**RESEARCH PAPER**

**A RESEARCH STUDY: HOSPITAL MANAGEMENT INFORMATION SYSTEM (HMIS) ERP IMPLEMENTATION IN TERTIARY CARE HOSPITAL**

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*Abstract:*  The origins of ERP systems can be traced back to the 1970s. Software companies used ERP systems during this period, with SAP releasing the R/3 version in 1992. Over the past decade, the ERP software market has grown significantly, with service providers offering comprehensive applications that cover a wide range of business functions and processes. This paper tried to research the detailed Hospital Management Information System ERP implementation process. The Research study was conducted by adopting allied modular approach for the Implementation of HMIS ERP in tertiary care hospital. We conclude this study as follows:

"The HMIS ERP system integrates all essential functions and tasks in a tertiary care hospital, including finance, clinical operations, procurement and inventory, and human resources. It facilitates data collection, processing, and communication at high speeds, enabling the hospital administration to make quick decisions on real-time issues. This system allows for the efficient and accurate completion of day-to-day hospital activities."

***Keywords*: Tertiary Care Hospital (TCH), ERP Implementation, Hospital Management Information System (HMIS)**

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1. **INTRODUCTION**

The ERP archive dates back to the 1970s, when the concept of integrating business processes was first initiated [1]. The term "ERP" was coined by the Gartner Group and saw its first implementation at the start of the 1990s [2,3]. Software firms such as SAP began deploying ERP systems in the early 1990s [3], with SAP delivering the R/3 version in 1992. The SAP R/3 system was equipped with client-server hardware architecture, allowing it to operate across multiple stages simultaneously.

In the year 2000, major ERP software providers successfully addressed the Y2K problem. Over the past decade, the ERP software market has expanded significantly, with service providers offering comprehensive applications that cover a wide range of business functions. In the next 10 years, business patterns are expected to evolve due to changes in ERP pricing structures, application methods, and adjustments to vertical markets. Many data are now stored using cloud application models, with SaaS (Software as a Service) gaining significant attention from companies. The ERP pricing model of payment based on usage has been largely adopted by businesses, replacing huge capital costs with month-to-month subscriptions [4].

**II. OBJECTIVES**

• To study the ERP implementation process in tertiary care hospital.

• To study the effects and benefits in ERP application

**III. ERP IMPLEMENTATION – OVER REVIEW**

The implementation (project) phase of an ERP system lifecycle begins after the system and the implementing partner have been chosen and ends after the system "go-live" [5]. This phase involves all activities necessary to make the selected system operational within an organization. Although the implementation phase is the most researched topic in the ERP system lifecycle, analysis of ERP-related papers indicates a lack of clarity on what occurs during the realization phase of the project.

Some authors reduce the realization process to the installation of the software [6,7,8]. Another group distinguishes between the installation of the so-called "vanilla" system and system customization, during which the system is modified to fit the organizational processes [9,10,11,12]. Chan and Rosemann [13] and Wang et al. [14] state that the implementation process mainly consists of system configuration blended with organizational change. Hislop [15] differentiates between configuration and customization as two ways of adjusting the system to the specificity of the adopting organization, where configuration involves setting up the system parameters, and customization involves changing the existing code. In this study, the approach presented by Hislop [16] was applied, as it reflects the reality experienced by the author in more than twenty implementation projects. To adjust the system to the specificity of an adopting organization, one can choose between (or combine):

**CONFIGURATION:** Setting the system parameters to determine how the system operates by choosing from the existing options.

**CUSTOMIZATION:** Changing the existing code of the system to alter its operation or developing new code to extend or change the functionality of the system.

The implementation of an ERP system using only configuration meets the definition of a "vanilla" implementation. However, a "vanilla" implementation should not be considered a simple system installation, as the largest ERP systems include thousands of configuration tables [17,18,19] offering a "myriad of business processes to choose from" [20]. Therefore, planning and executing the configuration of a large system requires significant time and effort.

The aim of our research study was to analyze the implementation of a major ERP system, to determine what activities were performed during the project. The remainder of this paper presents the results of the research study conducted in a tertiary hospital.

**IV. RESEARCH METHODOLOGY**

**HMIS ERP IMPLEMENTATION IN TERTIARY CARE HOSPITAL.**

In our research study we select module base approach for ERP Implementation in Tertiary Care Hospital.

**HMIS Overview**

Hospital Management Information System(HIMS) is an integrated ERP, which automates and integrates the processes of all activities, which go on in a hospital relating to patient care and administration. It takes care of the complete patient-hospital relationship starting from a patient’s entry into the hospital to his departure wherein doing so it logs all clinical & administrative information, that can then help, control and improve the quality of service. It is an Enterprise Resource Planning (ERP) solution that maximizes patient care while minimizing resource expense.

