Journal of Informatics Education and Research
ISSN: 1526-4726
Vol 4 Issue 3 (2024)

Challenges in the Implementation of Technology in effective Hospital Management System: A quantitative study

Dr. Susan Abraham
Professor, SCMS School of Technology and Management, Muttom, Aluva-683106, Kerala
susanabraham@scmsgroup.org

Mohan.S
Faculty of management, SRM Institute of Science and Technology, kattankulathur, Chennai 603203, Tamilnadu, India

Ms. Shelly Verma,
Assistant Professor, Sri Guru Gobind Singh College of Commerce, University of Delhi.

Subhadip Chowdhury,
Assistant Professor, Hospital Management, DSMS College of Tourism and Management

Abstract

To provide excellent care to patients and to maintain seamless functioning of healthcare facilities it is crucial to have effective hospital management system. Hospital management system presently is incorporating analytical approach to optimize work flow, for enhancement of resource utilization, and for providing comprehensive insurance assistance to patients. The technologies are highly crucial for workflow optimization, allocation of resources, scheduling of patients, and management of finances. There are various challenges faced by hospital management system like integration of data from diversified sources like billing system, administrative database, EHRs, and data accuracy and consistency. Safeguarding of data security is highly important that need strong security and adhering to rules and regulation as per the "Health Insurance Portability and Accountability Act." The importance of Information Technology is reducing rising costs of healthcare and improving quality of services. There is a need to address such challenges and identify the best way of technology implementation. A sample of 249 was collected from different departments in Hospital. The factors that identify the Challenges in the Implementation of Technology in effective Hospital Management System are High Initial Costs, Resistance to Change, Training and Skill Development, and Regulatory and Compliance Challenges.

Keywords: Information Technology, Technical Challenges, Hospital Information Systems, Automated Hospital Management System, Data Analytics

Introduction

A Hospital Management System is envisioned to help hospitals in handling information about all areas of healthcare like healthcare providers, patient's records, completion of tasks promptly and more efficiently. Proper resource utilization, data and information security is the best sign that technology implementation is effective. Effective implementation of technology in hospital management system can be improved by utilization of information technology applications. Role of information technology would be an effective way that would enable decision-making, reduced costs, reduction in usage of paper, and proper utilization of resources. It would also play a significant role in management of hospital practices for making it more effective (Singh & Chauhan, 2016). Many substantial hindrances have been highlighted by another study that prevent the successful implementation and adoption of "Healthcare Information System" in many developing nations. Obstacle like lack of education, availability of limited network, issue of power supply, insufficient funding, resistance of users was found to be frequent challenges and reasons for low adoption rate of "Healthcare Information System". It is essential to recognize that acknowledging these obstacles is a complicated, and long-term endeavour and its persistence is often worse due to limited research (Rahman & Islam, 2024). By analysing technical challenges, it is confirmed that hardware and software of computer required maintenance and upgradation as they get old and slow, but participants in study disagreed about the difficulty accessing of information. One of the top challenges is the slowness of system along with the recurring maintenance problem of hardware and software. With regards to human challenges, lack of experienced

healthcare professionals, and health informatic specialists (Khalifa, 2014). The security of collected data needs to be mandated by Healthcare Organizations to enhance security and privacy. However, in today's world where cyber security is often violated, it is very difficult to have strong security system to defend from bypass activities. One of the greatest challenges in artificial challenge is adoption of technology by staff, healthcare organization and patients in everyday clinical practices. Technology must be approved by regulators, considered by medical experts for recollected of data and diagnosis, trusted to get integrated by "Electronic Health Records" of the hospital, and to be funded by payers of the health organization for modifications and to updated (Gharote, Jatakia, & Nagare, 2022). One of the critical elements to enhance the patient care quality is efficient management of healthcare facilities which is highly recognized and is important for optimized operational workflow. Many challenges like rising volume of patients, resource constraints, and requirement of improved service delivery in healthcare system, there is a need of integration of advanced technological tools and data driven approaches a important solutions (Shukla et.al., 2024). To address the growing challenges faced by healthcare sector is to have smart healthcare strategies. However, applying smart healthcare strategies have not been anticipated successfully, the reason behind it is various challenges faced by distinct stakeholders during the adoption of such strategies. It is noted that acceptance of smart healthcare strategies is a complicated process, which is not only a technological challenge but also impact organizations and individual end users. The findings shows that different "technology-organisation-environment" impact adoption of smart healthcare strategies by hospital management system. Identified challenges enable policy makers and leaders of healthcare system to understand and evaluate potential challenges more accurately before adopting smart healthcare strategies to ensure practical interventions are put in place for addressing all such challenges and to improve the chance of successful adoption of smart healthcare strategies (Renukappa et.al., 2022).

