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Impact Of Hospital Information System Adoption And Staff Perception On Operational Efficiency In A Multispecialty Hospital

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Abstract
The use of technology in the healthcare industry has had a profound effect on the operations of hospitals, with Hospital Information Systems (HIS) being the core in the achievement of efficiency and quality in healthcare delivery. However, the success of technology in healthcare delivery largely depends on the acceptance and perception of the users. This study sought to establish the effect of the adoption of Hospital Information Systems and the perception of the staff on the efficiency of operations in the multispecialty hospital setting. A quantitative descriptive study design was employed in the study, with primary data being obtained through the administration of a structured questionnaire to 132 hospital staff in the outpatient, inpatient, and laboratory departments using the Likert scale of five points. The variables of the study were the adoption of Hospital Information Systems, perceived ease of use, perceived usefulness, organizational support, and operational efficiency. The study found that all the variables have a positive relationship with the dependent variable, with organizational support and perceived usefulness being the variables with the strongest association with the dependent variable. This study has provided valuable insights for hospital administrators on the best approaches to adopt in the implementation of technology in the healthcare setting.

Keywords: *Hospital Information System, Operational Efficiency, Staff Perception, Technology Adoption, Healthcare*

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I. Introduction

The rapid development of information and communication technology has greatly impacted the healthcare industry, especially in hospital management. Among the most influential technological changes in the healthcare sector is the introduction of the Hospital Information System (HIS), which provides a platform that integrates all hospital activities in order to improve coordination and decision-making. The introduction of the hospital information system has been seen to improve the efficiency, quality, and cost-effectiveness of healthcare services in healthcare organizations (Chaudhry et al., 2006; Buntin et al., 2011). The success of such systems, however, not only depends upon the technological capabilities but also upon the acceptance and organizational readiness of the users. (Davis, 1989) developed the Technology Acceptance Model (TAM) that identified the importance of 'perceived usefulness' and 'perceived ease of use' in the adoption of technology. Furthering the above argument, (Venkatesh et al., 2003) developed the Unified Theory of Acceptance and Use of Technology (UTAUT) that highlighted the importance of 'social influence' and 'facilitating conditions' in the adoption of technology. Apart from these models, research has also been conducted to assess the overall organizational success achieved by the implementation of health information systems. To illustrate, (DeLone & McLean, 2003) developed the Information Systems Success Model, which underscores the importance of system quality, information quality, and service quality in ensuring the success of the system. Moreover, (Devaraj & Kohli, 2000) showed that investments in information technology are instrumental in achieving organizational success in the healthcare sector. Prior research by (Haux, 2006) and (Hersh, 2004) also underscored the transformative power of health information systems in achieving organizational success. In the case of a healthcare setting, the attitude of staff, the usability of the system, and integration into workflow can greatly impact the utilization of HIS. Research has indicated that the usability of the HIS and its compatibility are very important factors for the minimization of resistance and for effective utilization (Holden & Karsh, 2010). In addition, organizational factors can greatly impact the effective implementation of HIS (Cresswell & Sheikh, 2013; Kruse et al., 2016). In addition, the efficacy of HIS has also been proven in many empirical studies that have found its impact on patient

safety, communication, and decision-making (Alotaibi & Federico, 2017; Menachemi & Collum, 2011). However, there is a knowledge gap in relation to how HIS adoption and staff perception impact hospital efficiency in Indian multi-specialty hospitals. Thus, this paper attempts to bridge this gap in knowledge by investigating the relationship between technological, behavioral, and organizational factors influencing hospital efficiency.

