DISSERTATION

at

Attune Technology Ltd., Anna Salai, Chennai

Analysis of the workflow of inventory department after HIS implementation

by

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Enroll No. PG/13/055

Under the guidance of

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Post Graduate Diploma in Hospital and Health Management

2013-15

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Certificate of Approval

The following dissertation titled **" analysis of the implementation of HIS IN INVENTORY DEPARTMENT** at **"xyz hospital (mohali)"** 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.

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Name	Signature
Prof AK Agarwal	
Dr Siddhartha Satpathy	
Dr Vinay Tripathi	

CERTIFICATE FROM DISSERTATION ADVISORY COMMITTEE

This is to certify that Richa Dixit, student of Post Graduate Diploma in Health & Hospital Management had worked under our supervision and guidance. she is submitting her dissertation titled Implementation of HIS in inventory in Hospital at Attune Technologies Pvt. Ltd. in partial fulfillment of the requirements for the award of Post Graduate Diploma in Health and Hospital Management.

This dissertation had a 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 Ashok K Agarwal
Professor,
Dean (Academic & Students Affairs)
IIHMR-Delhi.

Mrs. Paramjeet Kaur
ATTUNE Technologies. Pvt. Ltd.
Chennai.

TO WHOMEVER MAY CONCERN

This is to certify that Richa Dixit, student of Post Graduate Diploma in Hospital & Health Management from IIHMR- Delhi, has undergone internship training in ATTUNE Technologies Pvt. Ltd. from 4rth February 2015 to 4rth May 2015.

The candidate had successfully carried out the project designated to her during the internship and had used proper scientific methods to carry out the same. The internship is in the fulfillment of the course requirement. We wish him all the best for her future endeavors.

Dr Ashok K Agarwal Dr Ashok K Agarwal ,
Dean, Academics and student affairs,
IIHMR-Delhi
New Delhi.

Mentor

Completion of Dissertation from the Respective Organization

This certificate is awarded to

Richa Dixit

In recognition of successfully completed his internship and his project on

Implementation of the HIS in the inventory module in Hospital

May 2015-05-04

Attune Technologies Pvt. Ltd.

She comes across as a sincere, dedicated and hard working individual with an inquisitive mind.

Training and reporting officer

CERTIFICATE OF SCHOLAR

This is to certify that the project, "Implementation of HIS in inventory" is submitted by Ri
Dixit Enrollment no. PG/13/055 under the supervision of Dr Ashok K Agarwal for award of
Graduate Diploma in Health and Hospital Management of the Institute carried out from t
period 4-02-2015 to 4-05-2015 embodies my original work and has not form the basis of a
award, degree, diploma associate ship, fellowship title in this or any other institute or institu
of higher learning.

Richa Dixit

Signature

FEEDBACK FORM

Name of the Student: Richa dixit

Dissertation Organization: Attune technologies pvt. ltd.

Area of Dissertation: implementation

Attendance: 95%

Objectives achieved:

- Requirement gathering and addressing issues by end users
- Training to end users
- Monitor user issues
- Increase awareness of software in users

Deliverable s:

- User training for accession
- Master data for department
- Bug tracker issue

Strengths:

- Team work
- Hard working
- Multi-tasking
- Motivated and enthusiastic

Suggestions for Improvement:

- Learn thoroughly about system
- Should do follow up till completion of work.

Paramjeet Kaur

Signature of the Organization Mentor (Dissertation)

Date: 04/05/2015

Place: Chandigarh

Mrs. Paramjeet Kaur

ATTUNE Technologies. Pvt. Ltd.

ACKNOWLEDGEMENT

Words can never be enough to express my sincere thanks to **ATTUNE Technologies Pvt. Ltd.** and especially **Mrs. Paramjeet kaur,** my reporting officer for her continuous guidance and support.

I convey my gratitude to **Mr. Raghothaman, VP of ATTUNE Technologies Pvt. Ltd.** who gave me the opportunity to be a part of this Project. I express my greatest thanks to **Mr. Aminderbir singh, my senior in ATTUNE Technologies and also a past Alumni of IIHMR-Delhi** for his support and guidance to make this project possible.

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In the end, I am thankful from the core of my heart to my beloved parents who supported me throughout the course of study. Last but not the least; I am thankful to all the colleagues for their help and cooperation.

Richa Dixit

Hospital administration

2013-15

Roll No: PG/13/055

ABSTRACT

In this study we have discussed about the barriers and challenges which a team faces during the implementation of HIS in an inventory in a hospital. We have discussed the problem statement, the scope of the study, the rationale behind the studies. We have also discussed about the benefits of implementing the HIS and the methodology which is used during the implementation. Also we have discussed about what were the learning during the whole process, what were the loop holes in the process and the limitation of the study and what could be the probable solution to solve those problems.

We here had discussed how they can be managed by the HIS in a better way, right from Purchase department, inventory consultation ,stock management , data recovery, its analysis, not to mention the Q management by easing the traditional, tedious and complex way of workflow in the inventory. To prove this we have shown various analyses done on the basis of interview from the staffs and the consumer pre and post implementation of the HIS.

Research Question/objective of the study.

This research is based on following research questions:

- To document the Inventory Management System within the Standards and Procedures Manual.To provide Inventory System access to all necessary personnel (data entry, view, update and deletion).
- Issues faced in the implementation of the HIS & when providing training to personnel responsible for supporting the Inventory Management System.

METHODOLOGY

A qualitative research has been conducted for the application & evaluation of the HIS in inventory module of the XYZ hospital.the method used is observational process and survey process.

- **Observational process :** Research technique that involves the direct observation of phenomenon in there natural setting. In this we have to just record what we observe without interfering in it.

1) To study and identify the project plan and gaps

Study and identify gaps in project plan like resource plan , time plan etc.

2) **On field experience : To find Gaps during One to One training**

During training of the staff, Receptionist and the Doctor in the hospital.

- **Survey process:** this research can be specified and limited or it can have more global and specified goals.

It includes the technique of gathering data by asking questions to people who are thought to have desired information.interviews have more flexibility because for instance researcher can skip the irrelevant questions and both the interviewer and responder can ask for clarification.

Study area: Inventory department of XYZ hospital.

Study population: 10 staff members of inventory department.

Types of data: Primary Data Collection: There are times when the information must be collected and this approach is known as primary data collection.

Secondary data: .

Tools used: e-brochure, websites, journals on inventory module in HIS.

Tools used: feedbacks, observation

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List of figures:

ACRONYMS

EHR – Electronic Health Records

EHRIS - Electronic Health Record Information System

HIS – Hospital Information System

HIPPA – Health Information Protection & Portability Act

HL7 – Health Level 7

ICT – Information Communication Technology

IT – Information Technology

SRM -Supplier Relationship Management

EDI- Electronic Data Interchange

MM -Materials Management

INTRODUCTION

About the Organization

ATTUNE Technologies is an India based organization with its HQ based in Chennai, Tamil Nadu and Singapore. The CEO of the organization is Mr. Arvind Kumar. The organization came into existence in November 2008. It is one of the pioneers in Cloud Based LIS, ATTUNE TECHNOLOGIES offers next generation Healthcare IT products to the market with primary focus on delivering business benefits to its customers. Technology platform & architecture can serve a Single Centre as well as a National Healthcare Network. They have more than **3 MILLION PATIENT RECORDS** on cloud. They are backed by premier investors from **Singapore** and **US**.

Their unique solutions run in METROPOLIS, SERUM, MEDALL Precision and many more eminent labs. Customers are in **Singapore, India, Philippines, Indonesia, Kenya, Sri Lanka & Malaysia.** They constantly keep innovating new solutions for the entire healthcare value chain. They now are having 200+ employees working with them since their origin.

Products of Attune:

- **Attune Health Kernel** is a complete state of the art, secure & web-based solution for hospitals that integrates all the departments and branches that are geographically separated. All the hospitals/branches needs are low-end PC's and Internet connectivity with rest of the IT infrastructure and software taken care by us.
- **Attune Lab Kernel** is an advanced and contemporary software that combines all the collection centers, branches and partner networks into a single platform to facilitate easy functioning.
- **Attune Clinic Kernel** is a complete state of the art, secure & web-based solution for clinics and Clinic chains that integrates all its departments and branches that are geographically separated. All the clinics/branches needs are low-end PC's and Internet connectivity with rest of the IT infrastructure and software taken care

Modules in Attune HIS:

- Patient registration
- Billing and revenue cycle management
- Client management and critical control
- Doctor schedule and appointment
- Accident and emergency care
- Day care management system
- In patient management system
- Lab information system
- Radiology and imaging information system
- Pharmacy information system
- Purchase, inventory management and consumption tracking
- MIS ,Dashboard, Business intelligence

Vision - To manage world's health information

Values - To provide innovative solutions to business problems by appropriate usage of technology

Transparency – Take utmost care to ensure transparency in all our engagements with all the clients and vendors. To actively share relevant information and enabling them to take informed decisions in all activities pertaining to our operations.

Trust - Trust among various stakeholders is the key driver for a successful business. Attune strongly believe in this philosophy and leave no stone unturned to establish relationships based on mutual Trust.

Respect – Attune strongly value the relationships with all our stakeholders and greatly respect their needs and decisions. Mutual Respect and Understanding is the cornerstone of all their relationships.

Win-win - We strongly believe in establishing win-win relationships with all our stakeholders. Our engagements with customers and vendors shall be based on evolving long-term win-win relationships.

Work culture at Attune:

Work culture at Attune includes the trio factor:

- Entrepreneur
- Team work
- Positive contribution

Entrepreneur- Culture and Innovation: We actively foster Entrepreneurship and Innovation across the organization. In this era of Knowledge Economy, we strongly believe that the most valuable asset of an organization is its human talent. By promoting Informed Risk taking, we provide the ability to tap the combined potential of individual team members to add more value to our customers. For us, encouraging Innovation involves fostering a culture of applying un-conventional ideas to solve everyday business problems of our Customers. By challenging ourselves and practicing a vibrant and informal work culture, we ensure constant flow of ideas and suggestions across the organization.

Team work - One of the critical success factors of our business model is the ability of our project teams to deliver effective solutions to our Customers. This requires seamless co-ordination and transfer of knowledge among various specialized teams. Ability to work in cross-functional teams is a key pre-requisite for any member coming on board. Our Recruitment, Retention, Reward & Recognition Policies are aligned to foster and encourage team work across all levels of the organization.

Positive contribution - The organization promotes a culture where everyone is free to challenge the ideas of any other person in the organization. Every employee is expected to positively challenge the issues and come out with alternatives and in the end, the valid propositions are accepted based on objective discussions. Once a decision has been arrived at, the team goes ahead implementing it without postponing any further.