Literature Review

Gjelleaek et. al., (2020) revealed that managers of healthcare face many complicated challenges in adoption as well as development of new technology technological products and services. Knowledge and understanding of issues related to work, different ways of providing services and perceived problems and challenges among frontline workers must be communicated to top management for them to provide nuanced range of categories to make sense and alternate actions required for decision-making. Different level managers and workers involved would need to produce knowledge about uncertain situations, desirable future and their contradictions as common ground and challenges.

Arora & Ikbal (2021) stated that inadequate hardware quantity, slow network and system, improper training of staff, lacking operators for data entry, mismatching of records are some of the common challenges in the adoption of technology in hospital management. Majority of the departments face challenges of complications, inconsistency, and poor integration of the system. Though, many efforts are being taken by the management system to maximize the efficacy of the technology and other systems.

Turan & Palvia (2014) found that increasing costs of healthcare and service quality has raised the importance of information technology and is being recognized by the management. There are some significant challenges that remain and it is necessary to understand how to implement the technology in the system by overcoming such challenges. Some common challenges are incompatibility of infrastructure, insufficient capacity of industry, lacking security, and low standards, all these challenges are big obstacles in the path of adoption of technology in hospital management system.

Alves et.al., (2024) revealed that integration of technology in hospital management face many risks and challenges like lacking transparency or excessive dependency. Challenges also include slow acceptance of technological tools, mistrust, over valuation, and the requirement of severe consideration to avoid right violation or compromising on quality of services that are being provided to patients. The management of the hospital are facing many other challenges like complications in decision-making, variability of information, large volume of data, timing imposition, intensity of intervention, limited interoperability, integration of low data, difference in digital competencies among staff members and professionals.

Pakulska & Religioni (2023) highlighted that functioning of medical facilities in hospital management system is one of the major challenge these days. The duty of management is to ensure the effectiveness of functioning in medical system and in economic terms as well. Looking at the dominant goals of the functioning of medical system, attention towards the validation of costs, profitability and its pursuit have become a real challenge. Barriers in implementation are major part of new technology, irrespective of its type like medical, provisions related to health services, innovations related to technology. An obstacle can be defined as an element that might make a negative impact on the process of technology implementation.

Almotawkel, Shaddad & Qureshi (2021) stated that finding of constraints and challenges that need to be dealt with during the process of technology implementation of EHS information system and must be considered before technology

implementation for ensuring its successful implementation. Though, an effective role is played by information technology in the domain medical services, the evaluation of medical information technology does suffer from many issues and challenges that indicate that many issues and challenges are still faced by medical informatics. The difficulty to mediate and lacking technical consent are some of the complicated challenges of EHIS as it impacts the implementation process and also pose serious technical issues. High cost and constant financial support are needed for implementation of "Environmental Health Information System (EHIS)" for provision of hardware and software. It also needs maintenance, training, and constant development of human resources that would require high costs.

Ali, Jerald & Kassim (2020) revealed that arrival of "Hospital Information Systems" has helped in quick communication among employees and immediate spreading of information about patients. However, hospitals are facing challenges of improper practice of keeping of data, inaccurate reports, and wastage of time in processing of data, storing, and recovery of data, etc. Numerous challenges hinder the effective acceptance of technology in hospital management system. In the past decade, adoption of digital health system has been inhibited by insufficient knowledge of available technical tools, fear if disruption in the workflow that might cause clinicians' resistance, uncertain return on investment, difficult process of approvals for high-capital investments, differences in technology preferences between management, administrators and clinicians.

