

**INTERNSHIP TRAINING**  
**AT**  
**GUJARAT MEDICAL SERVICES CORPORATION LIMITED**  
**(GMSCL)**  
**Gandhinagar, Gujarat**

**ROLE OF INFORMATION TECHNOLOGY IN SUPPLY CHAIN**  
**MANAGEMENT SYSTEM**  
**‘e-Aushadhi’ (DVDMS)**

**Submitted By**  
**Dr. Deepika Bhati**

**Post Graduate Diploma In Hospital and Healthcare Management**  
**2014-2016**

**Under the guidance of**  
**Dr. A.K. Khokhar(Director)**



**International Institute of Health Management Research,**  
**New Delhi**



## **GUJARAT MEDICAL SERVICES CORPORATION LIMITED**

(A Government of Gujarat Undertaking)

The certificate is awarded to

**Dr. Deepika Bhati**

In recognition of having successfully completed her dissertation work in the  
**INFORMATION TECHNOLOGY** cell of GMSCL

and has successfully completed her Project on

### **ROLE OF INFORMATION TECHNOLOGY IN SUPPLY CHAIN MANAGEMENT SYSTEM**

**'e-Aushadhi'**

From 15<sup>th</sup> February, 2016 to 15<sup>th</sup> May, 2016

**AT**

**GUJARAT MEDICAL SERVICES CORPORATION LIMITED (GMSCL)**

**Gandhinagar, Gujarat**

She comes across as a committed, sincere & diligent person who has  
a strong drive & zeal for learning

I wish her all the best for future endeavors



  
**Managing Director**  
**GMSCL**  
Managing Director  
Gujarat Medical Services Corporation Ltd.  
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**TO WHOMSOEVER IT MAY CONCERN**

This is to certify that **Dr. Deepika Bhati** student of Post Graduate Diploma in Hospital and Health Management (PGDHM) from International Institute of Health Management Research, New Delhi has undergone Internship Training at **Gujarat Medical Services Corporation Limited (GMSCL)** from **15<sup>th</sup> February, 2016 to 15<sup>th</sup> May, 2016.**

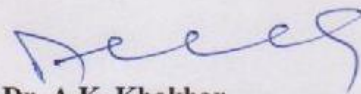
The Candidate has successfully carried out the study designated to him during internship training and his approach to the study has been sincere, scientific and analytical.

The Internship is in fulfillment of the course requirements.

I wish him all success in all his future endeavors.



**Dr. A.K. Aggarwal**  
Dean, Academic and Student Affairs  
(IIHMR, New Delhi)



**Dr. A.K. Khokhar**  
Director (IIHMR, New Delhi)

## CERTIFICATE OF APPROVAL

The following dissertation titled "**Role Of Information Technology In Supply Chain Management System - 'e-Aushadhi'**" at "**Gujarat Medical Services Corporation Limited (GMSCL)**" is hereby approved as a certified study in management carried out and presented in a manner satisfactorily to warrant its acceptance as a prerequisite for the award of **Post Graduate Diploma in Health and Hospital Management** for which it has been submitted. It is understood that by this approval the undersigned do not necessarily endorse or approve any statement made, opinion expressed or conclusion drawn therein but approve the dissertation only for the purpose it is submitted.

Dissertation Examination Committee for evaluation of dissertation.

Name Signature

DR AK Agnawal

AK Agnawal

DR Sanchit K Gupta

SK

DR Manish

Manish



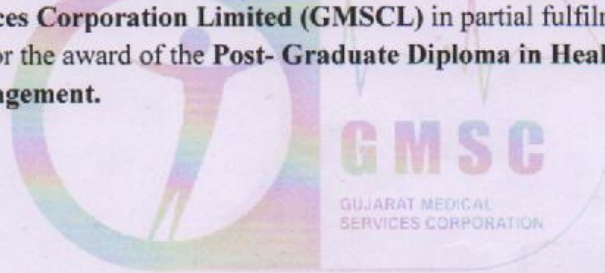


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### **Certificate from Dissertation Advisory Committee**

This is to certify that **Dr. Deepika Bhati**, a graduate student of the **Post- Graduate Diploma in Health and Hospital Management** has worked under our guidance and supervision. She is submitting this dissertation titled **"Role of Information Technology In Supply Chain Management System - 'e-Aushadhi' at Gujarat Medical Services Corporation Limited (GMSCL)** in partial fulfilment of the requirements for the award of the **Post- Graduate Diploma in Health and Hospital Management**.



This dissertation has the requisite standard and to the best of our knowledge no part of it has been reproduced from any other dissertation, monograph, report or book.

**Dr. A.K. Khokhar**  
Director (IIHMR, New Delhi)

**Managing Director**  
**GMSCL**  
Managing Director  
Gujarat Medical Services Corporation Ltd.  
Gandhinagar


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**INTERNATIONAL INSTITUTE OF HEALTH MANAGEMENT  
RESEARCH, NEW DELHI**

**CERTIFICATE BY SCHOLAR**

This is to certify that the dissertation titled titled **“Role Of Information Technology In Supply Chain Management System - ‘e-Aushadhi’** and submitted by Dr. Deepika Bhati Enrollment No. PG/18/014 under the supervision of Dr. A.K. Khokhar (Dean, Academic and Student Affairs) for award of Postgraduate Diploma in Hospital and Health Management of the Institute carried out during the period from 15<sup>th</sup> February 2016 to 15<sup>th</sup> May 2016 embodies my original work and has not formed the basis for the award of any degree, diploma associate ship, fellowship, titles in this or any other Institute or other similar institution of higher learning.

  
Signature

## FEEDBACK FORM

Name of the Person: Dr. Deepika Bhati

Dissertation Organization: Gujarat Medical Services Corporation Limited (GMSCL)

Area of Dissertation: Role of Information Technology in Supply Chain Management  
e-Aushadhi

Attendance: Regular

Objectives achieved: Yes, the objective of understanding the importance of  
IT systems in context of Supply Chain Management was  
achieved satisfactorily.

Deliverables: Achieved Successfully.

Strengths: The student showed keen interest in grasping and  
learning IT systems while working on a managerial assignment.  
She is extremely committed, sincere &  
dedicated to work.

Suggestions for Improvement:

NIL

Signature of the Officer-in-Charge  
Managing Director  
Gujarat Medical Services Corporation Ltd.  
Gandhinagar

Date: 12 MAY 2016  
Place:



## ACKNOWLEDGEMENT

*It is not possible to prepare a project report without the assistance and encouragement of other people. This one is certainly no exception.*

On the very onset of this report, I would like to extend my sincere and heartfelt obligation towards all the personages who have helped me in this endeavour. Without their active guidance, help, cooperation & encouragement, I would not have made headway in the project.

My deepest sense of gratitude towards Dr. Vipul Aggarwal (IPS), Managing Director, Gujarat Medical Services Corporation Limited (GMSCL) and all my **Team members** for their immense support and guidance. Thanks and appreciation to all the people at GMSCL for their support.

I am extremely thankful and pay my gratitude to my guide and mentor **Dr. A. K. Khokhar**, Director, IIHMR, Delhi for his valuable guidance and support.

I am highly fortunate to express my deep sense of gratitude and indebtedness to **Dr. Ashok K Aggarwal**, Dean, IIHMR, New Delhi for his invaluable inspiration.

At last but not the least all my friends, colleagues and family who have directly or indirectly helped me complete this project report.



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## LIST OF ABBREVIATIONS

1.	DMS	Drug and Vaccine Management System
2.	IT	Information Technology
3.	DDO	Direct Demanding Officer
4.	GMERS	Gujarat Medical Education and Research Society
5.	CHC	Community Health Centre
6.	PHC	Primary Health Centre
7.	ADHO	Additional District Health Officer
8.	CDHO	Chief District Health Officer
9.	RC	Rate Contract
10.	PO	Purchase Order
11.	QC	Quality Check/Control

**Gujarat Medical Services Corporation Limited**  
**(GMSCL)**

## **ORGANIZATION PROFILE**

The Gujarat Medical Services Corporation Ltd. (GMSCL) is a Govt. Company started functioning in the state of Gujarat in August, 2012 replacing the **‘The Central Medical Stores Organization’ (CMSO)** established under the Health & Family Welfare Department working since 1978 in Gujarat.

With the changes in the healthcare arena there was a felt need of developing new as well as upgrading the existing functioning and processes of CMSO, and consequently develop an institution supported with necessary infrastructure to make the system responsive to meet the objectives of the universal health coverage. With the view to match the changing demands and pace of development in the sector, CMSO was transformed into **“Gujarat Medical Services Corporation Limited”** (GMSCL) as an autonomous body and was incorporated under companies’ act, for systematic procurement, inventory management, Management information system and to infuse professional management with establishment, development and strengthening the use of information technology in medical store organization.

GMSCL was established primarily to look after the procurement and supply of medicines and other hospital requisites for the government health care facilities in the state. The utilization of information technology in a unique manner helped to bring transparency in functioning and reduce unethical practices remarkably. It also helped to make its services fast in many aspects. The Corporation deserves more support and encouragement from the State and Central Governments and other organizations. HMSCL also establish a market intelligence wing for conducting studies and evaluate its functioning, programs, policies and other related activities, that will further strengthen its functioning. The manner in which HMSCL is improving its functioning in the four years of its origin shows that the Gujarat model of Drug Policy is one of the best policies among all Indian states.

The pace of changes has been increased tremendously ever since HMSCL has started incorporating IT system.



At the state level, procurement systems vary in terms of autonomy of the procurement agency, level of decentralization, transparency and efficiency. Traditionally, procurement for medicines is done by the central medical stores department through annual rate contracts (quality based) by most of the states in India. In this system of procurement, bidders are invited to quote for lowest rate for the list of medicines through an open tender process. Tenders are scrutinized and sign the agreement with the respective departments for regular supply of medicines based on need from health facilities. Bidders quote the lowest rate to get empaneled with government supplies departments to increase their credibility in the private market. Many states such as Uttar Pradesh and Bihar among others have such central medical stores departments under the department of health and family welfare responsible for procurement of medicines and other medical supplies.

States such as Tamil Nadu, Kerala, Rajasthan and Gujarat have set up an autonomous corporation for procurement and distribution of medicines and other medical supplies for all public health facilities to achieve economies of scale using its purchasing power and in the process of negotiate better with suppliers.

