



## IMPLEMENTATION AND EFFECTIVE UTILIZATION OF HOSPITAL MANAGEMENT INFORMATION SYSTEM (HMIS): A RESEARCH EVALUATION

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### ABSTRACT

Information systems are crucial for the production, sharing, storage, and transmission of information across various domains. In the healthcare sector, hospital management information system (HMIS) play a vital role in meeting the needs of physicians, administrators, and patients within institutional processes. These systems ensure that data are collected accurately, completely, and interdependently. HMIS began to be utilized in the 1960s and can be categorized into integrated and modular systems. Integrated systems are further divided into hospital general information systems, clinical information systems, management information systems, and database management systems. Another classification of HMIS includes resource utilization and programming, financial management, materials and facility management, and staff management systems. The primary goals of HMIS are to enhance patient satisfaction, strengthen internal communication networks, reduce costs, and securely store data in a digital format. The research study first covered type of hospital information system and in the second part of research HMIS system was evaluated by development of questionnaire.

**Keywords:** Hospital Management Information System (HMIS), Healthcare, Enterprise Resource Planning (ERP), Questionnaire, Integrated or Modular Systems

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## **I. INTRODUCTION**

Enterprise Resource Planning (ERP) is a system that enables the different aspects of a business to function synchronously as a single unit. The ERP system is managed using software tools to support the finance, accounting, project management, and human resource, to name a few, of any business enterprise (Costa et al., 2016). After its introduction in the mid-90s, the ERP system has become integral to ensuring standardized operations across organizations. (McAfee et al., 2009). The healthcare sector is vital socially and economically, contributing to a society's economic growth and development. As such, there is a need for constant monitoring and improvement of processes to ensure effectiveness and efficiency in attaining set objectives while providing maximum output and minimal waste. To achieve this, adopting a custom designed ERP system aligned with the institution's goal is essential. This requires the learning and development of new skill to ensure proper adaptation of the system to the operation of the institution (Kuruvilla et al., 2004). The relationship between ERP and hospital management information system (HMIS) is quite significant in the healthcare industry.

Hospitals are required to implement a hospital management information system (HMIS) and provide guidance and supervision to improve health services. All health services provide information to managers in the process of managing health services in the hospitals (Machmud R., 2018). Hospitals that have implemented HMIS require hardware and software to run HMIS in supporting the HMIS operations (Bux, R et al., 2019). Implementation of HMIS can operate optimally if there is integration between subsystems. Therefore, the system does not stand alone and data transactions become faster (Odelia E., 2018).

HMIS is a communication information technology system that processes and integrates the entire flow of hospital service processes in the form of a network of coordination, reporting and administrative procedures to obtain precise and accurate information, and is part of the health information system. HMIS has several benefits, including improving service quality, making decisions, and becoming a consistent control function (Salim M. F., 2018). The hospital management information system (HMIS) used in a hospital must provide convenience in operations and must be able to overcome patient service constraints (Setyawan D., 2016).

Hospital Management Information Systems (HMIS) is defined as "an information system especially designed to assist in the management and planning of health programs, as opposed to delivery of care" (WHO., 2004). HMIS, however, is a term used to describe a comprehensive, integrated information system designed to manage all aspects of a hospital's operation, including medical, administrative, financial, and legal issues and the corresponding processing of services (Balaraman P et al., 2013, Abdulla MN et al., 2017). The various information systems used in hospitals can be classified as integrated or modular systems. Integrated information systems are divided into hospital general information systems, clinical information systems, management information systems, and database management systems. In another classification, HMIS is seen to include resource utilization and programming, financial management, materials and facility management, and staff management systems. HMIS is intended to improve the quality of healthcare by improving patient satisfaction, strengthening internal communication networks, reducing hospital costs, and reliably storing data in a digital environment. Above all, HMIS assures that data collection is accurate, complete, independent, and hassle-free (Demirel D., 2017).