Hospital Management Information System(HIMS) is a fully integrate system, covering the clinical, administrative and financial aspects of a hospital. The system integrates all procedures, from patient registration to patient billing and financial reporting, from procurement of material to disbursement of inventory, from organizational roles to administrative responsibilities.

The Hospital Management Information System(HMIS) is modularly designed and respective modules perform specialized tasks, which enable doctors, pharmacists, administrators, and suppliers to collaborate as when and where they need to do so.

The Application is designed to keep you connected with all your resources may they be human, material or informational at all times. It helps you work and grow, while delivering quality service in the challenging healthcare environment today. Based on the best industry practices adopted around the globe; it provides:

1. Powerful data warehousing functions that easily process strategic planning and operation management.
2. Multidimensional analysis on the captured clinical data.
3. Integrated linkage between stores, wards, and other departments.

**Features**

1. Reduces the overall budget/cost.
2. Reduces pressure/ workload on doctors.
3. Provide operational eases to hospital administration.
4. Enable users to manage large organization structure.

**HMIS integrated solution – Advantages in Summary**

1. Reduction of fake patients due to finger printing and electronic registration
2. Reduction of workload for preparing the administrative reports
3. Effective medicine management
4. Quick availability of patient history to only authorized users.
5. Right information at the right time to the right person
6. Simple and practical to use
7. Cost effective solution
8. Powerful and customizable application
9. Rapid Implementation
10. Seamless business intelligence and analytical reports
11. Advanced technology and latest image/ data processing techniques
12. Executing Information System for quick decision making
13. Interfaces with existing software and programs
14. Audit trail of every action and every user
15. Encourage discipline in departmental coordination
16. Provide mechanism for check and audit
17. **Project Scope**

The project involves implementation of a comprehensive integrated Hospital Management Information System that will enable the Hospital officials to login and conduct the routine business in more efficient and effective manner. The system should also provide one click facility to designated login/supervisor to conduct real-time business and access the database for latest information. The executive management would be presented with a special interface, where they can track, monitor and manage hospital wide work disciplines.

1. **Implementation Plan**

**Overview**

A rapid implementation methodology to complete the project within timeframe. Using our methodology would save huge amount of time which few bottom-up implementation companies would take. Using this methodology, an initial gap analysis shall be carried that would be refined through a number of drafts.

**Phases**

1. **Project Initialization Planning**

During this phase initial planning and preparation for the deployment of the proposed system shall be done. Since this particular project has its own unique objectives, scope, and priorities, the steps in the planning phase help identify and plan the primary focus areas to be considered. This phase consists of the following activities in a nut shell:

* Issuance of Project Charter
* Project Kick-off
* Baseline scope
* Project deliverables
* Infrastructure development
* Network component acquisition
* Resource induction
* Project Team Training

1. **Requirements Gathering / Analysis**

During this phase Applicationdomain expert and their teams would gather system requirements from Hospital’s various businesses departments/ locations. After gathering the initials requirements from the users, a report shall be prepared that would ***analyse the Gap*** in between the existing and the system to be implemented. At the end of this phase the following documents will be produced:

* Gap analysis
* Software specification requirements

1. **System Implementation [Incremental Builds, Validation and Approval]**

During this phase, the implementation of the software will start. The teams working on the modules will initially implement/ customize the version of the software for the user testing and validation. The users will give their feedback on the version one of the software and the team will build a new version of the software, based on the previous one. Each implementation will result in a more user friendly build of software, which will also be satisfying the exact user requirements.

1. **Deployment and Training**

After the final approval of the software in Phase 3, HMIS Implementation teams will conduct formal training sessions of the users, who will be using the software. Along with the training sessions the final version of the software will be deployed at the user premises. The users will be provided with the user manuals both in electronic and paper formats.

1. **Cut Over & Transition**

After completion of deployment and training of staff, the Implementation team ensure transition of manual processes of departments.

1. **HMIS ERP IMPLEMENTATION STAGES**
2. **Business Process Re-engineering [BPR]**

We follow one of the best practices in the world of Business process mapping and re-engineering called Four-Step Business Process Mapping. Knowing about key business processes is a must. The benefits of identifying key business processes are:

* Process improvements bring direct value to your organization
* Activities that support these processes add value; those that do not can be identified as wasteful.
* Understanding your key processes is necessary to know where to apply technology leverage to best effect.

1. **BPR Methodology**
2. **Process Identification**

Many companies think they know their processes - manufacturing, sales, accounting, building services. But it is just this mentality that causes processes to lose their customer-centric approach. Instead of defining processes based on the company's understanding, they must be defined by the customer's understanding. Walking through customer experiences helps the reviewer identify those trigger points that can make or break success. These then form the basis for process identification.

1. **Information Gathering**

Once the processes are identified, the second step begins. There is a large volume of information that should be obtained before trying to learn the intricacies of a process. Additional information that should be obtained includes the objectives of the process, risks to the process, key controls over those risks, and measures of success for the process.