Problem Statement:

Analysis of workflow of inventory Department after Implementation of HIS in XYZ hospital in Mohali. Before we move towards the issues here is the brief about XYZ hospital.

This is a chain of hospitals which is running in metro cities in India and the working environment in the hospital is manual. They were using paper based files for keeping records of the patients. Most of the staff is well aware about the usage of computers the available computers are used for performing routine tasks like getting prints of documents, keep staff records, using internet for getting some information.

Inventory process was also carried out manually so looking into the process flow the hospital decided to have HIS for the hospital. The implementation of the HIS was successful in all the departments with different modules for different departments.

But still there were some issues faced:

- Inventory Management System within the Standards and Procedures Manual was difficult to be demonstrated and illustrated due to the work load among-st the staff.
- There were Issues which were faced in the implementation of the HIS & when providing training to personnel responsible for supporting the Inventory Management System.

Review of Literature:

1. HOSPITAL INFORMATION SYSTEM (HIS) IMPLEMENTATION IN A PUBLIC HOSPITAL: A CASE STUDY FROM MALAYSIA (Far East Journal of Psychology and Business Vol. 8 No. 3 Sep 2012)

ABSTRACT In this competitive global information system (IS) environment, an integrative system is crucial for the highly demanding of information needs. This is evident in the fact that the greater majority of hospitals both in Asia Pacific and Southeast Asian are in the process of implementing or planning to implement the Hospital Information System (HIS). This research aims to investigate users' acceptance towards the implementation of HIS in one of the public hospitals in Malaysia. The research main objective is to identify the acceptance and awareness level of the system users in early system implementation. Furthermore, findings from a few past studies have shown that resistance in the early stages of the introduction of a new information system is quite common before users could evident its benefits in terms of minimizing costs and helping them to perform their tasks better. A case study method is used in this study for more thorough information in this stage of the system implementation. This research then is planned to contribute to the identification of major factors which can influence the users' acceptance or resistance. Thus, it will be a guidance for the researchers to overcome the gap.

Keywords: Implementation, Acceptance, Information System

Paper Type: Research Paper

2.HOSPITAL INFORMATION SYSTEM IN MEDICARE - AN EXPERIENCE AT TATA MAIN HOSPITAL, JAMSHEDPUR

Patient care management in Tata Steel has fully utilised the power of computers in Medicare, whereby network of integrated systems maintaining patient database for the hospital services in the areas of Pathology, Radiology, Medical Research, In-patient Admissions and Billing, Medical Stores & Pharmacy are operational. The implementation of the above modules have evolved user-friendly computerised systems which are loved and cared by all. This paper tries to cover giving an insight to the Hospital Information system implemented at the Tata Main Hospital, which is being fully utilised to provide quality service. The computerised system has enabled the medics to serve their customers with a smile and to meet the corporate objective set by the founder. "We do not claim to be unselfish, more generous or more philanthropic than

other people. But we think we started on sound and straight forward business principles, considering the interests of the shareholders our own, and the health and welfare of the employees the sure foundation o our prosperity", - JN Tata

3. Amrita Hospital Information System (AHIS)

Amrita Healthcare Informatics Suite is a demonstration of Amrita's leadership in research and development of state-of-the- art technologies. Amrita HIS is a comprehensive software solution that allows a holistic approach within and across clinical segments, delivering solutions with the innovation and synergy necessary to help move forward in today's changing healthcare environment. It is a fully integrated, highly configurable, platform independent, Enterprise Information System, which allows for scalability and performance, while at the same time ensuring all the needs of the healthcare organization are met. The system not only helps in daily patient care management, but it also provides the foundation to foster research and development. The solution addresses all the needs of healthcare domain and provides a fully indigenous implementation, adopting best-of-the-breed technologies and design techniques. Amrita HIS is developed using Extreme Programming Methodologies backed by a vibrant and large community of domain experts.

4.Azim Izzuddin Muhamad, Mohamad Rahimi Mohamad Rosman, Mohammad Ikram Ramzi, and Mohd Idzwan Mohd Salleh in 2012. Conceptualizing Medical Application Software for Managing Electronic Health Records (EHR) and Cash Flow Management in Private Clinics.

This study tells us about the growth of Information and Communication Technology (ICT) had certainly contributed to the better record management practice, especially in dealing with electronic record. Most major industry has shifted from paper record into electronic record as this kind of records were more reliable, accurate, cost-saving, and robust. This paper describe the development of medical software know as EHRIS (Electronic Health Record Information System). This system was developed using Microsoft Visual Studio 2008 as it main platform, with Microsoft Access as it database. Its include modules such as patient information, payment tracking, billing, medicine and supply, and QMS (Queuing Management System). It's suitable for small and large clinic, easy to installed and user-friendly. It's adopting the concept of EHR (Electronic Health Record) and refers to a systematic collection of electronic health information about individual patients or populations. This study undertakes the concept of System Development Life Cycle (SDLC) using the waterfall model.

5.INVENTORY MANAGEMENT SYSTEM

April 4, 2006, CSE 403 ,Assignment 1 – LCO

Abstract

This paper describes the *Inventory Management System* sufficiently to determine the feasibility and usability of a finished system. The core concept is to track the sale of items from the cash registers with additional features for interpreting the data. It uses a client-server model with a connected database to allow multiple stores and warehouses to be connected. This allows for later expansion while still supporting the targeted small businesses. The core features and final framework be completed within 2 weeks, leaving 5 weeks to implement additional features and testing.

HIS Core Application

The HIS core application accessible through a web browser via Internet and Intranet at hospital location.

The access to different modules and functionalities will be managed and controlled through the „Application Admin" module in the system, based in Role Based Access Control (RBAC). To develop a comprehensive information control and display feature through these modules as per requirement of individual users. It is proposed that there will be unique ID for all patients across all facilities within the State as well as across all programs. The patient would be tracked through this unique ID for availing all health services from different departments within the hospitals. This will enable collation of medical record through various touch points within the hospital providing health services thereby building patient Electronic Health record (EHR). This will further result in taking better clinical decisions especially referrals to tertiary institutions, as well as gradually developing a comprehensive „Disease Registry" for the State over the years.

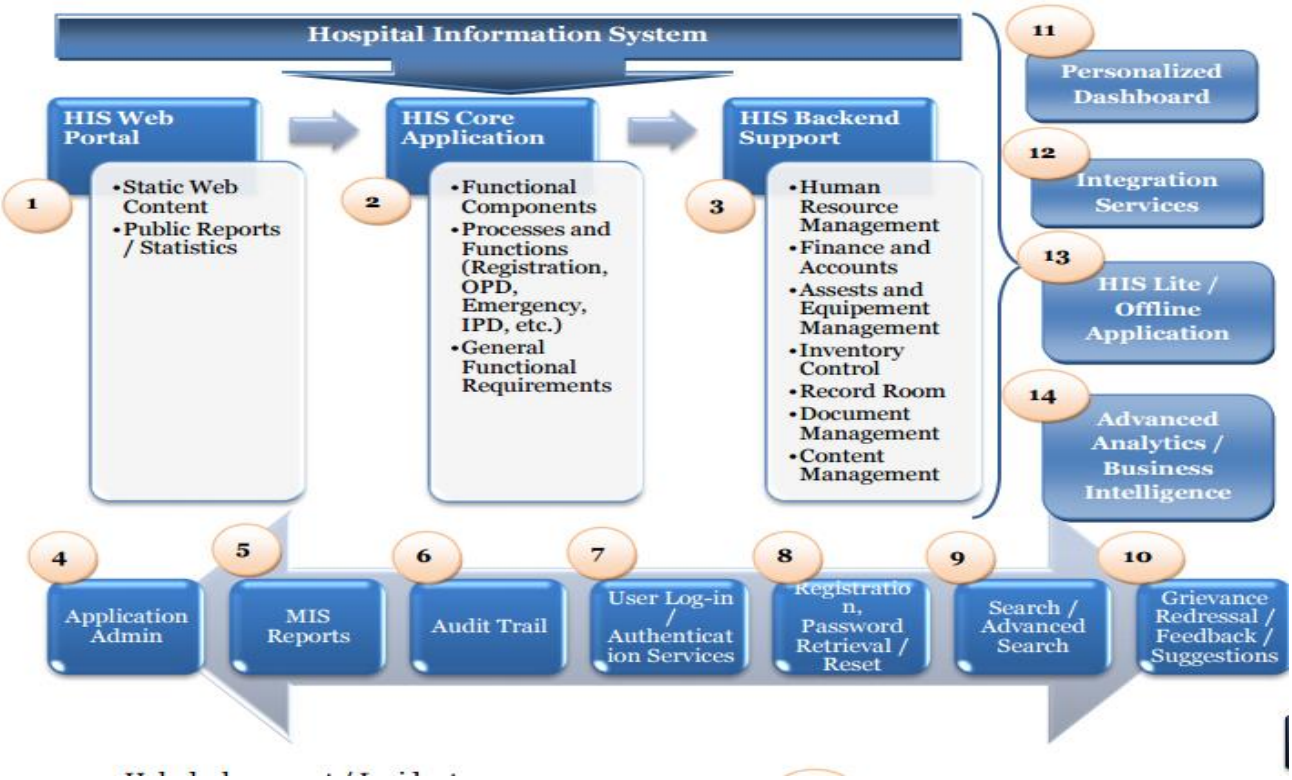
Figure 1.1 HIS CORE APPLICATIONS AND TYPES

HIS Core applications and types

S. No.	Applications	Application Type
1	HIS Core Applications and Support Services	Local/ Centralized Application
2	Portal	Centralized Application
3	Document Management System	Centralized Application
4	Content Management System	Centralized Application
5	Grievance Redressal	Local/ Centralized Application
6	Financial Management and Accounting	Local/Centralized Application
7	Human Resource Management	Centralized Application
8	Asset and Equipment Management	Centralized Application
9	Inventory Control	Centralized Application
10	Record Management	Local Application
11	Analytics and BI	Centralized Application

2.2. HIS Core Application – Processes and Functions

Figure 1.2 HOSPITAL INFORMATION SYSTEM FLOW DEMONSTRATED



Summary of Issues and Challenges faced

The key issues and challenges being faced by various have been analyzed during the assessment of existing processes and functions.