### ➤ **OBJECTIVES OF GMSCL**

- To buy, sell, supply, store, maintain or otherwise deal in all kinds and varieties of generic and patent / non-patent medicines, drugs, mixtures, formulations, tablets, pills, powders, pharmaceuticals and medical products, needles, syringes, injectable, vaccines, and surgical dressing, kits and instruments.
- To take up hospitals, nursing homes and healthcare centres and provide, encourage, initiate or promote facilities for the development of new methods of diagnosis, understanding and prevention and treatment of disease.
- To act as nodal agency for Government of Gujarat to implement any scheme and programs as may be assigned or transferred by the Government of Gujarat, and also any scheme / program of Government of India, WHO, UNICEF, or any other regional, national, international or bilateral agencies in the health and family welfare sector.

## ➤ **FUNCTIONS OF GMSCL**

- Procurement of essential, lifesaving quality medicines, surgical goods & Insecticides and their timely availability by creating highly decentralized storage capacity & distribution network.
- Procurement of quality medical equipment/Instrument and its maintenance for entire product life cycle.
- Establishment of Diagnostic Medical Service Centers for early diagnosis & ease of treatment for beneficiaries.

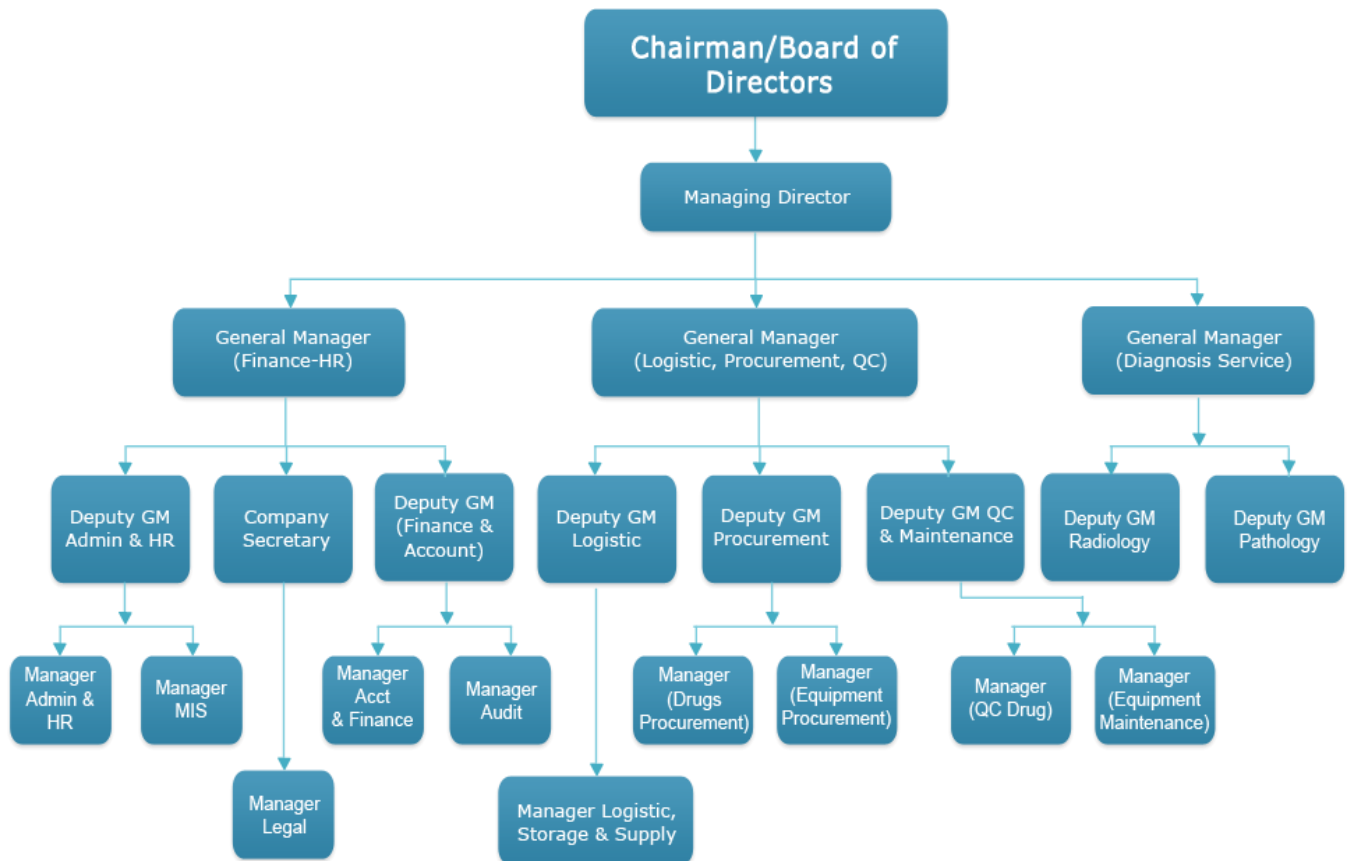
## **C-DAC (Centre for Development of Advanced Computing)**

Centre for Development of Advanced Computing (C-DAC) is the premier R&D organization of the Department of Electronics and Information Technology (DeitY), Ministry of Communications & Information Technology (MCIT) for carrying out R&D in IT, Electronics and associated areas. Different areas of C-DAC, had originated at different times, many of which came out as a result of identification of opportunities.

As an institution for high-end Research and Development (R&D), C-DAC has been at the forefront of the Information Technology (IT) revolution, constantly building capacities in emerging/enabling technologies and innovating and leveraging its expertise, caliber, skill sets to develop and deploy IT products and solutions for different sectors of the economy, as per the mandate of its parent, the Department of Electronics and Information Technology, Ministry of Communications and Information Technology, Government of India and other stakeholders including funding agencies, collaborators, users and the market-place.

**C-DAC (Centre for Development of Advanced Computing)** was a milestone in the history of GMSCL. Ever since the software has been launched the level of satisfaction has increased.

# ORGANOGRAM



## ➤ **PROCUREMENT OF DRUGS**

The erstwhile organization CMSO has been transformed to the GMSCL, procurement procedures and plans are already in place. But with a change in organization, some additions, alterations, or deletions are required to be accomplished in the procurement process to facilitate the functioning of GMSCL and to ensure quality services to the stakeholders i.e. Government healthcare institutions.

GMSCL centrally procures generic drugs for health care Institutions of Gujarat State Through e-tendering process. Tenders are advertised in the widely published newspapers. (Gujarati and English).

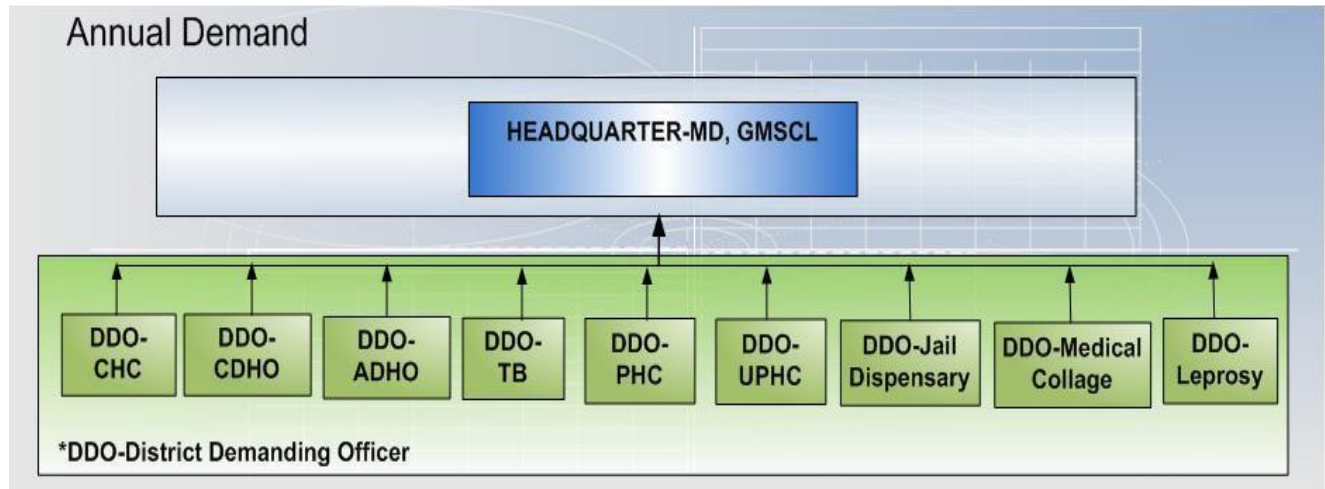
Initially the corporation shall work as per the norms of the CMSO, however, corporation is in the process of preparing purchase and procurement manual of its own with the objective to have flexibility in purchases, at competitive rate and will follow transparent procedure. The quality of drugs will not be compromised at any stage.

### **Demand management through central purchase policy:**

GMSCL issues a circular to all Districts Demanding Officers (DDO) to raise the Regular special/supplementary demand for central purchase as per the budget availability HOD wise i.e. 70% and 80 % under centralized procurement.

- Annual demand must be submitted by all institutions within the specified time.
- Individual entity will send the demand to upper level of Depot, and then is received by the GMSCL Headquarters.
- Demands are generated separately for each program.





## ➤ BUDGET ALLOCATION

### Process Flow:

Budget is maintained for programs at Head quarter level



Budget allocation program wise for hospitals/CHC/PHC



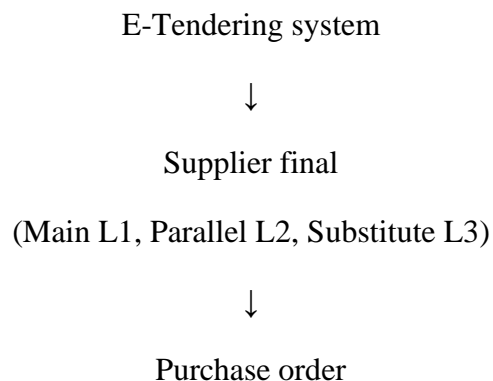
Separate purchase order for programs

## ➤ SUPPLIER RATE CONTRACT

- Drug Branch finalizes the supplier with rate contract to supply the Medicines and surgical consumables.

- **Rate contract** is an official agreement between the Procurement Agency and the Supplier/Manufacturer which mention the goods/Medicines that will be supplied by the supplier, Rate per unit of the Medicine and the quantity that will be supplied in a given frame.
- Along with the regular Rate contract GMSCL maintains the parallel RC and substitute RC's
- Along with this, the batch size and Bank Guarantee details are also captured in the rate contract.
- In case, the batch size is less than or more than the batch size mentioned in the rate contract or purchase order, there is penalty imposed on the supplier equivalent to twice the test charge of each extra batch supplied.
- Rate contract details are managed item wise instead of supplier wise.

