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Evaluation Of The Implementation Of Electronic Medical Records Using The Hot-fit Method In A Public Health Center In East Surabaya

Alfina Aisatus Saadah ^{1*}, Titin Wahyuni², Eka Wilda Faida ³ ,Diah Wijayanti Sutha⁴ ,Lilis Masyfufah ⁵

- ¹ STIKES Yayasan RS Dr. Soetomo, aisatusalfina@gmail.com
- ² STIKES Yayasan RS Dr. Soetomo, wtitin.2012@gmail.com
- ³ STIKES Yayasan RS Dr. Soetomo, ekawildafaida@gmail.com
- STIKES Yayasan RS Dr. Soetomo, diahwsutha@gmail.com
 STIKES Yayasan RS Dr. Soetomo, lilis, masyfufab@stikes-yrsds a
- ⁵ STIKES Yayasan RS Dr. Soetomo, lilis_masyfufah@stikes-yrsds.ac.id
- * Correspondence: aisatusalfina@gmail.com; Tel.089608101003

Abstract: The rapid development of information technology that has spread to various sectors of life including health can result in the development of a computer-based medical record system. Computer-based medical records or better known as EMR (Electronic Medical Record) have been used in various hospitals in the world as a complement or replacement for paper-based health records so that they can facilitate the process of managing, accessing, and distributing data or information. Based on the results of brief interviews with health workers working in health centers, it turns out that medical records for obstetric cases are still hybrid. The purpose of this study was to implement the application of Electronic Medical Records using the Hot-Fit method in East Surabaya Health Centers Indonesia. The research method used is descriptive research using a questionnaire sheet as a research instrument. The results of the study obtained data that the application of Electronic Medical Records in East Surabaya Health Centers from system quality, information quality, service quality, system use, organizational structure, facility conditions, and net benefits were categorized as good while for user satisfaction it was suggested to be satisfied and support was suggested to be supportive. So it can be concluded that the application of EMR was given well. Suggestions for the Health Center are the need to improve the system and network, the need to complete the information in the EMR in detail, the need to provide training to health workers in the use of EMR, and the need for socialization by superiors regarding the policy on the use of EMR.

Keywords: Electronic Medical Records, Hot-Fit, Health Center

1. Introduction

The rapid development of information technology in various fields has led to the use of information systems in health services that can provide many benefits that benefit service providers, which in this case are hospitals, clinics, and so on[1]. Patient health history records, including examination history, treatment history and administration of actions carried out using an electronic system are a form of implementation of technological developments [21]. Integrated health services are the key to improving patient conditions. The effects of disintegration of patient services include the use of large amounts of drugs, unwanted side effects of drugs (adverse drug events), and unnecessary hospitalizations. This can be a threat to patient safety. In the Institute of Medicine (IOM) report series, it was concluded that the ineffectiveness of service coordination was due to poor communication between health workers in providing and deciding on the clinical services provided. IOM recommends Electronic Medical Records (EMR) as a supporting medium for improving the quality of patient care through easy accessibility of information [2][3].

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EMR is a repository of patient data in digital form, stored securely, accessible to many authorized users, containing retrospective data and prospective information with the main objective of supporting integrated, sustainable, efficient, and quality health care [4].

EMR is beneficial for patients because it increases efficiency in the health care process. For administrative staff, the use of electronic medical records can facilitate the retrieval of patient information so that health workers can easily access patient information. Doctors and health workers also benefit in providing health services that assist in clinical decision-making such as establishing a diagnosis, providing therapy, avoiding allergic reactions, and drug duplication. From an efficiency aspect, the use of electronic medical records has an impact on reducing operational costs and increasing income in health care facilities, especially for hospitals [5]. The benefits gained from using Electronic Medical Records include increased documentation accuracy, reduced clinical errors, reduced time needed to review patient health histories, and easier and faster access to patient data, thereby improving the quality of service and patient satisfaction [22].

That the use of electronic medical records is still constrained in terms of input and process, so that in order to increase the use of electronic medical records in full, the behavioral aspect or user acceptance must be improved. This aspect is improved by improving the flow of influencing factors such as policy socialization, guidelines for the use of electronic medical records to all health workers, implementing team-based services that have been well socialized to all health workers regarding their responsibilities and roles, and ensuring adequate technical support [6].

That the obstacles in implementing RME were inadequate facilities and infrastructure. For example, the network and connection are not yet stable, not implementing a security system with full protection, only implementing a basic security system, lack of human resources or experts who are knowledgeable and competent in the field of electronic medical records, policies and SOPs (Standard Operating Procedures) for the implementation of electronic medical records which are still in the process of being made by management [9]. One of the inhibiting factors for the success of RME implementation is the lack of knowledge, skills, and competence of users [10].