The following depicts the current scenario as observed by the project team, which are the focus areas of HIS:

1. Issues faced by Hospital Staff

a. Data Collection and Duplication

i. Largely paper-based, time consuming and tedious

ii. Copying, aggregating and reporting of same data across levels

iii. Delays and errors in data entry

iv. Most of the staff at ground level maintain multiple registers, often capturing data for same fields at various points

v. Sometimes they maintain multiple copies of some registers

vi. Data collection fatigue and loss of attention from main function service provision

b. Data Reporting

i. Numerous reports are prepared at the hospital level based on ground level data capture and reports

ii. Same data fields or subsets are reported for various schemes

iii. Data transmission is a manual process until the data is finally entered in an IT system

c. Capacity Building

i. Lack of Training and skills augmentation for hospital staff working at all levels

2. Issues faced by Hospital Administrators

a. Reporting and Analytics

i. Lack of timely, accurate information and analytic tools support for decision making

ii. Lack of alerts for timely action and policy correction

iii. Lack of effective monitoring of schemes and related Project management; to ensure corrective steps are taken in time

iv. Use of data for planning, optimization of resources

v. Wrong / duplicate data leading to erroneous reports

vi. Frequent changes in the reporting formats with regard to the time and effort taken to get used to new reporting formats

b. HR related

i. Systemic management of HR - shortage of doctors, specialists, and other health personnel / hospital staff and contractual staffing

ii. Lack of transparency and visibility in transfers/ postings of various staff

iii. Recruitment and Performance Management

c. Infrastructure

i. Utilization of equipments not optimal

ii. No monitoring of performance of facilities

iii. Lack of timely availability of drugs, vaccines, and other consumables

iv. Un reliable connectivity for IT systems

v. Lack of Basic IT infrastructure facilities like computers, printers, internet connectivity, power backups, application software, etc.

vi. No specific IT support personnel / teams in any health facilities and hence troubleshooting is time consuming

d. Capacity building

i. Staff engaged in multiple activities (administrative and clinical), causing inefficiencies in their core functions (mainly clinical)

ii. Lack of adequate skills to usher in the changes necessary for effective use of IT systems in operational set-up

3. Issues faced by Patients / Citizens

a. Long waiting time in queues for availing various services within hospital premises

b. Lack of proper instructions to locate Labs, OPD‟s, Wards, etc.

c. Insufficient lab facilities including working equipments in comparison to number of beds

d. Late admission / admission in different wards (like emergency or disaster ward) due to limited number of beds

e. Unhygienic conditions / Inadequate measures for sterilization to prevent hospital acquired infection

f. Inadequacy of health personnel‟s to give health education to patients

g. Delayed response in cases of emergency in some cases

A Hospital information system (HIS) is envisaged to be a comprehensive, integrated information system designed to manage overall functioning of a government healthcare institution including patient care, hospital administration and the corresponding service processing.

Project Requirements The RFP envisages the following components of work to be executed by a competent Implementation Agency in order to fulfill the objectives of the proposed Hospital Information System:

1. Supply, installation, configuration, customization, integration, of Hospital Information System (HIS) together with the necessary database and other software

2. Implementation of HIS according to the reference architecture, performance metrics, acceptance criteria‟s and conformance to industry standards including its testing and certification

3. Installation, configuration and commissioning of central servers for hosting the HIS solution at Data Centre. Facilitate in provisioning of redundant broadband connectivity. Procurement Installation, configuration and commissioning of end user computing infrastructure at the project locations comprising of all hardware, system software, application software and any other software including necessary site preparation of hospital facilities considered for implementation Operation and Maintenance of the entire HIS Solution including Application, IT & Non IT infrastructure for a period of five years from the date of phase-1 Go-Live

4. Change Management and Capacity Building including Training of users for effectively using the system 5. Adherence to Implementation Plan and Project Governance Structure Implementation of Hospital Information System (HIS)

Implementation of HIS according to the reference architecture, performance metrics, acceptance criteria‟s and conformance to industry standards including its testing and certification

Background of Project:

The software used for inventory basically work on: **Purchase**, **Inventory Management** & **Consumption Tracking**

- Inventory Packaging, Supplier Quotation.
- Supplier Analysis & Purchase Decision Support System.
- Centralized or De-centralized Purchase, Approval Workflow.
- Distributed, Scheduled Supply Chain & Stock Receive Functions.
- Stock Damage, Store & Supplier Returns, Re-orders.
- Supplier Payments, Credit & Debit Adjustments.

Inventory Management

The *Inventory Management System* is a real-time inventory database capable of connecting multiple stores. This can be used to track the inventory of a single store, or to manage the distribution of stock between several branches of a larger franchise. However, the system merely records sales and restocking data and provides notification of low stock at any location through email at a specified interval. The goal is to reduce the strain of tracking rather than to handle all store maintenance. Further features may include the ability to generate reports of sales, but again the interpretation is left to the management. In addition, since theft does occasionally occur, the system provides solutions for confirming the store inventory and for correcting stock quantities.

Objectives

The objective of Inventory Management is to manage the physical and logical properties of resources and their relationship, while ensuring that service level commitments are achieved.

This process will: Ensure efficient and timely identification of vital corporate assets. Assist in managing the enterprise-wide inventory. Provide a common repository for asset protection. Plan and control the proliferation of assets across the enterprise.

The objectives of Inventory Management are: To identify and track all data processing assets in an Inventory System Repository. To define the process by which assets are identified and maintained in the Inventory System. To provide Inventory System access to all necessary personnel (data entry, view, update and deletion).

To provide a full range of reports that will satisfy informational requirements. To document the Inventory Management System within the Standards and Procedures Manual. To provide training to personnel responsible for supporting the Inventory Management System.

Purchase, **Inventory Management** & **Consumption Tracking salient features :**

1. Inventory Management services take care of all system critical information that ensures that all medication required for properly treating a patient are adequately stocked and maintained. It is important that all drugs, items and articles are constantly at the disposal of the care providers. All stores and sub stores shall be part of this module

2. System shall have facility to create main stores and sub stores in each facility with integration of all the stores

3. Following are the designated sub-stores, but not limited to OPD Pharmacy, Emergency Department , Injection and Immunization Room, OT, Labor Room, Wards

4. System shall maintain a master list of suppliers with unit cost of each item

5. System to facilitate creation of standard and unique codes for department and locations

6. The system allow the Store In-Charge to upload the scanned copies of required document like bills, invoices, etc. and fills other details in the system

7. The system have the ability to maintain Location master data

8. Standard list of the drugs and medical supplies used in the store be maintained

9. Capturing unique Item Description and code in the Inventory Master File

10. Capturing associated Unit of Measurement in the Inventory Master File

11. Capturing Lead Times in the Inventory Master File

12. Facility to define Item Codes under an item group

13. Facility to generate Store ledger with the following details for each item: opening balance (Quantity and value), receipts and issues, closing balance (Quantity and value)

14. able to enter supplies needed patient -wise by entering/ selecting: Name of item, Quantity

15. The system be able check the availability and quantity of items / drugs / articles / tools etc. at all sub-stores and main store

16. Stock would be classified and maintained on any and all of the following categories like sub store wise, VED , ABC, Expiry date of medicine, disease wise, FSN and high risk medication, High Cost

17. The system will facilitate retrieving details of available drugs (batch number, expiry date, location) in the pharmacy / drug store & reserve drugs for the indent based on the item code and quantity mentioned in the approved indent

18. A list of available and authorized medications with their source (warehouse or local purchase) will be maintained and auto updated from existing software

19. Monitoring and Tracking of Supplies to Hospital units, Management of materials, Management of suppliers/drugs/items/equipments

20. To provide alerts to the officials concerned for tracking their use in order to enable effective monitoring and avoid any pilferages

21. The system will support planning methodologies; re-order point, safety point, lot sizing, lead times, min/max levels etc

22. Shall have facility to transfer and record material from one location store to another

23. Medicines/articles that are consumed as per prescription/generated and daily expense register (prescription wise consumption) be generated by the system as per information entered by respective Users

24. The items which are damaged also be entered into the system to adjust the stock of that only after proper approvals on the system by the authorized person

25. The system provide facility so that outgoing medicines and prescriptions will be automatically deducted from its stock list

26. The system provide facility so that ; For each item-store combination, the minimum, maximum and re-order quantities will be maintained depending on the policies and procedures adopted for replenishment of stock at the sub-stores

27. To provide alerts to the officials concerned for tracking their use in order to enable effective monitoring and avoid any pilferages

28. The system maintain data for any Recall of Drug due to any reaction reported, and track the entire batch of medicines

29. The system will generate a list of near-expiry items that are due to expire 30 days or as defined from the date and display as an alert to the user

30. The system keep an account of all the drugs which are near expiry or have expired so that period they may be returned back to the Central Drug Store to be returned back to the vendor

31. Demand, Indenting, receipt of Stores

32. Each of the stores have the capacity of raising an indent based on demand forecast/previous consumption at fixed time interval through the store module as well as auto indent based on minimum reorder levels and availability in main store

33. The system have provision to track auto indents as well as online requests from various departments like OPD, IPD, Emergency, Labor room, OT, Pharmacy, etc. The system track all requests through a separate unique store ID

34. The demand generated be automatically consolidated by the system for the Store In-charge

35. The system be able to shortlist the items to be purchased at hospital level and items to be indented from warehouse

36. able to print the indent sheets according to prescribed format

37. The system provide facility so that ; allowing tracking of the indent throughout the creation and approval cycle using the unique indent number

38. The system will have the ability to display the alert for the indent approving authority on receipt of indent approval requests in the system

39. The system will have the ability to capture the approval of the Indents & transmit the approved indent details to the stores

40.If the medicine is not available with the approving authority the system would generate Non Availability Certificate automatically to initiate local purchase

41. According to approved indent a dispatch note will be generated in a prescribed format and will be sent by the system to indenting authority

42. Once the supplies are received, digital stock register is updated automatically. The system maintain a re-defined checklist for the inspection of stock and capture the status of the inspection for each aspect / items

43. A barcode be generated through the system and attached to the stock for further identification and tracking within the hospital stores. In case the bar code is already there the system have the provision to read the bar code

44. The system will have the ability to record the details of drugs received against the approved indent including the following: Date of Receipt, Drug Name, Drug Quantities, Batch Number, Expiry Date

45. The system will have the ability to validate the receipt against the Indent & Dispatch note

46. The system will have the ability to generate Receipt Report in which item details like quantity demanded , Expiry date, Batch number, quantity received, quantity accepted, quantity rejected etc are included

47. The system allow entry of drugs procured locally and maintain complete inventory of list of items/articles

48. Reports & Analysis

49. Generate inventory reports as per requirement of user

50. Store wise periodic analysis and demand projection

51. Inquiry & Reporting for Inventory Status (by item-code, type, etc.)

52. List of Indent with status

53. List of materials vendor-wise

54. List of vendors with unit cost of item

55. Location-wise, specialty-wise, disease-wise and month-wise consumption reporting

56. Comparative analysis of location-wise inventory

57. The system will have the ability to maintain detailed audit trails for the transactions carried out in the system for issuing the drugs including date & time and details of user conducting the transaction in the system