Statement of the Problem

Hospitals are always on the lookout to improve efficiency in their operations and ensure that high standards of patient care are met. This has been possible with the advent of new technologies that have transformed many industries. Hospitals have incorporated Hospital Information Systems (HIS) to improve efficiency in their operations. The system is designed to integrate different aspects of hospital management, including patient registration, appointment booking, billing, lab services, and medical records management. Theoretically, hospitals can improve efficiency through better coordination of activities, reduction of waiting times, and improved productivity through the implementation of HIS. Despite investing heavily in technology and infrastructure, hospitals continue to experience inefficiencies in service delivery, poor management of workflow, and poor system utilization. One of the factors that can influence the efficiency of HIS is its adoption rate within hospitals. Healthcare professionals, including doctors, nurses, administrative staff, and technicians, use HIS on a day-to-day basis. The perception of staff members about HIS can influence its efficiency. For instance, staff members can view the system as too complex and time-consuming to use. This can lead to resistance to system use, which can negatively impact its efficiency. Another factor that can influence the efficiency of HIS is organizational support. For instance, implementing HIS in hospitals can only be effective through adequate training and technical support. Without adequate training and technical support, staff members can find difficulties in using new systems and can negatively impact efficiency. Thus, there is a need to investigate how the adoption rate of HIS and staff perception can influence operational efficiency in hospitals.

Objectives of the Study

To assess the level of adoption of the Hospital Information System (HIS) among hospital staff in the selected multispecialty hospital.

To evaluate staff perception regarding the usability, usefulness, and effectiveness of the Hospital Information System in their daily work activities.

To analyze the influence of Hospital Information System adoption and staff perception on operational efficiency in the hospital.

II. Methodology

This study adopted a quantitative research approach to examine the relationship between Hospital Information System adoption, staff perception, and operational efficiency. A descriptive research design was used to analyze the patterns and relationships among the selected variables. The study was carried out in a multispecialty hospital that has implemented a Hospital Information System across multiple departments to manage clinical and administrative processes efficiently. The study population comprised hospital staff working at the multispecialty hospital with an estimated total staff strength of approximately 300 employees across various departments. Using purposive sampling, a sample size of 132 staff members was selected to ensure inclusion of respondents who actively use the Hospital Information System (HIS) in their daily operations. The inclusion criteria consisted of staff members with a minimum of six months of work experience and regular interaction with the HIS, while those with less than six months of experience or no exposure to the system were excluded from the study. The sampling approach ensured representation from outpatient, inpatient, laboratory, and administrative departments. The estimated sample size of 132 respondents was considered adequate for statistical analysis with a confidence level of 95% and an acceptable margin of error. A total of 132 questionnaires were distributed, and all were completed and returned, resulting in a response rate of 100%. The questionnaire consisted of statements measured using a five-point Likert scale ranging from strongly disagree to strongly agree.

The study focused on the following variables:

- Hospital Information System Adoption
- Perceived Ease of Use
- Perceived Usefulness
- Organizational Support
- Operational Efficiency

III. Results

Table 1: Demographic Profile of Respondents

	Frequency	Percent
Designation		
Medical Staff	37	28.0
Nursing Staff	37	28.0
Administrative staff	14	10.6
Front Office / OPD	21	15.9
Laboratory Staff	23	17.4
Department		
Inpatient	62	47.0
Outpatient	47	35.6
Laboratory	23	17.4
Years of Experience		
Less than 1 year	22	16.7
1–3 years	56	42.4
4–6 years	31	23.5
More than 6 years	23	17.4
Daily interaction with HIS		
Less than 1 hour	7	5.3
1–3 hours	43	32.6
4–6 hours	34	25.8
More than 6 hours	48	36.4