### **Process flow:**



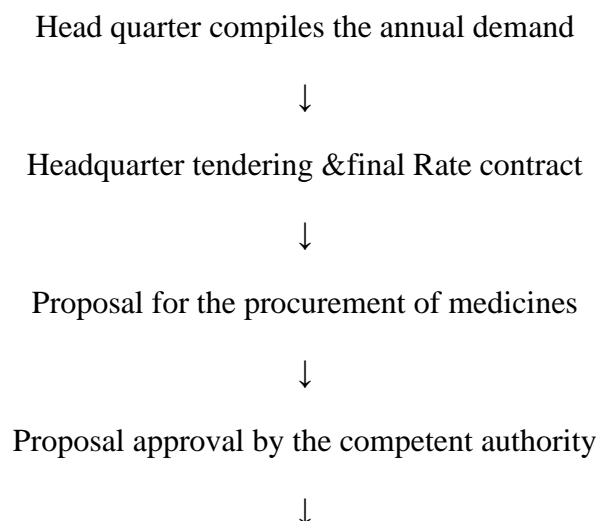
### **➤ Process flow of procurement medicine approval and Purchase Order**

- The proposal for the procurement of Medicines is prepared for the approval from competent authority, if any changes or correction require within the proposal for the

procurement of Medicines, same will be rectified and resubmitted to the competent authority for approval.

- Once the DRAFT proposal approved by the competent authority, same approved proposal details transfer in the form purchase order and issue to supplier for the shipment of Medicines to Drug warehouse.
- For each Warehouse, Medicine and each program a separate purchase order is generated by the GMSCL.
- In case the supplier doesn't agree with the terms and conditions of the purchase order or does not supply the drugs within specified duration then the order is canceled and a risk order is generated with the parallel RC or substitute RC's.
- In case of risk purchase, order is placed to parallel or L2 supplier and a penalty equivalent to the difference in rate of the two suppliers or 10% of the PO value (whichever is higher) is imposed on the L1 supplier.
- Special Purchase is made separately for program wise demand.

**Process Flow:**



Purchase order issue to supplier

➤ **Receive of medicines as per the approved Purchase order**

**Process Flow:**

Warehouse in charge receives the medicines



Pharmacist verifies the order quantity as per the purchase order



Certain parameters like GMSCL logo, MRP printing, test report, and package as per specification and different color are checked



Entry is made on daily register



Stock register is entered only if the drug received is passed from the quality check

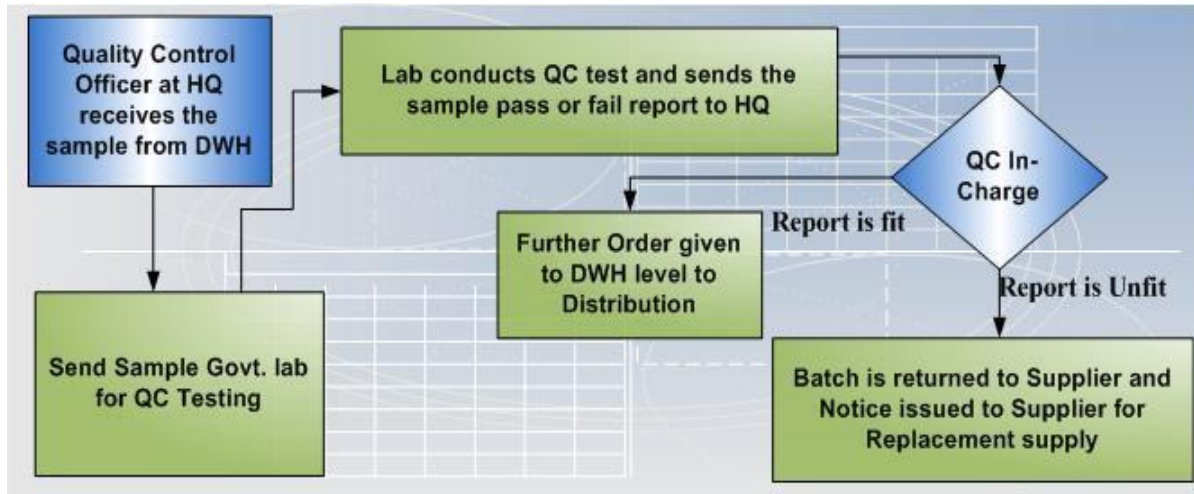
➤ **QUALITY ASSURANCE OF DRUGS**

GMSCL assures quality of drugs supply to all Health Institutions of Gujarat Government. This is assured by pre-dispatch testing and testing as per Drugs and cosmetics Act 1940 & rules there under. Thus GMSCL keeps watch on the quality Drugs supply to the Government Health Institutions.



### ➤ Pre-Dispatch Test

#### Process Flow:



### ➤ DRUG AND COSMETIC ACT

#### Process Flow:

Random sampling by drug inspector at the warehouse



Samples sent to government laboratory



If QC report is NOSQ(Not of standard quality)



Concerned authorities are informed for condemnation

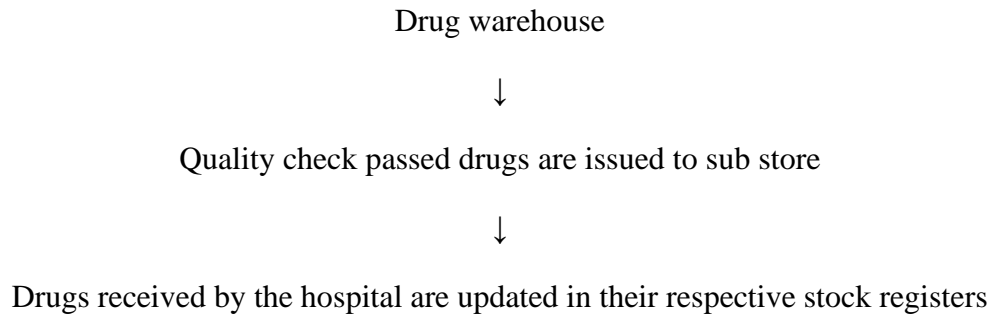


Supplier is informed about the QC findings



Action is taken as per tender conditions

➤ **Medicine distribution from Drug warehouse to sub store**

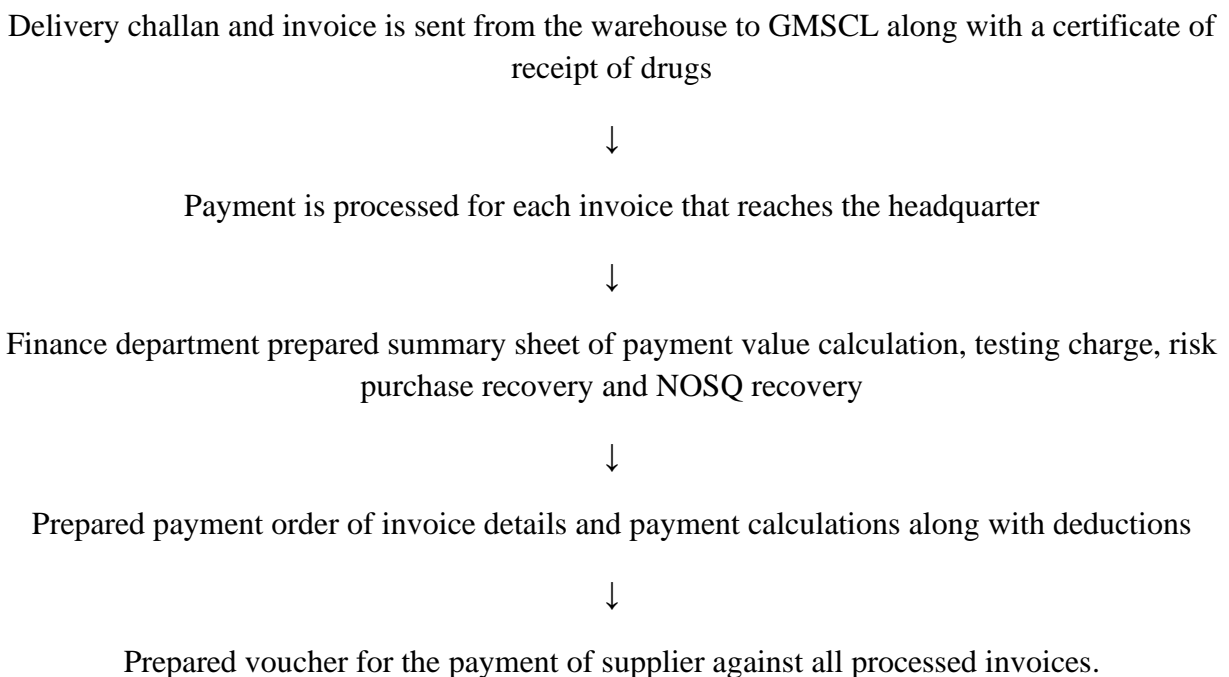


➤ **Medicine received from third party or NGO**

Medicines donated by third party or any NGO to concerned warehouse, the warehouse in-charge update the corresponding register with donated Medicine details such batch number, manufacturing date, expiry date, batch quantity, received date etc.

➤ **BILL PROCESSING**

**Process Flow:**



## ➤ **PENALTY AND RECOVERY**

Late Delivery (LD) is imposed on the supplier if delivery of medicines is made after the specified delivery period with following calculations:

- 0 to 3 days – no penalty
- 4 to 10 days – 0.5% of the invoice value
- 11 to 17 days – 1.0% of the invoice value
- 18 to 24 days – 1.5% of the invoice value
- 25 to 31 days – 2.0% of the invoice value
- 32 to 33 days – 2.5% of the invoice value
- After 33 days – 10.0% of the invoice value

## ➤ **PROCUREMENT OF EQUIPMENTS**

**The objectives for Equipment Procurement of GMSCL are:**

- To procure modern era optimum quality Equipment at competitive rates and to follow transparent procedures.
- To meet the Equipment Purchase and Maintenance requirements of different Primary, Secondary and Tertiary Healthcare Institutions.
- To follow quality parameters for diagnosis, technology and research to provide best healthcare services in Gujarat.

## ➤ **STORAGE OF DRUGS**

As far as storage of quality generic medicines are concerned there are seven functional warehouses at:

- Adalaj
- Amreli
- Jamnagar
- Patan
- Surat
- Rajkot
- Vadodara

### **Upcoming warehouses:**

- Bhuj
- Bharuch
- Dahod
- Himmatnagar
- Valsad

These warehouses will be provided with all modern facilities necessary for drugs storage.



## **ROLE OF INFORMATION TECHNOLOGY IN SUPPLY CHAIN MANAGEMENT**

The use of information technology (IT) is considered a prerequisite for the effective control of today's complex supply chains.

**Supply chain management (SCM)** is the management of the flow of goods and services. It includes the movement and storage of raw materials, work-in-process inventory, and finished goods from point of origin to point of consumption.