1. **Interviewing and Mapping**

In this step, our junior and Senior Analysts gather detailed information regarding your processes with the help of direct face-to-face correspondence (interviews etc.) as well as documents/artefact concerned with processes keeping in mind that all information is only about the existing system so that the information can be handled in process modelling and improvement phase.

Only after all this is done is actual "Process Mapping" completed. This involves sitting with each employee and having him or her describe what it is they do. This information is recorded using a sticky-note method. Each step in the process is recorded on a sticky note and built in front of the individual completing the work. This allows them to interactively ensure the final map matches their understanding of their work.

1. **Analysis**

While Analysis is considered the fourth step, analysis must really occur throughout the review. While defining the processes, the reviewer may determine that objectives are not in line with the processes in place. In gathering information, it may become apparent that measures of success do not correspond to department objectives. These are just some of the examples of ongoing analysis.

However, there are some specific examples of analysis that can be completed once maps are done. These include identifying unnecessary approvals, isolating rework, removing duplicate forms, eliminating useless hold files, and investigating decision requirements that lead to no discernible result. In and of them, no single incident is necessarily wrong. But each must be analyzed in the context of the map to ensure it supports the objectives.

1. **Four Step Approach at a Glance**

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| --- | --- |
| **Process Identification** | Attaining a full understanding of all the steps of process |
| **Information Gathering** | Identifying objectives, risks and key controls in a process |
| **Interviewing and Mapping** | Understanding the point of individuals in the process and designing actual maps |
| **Analysis** | Utilizing tools and approaches to make the process run more effectively and efficiently |

1. **Deployment**
2. Setting up of service and support infrastructure
3. Conducting Training need analysis
4. Training procedures Definition
5. Distribution of training plans
6. Execution of Training
7. Configuration of Application
8. Module wise On job training
9. Go-Live
10. Monitoring and Fine tuning
11. User Acceptance Testing
12. Handover

# **Deployment Details**

The following phases included in the deployment of HMIS.

1. **Phase-I Lab Training**

The first step of deployment of HMIS is Lab training. The purpose of Lab training is to familiar users with computer & application. It is conducted in a separate room with limited computers i.e 8 to 10 and Implementation trainers give training to users in different schedules which was finalized with the help of administration and HODs of the Hospital

1. **Phase-II On Job Training**

After completing lab training on job training start. In this phase doctors and paramedical staff start their work on HMIS but manual work also in progress.

1. **Phase-IV Transition (Cut Over)**

After completion of on Job training transition of every department start. Manual works totally close in this phase and every department of the hospital work on HMIS.

1. **Phase-III Go-Live**

The Implementation team lives all the departments gradually. In this phase every Implementation rep of HMIS team and MIS department give individually help to the doctors and paramedical staff.

1. **Phase-V Monitoring and Hand Over**

* System Support to all Departments.
* Evaluation and Performance Assessment of HMIS.
* Cut off of the manual work.
* Handing over of system to local MIS Department.
* After transition stage every department of the Hospital start work on HMIS. In this phase The Implementation team monitor and support all the departments.

1. **RESULTS**

**Effects**

Quantitative and Qualitative Impact on Hospital business performance.

Create work efficiency during the Arrival and Discharge of patients.

Create an atmosphere of professional competency.

Helped create transparency across all the departments along with Quality Checks.

**Benefits**

* Improved patient care
* Lower cost per patient along with higher quality of management practices.
* Better organizational planning, management & control.
* Readily available reports.
* Helps in eying on ‘Malfunction’
* Change in professional staff's attitude
* Strengthened supply-chain process.
* Advanced Organizational Planning Processes.
* Crystal Clear Billing mechanism.
* Complete tracking of Inventory Items.
* Automatic payment and debiting system.
* Real time functions for patient management including coordination
* Record keeping of appointments and related patient services.
* The exact outcome of an integrated HMIS can give both short term and long term quantifiable benefits. In short term positive change, the paramedic staff gets more patient specific information data, quick access to information, elimination of old/ manual system, duplication of human resource etc. While in the long term it is presumed that the trickledown effect of this software would take 2-3 years as such even if the software achieves 10% improvement in reducing operational costs, it converts into millions of Dollars and more over creates better image of the hospital services.
* Historical data generated over a period of time in Hospital, Data such as pharmacy, increased patient satisfaction, quick processing, cross-function real-time data access etc.

**CONCLUSION**

The research in this paper explored different activities performed for the Implementation of HMIS in tertiary care hospital. HMIS enjoys established track record of successful delivery of turnkey implementations major tertiary hospital. HMIS has a demonstrated capability with fully integrated software systems that is a best fit for any tertiary Hospital. HMIS software product had been developed in conformity with established international standards like, HL7 and ICD (International Code of Diseases v 10), and DICO

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