Table 2: Descriptive statistics

Statements	N	Minimum	Maximum	Mean	Std. Deviation
HIS is integral to routine work	132	1	5	4.18	.827
Activities carried out using HIS	132	2	5	4.19	.753
HIS supports decisions	132	1	5	4.05	.924
Perform responsibilities efficiently using HIS	132	1	5	4.07	.831
Work disrupted if HIS unavailable	132	1	5	4.01	.904
The Hospital Information System is easy to learn and operate	132	1	5	4.17	.878
Interaction with the Hospital Information System requires minimal cognitive effort.	132	1	5	3.91	.833
The interface design, system layout, and navigation of the Hospital Information System are clear and user-friendly.	132	1	5	3.86	.923
I am able to use the Hospital Information System effectively even during periods of high operational workload.	132	1	5	3.89	.922
The system will make it easier to conduct quality audits and monitoring.	132	1	5	4.00	.882
The Hospital Information System enables me to complete work-related tasks more efficiently.	132	1	5	3.95	.864
The Hospital Information System enables smooth and uninterrupted task execution.	132	1	5	3.89	.858
The Hospital Information System improves the accuracy and reliability of work-related information.	132	1	5	3.98	.805
The Hospital Information System facilitates effective coordination and information sharing across functional areas.	132	1	5	4.02	.895
The Hospital Information System enhances the overall quality of service delivery.	132	1	5	4.05	.790
Adequate training was provided both prior to and following the implementation of the Hospital Information System.	132	1	5	3.77	1.003
Timely and effective technical support is available whenever system-related issues arise.	132	1	5	3.72	1.006
The hospital information technology infrastructure is sufficient to support the efficient functioning of the Hospital Information System.	132	1	5	3.87	.842
Hospital management demonstrates active commitment to promoting and supporting the effective use of the Hospital Information System.	132	1	5	3.95	.794
The Hospital Information System (HIS) has contributed to a reduction in patient waiting time.	132	1	5	3.89	.871
HIS has improved overall workflow efficiency.	132	1	5	3.77	.881

HIS has reduced duplication of work and manual processes.	132	1	5	3.76	.926
HIS has improved service turnaround time.	132	1	5	3.90	.846
HIS has enhanced staff productivity.	132	1	5	3.92	.811

Descriptive statistics were used to assess the central tendency and variability of key variables, including HIS adoption, perceived ease of use, perceived usefulness, organizational support, and operational efficiency. The above table indicates how much the participants agree with the statements about adopting the Hospital Information System, how easy it is to use, how useful it is, how much support there is from the organization, and how efficiently it works. From the overall results, it is evident that the participants have a positive view about the implementation and effects of the Hospital Information System in the hospital.

Table 3: Correlation Analysis

		his_adopt_mean	ease_mean	use_mean	support_mean	eff_mean
his_adopt_mean	**Pearson Correlation**	**1**	**.648****	**.665****	**.446****	**.496****
	N	**132**	**132**	**132**	**132**	**132**
ease_mean	**Pearson Correlation**	**.648****	**1**	**.734****	**.664****	**.539****
	N	**132**	**132**	**132**	**132**	**132**
use_mean	**Pearson Correlation**	**.665****	**.734****	**1**	**.668****	**.619****
	N	**132**	**132**	**132**	**132**	**132**
support_mean	**Pearson Correlation**	**.446****	**.664****	**.668****	**1**	**.677****
	N	**132**	**132**	**132**	**132**	**132**
eff_mean	**Pearson Correlation**	**.496****	**.539****	**.619****	**.677****	**1**
	N	**132**	**132**	**132**	**132**	**132**

Correlation analysis was conducted to examine the relationship between the independent variables and operational efficiency. Organizational support showed the strongest correlation with operational efficiency, followed by perceived usefulness. This suggests that both system-related and organizational factors play a critical role in improving hospital performance.

HIS Adoption and Operational Efficiency

H_0: There is no significant relationship between HIS adoption and operational efficiency.

H_1: There is a significant relationship between HIS adoption and operational efficiency.

It shows small positive link between using a hospital information system and how efficiently a hospital runs, with a correlation of r = 0.496. Because this value is more than 0.01, we can reject the idea that there's no connection. This suggests that more a hospital uses the system, the more efficient its operations tend to be.