58. Inquiry & Reporting for Slow Moving and Obsolete Inventory

Process flow of inventory Department:

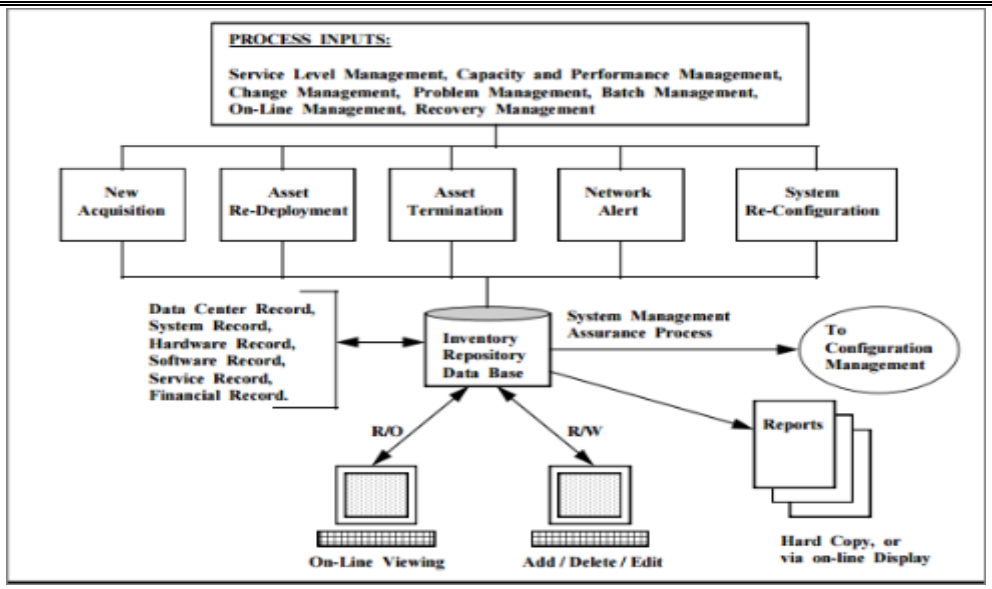


Figure-1.3 INVENTORY MANAGEMENT PROCESS FLOW OVERVIEW

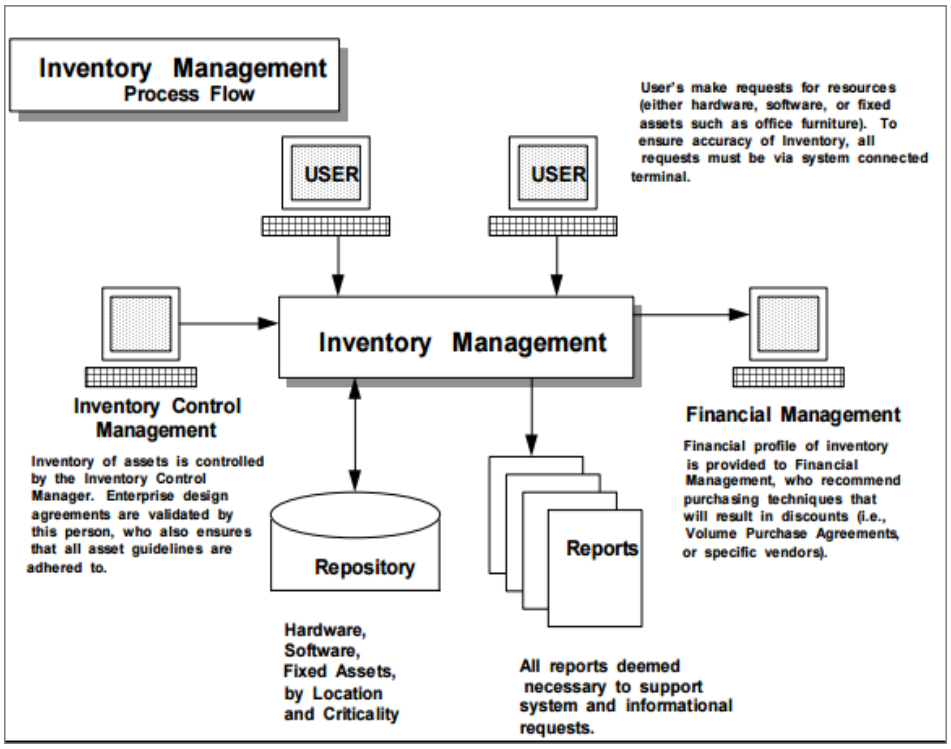


Figure-1.3.1 INVENTORY MANAGEMENT PROCESS FLOW

Implementation Management Program:

Implementation of IT in inventory is a complex process which must be divided into phases in order to avoid any confusion. It be phased such that small pilot sample come in priority, so that in case any contingency arise we can change the implementation plan without any hassle. The implementation process can be planned as:

- Requirement gathering
- Identify the super users and the end users
- Repo building with them by executing the communication plan with them
- Implement the software
- Training of the super users
- Training of the end users
- Execute change management plan side by side
- Go live
- Reporting on daily basis

Steps of implementation in details are as during the implementation:

1) **Requirement gathering:**

   A team of product specialists & implementation specialists go to the client site where software implementation is required. Here the work flow of the concerning department is observed and understand by the team. Now, the gaps in the work flow are marked by this team & it is sent to the back hand team for further analysis.

   A person is been appointed from the side of the institution, who will be responsible for all the support to be provided to the implementation team for the development of the product and its implementation. This person is also known as Single Point Of Contact (SPOC).

   The master data is collected with the help of this staff. Master data is the data which contains all the details that is needed to be kept in mind while designing the product. (It includes doctor's name, doctor's schedule, inventory details, VAT deductions, etc).

2) **Identification of the users:**

   Before the implementation of the software pointing out of the users is done. It includes:

   - Admin
   - Super users

- End users

Here training is even later on to each and every one on the basis of the role in the organization. Like admin had the right to view, edit and save the data. While super users and end users can only view and save data.

Mostly the hospitals are very large where s/w is implemented. It is not possible for the implementation team to train each and every staff one on one. So we choose the head of these departments and train them on the use of the s/w. They can further give training in the respective departments. They can consult to the implementation and the support team whenever there are any doubts while using the tool.

3) **Repo building:**

Implementation team go to the institute and ask all sorts of question to the end users and the hospital staff in order to understand the challenges they faces in daily activities at work as well as in the personal dimension. This will help them to understand them and will develop a personal and human bonding, which will help them during implementation and change management.

4) **Training of the super users and end users:**

It is not possible for the implementation team to train each and every staff member one on one in a big institute. So, they mark super users from the various departments of the institute, who will be trained by the implementation team and in return they will be training all the peers and staff of the institute. However implementation team will be there for the support services on case of any doubts and difficulties.

5) **Change management side by side:**

Along with the implementation of the software there are various steps carried out to bring the change management. Change is never easily accepted by anyone so while implementation the team try to find out the factors responsible for the hindrance in the implementation of the project (Any personal problem leading to the defiance, defiance due to fear of losing his/her stature in the organization).

To adapt to the new technology instead of traditional paper work might be difficult for the staff, hence implementation team let both the s/w system as well as the manual work running side by side to see if the s/w is running properly and the staff is adapting the system without any pressure.

6) **Go live:**

Lastly comes the day for going live. On this day the client institute starts working with the product as a whole. After this the team is there for daily reporting and for the support of the client for the next few months depending on the size of the project.

7) **Daily reporting:**

In the last stage of implementation comes the support work which is there for the next few months. During this period the team keeps on reporting the back hand team about how is the product working (no. of daily registrations, no. of admissions, etc).

This would help the vendor to evaluate the success of the product and thus will increase the credibility of the organization in the market. Plus it will also help the vendor to do the analysis and thus built the confidence in the client about the product and to state how the software had helped the hospital in increasing the efficiency, optimization of the resources and bringing the transparency in between the client and the consumers.

Training Requirements Introducing any change needs to consider the impact that change will have – both within and outside the Hospitals. It is therefore necessary to formulate a change management strategy that encompasses the requirements of the end user and the workforce. Change management start with the planning stage and continue with life of the project. It is essential to understand that change management is not a onetime activity. It is a continuous activity propagating to complete life of the project and touching all the stakeholders involved in the project. This section focuses on the change management and capacity building approach and plan so as to be able to tackle the issues that might arise due to new processes within the new HIS system. Training for HIS solution will allow multiple stakeholders to participate in the day to day management of the solutions and ensure sustainable programs to cover basic system awareness programs in addition to HIS specific programs in order to ensure adoption of the system at each level.

Need for Change Management Introducing radical reforms has to be necessarily accompanied by efforts to energize and orient the mindsets of the people – both within and outside the Hospitals. For instance, the Hospital staff be skilled to operate and work in a significantly newer and different way. A well calculated and well-designed strategy has to be followed for the people to be trained to work effectively in the new environment. It is necessary to formulate a change management plan with appropriate interventions for capacity building, training and stakeholder communications.

A successful Change Management Program will ensure:

1. A smooth transition to the new way of working

2. The organization/people support the changes implemented

3. Individuals know how the changes affect them and the role they have to play

4. Stakeholders to understand the benefits of the changes and internalize it

5. The new system and its underlying concepts are understood

6. People are aware of how roles and responsibilities are changing

7. Everyone is motivated and committed to the change program

8. The success and progress of the program is monitored and measured

Change Management Plan (As per the implementation of HIS in Hospital):

Key Change Management

Implications With the implementation of a new HIS Solution, will have several change implications emanating from the following changes:

1. Process and procedural (necessary introduction of some new process and systems emanating from the need of changing core functional information flow in a few cases)

2. Technical and technological (introduction of new technologies for enabling the new / unaddressed business requirements)

3. Organizational (transformation of existing organizational structure and redefined roles and responsibilities)

Change Management Plan It will be critical to assess those issues that will have the highest impact on the change management plan and manage them through appropriate interventions. Some of the interventions proposed are listed below:

1. Help to make staff realize the benefits of the new system

2. Identification and preparation of change agents (change champions) to deal with change at local level

3. Rationalized and planned work schedule and workload

4. Highlight the ease of working in the new system with better technology and simpler processes Responsibilities of Change Management Teams

The key responsibilities of Change Management Teams which includes both the IA and would be as follows:

1. Assessing and building staff capability to implement change quickly and effectively

2. Preparing key officers and their direct reports to meet the challenges and opportunities they will encounter as they implement new processes

3. Implement and monitor training plans

4. Helping to increase individual skills, and knowledge.

5. Developing and implementing change communication plans

6. Facilitation to concerned staff for transition to new roles

7. Work towards minimizing employee resistance to re-engineered processes and new organizational setup

8. Key Steps for Change Implementation Intervention at various levels is needed to mitigate staff resistance to change and facilitate an environment which encourages staff to pro-actively volunteer within the new system.