At every level, starting from designing to implementation, monitoring to quality assurance, various challenges and concerns arise that lead to a weak HMIS implementation. Some of these are weak planning and financing, misuse of resources, weak monitoring and supervision, poor skills development, poor quality data, and lack of leadership and commitment (Balaraman P et al., 2013, Berg M., 2001). The perceived potential benefits however regarding the use of HMIS for clinicians are easy and efficient viewing of records and data, effective documentation and care management, timely ordering of labs and services, messaging along the chain of command, accurate analysis and reporting system, patient-directed functionality and transparent billing (Miller RH., 2004). The HMIS is implemented as a form of electronic data exchange between healthcare workers, so as to ensure the availability of complete and efficient patient information with an indicator in the success of system development being user satisfaction (Sabdana, I., 2019). System user satisfaction is seen through response and feedback raised by the user after using the information system (Machmud, R., 2018). Completeness of patient information can help the patient service process improve and satisfactory. (Blaya, J et al., 2008)

## **II. RESEARCH METHODOLOGY**

A research study was conducted in all the departments of an 800-bedded hospital. It is an ISO 9001 - 2015 certified hospital. The various departments included in the study were Medicine, Dermatology, Gynecology and Obstetrics, Surgery, Urology, Otorhinolaryngology (ENT), Emergency Medicine, Radiology, Pediatric Medicine, Anesthesia, Ophthalmology, Operation Theater and Orthopedics. The total duration of the study was 06 months.

Research study was conducted using a self-administered structured analysis questionnaire, which was designed in English and Urdu as well. In the first part of research study different questionnaires were designed for different section of hospital for effective utilization and implementation of HMIS system. In the second part of research a software usability measurement assessment questionnaire comprised of fifty questions were designed to evaluate effectiveness of HMIS by end user data assessment.

### III. INSTRUCTIONS

- Please provide the information of the specific Hospital where HMIS is to be Implemented /Deployed.
- Preferably the Operational Management should fill the forms with care and correctness.
- Please use extra paper for additional information (if required).

### Part-I ANALYSIS QUESTIONNAIRE

#### IV. HOSPITAL GENERAL INFORMATION

Questionnaire designed for administration to collect correct information about hospital.

Description	Answer
<b>Name of Hospital</b>	
<b>Principal Address</b>	
<b>Phone</b>	
<b>Email</b>	
<b>Fax</b>	
<b>Contact Person</b>	
<b>Hospital Type</b>	Please Check: a. Public _____ b. Private _____ c. Government _____ d. Teaching _____ e. Non-Teaching _____ f. University _____ g. Others _____
<b>Total Support Staff (In numbers)</b>	
<b>Total Hospital Staff (In numbers)</b>	
<b>Total Beds (In numbers)</b>	
<b>Total Patient Turn out per day (In numbers)</b>	a. Patient Visit _____ b. Admissions _____ c. Lab Test _____ d. Radiology _____ e. OT _____ f. Others _____
<b>Area of Spread:</b>	
<b>Number of Total building Blocks?</b>	
<b>Are they Closely or sparsely related?</b>	
<b>Other Services provided by hospital?</b>	a. ECHO _____ b. ETT _____ c. ECG _____

	d. Dialysis _____ e. C.T Scan _____ f. Others _____
<b>Emergency OPD</b>	Yes No If Yes a. No Of Doctor _____ b. No Of Bed _____ c. No of Paramedical Staff _____

## V. ADMINISTRATIVE

Questionnaire to indicate all the Administrative departments of the hospital.

Administration	How Many	Locations	No of Staff	Qualifications of the Staff	Types of Staff
Reception					X
Finance (Accounts – section)	X	X			
Stores (Like of medicines, bed linen, furniture etc)					
Laundry					
Laboratory					
Radiology					

Others (specify, if any)

## VI. CLINICAL

Questionnaire for information of all the Clinical departments of the hospital.