### **➤ DRUG DISTRIBUTION SYSTEM**

The GMSCL created a chain of warehouses with all required facilities to provide reasonably good storage conditions including 'cold place' for the storage of items. Warehouses were established at 7 Locations. At present, the GMSCL has 7 warehouses in the state and they cover the 33 districts. All the warehouses are of uniform design and structure.

Each warehouse is staffed with four pharmacists, one data entry operator and four helpers who help in loading and unloading operations. On receipt of new stock, appropriate entries are made in the computer about the stock arrived on that day, existing stock, pending quantity to receive, drugs distributed to various centers, expiry dates of different batches, total stock in warehouse, and drugs with batch number sent for quality control (QC) checks. Distribution schedules were given to the hospitals to enable them timely deliveries.

The warehousing and material transport system planned and adopted by GMSCL is much better and more scientific compared to other medical corporations. Medicines from the manufacturers are received and stored in the Regional warehouses for delivery to the hospitals. Medicines are issued to the medical college hospitals four in a month and to the general hospitals and district hospitals twice in a month. CDHO/ADHO/CHC hospitals and others receive medicines once in a month. Emergency supplies are affected as per the need. For each hospital the budget allotment is notified by the GMSCL and recorded in the passbooks. All the Regional

warehouses and head office are connected through online network (e- Aushadhi) for monitoring to check position and details regarding quality control and quality assurance process.

The new warehouses under construction are very much modern, scientific and technically designed. The GMSCL initiated serious steps for improving infrastructure of warehouses and material transport system by the beginning of 2012. They have also planned to modernise their warehouses which were made available to them by the state government in all the 33 districts of Gujarat.

## **e-Aushadhi**

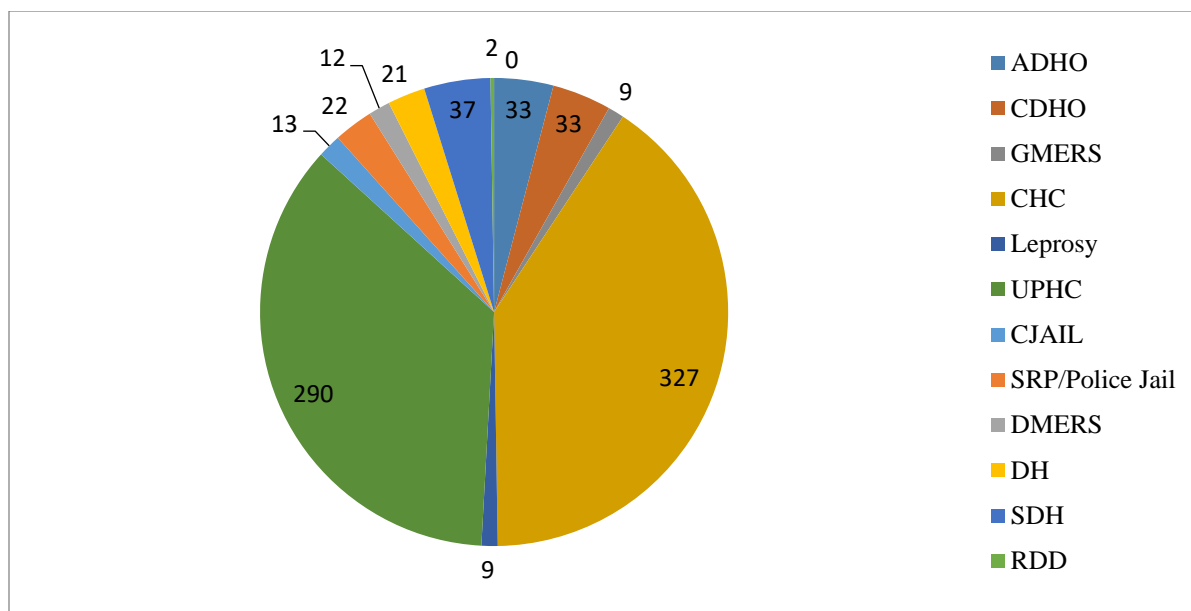
### **DRUG AND VACCINE MANAGEMENT SYSTEM (DVDMS)**

e-Aushadhi is a web based supply chain management application deals with Purchase, Inventory Management & Distribution of various drugs, sutures and surgical items to various Regional Warehouses (RWH) of State, District Hospitals (DH) their sub stores like Community Health Centre (CHC), CDHO, ADHO, POLICE JAIL and LEPROSY CONTROL UNIT to distribute drugs to patient, the final consumer of the supply chain.

- 'e-Aushadhi' deals with the management of stock of various drugs, sutures and surgical items required by different district drug warehouses of Gujarat state.

### **BENEFITS AND MAIN OBJECTIVES OF 'e-AUSHADHI'**

- To implement a transparent system for procurement, storage and distribution of quality drugs, supplies, equipment's etc. required for the hospitals at reasonable competitive price.
- To ensure adequate savings in the drug budget by scientific forecasting system based on the preparation of essential drug list and its actual consumption.
- Monitoring the budget and drug consumption pattern by introducing pass book system.
- To improve infrastructure of the existing drug warehouse in district.
- Efficient control of Inventory
- Streamline the Drug warehouse management, quality management, equipment inventory management, equipment complaints chain management, equipment auction life cycle, human resource and finance management in an optimized and efficient manner.



## Institutions Covered Currently by e-Aushadhi across Gujarat

### ➤ DEMAND GENERATION FOR CURRENT FINANCIAL YEAR

This process is used to generate the purchase demands for the current financial year. Using this process, the demand for the purchase will be initiated by the end users at the district level. This purchase demand or indent for purchase is then forwarded to the competent authority for verification and approval. The concerned authority has the right to modify the Medicines and their quantity if required. Once the purchase demand is approved, the next step in the flow is the Purchase Order generation.

## Screen shot of demand desk

Annual Purchase Demand Desk

Store Name: Surat DWH Category: Drug  
Request Type: Annual Purchase Demand Status: Pending

Generate Modify Final Save Cancel View Print

Store Name : Surat DWH , Category : Drug , Request Type : Annual Purchase Demand , Status : Pending

Demand No	Demand Date	To Store	F.Y.	Mode
No Record Found !!				

Total Records: 0

FILTER: Demand No Search

Urgent

Activities that can be performed on demand desk:

- Generation of demand
- Demand Modification
- Cancellation
- View
- Print

### ➤ Demand Approval

Demand once generated, reflects on the approval desk of the configured user. Multiple approval levels can be configured. Approver at each level can modify the demanded quantity and quantity approved by the approver at previous level.

### ➤ Compilation Desk

Compilation desk compiles a set of demands and generates single demand against the compiling store.

## ➤ Rate Contract Desk

Following activities are performed with Rate Contract Desk.

- Add new rate contract.
- Renew existing rate contracts.
- Cancel a rate contract.
- View entered rate contracts.

Rate Contract Details

Supplier NameAmkay Products Pvt Ltd

Contract TypeRate Contract

CategoryDrug

Contract details

Contract Date24-Nov-2014

\*Contract From01-Nov-2014

\*Tender No.Tender 125

\*Tender Date01-Nov-2014

Purchase Committee Meeting Date01-Nov-2014

Tax Type:VAT

\*Delivery Day(s)45

\*Contract To30-Nov-2015

Quotation No.

Quotation Date

Negotiation Meeting Date.

\*TAX(%)10

Drug Finder

Drug/Item Name	Last Purchase Rate/Unit	*Rate/Unit	*Rate Unit	Qty.	*Security Amt(%)	Security Amt.	Imported
Paracetamol Tab 500 Mg [ 41.3 ]	.2/No.	.2400	No.	0	0	0.00	<input type="checkbox"/>
Paracetamol Drops 150 Mg/Ml 15 Ml [ 41.4 ]	32.3/No.	33.3333	No.	0	0	0.00	<input type="checkbox"/>

Remarks

\*Mandatory Field

Save

Clear

Back

## ➤ Purchase Order Desk

This desk will be used to maintain the details pertaining to purchase order. It includes activities like Purchase Order (PO) generation, Medicine delivery scheduling, Medicine shipment details, PO cancellation, viewing of PO, and printing of PO.

## ➤ Purchase Order Generation

Users can generate the Purchase Order after consolidating all the demands. Here Rate and tender details are fetched as per the data entered in Rate Contract Desk. As we will enter the quantity to be ordered the rate will be automatically calculated.

### Screenshot of Purchase Order Generation Desk:

The screenshot shows the 'Purchase Order Generation Desk' interface. At the top, there are dropdown menus for 'Store Name' (G.M.S.C.L.) and 'PO Status' (Pending). Below these are buttons for 'Generate', 'Modify/Schedule', 'Cancel', 'View', and 'Print'. A status bar indicates 'Store Name : G.M.S.C.L., PO Status : Pending'. Below this is a table with columns: PO Prefix, PO No, PO Date, PO Value, Supplier Name, and Item Name. The table is currently empty, showing 'No Record Found !!'. Below the table, it says 'Total Records: 0'. At the bottom, there is a 'FILTER' section with a dropdown for 'PO Prefix' and a 'Search' button. A green dot icon labeled 'Local Purchase' is visible at the bottom left.

## ➤ Challan Process Desk

This desk will be used to maintain all the activities of the Challan at the time of delivery. The details include financial year or calendar year, source of Challan, scheme of Challan, District Medical ware house, P.O. Number, Challan receipt number, Challan receipt date, schedule number, schedule date, delivery date etc.

### Screen shot of challan process desk

The screenshot shows the 'Challan Process' interface. At the top, there are dropdown menus for 'Store Name' (Adalaj DWH), 'Item Name' (Acyclovir DT Tab 200 mg [136.1]), 'Supplier Name' (Healthy Life Pharma), 'PO Status' (Active), 'PO No.' (390/C-8/E-100/2013-14 Tab. Acyclovir 200 mg. Date. 16.01.20), and 'Challan Status' (In-Process). Below these are buttons for 'Receive', 'Cancel', 'Verify', 'Freeze', and 'View'. A status bar indicates 'Store Name : Adalaj DWH, PO Status : Active, Item Name : Acyclovir DT Tab 200 mg [136.1], PO No. : 390/C-8/E-100/2013-14 Tab. Acyclovir 200 mg. Date. 16.01.2014/2013/1/10281400081, Supplier Name : Healthy Life Pharma, Challan Status : In-Process'. Below this is a table with columns: PO NO, Rec. Date, Supp Rec. No, Item Name, Rec. Qty, Acc. Qty, and Status. The table is currently empty, showing 'No Record Found !!'. Below the table, it says 'Total Records: 0'. At the bottom, there is a 'FILTER' section with a dropdown for 'PO No.' and a 'Search' button. A red dot icon labeled 'Received Against Returned' is visible at the bottom left.