SCREEN SHOTS OF SOFTWARE USED FOR INVENTORY MANAGEMENT USING HIS :

Figure 1.4 SCREENSHOT OF CENTRAL PURCHASE ORDER

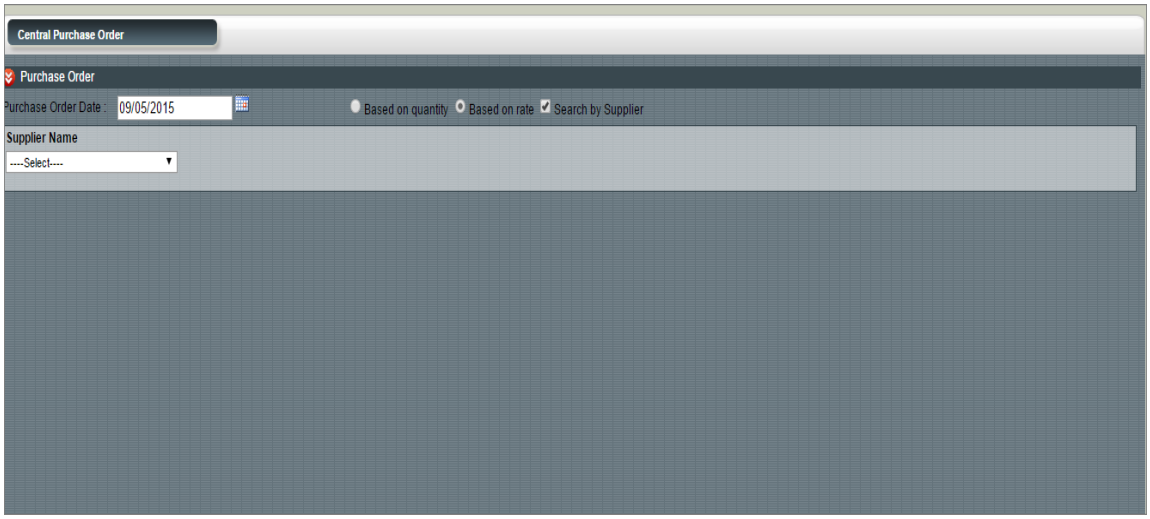


Figure1.5 SCREENSHOT OF STOCK DAMAGE

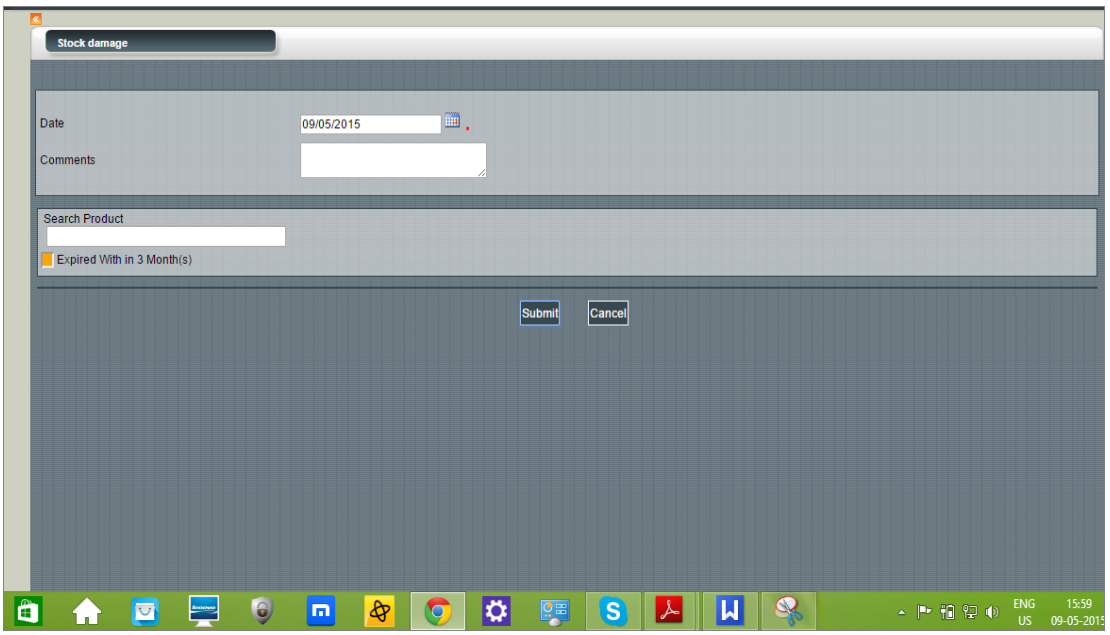


Figure-1.6 SCREENSHOT OF PRODUCT UPDATE

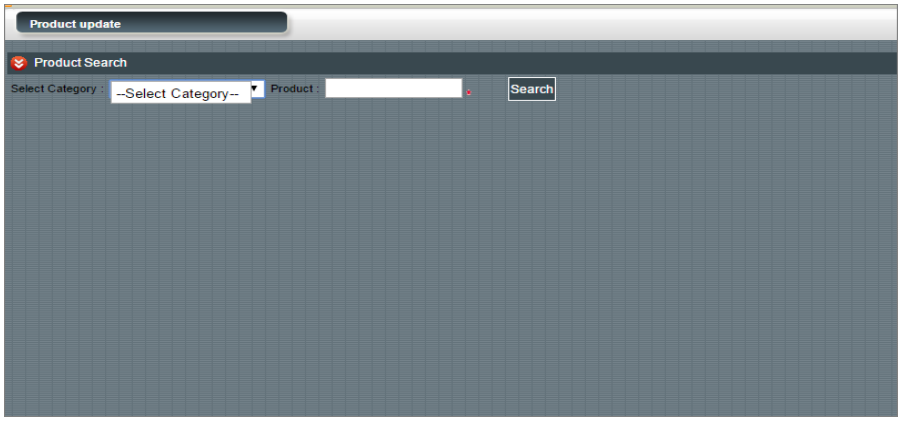


Figure-1.7 SCREENSHOT OF REORDER LEVEL REPORT

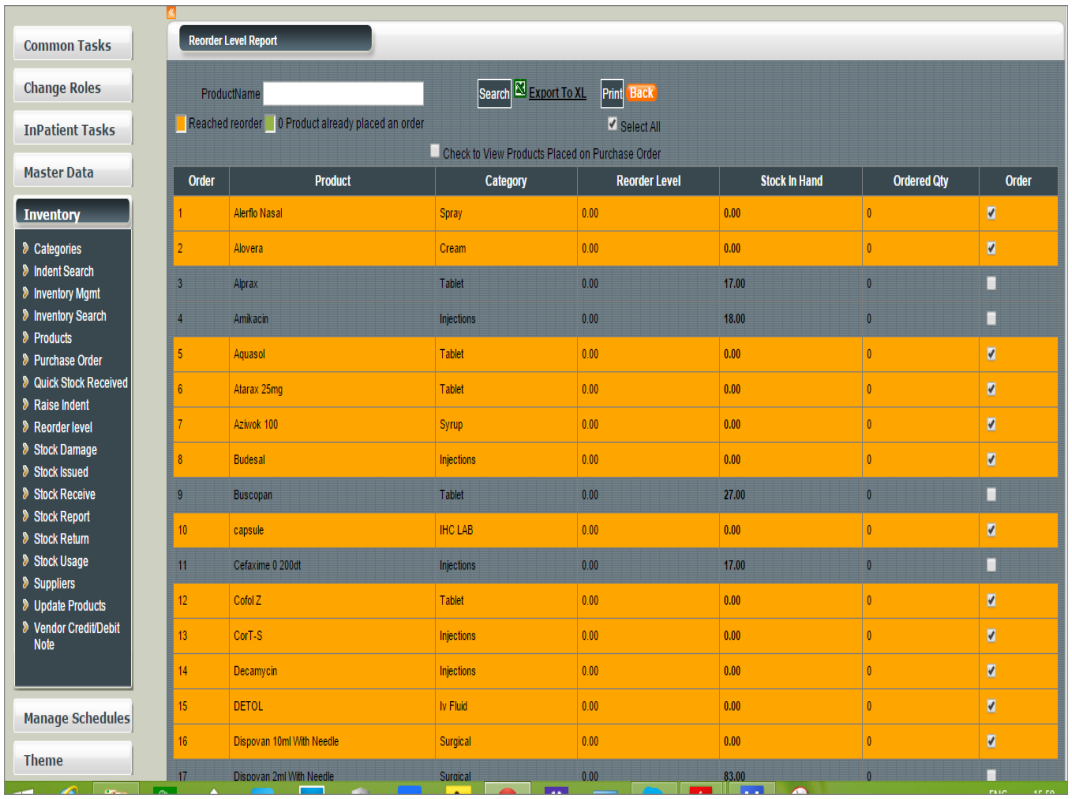


Figure-1.8 SCREENSHOT OF STOCK REPORT

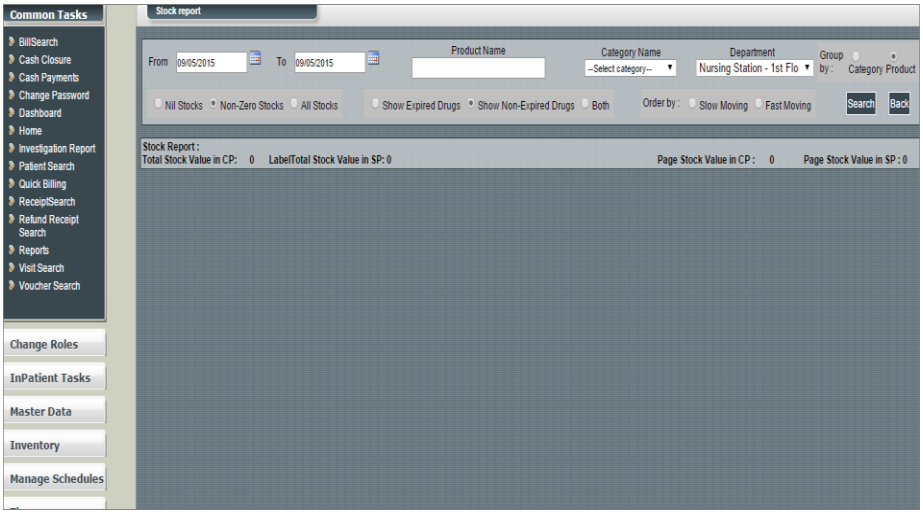


Figure-1.9 SCREENSHOT OF INVENTORY SEARCH

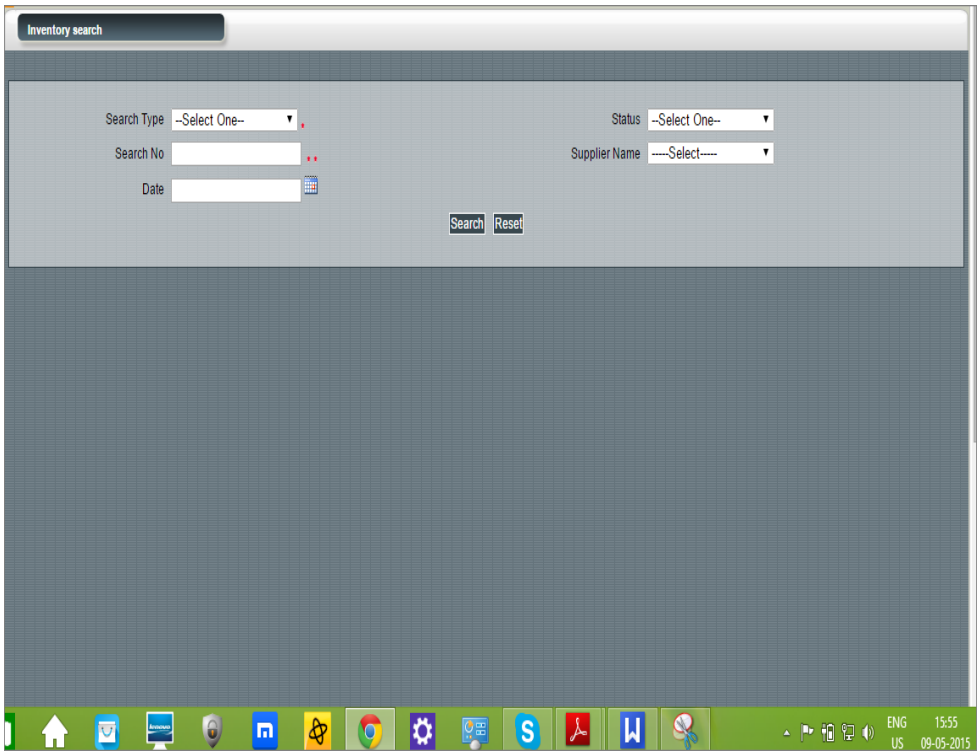


Figure-1.10 SCREENSHOT OF SUPPLIERS MASTER

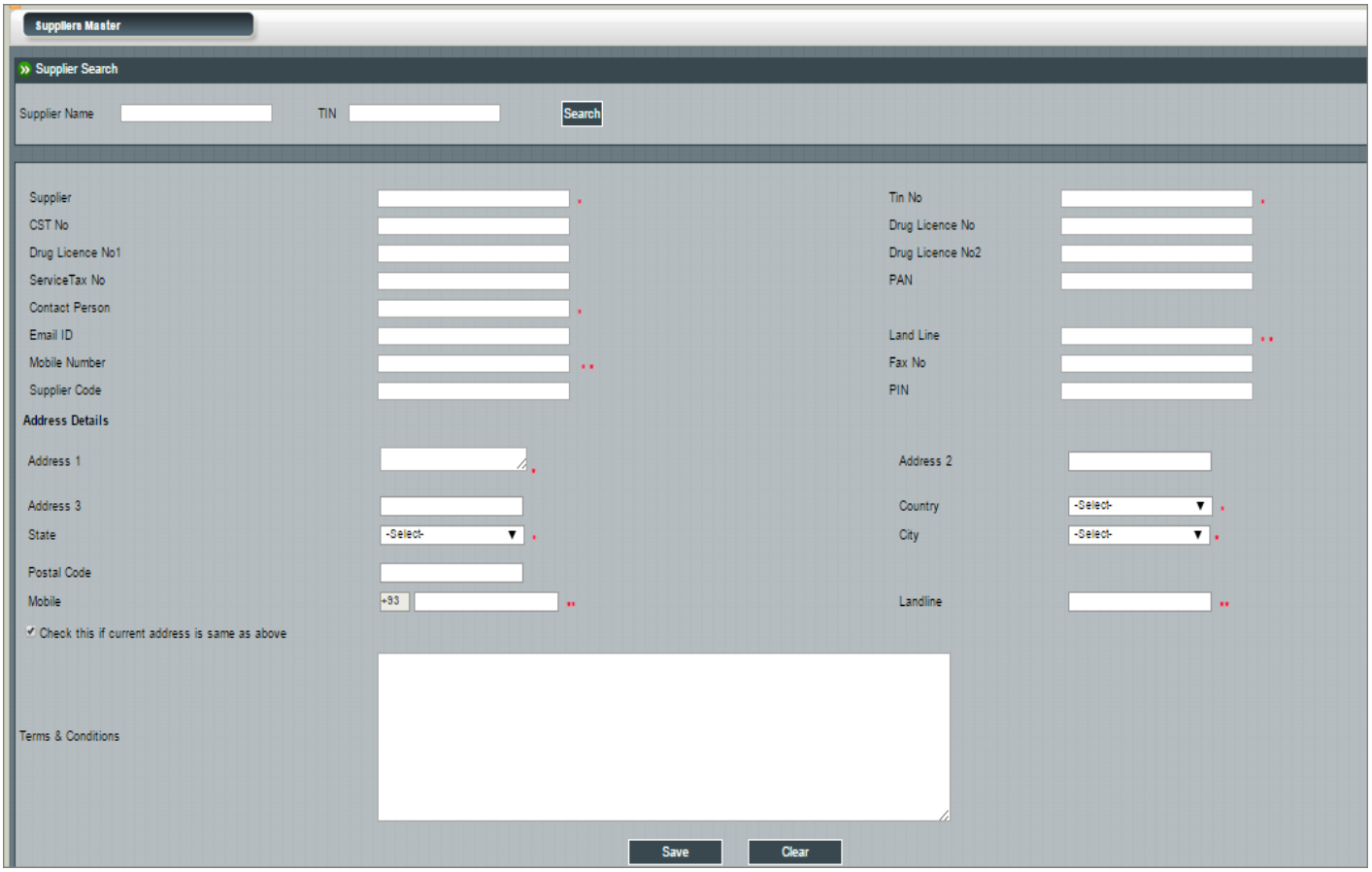


Figure-1.11 SCREENSHOT OF STOCK RETURN PAYMENT

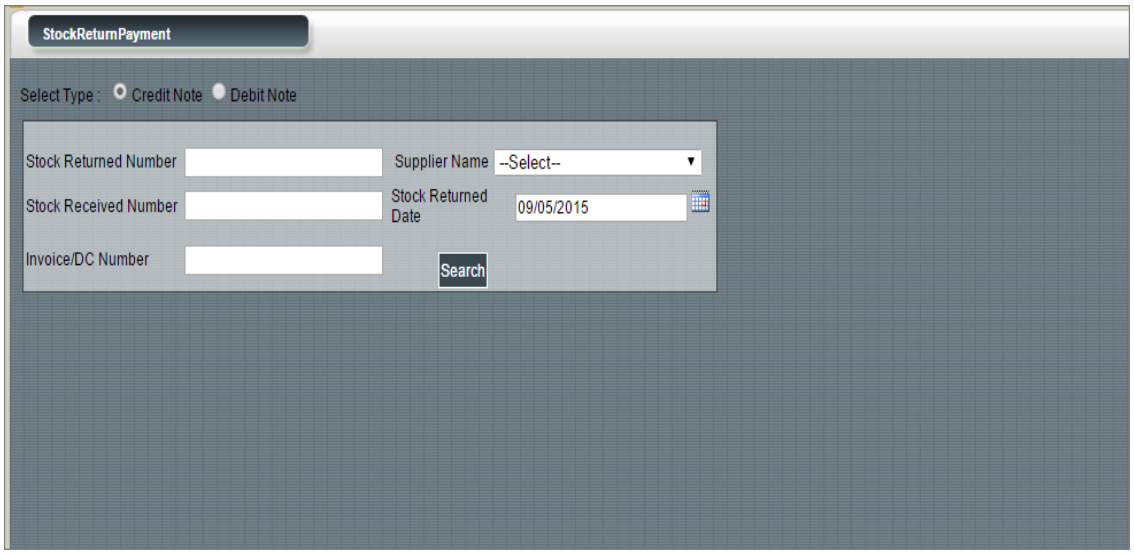


Figure-1.12 SCREENSHOT OF PRODUCTS IN INVENTORY

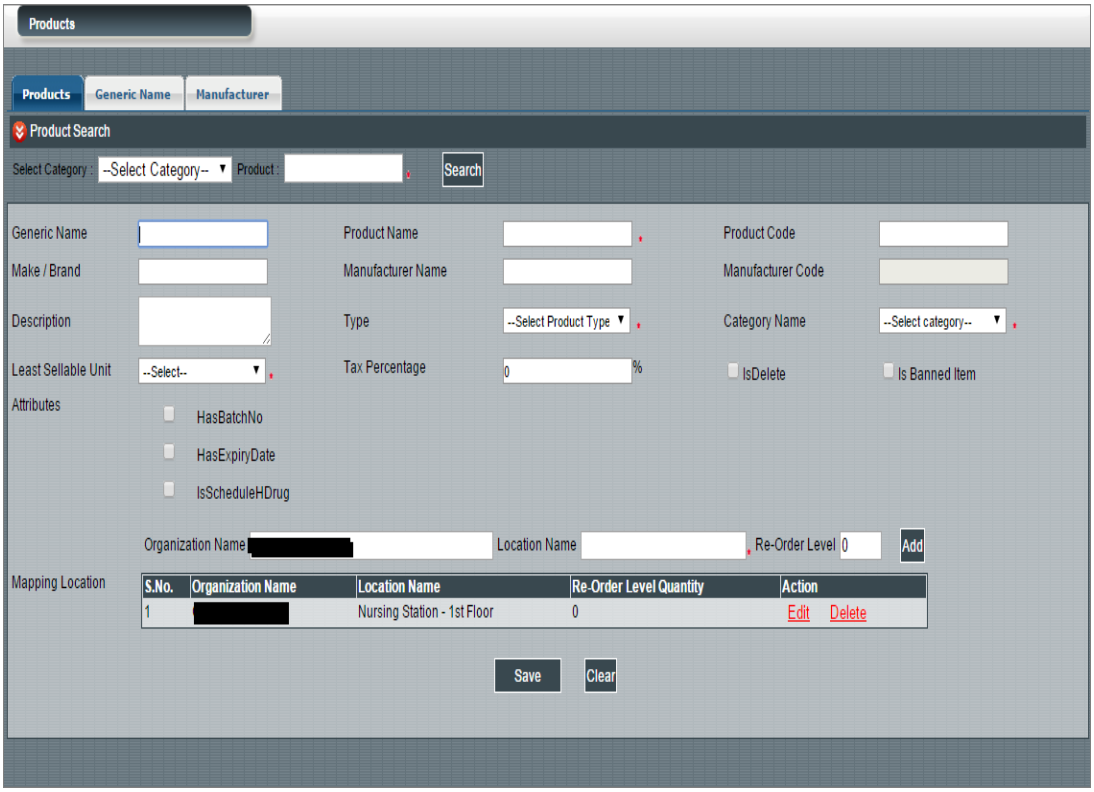


Figure-1.13 SCREENSHOT OF INTEND DETAIL VIEW

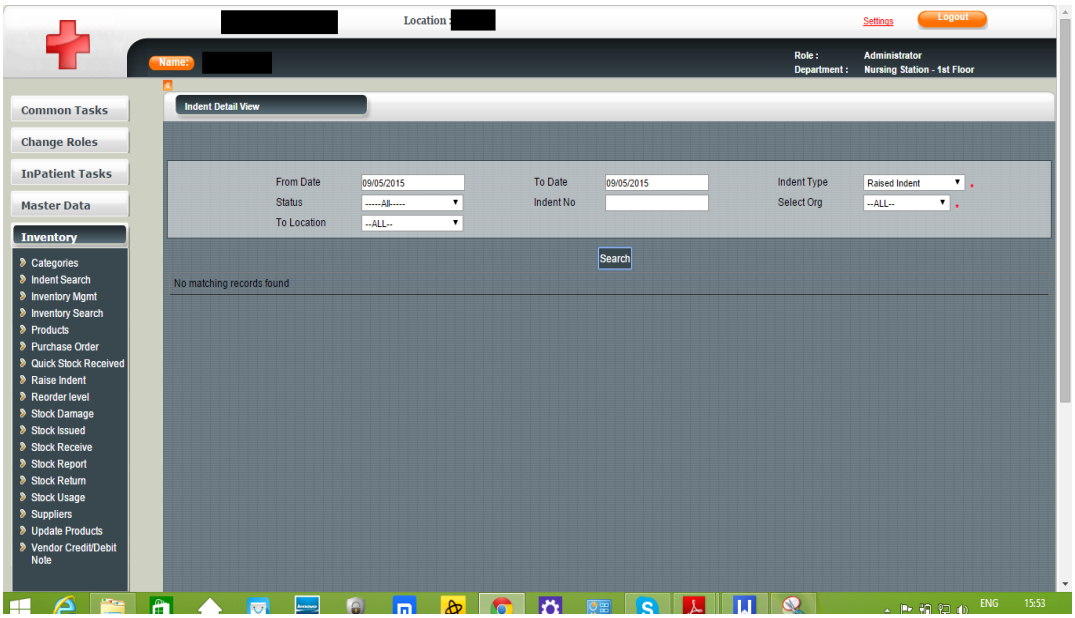


Figure-1.14 SCREENSHOT OF RAISE INTEND

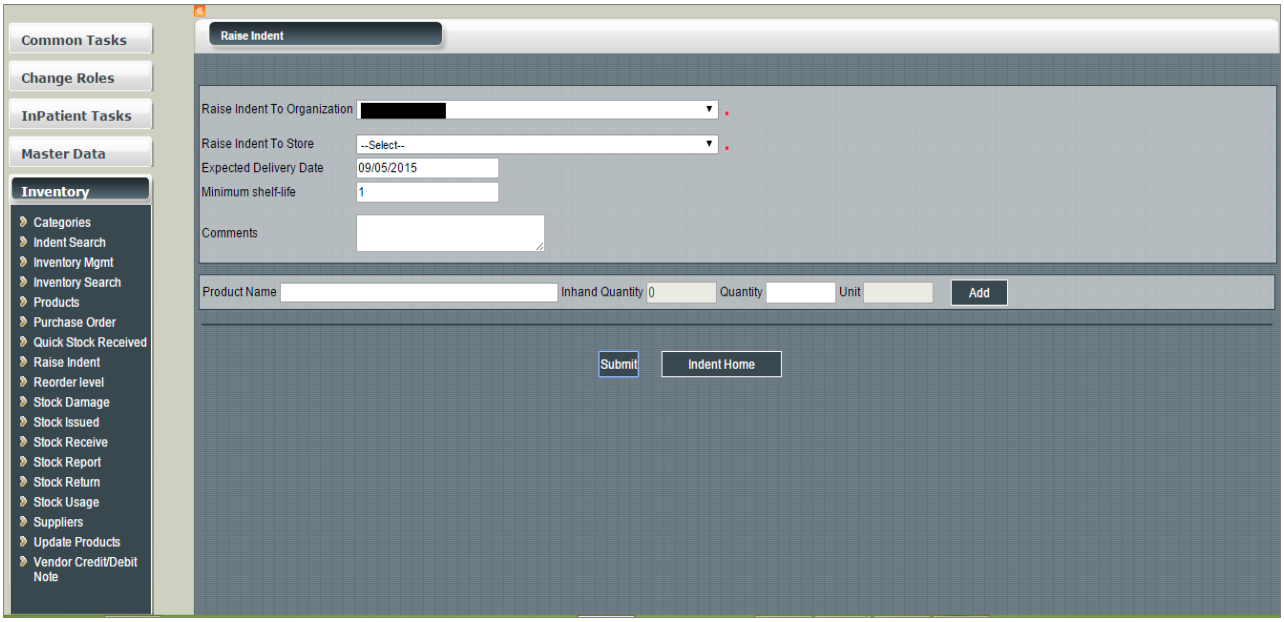


Figure-1.15 SCREENSHOT OF PRODUCTS

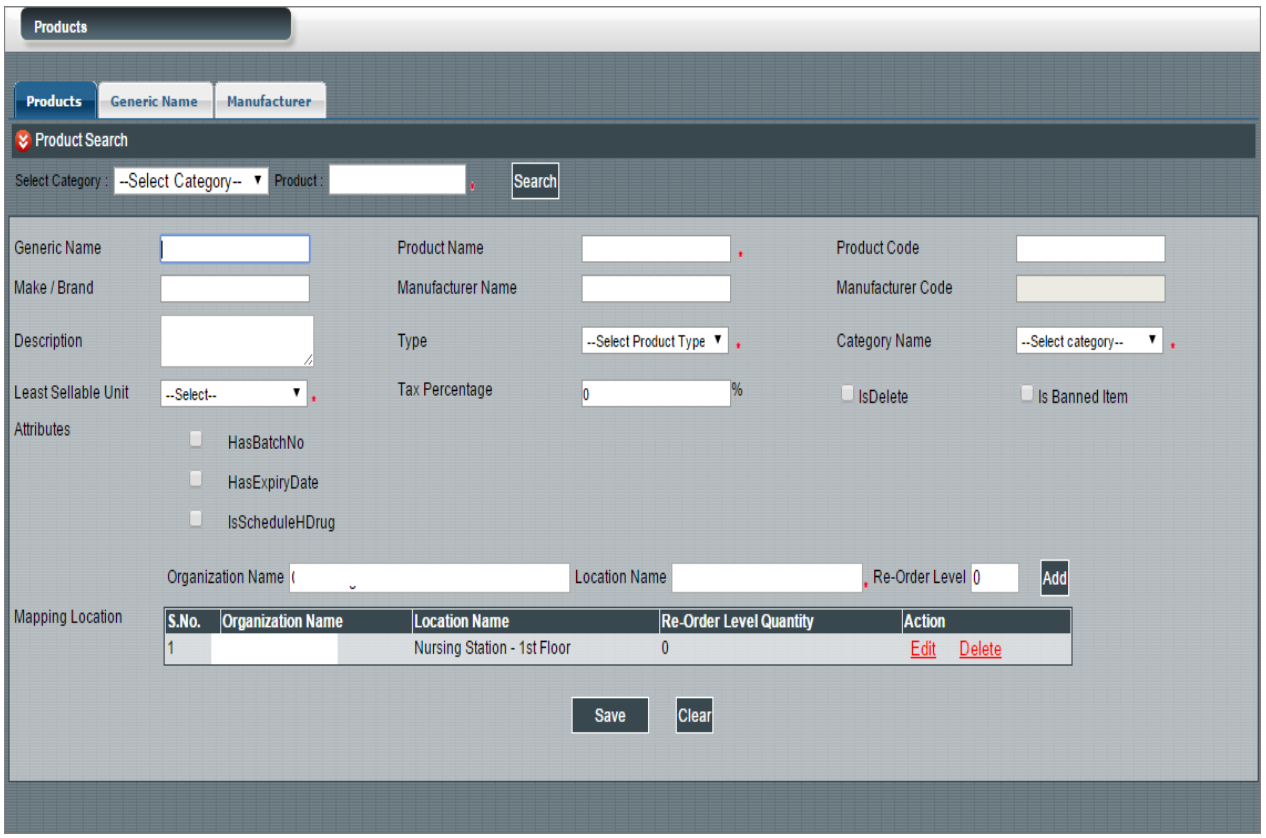


Figure-1.16 SCREENSHOT OF STOCK RETURN PAYMENT

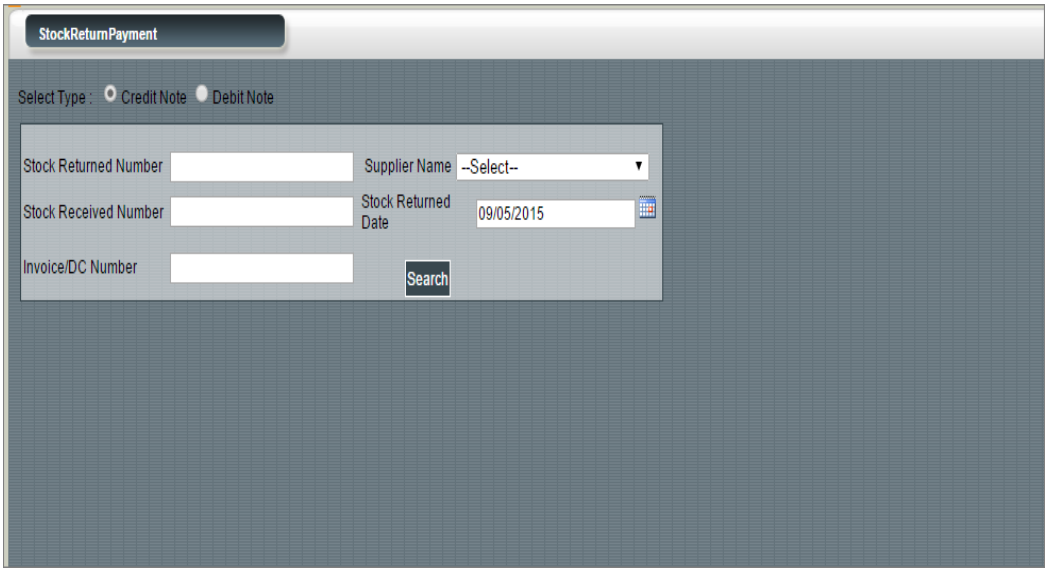


Figure-1.17 SCREENSHOT OF PRODUCT CATEGORIES

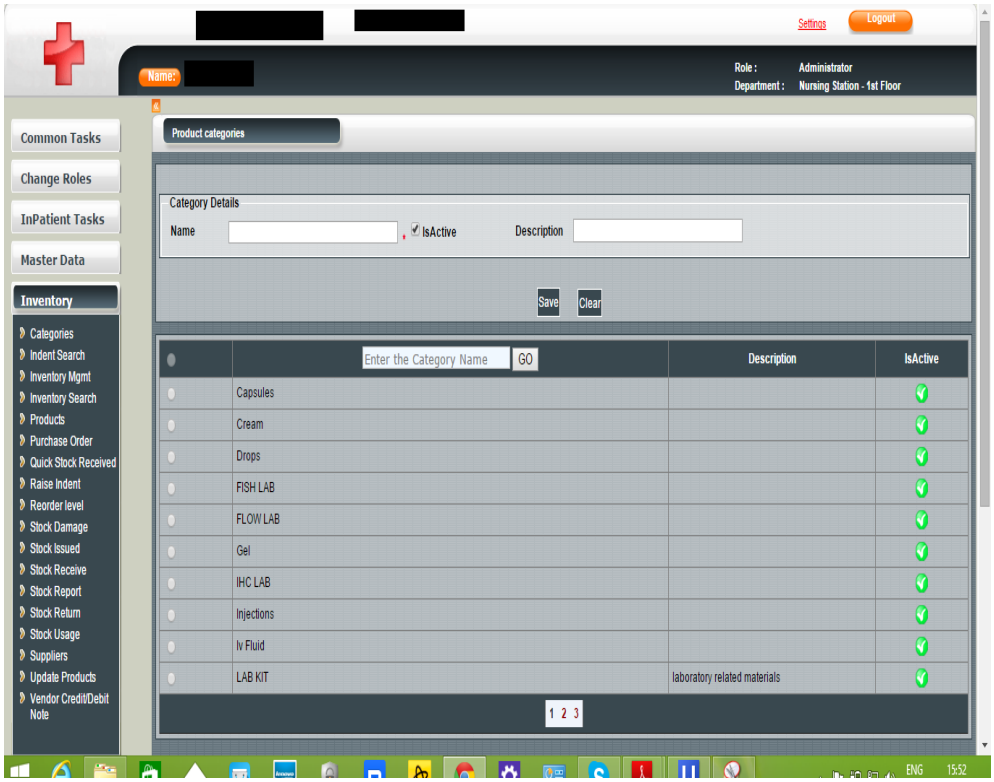
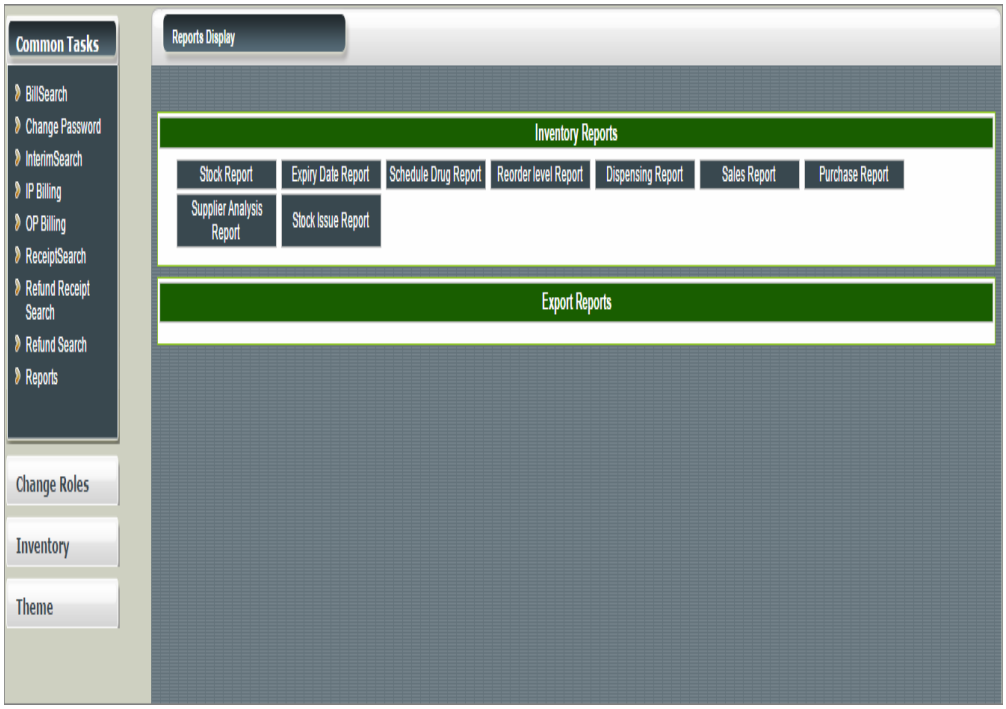


Figure-1.18 SCREENSHOT OF REPORTS DISPLAY



Discussion on the basis of feed back :

Total of 10 users from the inventory department which were offered training were chosen.after studying the feedbacks form following are the observations on the basis of training provided and software implementation post responses for acceptance of it:

	More difficult	**Difficult**	**No change**	**Easier**	**Significantly easier**	**Dont' know**
To enter daily notes has become			10%	10%	70%	10%
To review the records has become				10%	90%	
To collect information for stock reports has become				20%	70%	10%