Inampudi et.al., (2024) claimed that healthcare system of a country can be revolutionized by digital transformation of the hospital management system. However, the effective sustainability of digital health depends on many different factors that impact its effective implementation. Addressing those challenges in the implementation is vital to design and deliver digital health services. The obstacles that are identified in the study are lack of internet network and IT infrastructure, high cost of installation and operation of technology, lack of experts and medical records, lack of physical evaluations, inaccurate data, and misdiagnosis, confidentiality and data privacy, barriers of communication and language, legal, ethical and accountability concerns. The most significant challenge in the adoption of digital health transformation is security of data and its confidentiality.

Gadhari, Kadam & Suman (2016) found that major challenge faced by hospital management system is inefficacy of operations and management of practices and waiting time between different process, people and departments. There is a need to work hard to deal with these challenges for customer satisfaction and for better profit margins. Hospital management would be able to bring improvement in operational cost control and also streamline the work process. It would improve the response time of the patient's demand by automating the collection, collating and retrieving process of patient's information.

Objective

To identify "Challenges in the Implementation of Technology in effective Hospital Management System"

Study's Methodology

249 respondents are considered for this study which was collected from different departments in Hospital. Random sampling method was used to collect data and examined by "Explanatory Factor Analysis" for results.

Findings of the Study

Below table shows demographic details of participants it shows that male participants are 51.41%, and female participants are 48.59%. Looking at the age of the participants, 33.33% were between 25 to 30 years of age, 27.71% were between 30 to 35, and 38.96% were above 35 years of age. With regards to Departments, 28.51% are from Finance department, 36.55 are from Pharmacy department, and 34.94% are from Administration department.

Details of Participants

Variable	Participants	% age
Gender of Participants		
Male	128	51.41%

Female	121	48.59%
Total	**249**	**100**
Age in years		
25 to 30	83	33.33%
30 to 35	69	27.71%
Above 35	97	38.96%
Total	**249**	**100**
Departments		
Finance department	71	28.51%
Pharmacy department	91	36.55%
Administration department	87	34.94%
Total	**249**	**100**

"Factor Analysis"

"KMO and Bartlett's Test"

"Kaiser-Meyer-Olkin Measure of Sampling Adequacy"		.777
"Bartlett's Test of Sphericity"	"Approx. Chi-Square"	4222.278
	df	91
	Significance	.000

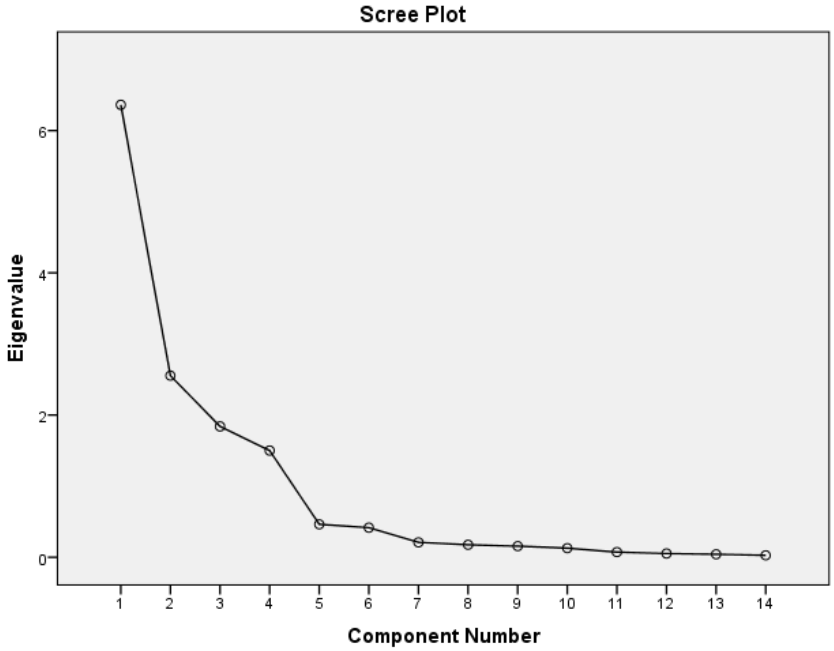
"KMO and Bartlett's Test", value of KMO is .777