## ➤ Verify

This process will be used to maintain the details pertaining to Challan verification. Quantity accepted, breakage, rejected and excess can be entered in the process. Supplier performance parameters are also captured in the process.

## Screenshot of verify desk

Challan Process >> Verify

P.O. Detail(s)  
Challan Detail(s)

Challan No. 10681400449  
Supplier Receipt No. IN34  
Delivery Date 02-Mar-2014  
Drug/Item Name Acyclovir DT Tab 200 mg [136.1]  
\*Batch No ACY123  
Manufacture Date [dd-Mon-yyyy] 01-Nov-2014  
Rack No  
\*Manufacturer Name Aai Medical

Received Date 24-Nov-2014  
Supplier Receipt Date 24-Nov-2014  
Schedule Type Fresh Supply  
\*Unit No.  
\*Expiry Date [dd-Mon-yyyy] 30-Nov-2015  
\*Stock Register No 4365

Programme Detail(s)

Programme Name	Balance Qty.	Rec. Qty. (Org.)	Rec. Qty. (Mod.)	*Accepted Qty.	*Breakage	*Rejected	Excess Qty.
IPD/OPD NRHM	40 No.	40 No.=40	40 =40	40 =40	0	0	0

Supplier Performance Detail(s)

1. Test Report No. and Date  
2. Whether Medicines/ packaging are in good condition  
3. Whether For Govt. of Maharashtra Supply Not for sale & in Green and Saffron Colour  
4. Brand Name not Written  
5. Price(MRP) not printed /Visible

Remarks(if any)

Reference Details

\*Mandatory Fields

Save Clear Back

## ➤ Freeze

After verifying all the Medicines in the challan, challan is freeze and Medicines are entered in the stock.

## Screenshot of freeze desk

Challan Process >> Freeze

Store Name Adalaj DWH  
Challan No. 10681400449  
Supplier Receipt Date 24-Nov-2014  
Supplier Name Healthy Life Pharma

PO No. 10281400081(390/C-8/E-100/2013-14 Tab. Acyclovir 200 mg, Date. 16.01.2014/2013/1)  
Supplier Receipt No. IN34  
Schedule Type Fresh Supply  
Manufacturer Name Aai Medical

Verified Item Detail(s)

Drug/Item Name	Batch No	Expiry Date	Supplied Qty.	Accepted Qty.	Rej.Qty	Bkg.Qty
Acyclovir DT Tab 200 mg	ACY123	30-Nov-2015	40 No.	40 No.	0 No.	0 No.

\*Remarks

ok

\*Mandatory Fields

Save Clear Cancel

## ➤ QUALITY CONTROL

This process will be used to maintain the details/flow of the quality control performed on the Medicines provided by concerned DWH.

### The flow of Quality Control as per e-Aushadhi:

1.All stores send samples to Quality Cell for sample check.

Sending Sample To PHD For QC Check

\*Main Store

Adalaj DWH

\*Category

Drug

\*HQ Name

G.M.S.C.L.

\*Issue Date

24-Nov-2014

Sample Send Request Detail(s)

Req.No. & Date	Item Name	Batch No.	Exp. Date	Req. Qty.	Avl Qty.	Issue Qty
10761400170/24-Nov-2014	Acyclovir DT Tab 200 mg [136.1]	ACY123	Nov/2015	10	40	10

Remarks

sending to HQ

Legend

\*Mandatory Field

Save

Clear

Cancel

2. Quality Cell acknowledges the receipt of samples.

Sample Receiving At PHD

\*HQ Name

G.M.S.C.L.

\*Category

Drug

\*Store Name

Adalaj DWH

\*Drug/Item Name

All

\*Batch No

All

Go

Sample Receive Detail(s)

	Issue Date	Store Name	Drug/Item Name	Batch No.	Expiry Date	Issued Qty	Bkg/Lost Qty	Received Qty
	07-Aug-2014	Adalaj DWH	Lignocaine HCl I.P Inj 2 % 30 ml Vial [1.2]	V-14030	Dec/2015	10 No.	0	0
	07-Dec-2013	Adalaj DWH	Ketorolac Promethymene Eye Drop 5 ml [409.1]	31386	Aug/2015	10 No.	0	0
	07-Jun-2014	Adalaj DWH	Cefuroxime Tab DT 125 mg [57.1]	CADM14505	Mar/2016	50 No.	0	0
<input checked="" type="checkbox"/>	24-Nov-2014	Adalaj DWH	Acyclovir DT Tab 200 mg [136.1]	ACY123	Nov/2015	10 No.	0	10

\*Mandatory Field

Save

Clear

Cancel

3. QC sends all batches from the received sample to empaneled labs quality check. While sending the samples to labs, the samples are encoded (given a secret code).

Sending Samples From PHD To Empanelled Labs

Re-Send
View/Cancel

\*HQ Name
G.M.S.C.L.

\*Category
Drug

\*Lab Name
Ana Laboratories

Drug Finder

Drug/Item Name	Batch	Avl Qty	Expiry Date	*Issue Qty	*Secret Code
**Acyclovir Dt Tab 200 Mg [ 136.1 ]	ACY123	10	Nov/2015	5	secret

Remarks

Remarks(if any)

Mandatory Fields

Save
Clear
Cancel

4. Labs acknowledge the receipt of samples.

Sample Receiving At LAB(INTERFACE)

View/Cancel

\*Lab Name
Ana Laboratories

\*Drug Name
All

\*Batch No.
All

Go

Sample Receive Detail(s)

1

	Sent Date	Secret Code	Drug Name	Issued Qty	Mfg, Date	Exp, Date	Bkg/Lost Qty	Received Qty
<input checked="" type="checkbox"/>	24-Nov-2014	secret	Acyclovir Dt Tab 200 Mg [136.1]	5 No.	Nov/2014	Nov/2015	0	5

Received By
Maanvinder Singh

Remarks

Mandatory Field

Save
Clear
Cancel

5. Labs enter the findings of quality check. Entering Report, No, Date, Report Summary etc.

**Qc Report At Lab** View/Cancel

\*Lab Name: Ana Laboratories Go

Searching Criteria ::: Drug Name 1

#	Receive Date	Drug Name	Secret Code	Batch	Mfd Date.	Exp Date.
1	24-Nov-2014	Acyclovir Dt Tab 200 Mg [136.1]	secret	ACY123	01-Nov-2014	Nov/2015

**QC Details**

\*Report No: 10103884 \*Report Date: 24-Nov-2014

\*CTR No: 1023830 \*Dispatched Date: 24-Nov-2014

Lab Incharge Name: Ramlal \*Test Fee(Rs.): 1101

\*Report Summary

**Reference Details**

\*Mandatory Field

Save Clear Cancel

6. Quality Cell acknowledges the receipt of sample reports from labs.

**Acknowledge Qc Report** View

\*HQ Name: G.M.S.C.L. Go

Searching Criteria ::: Drug Name 1

#	Dispatch Date	Drug Name	Secret Code	Batch No	Lab Name	Report Status
1	18-Feb-2014	Norfloxacin Tab 400 Mg	NA	3K-5-160	Dhs Lab	RR
2	24-Nov-2014	Acyclovir Dt Tab 200 Mg	secret	ACY123	Ana Laboratories	RR

**QC Report Detail(s)**

Report No: 10103884 Report Date: 24-Nov-2014

CTR No: 1023830 Test Fee(Rs.): 1101

Report Summary: Ok Ok Dispatched Date: 24-Nov-2014

Up-Loaded Document: NA Sample Status: ☒ Pass ☐ Fail

\*Received Date: 24-Nov-2014

Remarks

\*Mandatory Fields

Save Clear Cancel

- If quality check passes, then QC approves the Medicine's quality and updates the status to Active for that batch. (Across the State). In case, quality check result is negative then Medicines of that particular batch are rejected and its status is updated.

## **PROBLEM STATEMENT**

Different states are using different drug warehouse management systems based on their requirements. However, many of them lack in essential features like system alerts for near expiry items, status of pending purchase order, proper inward/outward records, maintaining minimum order level of stock at various level of distribution, QC management on drugs, lack in control of Quarantine drugs and drugs status etc. Another vital feature missing in traditional systems is the maintenance of current stock position at main stores and sub stores.

In Gujarat state, there is problem in maintaining the Supply Chain and inventory at GMSCL, warehouses and various facility levels.

In this regard an IT system was developed known as “**e-Aushadhi**” (**Drug ManagementSystem**) to streamline the drug warehouse management and drug distribution system throughout the Gujarat State.

## **SCOPE OF THE PROJECT**

Supply chain management (SCM) is concerned with the flow of products and information. It includes the movement and storage of raw materials, work-in-process inventory, and finished goods from point of origin to point of consumption.

The contribution of IT in helping to provide real time data and enhancing the entire distribution set up to achieve higher service levels and lower inventory and lower supply chain costs.

The IT system i.e. e-Aushadhi is helpful to coordinate the activities to manage the supply chain.

This system will create a transparent system for procurement, storage and distribution of quality drugs, helps in monitoring the drug consumption pattern and efficient control of inventory at drug warehouses and all facility levels.

## **REVIEW OF LITERATURE**

### **Study 1**

#### **ABSTRACT**

The use of information technology (IT) is considered a prerequisite for the effective control of today's complex supply chains. Despite the acknowledged importance of the use of IT in supply chain management (SCM), the number of empirical studies assessing the use of IT in the supply chain context is limited. Based on empirical data from 16 Finnish industrial and service companies this paper presents a classification of the ways in which companies use IT in SCM, and examines the drivers for these different utilization types. According to the findings of this research, the use of IT for SCM purposes can be divided into 1) transaction processing, 2) supply chain planning and collaboration, and 3) order tracking and delivery coordination. The findings further suggest that the drivers between these three uses of IT in SCM differ.

#### **RESULTS**

In the within-case analyses, the relationship between the two constructs, the types of IT use in SCM and the drivers for the use of IT in SCM, was examined. After looking at each of the cases separately, the cases were compared with each other in order to identify potential patterns between them. This cross-case analysis revealed commonalities between the companies utilizing IT in a specific way regarding the drivers of IT use. As for the business environment characteristics, the number and concentration of supply chain partners as well as the role of the company in the supply chain seemed, in some occasions, to segregate companies utilizing IT in a specific way from the non-users. However, order penetration point, the level of product customization, number of products, and the level of internal IT integration did not, to our surprise, distinctly differ between the users and the non-users in any type of IT use. Next, the findings of the cross-case analysis are presented in more detail.