Outpatient Department	No. of OPDs	No of Doctors	No of Paramedics	No. of wards	Wards sharing (if any)	No. of Beds
Surgery						
Medicine						
Gynecology/Obstetrics						
Ophthalmology						
ENT						
Urology						
Orthopedic						
Pediatrics						

Others (specify, if any)

Other Clinical Departments	No. of Doctors	No of Paramedics	No. of Rooms	No. of Patients/day
Emergency				
Operation Theatre				
Pharmacy				
Blood Bank				
Radiology				
Physiotherapy/ Rehabilitation				

Others (specify, if any)

## VII. INVENTORY SYSTEM INFORMATION

1	Name of Store	
2	How Many Sections	
3	Total Strength in Store	

## VIII. INVENTORY SYSTEM (PHARMACY)

1	Name of Pharmacy	
2	No of Windows (Male/Female/Senior Citizen)	
3	Local Purchase/Others	

## Part-II SOFTWARE SURVEY ASSESSMENT

### IX. SOFTWARE USABILITY MEASUREMENT INVENTORY EVALUATION FOR HMIS

The information you provide is kept completely confidential, and no information is stored on computer media that could identify you as a person.

This questionnaire has fifty statements. Please answer them all. After each statement there are three boxes.

- Write '1' in the first box if you generally AGREE with the statement.
- Write '1' in the middle box if you are UNDECIDED, or if the statement has no relevance to your software or to your situation.
- Write '1' in the right box if you generally DISAGREE with the statement.

In checking the left or right box you are not necessarily indicating strong agreement or disagreement but just your general feeling most of the time.

Sr. No	Question	Agree	Undecided	Disagree
1	This software responds too slowly to inputs. یہ software دی گئی input کا جواب دیر سے دیتا ہے۔			
2	I would recommend this software to my colleagues. میں اس software کے استعمال کا مشورہ دوں گا۔			
3	The instructions and prompts are helpful. ہدایات اور اضافی عبارات مفید ہیں۔			
4	The software stops unexpectedly sometimes. رک جاتا ہے۔ یہ software بعض اوقات بغیر کسی وجہ کے کام کرتے کرتے			
5	Learning to operate this software is full of problems initially. شروع میں software کے طریقہ استعمال کو سیکھنے میں بہت سی مشکلات آتی ہیں۔			
6	I sometimes don't know what to do next with this Software بعض اوقات مجھے software استعمال کے (دوران) معلوم نہیں ہوتا ہے کہ اگلا اقدام کیا ہو گا۔			
7	I enjoy my sessions with this software. میں اس software کے استعمال کے دوران لطف اندوز ہوتا ہوں۔			
8	The help information given by this software is not very useful دی گئی مددگار ہدایات بہت زیادہ قابل استعمال نہیں ہیں			
9	If this software stops, it is not easy to restart it. اگر یہ software کام کرتے کرتے رک جائے تو وہیں سے دوبارہ چلانا آسان نہیں ہے۔			
10	It takes too long to learn how to work with this software. اس software کا استعمال سیکھنے کے لیے کافی وقت درکار ہے۔			
11	I sometimes wonder if I'm using the right command. بعض اوقات مجھے درست command کا استعمال کرتے ہوئے حیرت ہوتی ہے۔			
12	Working with this software is satisfying. اس software کا استعمال تسلی بخش ہے۔			
13	The way that information is presented is clear and understandable. معلومات دکھانے کا طریقہ کار آسان اور سمجھ آنے والا ہے۔			
14	I feel safer if I use only a few familiar commands or operations.			