The challenges of implementing RME at RSGM Prof. Soedomo from the human resource dimension include the still diverse perceptions of users for the implementation of medical records will prolong the service process and increase the workload, user motivation who are still doubtful that RME will make work easier both administratively and clinically, user concerns about technical obstacles in the implementation of RME, changes in user work culture from manual to electronic have an impact on slowing down the patient service process, lack of knowledge and experience in using computers by health workers, differences in user characteristics based on age will affect user acceptance and interest in using RME, in this case, doctor users who are over 50 years old [7]. This is in accordance with the identification of stakeholder or user obstacles in adopting RME which include fear of change, lack of speed and reliability in using the new system, requiring a long time to fill in medical records, changes in workflow and loss of productivity [8].

Based on the results of a brief interview in July 2023 with health workers working in health centers in the East Surabaya area, it turned out that medical records for obstetric cases were still hybrid (manual and electronic), not all of them used RME because there were obstetric medical record files that were difficult to make in electronic form such as cohort reports and partographs. Health centers in East Surabaya that have implemented RME for less than 6 months from February 2023 to July 2023 are Kalijudan Health Center and Kalirungkut Health Center.

One method to determine the factors of using an information system is the HOT-Fit Model, by looking at the system as a whole by placing important components in the information system, namely humans, organizations and technology and the suitability of the relationship between them as determining factors for the success of implementing an information system [11]. Research on the evaluation of the use of EMR using the hot fit method in Indonesia has never been carried out, so researchers are interested in conducting research on this to evaluate the implementation of electronic medical records using the Hot-Fit method at Health Centers in East Surabaya.

2. Materials and Methods

This type of research is descriptive research with a quantitative approach. The research design uses a cross-sectional approach. In this study, the researcher used a purposive sampling technique to determine the research sample. The sample to be studied must meet the inclusion criteria, namely:

- 1. Health center officers who use EMR
- 2. Health center officers who have an EMR account
- 3. Health center officers in the East Surabaya area who have implemented EMR for less than 6 months
- 4. Officers who are willing to be research respondents.

The research sample consisted of 28 officers of the Kalijudan Health Center and Kalirungkut Health Center who met the inclusion criteria. This research has received approval to become a research respondent. The instrument used in this study was a questionnaire. The questionnaire used in this study is an adapted version of the instrument developed by [23]. Data Presentation Method The data obtained from the research results are presented in table form and explained in narrative form. The variables, definitions, and the measurement results used in this study are presented in Table 1.

No	Variabel	Definitions	data	Results of data
			measurement	
1.	Sistem Quality	The quality of the	Questionnaire	Very good
		combination of	sheet where	(22-28)
		hardware and	the values are	Good (15-21)
		software in an	strongly	Poor (8-14)
		information system,	disagree (1),	Very poor (1-7)
		the focus is on	disagree (2),	
		system performance,	agree (3),	
		which refers to how	strongly	
		well the hardware	agree (4).	
		and software		
		capabilities, policies,		
		procedures, of the		
		information system		
		can provide the		
		information users		
		need.		
2.	Information	Referring to the	Questionnaire	Very good
	Quality	output of the	sheet where	(19-24)
		information system,	the values are	Good (13-18)
		concerning the	strongly	Poor (7-12)
		value, benefits,	disagree (1),	Very poor (1-6)
		relevance and	disagree (2),	
		urgency of the	agree (3),	
		information	strongly	
		produced	agree (4).	

Table 1. The variables, definitions, and the measurement results

No	Variabel	Definitions	data	Results of data
3.	Service Quality	Refers to all support provided by service providers, both internal to the organization and external/outsourced vendors.	Questionnaire sheet where the values are strongly disagree (1), disagree (2), agree (3), strongly agree (4).	Very good (7-8) Good (5-6) Poor (3-4) Very poor (1-2)
4.	Sistem Use	The use of information output such as reports from information systems. System use is also related to individual knowledge and beliefs, and acceptance of information systems.	Questionnaire sheet where the values are strongly disagree (1), disagree (2), agree (3), strongly agree (4).	Very good (25-32) Good (17-24) Poor (9-16) Very poor (1-8)
5.	User Satisfaction	Response and feedback submitted by users after using the information system. User satisfaction is obtained only when needs and desires are met. User attitudes towards information systems are subjective criteria on how users to the system are used. This variable is measured by indicators consisting of: a) Software satisfaction, b) Efficiency, and c) Effectiveness	Questionnaire sheet where the values are strongly disagree (1), disagree (2), agree (3), strongly agree (4).	Very good (22-28) Good (15-21) Poor (8-14) Very poor (1-7)
6.	Organization Structure	Leadership, support from top management, and staff support are important parts in measuring the success of an information system.	Questionnaire sheet where the values are strongly disagree (1), disagree (2), agree (3), strongly agree (4).	Very good (16-20) Good (11-15) Poor (6-10) Very poor (1-5)