## **2. e-Aushadhi- Jammu and Kashmir**

A web-based supply chain management application e-Aushadhi has been launched by Jammu and Kashmir government at Jammu and Kashmir Medical Supplies Corporation Ltd (JKMSCL) office.

The application has been prepared by Centre for Development of Advanced Computing (C-DAC) Noida, Ministry of Commerce and Information Technology, Government of India.

e-Aushadhi shall help JKMSCL to improve drug warehousing and supply chain management in all government hospitals in the state.

The application will keep a check on purchases, inventory management and distribution of various drugs and surgical items to various regional and district drug warehouses, district hospitals, primary health centres (PHCs) and community health centres (CHCs).

## **3. Uttarakhand: Government to streamline drug purchase via online app e-Aushadhi**

The Uttarakhand health department will introduce a web-based supply chain management application, e-Aushadhi to improve the stock and supply of drugs and surgical equipment in the health institutions of the state.

The online application, developed by the Centre for Development of Advanced Computing (C-DAC), will monitor purchase, inventory management and distribution of various drugs, and surgical items to various drug warehouses of the state, district hospitals, primary health centres and community health centers.

The software will ensure that the drug reaches the ultimate beneficiary with uncompromised quality and will also improve efficiency and effectiveness of procurement and distribution of drugs besides ensuring transparency in supply chain.

The Union ministry of health and family welfare has released Rs 15 crore to the state government for procuring generic medicines for state-run healthcare facilities in the current fiscal.

The software will bring transparency in supply chain management and support the state government in cutting cost of branded medicines.

The government has asked the authorities of C-DAC to complete all the formalities as early as possible so that this system is adopted in the state for overall benefit of the people.

#### **4. Maharashtra Public Health Department- E- Aushadhi supply management system:**

Supply chain automation of the drug management system in Maharashtra Public Health Department leads to 20% reduction in cost of medicine, and provides an accurate view of state of drugs warehouse and inventories across the state.

Public Health Department is the nodal department for administration, decision and policy making related to public health of Maharashtra. PHD's outlined objective is to strengthen the state healthcare at primary, secondary and tertiary levels by providing greater levels of access to quality healthcare, particularly in the under-served and backward regions. The department implements various national level health programs in the state, provides trainings to its medical and non-medical staff and is responsible for improving knowledge, attitude and behavior of the community by giving health education.

The organization focuses on providing an array of citizen centric services across the State with its various policies, legislation and administration. The department has formulated and executed various health programs in line with National Health Policy enabling a better administration, better health, better care, and better value for all.



The department along with implementing various programs and schemes focuses on strengthening its internal setup and enhancing its Government capabilities by adopting various e-governance practices.

The drug management system in the state of Maharashtra witnessed the need to automate its supply chain in order to have better stock efficiency, improve stock visibility and gain control over drug distribution in the state. The state government realized that the computerization of drug warehouse could reap added benefits like reduction in the invoice processing cost, increasing in the supply chain capacity by reducing manual intervention to minimal levels, improvement in the working capital management and real time use of business intelligence for scaled efficiencies.

### **The Result**

The biggest achievement of the solution has been the reduction in the cost of medicines by 20% or more, which has further enabled the department to procure more medicines in the same budget.

e-Aushadhi streamlined the process of inventory management and brought transparency in the system. Different users at all levels have a better and much more accurate view of the state of drugs warehouse and inventories across the state. This accurate root level reporting and monitoring has in fact been one of the major achievements of this application. Stock ledgers, as a result of this application, are now up to date and are managed much more efficiently.

The MIS module provides critical reports that lead to efficient monitoring and decision making. Separate interface for the laboratories further improves the Quality status.

More than 3500 users are using this application regularly updating their information at more than 1800 locations. The numbers are expected to grow to 5500+ users at more than 2500+ locations in another year. The deep involvement and constant engagement of users has been the driving point of success with this application.

## **5. List of e- Health initiatives in Gujarat**

**Gujarat Hospital Management Information System (GHMIS):** GHMIS is state-of the-art healthcare solution to provide better care to patients by addressing all the major functional areas of the hospital & the entire gamut of hospital activities. The main aim is to maintain electronic Health records of Patients.

### **Objectives:**

- Streamline the operations and improve efficiency in government hospitals
- Improve patient care
- Effective administration and control
- Pro-active monitoring of quality health service indicators
- Integrated state-level holistic view of the resource utilization

## **6. Importance of information Technology for effective supply chain management**

### **ABSTRACT**

In order to survive and beat the competition in today's competitive world, one has to manage the future. Managing the future means managing information. In order to deliver quality information to the decision-maker at the right time and in order to automate the process of data collection, collation and refinement, organizations have to make Information Technology an ally, harness its full potential and use it in the best possible way. IT is beneficial for cooperation and integration within the stakeholders of the supply chain.

### **Conclusion**

It is confirmed that the importance of IT and quality of information are complementary to each other because manual filtering might disappear. Although automated information processing prevents manual mistakes, it also makes the process less transparent and therefore, wrong

information or information of low value might be generated if the information input is already of bad quality and not properly checked. A distinction can be generated between the volume of information and the richness of information exchange. The sharing of information in systematic language involves more action and commitments support to enhance the quality of any organization which is beneficial in the light of supply chain network.

## OBJECTIVES

**General objective:** To ascertain the needs and monitor the constant availability and supply of drugs to the various facilities of districts at all hierarchical levels in Gujarat state through e-Aushadhi application.

### **Specific Objectives:**

- To monitor MIS reports of various drugs, injections, surgical items through e-Aushadhi application at depot level.
- To determine the level of satisfaction of e-Aushadhi among the users at depot level.

## METHODOLOGY

- **Sample design:** Observational and Descriptive cross sectional study
- **Sampling method:** Convenience random sampling
- **Sample size:** 20
- **Duration of study:** 3 months (15<sup>th</sup> February 2016 – 15<sup>th</sup> May 2016)

### **Data Collection Tools and Techniques:**

#### **Primary data collection**

- Raw data (also known as primary data) is a term for data collected from a source. Raw data has not been subjected to processing or any other manipulation, and are also referred to as primary data.
- Primary data is a type of information that is obtained directly from first-hand sources.
- Primary data collection is observed and recorded directly from respondents. The information collected is directly related to the specific research problem identified. All the

questions that one asks the respondents must be totally unbiased and formulated so that all the different respondents understand it.

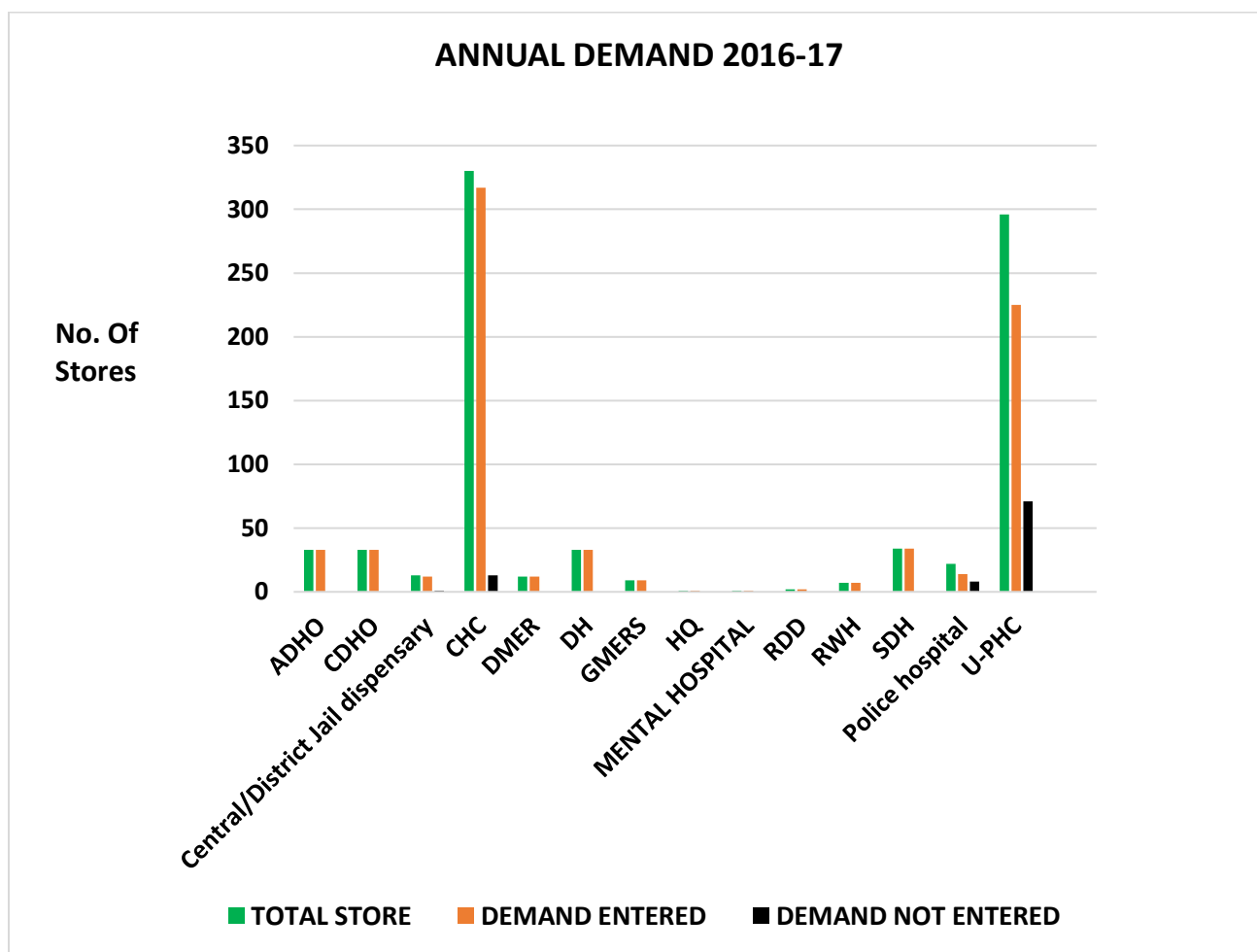
### **Secondary data collection**

Secondary data is data collected by someone other than the user. Common sources of secondary data for social science include censuses, organizational records and data collected through qualitative methodologies or qualitative research. Primary data, by contrast, are collected by the investigator conducting the research.

In this project, all the information has been gathered through telephonic interview and secondary sources that is internet.