About your satisfaction with the HIS in your department	**Never/ Almost never**	**Seldom**	**Most of the time**	**Always**
precise information		**10%**	**60%**	**30%**
sufficient information		**20%**	**70%**	**10%**
accuracy of the system		**20%**	**60%**	**20%**
information clear		**30%**	**50%**	**20%**
system user-friendly			**90%**	**10%**
up-to-date information			**20%**	**80%**

Assessment of the HIS in your department	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**
HIS is worth the time and effort required to use it			**40%**	**60%**

Satisfaction level with training	**Poor**	**Fair**	**Good**	**Excellent**
		10%	**70%**	**20%**

Limitations:

- Name of the sources of data can't be disclosed due to clause of confidentiality.
- This study is limited to a limited geographic location.
- Dependence mainly on the secondary data because on clause of confidentiality.
- Time to conduct the study is very less for the analysis of the outcome results.

Recommendations:

- Implementation of HIS in hospital is not merely computerization and automation of the existing paper trail but a practice to improve the efficiency and effectiveness of the hospital. This fact be well delivered and conceived by the users.
- Responsibility comes with accountability and hence the client side be held equally accountable for any kind of changes and additions that has to be made to software.

Lessons Learned:

- Acceptance level towards IT and change in work culture from end users and administration.
- Transcription of data from paper to digital is a tedious job.
- If the organization is using an IT system before hand then the product must be developed such that it is compatible with the old one.
- Old school work culture affect the implementation process adversely.
- Phase wise implementation process is more practical and feasible.