"Total Variance Explained"

"Component"	**"Initial Eigenvalues"**			**"Rotation Sums of Squared Loadings"**		
	"Total"	**"% Of Variance"**	**"Cumulative %"**	**"Total"**	**"% Of Variance"**	**"Cumulative %"**
1.	6.362	45.446	45.446	**3.740**	26.716	26.716
2.	2.554	18.245	63.691	**3.666**	26.185	52.901
3.	1.840	13.143	76.834	**2.558**	18.270	71.172
4.	1.501	10.718	87.552	**2.293**	16.381	**87.552**
5.	.463	3.310	90.862			
6.	.416	2.973	93.834			
7.	.210	1.500	95.334			

8.	.175	1.253	96.587			
9.	.156	1.115	97.701			
10.	.128	.915	98.616			
11.	.072	.516	99.132			
12.	.052	.373	99.506			
13.	.042	.301	99.807			
14.	.027	.193	100.000			

All the four factors are making contribution in explaining total 87.552% of variance. The variance explained by High Initial Costs is 26.716%, Resistance to Change is 26.185%, Training and Skill Development is 18.270%, and Regulatory and Compliance Challenges is 16.381%.



Scree Plot

"Rotated Component Matrix"

S. No.	Statements	Factor Loading	Factor Reliability
	High Initial Costs		**.953**
1.	Advanced HMS require investment in hardware, software, and infrastructure	.943	
2.	Financial burden can be challenging for small or underfunded healthcare facilities	.893	

3.	Personalizing the technology to meet the specific needs of a hospital adds to the expense	.856	
4.	Installation of technological tools demand high investment cost	.848	
	Resistance to Change		**.963**
1.	Hospital staff may resist new technologies due to fear of increased workload or lack of familiarity	.956	
2.	Resistance can stem from inadequate training or doubt about the system's benefits	.909	
3.	Transitioning from traditional methods to digital systems might be challenging due to unfamiliarity or complication	.897	
4.	Organizations with firm hierarchical structures might find it harder to adapt to innovative solutions	.887	
	Training and Skill Development		**.890**
1.	Staff need comprehensive training to use the digital system effectively	.921	
2.	High turnover rates can necessitate training programs, adding to costs and infrastructure challenges	.866	
3.	It takes time for staff to become proficient in new systems, potentially affecting initial productivity	.828	
	Regulatory and Compliance Challenges		**.833**
1.	The healthcare industry is heavily regulated, requiring system to meet stringent standards	.934	
2.	Keeping the system updated with changing regulations is a continuous effort	.929	
3.	Errors in automated systems lead to legal actions, emphasizing the need for accuracy and oversight	.638	

Factors and the associated variables

The first factor of the study is High Initial Costs, the variables it includes are Advanced HMS require investment in hardware, software, and infrastructure, financial burden can be challenging for small or underfunded healthcare facilities, Personalizing the technology to meet the specific needs of a hospital adds to the expense, and Installation of technological tools demand high investment cost. Resistance to Change is the second factor, it includes variables like Hospital staff may resist new technologies due to fear of increased workload or lack of familiarity, Resistance can stem from inadequate training or doubt about the system's benefits, transitioning from traditional methods to digital systems might be challenging due to unfamiliarity or complication, and Organizations with firm hierarchical structures might find it harder to adapt to innovative solutions. Third factor is Training and Skill Development, the variables that falls under this factor are Staff need

comprehensive training to use the digital system effectively, High turnover rates can necessitate training programs, adding to costs and infrastructure challenges, it takes time for staff to become proficient in new systems, potentially affecting initial productivity. Last and fourth factor is Regulatory and Compliance Challenges, the variables it includes are the healthcare industry is heavily regulated, requiring system to meet stringent standards, Keeping the system updated with changing regulations is a continuous effort, and Errors in automated systems lead to legal actions, emphasizing the need for accuracy and oversight.