## ➤ DATA ANALYSIS

### Graphical representation of the annual demand placed by all the Direct Demanding Officers (DDO's) for the current financial year (2016-2017):



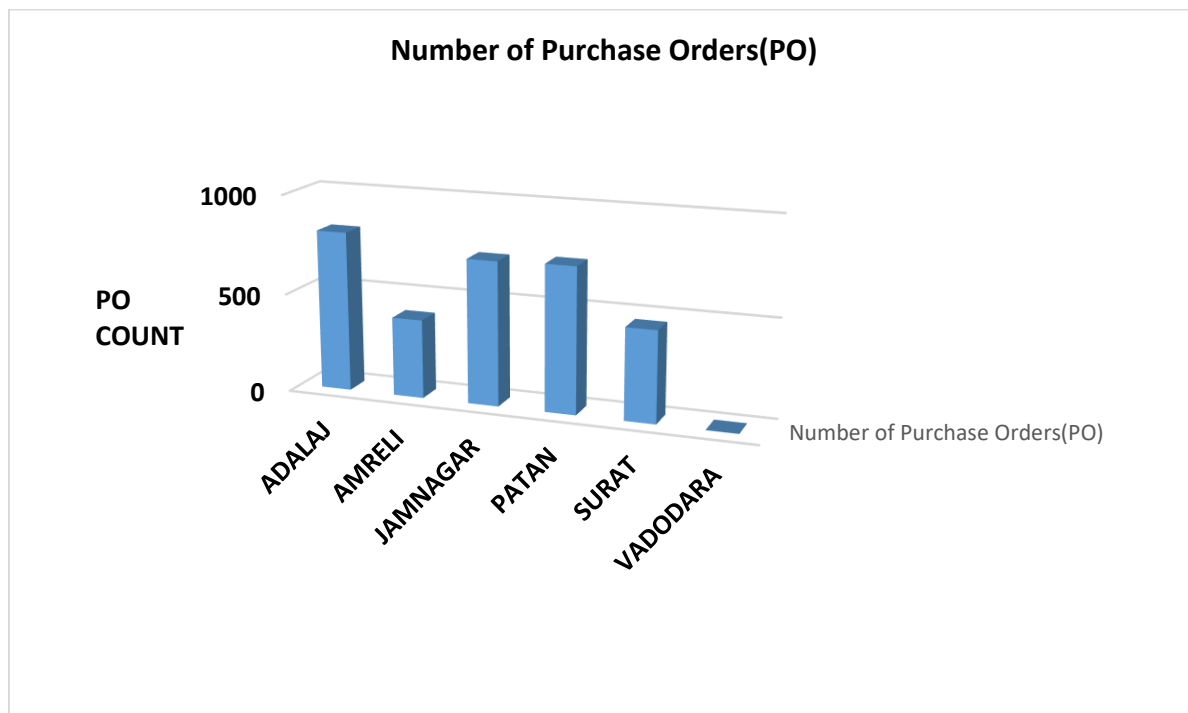
#### **The graph shows:**

- The annual demand placed for the financial year 2016-2017.
- All the demanding officers i.e. ADHO, CDHO, Central/District Jail dispensary, CHC, DMER, District hospital, GMERS (Medical College), Head quarter, Mental hospital,

RDD, RWH (Regional warehouse), SDH(Sub District hospital), Police hospital, U-PHC placed their annual demand of drugs for the current year.

- The green bar represents the total number of stores under the particular direct demanding officer.
- The orange bar represents the demand entered in e-Aushadhi application for the current year by each store.
- The black bar represents the number of stores which does not demanded.

**Graphical representation of the total number of purchase orders placed for the financial year 2016-2017**

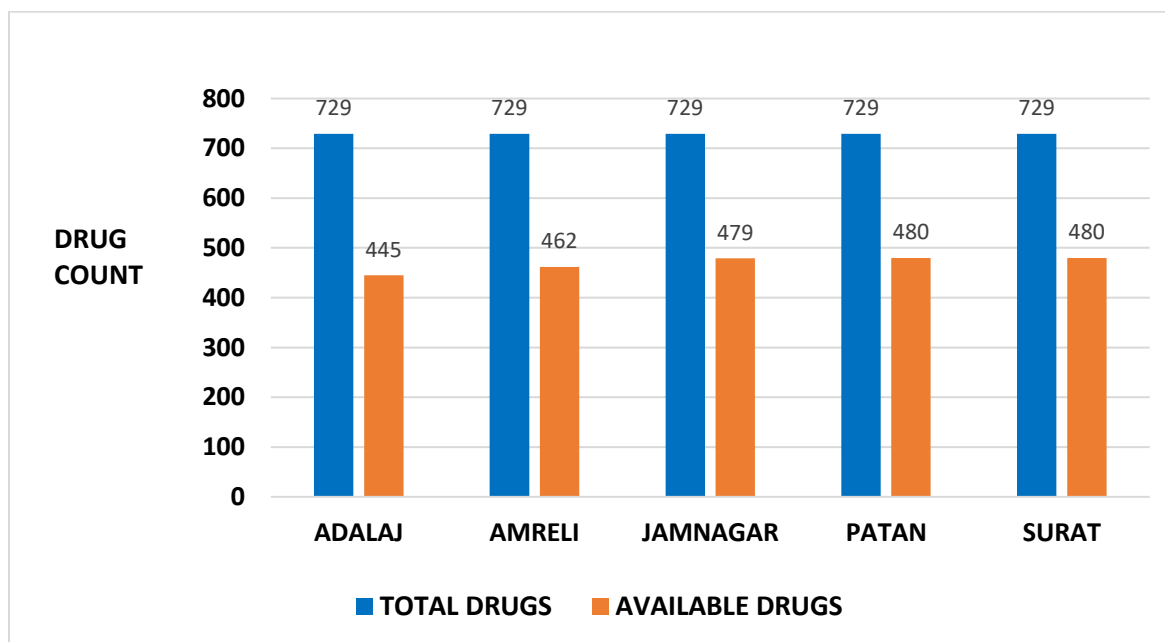


**The graph represents:**

- The total number of purchase orders in front of which the drugs have been demanded.

- All the regional warehouses have different number of purchase orders based on their requirements.
- The highest number of purchase orders are associated with Adalaj warehouse.
- The least number of purchase orders are associated with the Vadodara warehouse as it has started working recently.

### **TOTAL DRUG VS AVAILABLE DRUGS AT WAREHOUSES:**

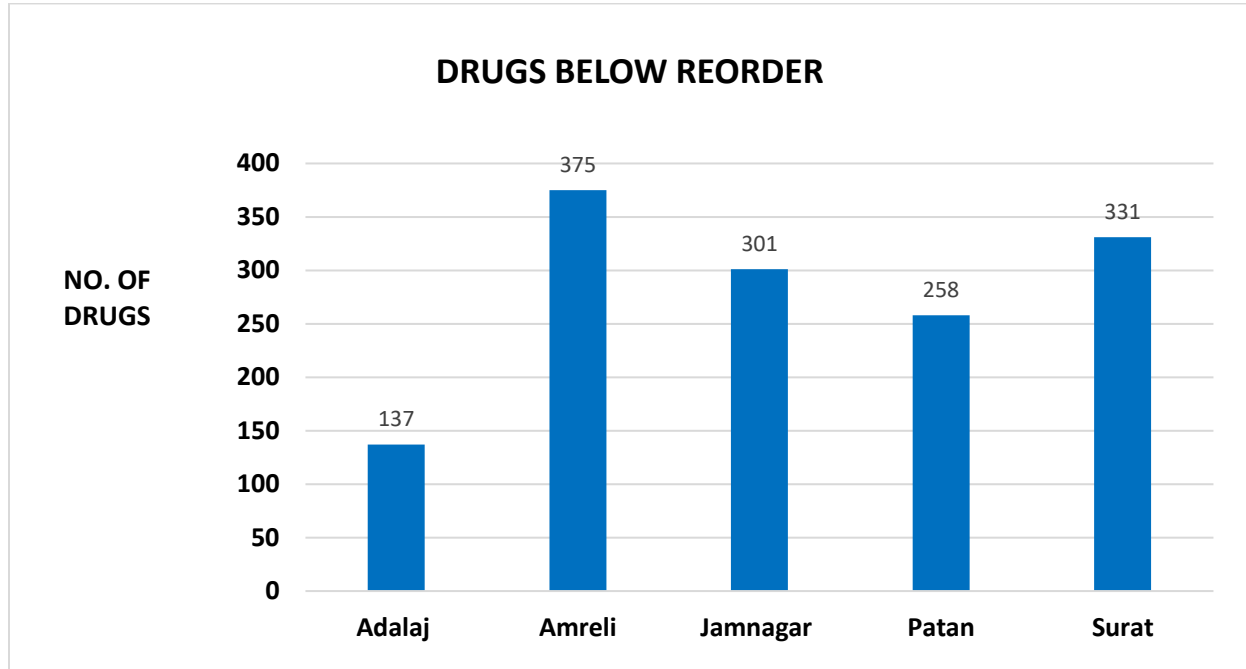


### **The graph represents:**

- The blue bar represents the total number of drugs i.e. the drugs under Essential Drug List (EDL) and Non-Essential Drug List (Non- EDL).
- The orange bar represents the number of drugs available at each warehouse.



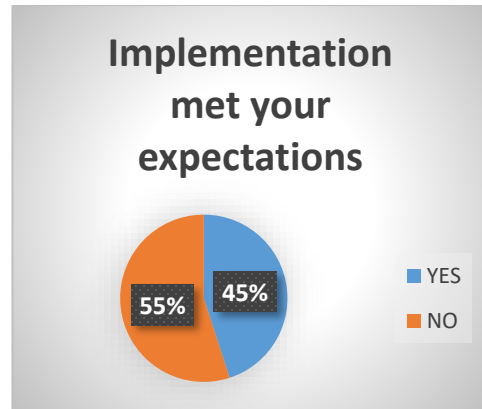
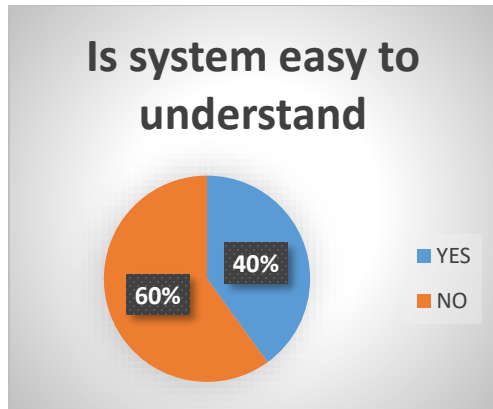
**NUMBER OF DRUGS BELOW REORDER LEVEL QUANTITY AT WAREHOUSES:**



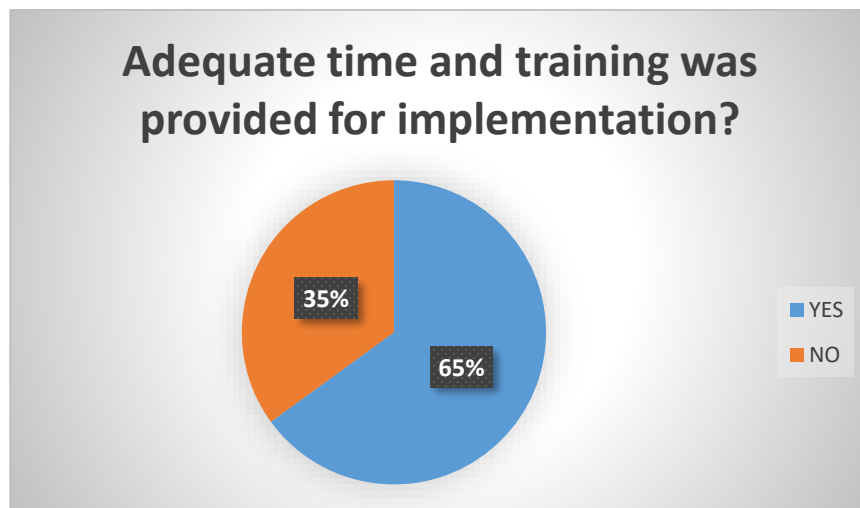
**The graph represents:**

- The number of drugs which are below reorder level at each regional warehouse.
- Reorder Level is the level or the quantity of drugs that a warehouse is supposed to maintain in the stock. Below this level, the particular drug needs to be demanded for procurement.
- It represents the current status of a particular warehouse.