- Managing client feedback is the key of successful implementation
- Up-to-date information about data processing resources through the creation and archiving of records in a centralized repository.
- Financial records specific to a single component, or groups of components.
- Service records for all components in the inventory.
- Data used to support configuration diagrams of the hardware and software components contained within specific locations, or the entire data processing environment.

Conclusion:

- In conclusion, there are a lot of critical components that are needed for a successful implementation of a perpetual inventory management system in the inventory area.
- On the basis of feedback.following observations are obtained:

1. It was observed that 70% of the users replied good for Satisfaction level with training.
2. When asked about there satisfaction with the HIS in inventory department: 60% agreed to it and 40 % were neutral about it.
3. Reviewing the records has became significantly easier for the users as per 90% responses according to the feed back.
4. According to the feedback on satisfaction with the HIS in inventory department the responses were on positive note.

- According to analysis of feed back obtained, Some of these include supportive upper management as well as an engaged and dedicated project team. In addition, the team needs to have an analytic-al and practical approach to solving all the unknown problems that will arise. If these basic components are present, successful implementation can be achieved.
- Implementation is just not only limited to the training and monitoring but it also involve human factor and the understanding the problems of the end users. It would not only help the implementation to be successful but also allow the cooperation by the users to adapt the change in the work culture plus maintain the change even after the implementation team will leave the premises of the institution