	کچھ سٹاسٹک command کا استعمال محفوظ لگتا ہے۔			
15	The software documentation is very informative.			
	اس software کی دستاویزات بہت معلوماتی ہیں۔			
16	This software seems to disrupt the way I normally like to arrange my work.			
	یہ software میرے کام کرنے کے طریقہ کار کو شاید بدل دے			
17	Working with this software is mentally stimulating.			
	اس software کے ساتھ کام کرنا دلچسپ ہے۔			
18	There is never enough information on the screen when it's needed.			
	جب بھی ضرورت پڑتی ہے تو سکرین پر مطلوبہ معلومات ناکافی ہوتی ہیں۔			
19	I feel in command of this software when I am using it			
	جب بھی میں اس پر پروگرام استعمال کرتا ہوں تو مجھے اس پر عبور محسوس ہوتا ہے۔			
20	I prefer to stick to the operations I know best.			
	میں اپنی آپریٹنگز کو ترجیح دیتا ہوں۔			
	میرے لیے عبور حاصل ہے۔			
21	I think this software is inconsistent.			
	میرے خیال میں یہ software بے جوڑ ہے۔			
22	I would not like to use this software every day.			
	مجھے اس software کا روزانہ استعمال ناپسند ہے۔			
23	I can understand and act on the information provided by this software			
	اس software میں دی گئی معلومات سمجھتا ہوں اور ان پر عمل بھی کر سکتا ہوں۔			
24	This software is awkward when I want to do something which is not standard.			
	جب بھی میں کوئی ایسا غیر معیاری کام کرنا چاہتا ہوں تو یہ مرتبہ غیر یہ software غیر تسلی بخش ہے۔			
25	There is too much to read before you can use the software			
	اس software کے استعمال سے پہلے بہت زیادہ مطالعہ کرنا پڑتا ہے۔			
26	Doing what you want to do with this software is straightforward.			
	اس software کا استعمال جیسا آپ کرنا چاہیں آسان ہے۔			

27	Using this software is frustrating.			
		اس software کا استعمال حوصلہ شکن ہے۔		
28	The software has helped me overcome any problems I have had in using it.			
		اس software کا استعمال کرتے ہوئے آکر کوئی مسئلہ آجائے تو یہ اس کو حل کرنے میں مدد دیتا ہے۔		
29	The speed of this software is fast enough.			
		اس software کے کام کی رفتار کافی تیز ہے۔		
30	I keep having to go back to look at the guides.			
		میں اس سے استعمال کے دوران رہنمائی حاصل کرتا رہتا ہوں		
31	It is obvious that user needs have been fully taken into consideration.			
		ظاہر ہے کہ اس کے بنانے میں استعمال کرنے والوں کی ضروریات کو ملحوظ خاطر رکھا گیا ہو گا		
32	There have been times in using this software when I have felt quite tense.			
		بعض اوقات میں اس software کا استعمال کرتے		
33	The organization of the menus and lists seems fairly logical.			
		menu اور فہرست کی تنظیم نظر آنے میں قطعی منطقی ہے۔		
34	You don't have to do a lot of input to make this software work.			
		آپ کو اس software کے کام لینے کے لئے زیادہ input نہیں دینا پڑتی		
35	It is hard to learn to use new functions.			
		نئے functions کا استعمال سیکھنا خاصا مشکل ہے۔		
36	There are too many steps required to get something to work			
		بہت سارے اقدامات کی ضرورت ہوتی ہے کسی کام کو کرنے کے لئے۔		
37	Sometimes this software gives me a headache.			
		بعض اوقات اس software کا استعمال بے درد سر دیتا ہے۔		
38	Error prevention messages are inadequate.			
		غلطی کے اعداد کے لئے پیغامات ناکافی ہیں۔		
39	It is easy to make the software do exactly what you want.			
		یہ آسان ہے اس software کو ایسا بنانا جیسا آپ چاہیں		
40	I will never learn to use all the functions in this software.			
		میں کبھی بھی اس software کے سارے مقاصد نہیں سیکھ سکتا		
41	The software hasn't always done what I was expecting it to do.			
		یہ software میری توقعات کے مطابق کام نہیں کرتا		