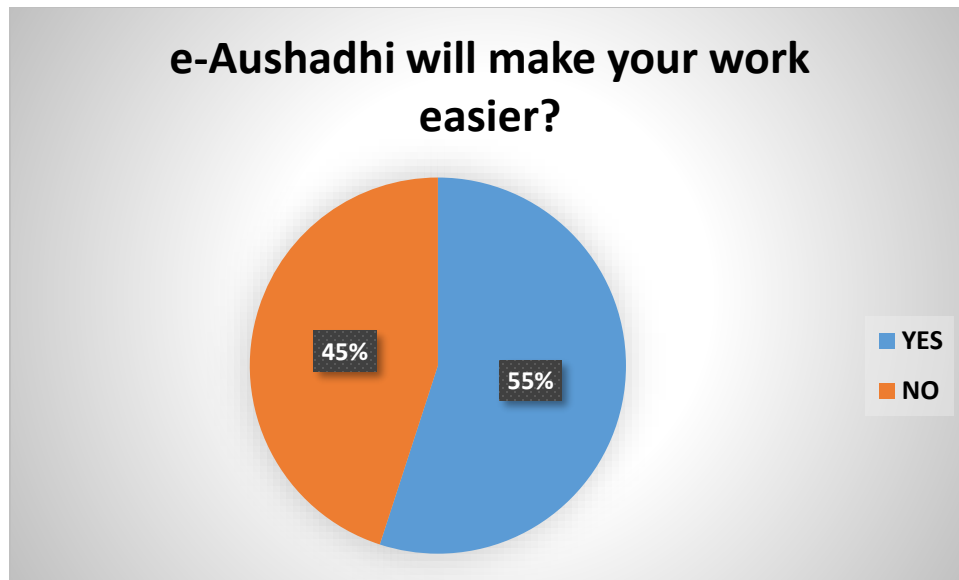
## PRIMARY DATA ANALYSIS



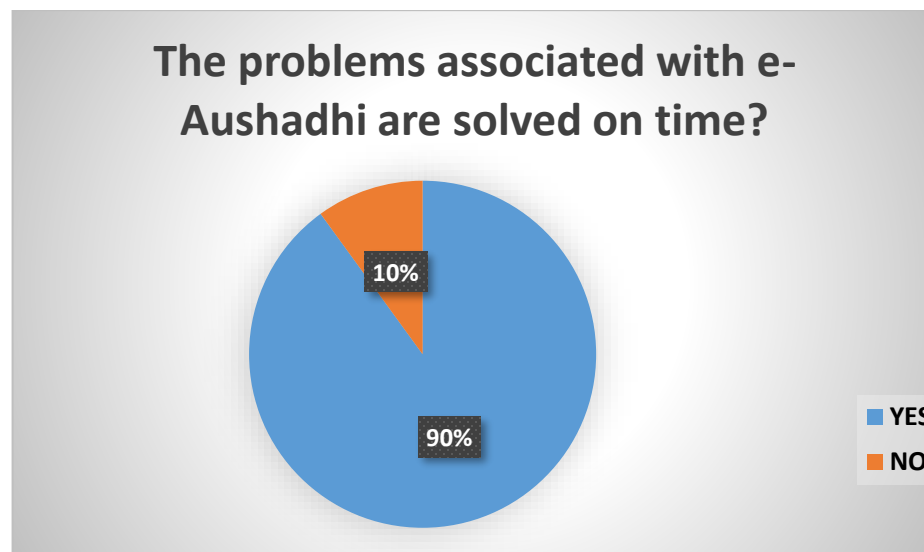
- These graph represents that approximately 55-60 percent of sample size taken agrees that system is easy to under understand and has met their expectations but 40-45 percent disagrees.



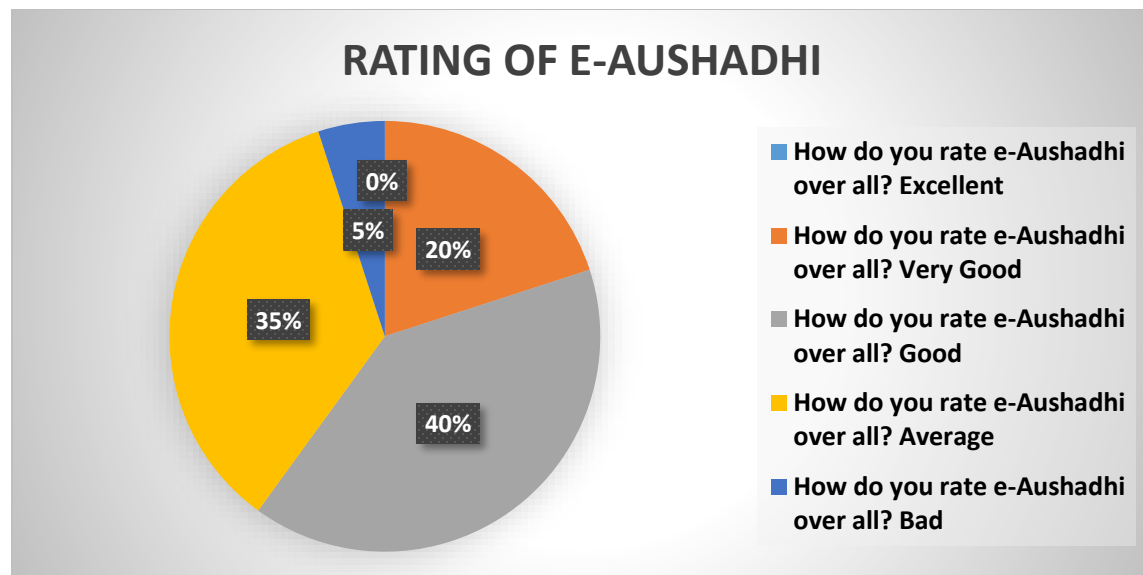
- The graph represents that 65 percent of sample size taken agree that appropriate and adequate training related to usage of e-Aushadhi application has been provided but 35 percent does not agree



- The graph shows that 55 percent of sample size agrees that e-Aushadhi will make their work easier and 45 percent says that it will not.



- The graph shows that 90 percent of sample size taken agrees that the issues associated with e-Aushadhi application are resolved on time but 10 percent does not agree.



- The graph shows that 40 percent of sample size taken rated e-Aushadhi as good while 35 percent rated it as an average software overall.

## ➤ CHALLENGES

The system aimed at bringing enhanced transparency across all levels and hence found a big resistance in implementation and non-cooperation. It was important to ensure that the users continue the operations without disrupting the critical activities.

Following are some of the challenges faced during the implementation of e-Aushadhi at various levels:

- Limited computer proficiency
- Requirement gathering created an issue owing to non-cooperation
- Limited internet connectivity
- Limited manpower
- Many customizations required in the application
- Limited IT support at various level

## CONCLUSION

Supply chain automation of the drug management system provides an accurate view of state of drugs warehouse and inventories across the state.

Information Technology is a very important step in streamlining the Supply Chain Management of the any organization. Through Information system (e-Aushadhi), the process can be made more transparent and chances of data manipulation and wrong information can be prevented.

e-Aushadhi can help in streamlining the process of inventory management and can brought more transparency in the system. Different users at all levels have a better and much more accurate view of the state of drugs warehouse and inventories across the state Though there are many hindrances related to the implementation of e-Aushadhi such as proper infrastructure is not available to support the application at many levels which needs to be noticed and rectified.

The e-Aushadhi application keeps a check on purchases, inventory management and distribution of various drugs and surgical items to various regional and district drug warehouses, district hospitals, sub-district hospitals, medical colleges(GMERS), primary health centers (PHCs) and community health centers (CHCs).

The MIS module provides critical reports that lead to efficient monitoring and decision making. Separate interface for the laboratories further improves the Quality status. The deep involvement and constant engagement of users can be the driving point of success with this application.

The accurate root level of reporting and monitoring of e-Aushadhi at all hierarchical levels is a major step in complete implementation of the application.

### **ANNEXURE: QUESTIONNAIRE**

S.NO.	QUESTIONS	REMARKS
1.	e-Aushadhi will make your work easier?	YES- 11
	YES NO	NO- 9
2.	Do you use e-Aushadhi on regular basis?	YES- 20
	YES NO	NO-0
3.	Adequate time and training was provided for implementation?	YES- 13
	YES NO	NO- 7
4.	You will be able to apply the knowledge learned?	YES- 14
	YES NO	NO-6
5.	e- Aushadhi application was encouraged to use?	YES- 18
	YES NO	NO-2
6.	The problems associated with e-Aushadhi are solved on time?	YES-18
	YES NO	NO- 2
7.	The implementation met your expectations?	YES-9
	YES NO	NO- 11
8.	Is system easy to understand?	YES- 8
	YES NO	NO- 12
9.	How do you rate e-Aushadhi over all?	Excellent-0 Very good-4 Good- 8 Average- 7 Bad- 1

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- Prof. Himanshu ,S. Moharana, Dr. J.S. Murty, Dr. S. K. Senapati, Prof. K. Khuntia- Importance of Information Technology for effective supply chain management IJMERE Vol.1, Issue .2, pp-747-751

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- <http://www.ijmer.com/papers/vol%201%20issue%202/BU012747751.pdf>