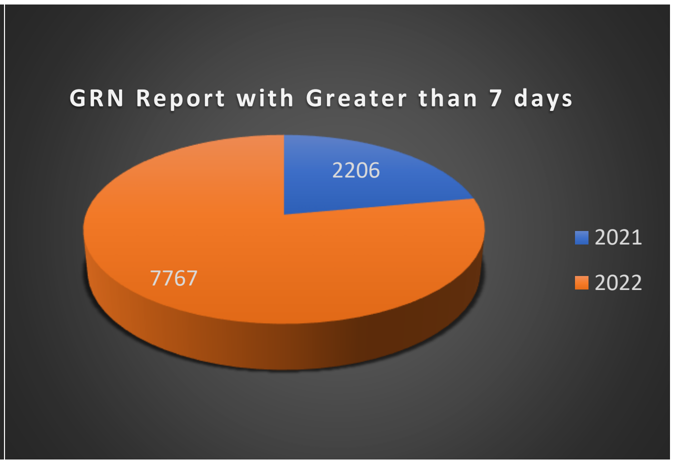
Graph 3.3 – FSN Analysis

- Lead time –

Lead time in stock administration is the lapse accompanying betwixt when an order is established to fill stock and when the order is taken. Lead time influences the amount of stock a Organization needs to hold always sooner than expected.



Graph 3.4 – Jan may GRN Report



Graph 3.5 – GRN Report with Greater than 7 days

- Monthly Planning is done by Power BI. Before ordering we are matching with PPO. If product is miss, then we have informed Power BI team to Update the same.

- Stock audit – it is done to maintain and track of item, near expiry date, variation of item.

perpetual audit –everyday perpetual audit done to manage the inventory.

batch audit-This audit is done by Batch wise weekly once.

monthly audit-it done by monthly once for tracking item Variation,

- procedure of Transfer material to different unit – For Transfer Material to different unit 1st indent is done in the name of supply return store then then transfer to courier for sending to end user.

Some of Important point in supply chain management

- **PURCHASE: -**

a) Vendor creation forms and necessary guidelines to fill up: -
- Vendor mandate form, Company original cancel cheque, pan card, GST, MSME (if applicable).

b) Purchase negotiation policy: -
- Rate contract negotiation for bulk consumption(1year)
- Regular negotiation for non-rate contracts products.
- Monopoly product negotiation

c) CBU policy and team members: -
- As per SCM protocol.

d) Rate contract entry in system: -
- All the negotiated product prices by CBU & LBU will be updated in oracle with proper approval.

e) Find out new item from item master
- Item master is stack of products related to medicine and surgical with respective codes it is helpful to identify item. Item master helps the user to find correct item code of medicine & surgical.

f) Item creation template: -
- Item creation is a template which used to create one item code/item name for BU like 1001(NICS),4505 warehouse. It’s a template to Create new item name or code between internal units.

g) Change in VAT configuration concept: -
- 0%
- 5%
- 12%
- 18%
- 28%

And change will do in oracle.

h) Standard purchase order entry: -

- It is done in oracle. In NRC material we did SPO.

i) Oracle reports-pending purchase order, rate contract report etc.: -

- Pending purchase order (PPO) is a file which consists pending items of last 45 days.
- Rate contract report is a file which is having price of the rate contracted products of CBU & LBU with expiry date.

j) Implant cost, FSP & credit note

- The material fixed in our body that cost called implant cost of that material.

Fsp-fixed selling price.
Credit note: - it is for the returning of non-moving material or near expiry materials to the Vendor & Vendor return the money of that item.

k) Suppliers return in system :-

- It is done by Oracle ERP.

l) Item name creation: -

- By the help of item creation format create new item and send to IT department and after item name creation done PO will be process otherwise it is not possible to do the PO before completion of any item creation.