Ease of Use and Operational Efficiency

H_0: There is no significant relationship between perceived ease of use and operational efficiency

H_1: There is significant relationship between perceived ease of use and operational efficiency

Analysis between the use of a hospital information system and how efficiently the hospital operates revealed a low but positive relationship shown by the correlation result r = 0.539. Since the p value is not less than 0.01, we conclude that there is indeed a relationship. This implies that the higher the use of the hospital information system, the higher the efficiency.

Perceived Usefulness and Operational Efficiency

H_0: There is no significant relationship between perceived usefulness and operational efficiency.

H_1: There is significant relationship between perceived usefulness and operational efficiency.

As per the correlation analysis table, strong positive relationship between level of usefulness that users perceive for the hospital information system and the level of operational efficiency. The correlation coefficient is 0.619. Since the p-value is less than 0.01, the null hypothesis can be rejected. This implies that if users find the hospital information system useful, there will be higher operational efficiency.

Organizational Support and Operational Efficiency

H_0: There is no significant relationship between organizational support and operational efficiency.

H_1: There is significant relationship between organizational support and operational efficiency.

The correlation coefficient shows a strong positive link between organizational support and operational efficiency, with a value of r = 0.677. Since the significance level is less than 0.01, we can reject the null hypothesis.

Table 3: ANOVA Analysis

Model	Sum of Squares	df	Mean Square	F	Sig
Regression	32.546	4	8.137	34.744	0.000
Residual	29.741	127	0.234		
Total	62.287	131			

Regression analysis was performed to determine the impact of independent variables on operational efficiency. The findings revealed that HIS adoption and staff perception variables significantly influence operational efficiency. Perceived usefulness and organizational support emerged as the most influential predictors, indicating that staff are more likely to use the system effectively when they perceive it as beneficial and when adequate support is provided.

The ANOVA results show that the regression model is statistically significant ($F = 34.744$, $p < 0.001$). This suggests that the independent variables together have a meaningful impact on operational efficiency.

$H_0$1: HIS adoption does not significantly influence operational efficiency.

From the regression results, it is clear that implementing the Hospital Information System (HIS) does not significantly impact operational efficiency, as indicated by a p-value of 0.059. Since the p-value is above 0.05, we accept the null hypothesis. This means that the use of the HIS does not appear to have a meaningful effect on how efficiently the hospital operates.

$H_0$2: Perceived ease of use does not significantly influence operational efficiency

The results indicate that how easy a system is to use does not greatly affect its operational efficiency, as shown by a p-value of 0.553. Because this p-value is higher than 0.05, we do not reject the null hypothesis. This means that ease of use is not a major factor in determining operational efficiency.

$H_0$3: Perceived usefulness does not significantly influence operational efficiency

- Beta = 0.223
- p = 0.034 (<0.05)

The analysis results indicate that perceived usefulness has a significant impact on operational efficiency, with a p-value of 0.034. Because this p-value is below 0.05, we reject the null hypothesis. This suggests that when people believe the hospital information system is more useful, the overall operational efficiency tends to improve.

$H_0$4: Organizational support does not significantly influence operational efficiency.

The results indicate that having strong organizational support is a significant factor in improving operational efficiency, and the correlation is extremely strong, with a p-value of less than 0.001. Therefore, we can safely conclude that the null hypothesis is not true. In other words, hospitals that receive greater support from their organization are more likely to be operationally efficient.

IV. Discussion

The present study has yielded significant insights into the impact of the adoption of the Hospital Information System (HIS) and the perception of the staff on the operational efficiency of the hospital. The integration of the three aspects has provided an all-encompassing view of the impact of technology on the performance of the hospital. The positive relationship between the adoption of HIS and operational efficiency is in line with previous studies that highlighted the advantages of health information technology in enhancing performance in the healthcare industry (Buntin et al., 2011; Chaudhry et al., 2006). This is in line with the theoretical basis of the Technology Acceptance Model, as proposed by Davis (1989), which emphasizes the need for perceived usefulness and ease of use in the adoption of technology. The research also supports earlier research by the Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003), which states that facilitating conditions such as organizational support can impact technology use. In this regard, this research found organizational support to be the most important factor in relation to operational efficiency. This is consistent with earlier research suggesting that training, infrastructure, and technical support are critical for a successful implementation of HIS (Cresswell & Sheikh, 2013; Kruse et al., 2016).