No	Variabel	Definitions	data measurement	Results of data
7.	Kondisi Fasilitas (Facilitating Condition)	The agency provides resources, facilities and infrastructure (hardware, software, network infrastructure, maintenance and technical support) that support the use of EMR, The agency provides training on using EMR, There are training institution officers who are responsible and provide assistance if problems occur with EMR.	Questionnaire sheet where the values are strongly disagree (1), disagree (2), agree (3), strongly agree (4).	Very good (10-12) Good (7-9) Poor (4-6) Very poor (1-3)
8.	Dukungan Pimpinan (Top Management Support)	Leadership support will support the success of an information system.	Questionnaire sheet where the values are strongly disagree (1), disagree (2), agree (3), strongly agree (4).	Very good (13-16) Good (9-12) Poor (5-8) Very poor (1-4)
9.	Net Benefit	The balance between the positive and negative impacts of information system users. Net benefits can be characterized by direct benefits, work effects, efficiency and effectiveness, reducing error rates, controlling expenses and costs. The higher the positive impacts generated, the more successful the implementation of information systems.	Questionnaire sheet where the values are strongly disagree (1), disagree (2), agree (3), strongly agree (4).	Very good (19-24) Good 13-18) Poor (7-12) Very poor (1-6)

3. Results and Discussion

1. Results of Identification of the Implementation of Electronic Medical Records in East Surabaya Health Centers from System Quality.

Table 2. Implementation of Electronic Medical Records from System Quality

Category	System Quality			
	Total	Percentage		
Very good	12	42,9%		
Good	16	57,1%		
Poor	0	0%		
Very poor	0	0%		
Total	28	100%		

Based on Table 2, the quality of the system in the application of Electronic Medical Records is categorized as good.

2. Results of Identifying the Implementation of Electronic Medical Records at Puskesmas in the East Surabaya Region from Information Quality.

Table 3. Implementation of electronic medical records in terms of information quality

Category	Information Quality			
	Total	Percentage		
Very good	7	25%		
Good	21	75%		
Poor	0	0%		
Very poor	0	0%		
Total	28	100%		

Based on Table 3, the quality of information in the application of electronic medical records is categorized as good.

3. Results of Identifying the Implementation of Electronic Medical Records at Puskesmas in the East Surabaya Region from Service Quality.

Category	Service Quality			
	Total	Percentage		
Very good	8	28,6%		
Good	20	71,4%		
Poor	0	0%		
Very poor	0	0%		
Total	28	100%		

Table 4. Implementation of electronic medical records in terms of service quality

Based on Table 4, the quality of service in the application of Electronic Medical Records is categorized as good.

4. Results of Identification of the Implementation of Electronic Medical Records at Puskesmas in the East Surabaya Region from the Use of the System.

Table 5. Implementation of Electronic Medical Records from the Use of the System

Category	System usage			
	Total	Percentage		
Very good	6	21,4%		
Good	22	78,6%		
Poor	0	0%		
Very poor	0	0%		
Total	28	100%		

Based on Table 5, the use of the system in the application of Electronic Medical Records is categorized as good.

5. Results of Identifying the Implementation of Electronic Medical Records at Puskesmas in the East Surabaya Region from User Satisfaction.

Table 6. Implementation of Electronic Medical Records from User Satisfaction

Category	User's satisfaction			
	Total	Percentage		
Very good	5	17,9%		
Good	23	82,1%		
Poor	0	0%		
Very poor	0	0%		
Total	28	100%		

Based on Table 6, user satisfaction in the application of Electronic Medical Records is categorized as good.

6. Results of Identification of the Implementation of Electronic Medical Records at Puskesmas in the East Surabaya Region from Organizational Structure.

т	able 7	Imn	lementatio	n of Flecti	onic Media	al Record	s from a	n Organ	izational	Structure
	abic 7.	mp	icincinatio	II OI LICCU	onic mean	ui iccoru	5 110111 u	in Organ	inzational	Structure

Category	Organization Structure			
	Total	Percentage		
Very good	8	28,6%		
Good	20	71,4%		
Poor	0	0%		
Very Poor	0	0%		
Total	28	100%		

Based on Table 7, the organizational structure in the implementation of Electronic Medical Records is categorized as good.

7. Results of Identification of the Implementation of Electronic Medical Records at Puskesmas in East Surabaya Region from Facility Conditions.