Evaluation of Hospital Information System - Questionnaire

Post-Implementation feedback

In this questionnaire, we would like to know about your use of and perception of the HIS in your hospital.

A. **About your position**

Have you been working for more than three months in this hospital?

Yes ☐ No ☐

B. About the Performance of HIS in the hospital

Compared to previous routines, how has the HIS in your opinion changed the performance of the following tasks?

	More difficult	**Difficult**	**No change**	**Easier**	**Significantly easier**	**Dont' know**
To enter daily notes has become						
To review the records has become						
To collect information for stock reports has become						

About your satisfaction with the HIS in your department

	Never/ Almost never	**Seldom**	**Most of the time**	**Always**
How often does the system provide the precise information you need?				
How often does the system provide sufficient information?				
How often are you satisfied with the				

accuracy of the system?				
How often is the information clear?				
How often is the system user-friendly?				
How often does the system provide up-to-date information?				

Assessment of the HIS in your department

	Strongly disagree	**Disagree**	**Neutral**	**Agree**
How much do you agree with the following statement: HIS is worth the time and effort required to use it				

	Poor	**Fair**	**Good**	**Excellent**
Were you satisfied with the training				
All considered, how would you rate your satisfaction with HIS in your department?				

Comments

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6. Technical and Human Challenges of Implementing Hospital Information Systems in Saudi Arabia, Mohamed KHALIFA, a Consultant, Medical & Clinical Informatics, King Faisal Specialist Hospital and Research Centre, Jeddah, Saudi Arabia, February 2014.