Further, the research also found that perceived usefulness has a significant impact on operational efficiency. This is consistent with earlier research suggesting that healthcare professionals are more likely to adopt a system that can enhance their performance and productivity (Aggelidis & Chatzoglou, 2009). Another important factor highlighted by this research is the importance of usability, where a system should be easy to use and integrate into the existing system to enhance efficiency (Holden & Karsh, 2010).

Moreover, the findings of this study are also consistent with the results of previous empirical research that examined the efficiency outcomes of information system adoption. For instance, (Kazley & Ozcan, 2008) have revealed that the utilization of electronic medical records leads to increased efficiency in hospitals. Moreover, (Nguyen et al., 2014) have indicated that the success of the implementation of an electronic health record relies on various factors, including technology and context. In addition, (Kellermann & Jones, 2013) have emphasized that to obtain the full potential of health information technology, it is necessary to match the capabilities of the technology and the processes of the organization.

Additionally, the research supports the existing literature that suggests that HIS can play an essential role in promoting patient safety, communication, and quality care (Alotaibi & Federico, 2017; Menachemi & Collum, 2011). Moreover, the research supports the sociotechnical perspective, which suggests that digital transformation can only occur when there is an integration between the technology, the user, and the processes (Sittig & Singh, 2020). This research contributes to the existing body of knowledge by incorporating the different dimensions of the effectiveness of HIS, which can promote the operational efficiency of hospitals.

Managerial Implications

The study has also found organizational support to be a significant antecedent to operational efficiency. This implies that hospital management should not assume that the implementation of a Hospital Information System will automatically translate into greater operational efficiency. Rather, equal importance should be given to training and technical support. Training programs and refresher courses can be conducted to enhance the skills and confidence of hospital staff in using the system. In addition, employee participation in system upgrade can also be encouraged to increase acceptance and reduce resistance to the system.

Technological Implications

The study has also found that perceived ease of use and usefulness to be significant determinants of system adoption. This implies that system developers and IT professionals should ensure that the system is user-friendly and efficient. Therefore, hospitals should conduct usability studies and make necessary changes to the system to enhance user experience. Furthermore, the barriers, such as the cost, system complexity, and resistance, which have been identified by previous studies (Kruse et al., 2016; Goldzweig et al., 2009), need to be addressed by the hospital management for the successful implementation of HIS.

Operational Implications

The significant and positive relationship between HIS adoption and operational efficiency implies that hospitals can benefit greatly by using HIS to increase operational efficiency. This can be done by effectively using the system to increase coordination in hospital operations and minimize waiting times for patients. This will result in greater productivity and better service delivery.

Academic Implications

The study contributes to the existing literature because it considers all aspects of technology, behavior, and organization in its analysis of operational efficiency. The study offers a basis for further research to examine similar relationships in other settings or with other variables such as patient satisfaction and outcome. Future research can use this study as a basis to create an expanded model of health information system effectiveness.

V. Conclusion

Hospitals are increasingly using Hospital Information Systems to manage today's complex health care environment. This study looked into how the use of a hospital information system (HIS) and the views of staff about the system affect the smooth running of a multispecialty hospital. The results show that having the technology alone isn't enough to make the hospital run smoothly. Instead, it's the staff who use the system every day that need to fully embrace and adapt to the technology for the system's implementation to be effective. The findings revealed that the adoption of HIS enhances the efficiency of operations through better coordination between departments, reduction of manual operations, improvement of documentation's accuracy, and efficiency in the management of the entire workflow process. Positive perceptions of staff regarding the system further enhance its adoption to maximize its benefits.

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