42	The software has a very attractive presentation.			
	یہ software دیکھنے میں بہت پرکشش ہے۔			
43	The amount or quality of the help information varies across the system.			
	امدادی معلومات کی مقدار اور معیار سارے software میں مختلف ہے۔			
44	It is relatively easy to move from one part of a task to another.			
	کام کے ایک حصے سے دوسری طرف جانا نسبتاً آسان ہے۔			
45	It is easy to forget how to do things with this software.			
	اس software سے چیزوں کو کیسے کرنا ہے بھولنا آسان ہے۔			
46	Sometimes this software behaves in a way which I don't understand.			
	بعض اوقات یہ software ایسا رویہ اختیار کرتا ہے جسے میں سمجھ نہیں سکتا۔			
47	This software is very awkward to use.			
	یہ software استعمال میں بہت الجھن دہنی ہے۔			
48	You can see at a glance what the options are at each stage.			
	آپ ہر مرحلے میں دیکھ سکتے ہیں کہ کون سے انتخابیات موجود ہیں۔			
49	Getting data files in and out of the system is not easy.			
	اس نظام سے اعداد و شمار لینا اور دینا مشکل ہے۔			
50	I have to seek assistance when I use this software.			
	مجھے مدد کے لیے سراغ لگانا پڑتا ہے جب میں اس کو استعمال کرتا ہوں۔			

**What, in general, do you use this software for?**

آپ نام لہو پر اس software کو کس لیے استعمال کرتے ہیں؟

**How often do you use this software?**

آپ اس software کا استعمال کس قدر استعمال کرتے ہیں؟

Several times a day

دن میں کئی بار۔

Not more than once a day

دن میں ایک بار سے زیادہ نہیں۔

Several times a week

ہفتہ میں کئی بار۔

Not more than once a week

ہفتہ میں ایک بار سے زیادہ نہیں

Several times a month

مہینے میں کئی بار

Not more than once a month

مہینے میں ایک دفعہ سے زیادہ نہیں

Less than once a month

مہینے میں ایک دفعہ سے بھی کم

**How long have you been using this software?**

آپ اس software کا استعمال کب سے کر رہے ہیں؟

Less than a month

ایک ماہ سے کم

2-6 months

2-6 مہینے

6 months to a year

6 مہینے سے ایک سال

For more than a year

ایک سال سے زیادہ

**What do you think is the best feature of this software?**

آپ کے خیال میں اس software کا بہترین خصوصیت کون سا ہے

**What do you think is the feature which needs most improvement?**

آپ کے خیال میں اس software کا کون سا خصوصیت سب سے زیادہ بہتری کی ضرورت ہے۔

## X. CERTIFICATE

This is to certify that the following information regarding this questionnaire is correct. This Questionnaire is used to evaluate HMIS utilization by end user assessment for future improvement/changes to make HMIS more effective and user friendly.

User Information	
Name:	_____
Designation :	_____
Signature:	_____
Gender:	_____
Usage Role:	_____

## CONCLUSION

Health Management Information Systems (HMIS) are being adopted increasingly in tertiary hospitals in developing countries, with the aim of improving physician and patient convenience. However, the perception of healthcare professionals regarding HMIS should be thoroughly assessed in order to achieve effective utilization and implementation of this system.

Indeed, HMIS implementation is the way forward for efficient management of hospital services, however, as this study reveals, it has its sets of benefits as well as limitations. The study concludes that ease to review

Patients' medical history is the most common perceived advantage of HMIS among physicians, followed by the provision of a paper-less system or less paper system and facilitation of data analysis. Additionally, it facilitates the doctors in their research work. On the other hand, the major perceived disadvantages of HMIS were it being more time-consuming and thus a possible hindrance to smooth running of clinical work in case of increased patient flow. Questionnaire for end user assessment tend to boost all hospital staff confidence in the system, and the presence of supportive technical staff is also pivotal in this aspect. The study sample has representatives from all the departments, including both the junior and senior doctors, and the study by questionnaire evaluation is novel in effective implementation of HMIS.

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