- **CONSUMPTION: -**

a) Departmental consumption booking-manual entry/auto consumption booking: -

- For auto consumption it is available in Athma application (Narayana health in house application) & for Manual Item, it is provided to user and written in a manual book.

b) Nursing indenting process-generic based: -

- Nursing people indent by API (Active pharmaceutical ingredient) for Medicine names, there is no brand name in their system.

c) Issue against indent process: -

- Issue material against indenting material.

d) Follow up for bounce items: -

- Everyday Material planning team send less than 5 days Vs PPO working to Purchase team for follow up & for this fulfilment percentage increase.

e) Reports- Departmental consumption report, pharmacy consumption report: -

- Both reports are available in Athma.

➢ **Inventory: -**

a) Material forecasting: -

- Material forecasting is done by analysing last conjugative three-month consumption report and that product is regular or not, what is the movement for that product. ABC analysis, VED analysis, SPV report, PPO report, UOM (unit of measurement) after having all these reports then planning is done. Basically, For A class Product 15 days, B class product is for 20 days and C class product for 25 days for planning.

b) Register entry for incoming materials: -

- In register all incoming material written in register entry book for future references.

c) GRN entry in system: -

- In Oracle GRN entry is done after receiving material from vendor.

d) Bar code screen and system entre: -

- After GRN done bar code is create for sutures and for outpatient department Bar code create all material.

e) Inter branch transfer process: -

- Transfer material from main warehouse to store.
  For example: -main warehouse to msh store.

f) Intra store transfer process

- Transfer material from store to sub store
  For example: -MSH store to msh sub store

g) Store to store indenting process: -

- In store they indent in Athma Application then after indent approved material issued to store.

h) Reports-OCR, SV, stock variance report, non-moving identification

- Opening & closing report, stock variance Report is in Athma application and for non-moving Identification, if item movement is not done by 6 months, then it's a non-moving item.

i) Stock variation report: -
- It is available in Athma application.

j) Stock variance options-direct inventory adjustment/stock taking initiation option: -
- It is done in Inventory adjustment where positive/negative will mention.

k) GRN report: -
- In GRN report we get last one-month GRN done & it is available in Oracle ERP.

l) Item master report: -
- It is found in oracle ERP. there is lot of data including everything about product and we also need it for finding non – moving material.

m) Purchase requisition option: -
- It is done by oracle.

n) Stock variance audit committee: -
- There are five members from different department head in audit committee.

o) Perpetual audit process: -
- Daily audit done by warehouse people is called as a perpetual audit.

p) Arrangement of items generic wise in pharmacy, brand wise in OP pharmacy.

- In OP pharmacy, item stored in brand wise because many end user need for branded drug and IP pharmacy, item stored in generic wise just because nursing people indent in generic wise.

q) Crash cart/Drug cart list: -
- VED (vital essential desirable) items & Lifesaving drugs are there in each floor of hospital.

r) PR tool: -
- Power BI & Oracle ERP.

s) SCM metrics: -

- they are many paraments. In scm metrics they cover procurement & inventory.

t) Identification of near expiry items: -

- In store there are 3 type audits done, perpetual audit, batchwise audit and final audit. In batchwise audit they identified near expiry material in medicine store by physically.

u) Credit note accounting for return items: -

- Vendor will give credit note after sending non-moving items / near expiry items.

v) Admission kit for ITU: -

- There is kit where some nos. of item are there for ITU admission patients only.

RESEARCH QUESTION

- What is the on time in full (OTIF) percentage in inventory management of inpatient & outpatient department?
- How forecasting done in material planning?
- What is the strategy behind controlling the inventory in supply chain management?
- What is the benefit for implementing bar code system?

OBJECTIVE

The objective of this study is to identify the issues in material planning in a supply chain practice of a hospital.

Focus of the analysis: -

- To analyse the demand planning by forecasting.
- Performance of on time in full (OTIF).
- To assess the inventory management for medicine & surgical of hospital.
- Performance of Bar code system for sutures in surgical & for all materials in outpatient department.

Conclusion

- After analysing the data and process, I found that Material Requirement Planning is the pillar of supply chain management with the help of forecasting by previous consumption data.
- RFID (Radio Frequency identification) technology used for reducing waiting time for patients in OPD. It was observed that approximately 4-5 minutes reduced per patients.
- OTIF & Fulfilment was also increased as compared to previous year.

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