"Reliability Statistics"

"Cronbach's Alpha"	"Number of Items"
.897	14

Total reliability of 14 items that includes variables for Challenges in the Implementation of Technology in effective Hospital Management System is 0.897

Conclusion

Different challenges related to the technology implementation in an effective Hospital Management System are explored in this study. The findings of the study revealed that there are numerous critical barriers like lacking technical knowledge and training, inadequate financial resources, resistance to changes among doctors, nurses, and staff members, concerns related to data security, and inadequate infrastructure. All such challenges are collectively hindering the acceptance and proper utilization of technology in hospital management, which is impacting the overall efficacy as well as quality of healthcare services and practices. Despite of all these challenges in the pathway of effective hospital management system, this study has highlighted the transformative possibilities of technologies in restructuring the administrative process, improving the patient care, enhancing data management, and for better allocation of resources. Addressing all such challenges by targeted interventions like investing in strong infrastructure, training of staff, security measures, and cultural innovation as all these practices would enhance the implementation of technology in the hospital management system. The factors that identify the Challenges in the Implementation of Technology in effective Hospital Management System are High Initial Costs, Resistance to Change, Training and Skill Development, and Regulatory and Compliance Challenges.

References

1. Singh, R., & Chauhan, A. (2016). Information Technology Role in Hospital Administration Practices, *International Journal of Management*, 7(4), 108-118.
2. Rahman, S., & Islam, A. (2024). Healthcare Information Systems (HIS): Implementation Challenges in Developing Countries, *Bangladesh Journal of Medical Science*, 23(2), 314-326.
3. Khalifa, M. (2014). Technical and Human Challenges of Implementing Hospital Information Systems in Saudi Arabia, *Journal of Health Informatics in Developing Countries,* 8(1), 12-25.
4. Gharote, Y., Jatakia, R., & Nagare, G. (2022). Evolution, Prospects, and Challenges in Hospital Management Information System: Case Studies, International Journal of Engineering Research & Technology, 11(11), 192-196.
5. Shukla, P., Jadhav, A., Mahure, S., Shete, D., & Chawan, P.M. (2024). Optimized Hospital Management System with Analytics: A Survey, *International Research Journal of Engineering and Technology*, 11(10), 827-831.
6. Renukappa, S., Mudiyi, P., Suresh, S., Abdalla, W., & Subbarao, C. (2022). Evaluation of challenges for adoption of smart healthcare strategies, *Smart Health*, 26, 1-14.
7. Gjellebæk, C., Svensson, A., Svensson, C., Fladeby, N., & Grunden, K. (2022). Management challenges for future digitalization of healthcare services, *Futures*, 124, 1-10.

8. Arora, L., & Iqbal, F. (2021). Experiences of implementing hospital management information system (HMIS) at a tertiary care hospital, India, *Vilakshan – XIMB Journal of Management*, 20(1), 59-81.

9. Turan, A.H., & Palvia, P.C. (2014). Critical Information Technology Issues in Turkish Healthcare, *Information & Management*, 51 (1) 57-68.

10. Alves, M., Seringa, J., Silvestre, T. & Magalhães, T. (2024). Use of Artificial Intelligence tools in supporting decision-making in hospital management, *BMC Health Services Research*, 24, https://doi.org/10.1186/s12913-024-11602-y, 1-13.

11. Pakulska, T., & Religioni, U. (2023). Implementation of technology in healthcare entities – barriers and success factors, *Journal of Medical Economics*, 26(1), 821-823.

12. Almotawkel, N.A.A., Shaddad, A.N., & Qureshi, E.A. (2021). The Effect of Information Systems on Healthcare Management and Diagnostic Services, *International Journal of Business and Management Invention*, 10(7), 1-7.

13. Ali, M., Jerald, T. & Kassim, M. (2020). A Web-Based Hospital Management System for Iganga District Hospital, Uganda, *International Journal of Advance Research and Innovative Ideas in Education,* 6(5), 865-875.

14. Inampudi, S., Rajkumar, E., Gopi, A., Mol, K.S.V. & Sruthi, K.S. (2024). Barriers to implementation of digital transformation in the Indian health sector: a systematic review, *Humanities and Social Sciences Communications*, 11, https://doi.org/10.1057/s41599-024-03081-7, 1-10.

15. Gadhari, D.H., Kadam, Y.P., & Suman, P. (2016). Hospital Management System, *International Journal for Research in Engineering Application & Management*, 1(11), 1-4.