Tab	le 8.	Imp	lementation	of e	lectronic	medical	record	s from	facilit	y conditio	ns
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Category	Facility Condition			
	Total	Percentage		
Very good	7	25%		
Good	21	75%		
Poor	0	0%		
Very Poor	0	0%		
Total	28	100%		

Based on Table 8, the condition of facilities in the application of Electronic Medical Records is categorized as good.

8. Results of Identification of the Implementation of Electronic Medical Records at Puskesmas in East Surabaya Region from Leadership Support.

Table 9. Implementation of electronic medical records from leadership support

Category	Leadership Support	
	Total	Percentage
Very good	11	39,3%
Good	17	60,7%
Poor	0	0%
Very poor	0	0%

Based on Table 9, leadership support in the implementation of Electronic Medical Records is categorized as good.

9. Results of Identification of Electronic Medical Record Implementation at Puskesmas in East Surabaya Region from Net Benefit

Category	Net Benefit	
	Total	Percentage
Very good	12	42,8%
Good	15	53,6%
Poor	1	3,6%
Very poor	0	0%
Total	28	100%

Table 10 Implementation of Electronic Medical Records from Net Benefit

Based on Table 10, the Net Benefit in the application of Electronic Medical Records is categorized as good.

Discussion

1. Results of Identification of the Implementation of Electronic Medical Records at Puskesmas in East Surabaya Region from System Quality

Based on table 2, the system's quality in the application of Electronic Medical Records is categorized as good. This is in line with Erintan's research, syifa (2022) on "Review of Medical Record Management Using Hot-Fit Theory at Soeprapto Special Mental Hospital Bengkulu" states that, in general, officers say that SIMRS is easy to use so that the quality of the system is said to be good. The software is relatively easy and can be installed by the hospital. This phenomenon is in line because the SIMRS features at RSJKO Soeprapto Bengkulu are easy to use and learn. In addition, SIMRS at RSJKO Soeprapto Bengkulu already has accurate security because SIMRS officers at RSJKO Soeprapto Bengkulu have their username and password [12].

The results of other research conducted by Mutiara Hapsari (2021) on "Legal Study Of The Use Of Electronic Medical Records In Hospitals" state that the quality of the current system is quite good [13]. In addition, Sukma (2020) on "Application Of Hot Fit Method In The Evaluation Of Hospital Management Information System At Jombang Regional Hospital" also states that the already has a security system whose authority is held by pustipanda [14].

2. Results of Identifying the Implementation of Electronic Medical Records at Puskesmas in the East Surabaya Region from Information Quality

Based on Table 3, the quality of information in the application of electronic medical records is categorized as good. This is in line with Erintan's research, syifa (2022) on "Review of Medical Record Management Using Hot-Fit Theory at Soeprapto Mental Special Hospital Bengkulu" states that in general, SIMRS officers at RSJKO Soeprapto Bengkulu already feel appropriate with the information generated by SIMRS. In general, the data generated is accurate, but there is a need to improve the system on SIMRS because there are more features needed by officers. However, officers feel that SIMRS is helpful in the information needed[12].

The results of research by Tania Anzany Dwi Putri (2023) on " challenges in implementing electronic medical record in indonesia health care facilities" state that SIMRS accelerates data presentation so that users feel in accordance with SIMRS [15].

The results of another study conducted by Aisyah Ayuningtyas (2015) on "Relationship Between Level of Knowledge About Medical Records and Completeness of Anamnesis Sheets by Midwives in the Obstetrics Ward of Nur Hidayah Hospital Bantul" stated that SIMRS was good because it made it easy to check patient information, easy to access examination results and easy to find disease coding [16].

3. Results of Identifying the Implementation of Electronic Medical Records at Puskesmas in the East Surabaya Region from Service Quality

Based on table 4, the quality of service in the application of Electronic Medical Records is categorized as good. This is in line with Erintan's research, syifa (2022) on "Review of Medical Record Management Using Hot-Fit Theory at Soeprapto Special Mental Hospital Bengkulu" states that in general, officers feel appropriate with the use of SIMRS at RSJKO Soeprapto Bengkulu and the hospital accepts SIMRS well and hopes that this SIMRS can help improve the quality of hospital services and improve hospital accreditation [12].

4. Results of Identification of the Implementation of Electronic Medical Records at Puskesmas in the East Surabaya Region from the Use of the System

Based on table 5, the use of the system in the application of Electronic Medical Records is categorized as good. This is in line with Erintan's research, syifa (2022) on "Review of Medical Record Management Using Hot-Fit Theory at Soeprapto Mental Special Hospital Bengkulu" states that at RSJKO Soeprapto Bengkulu SIMRS already has features that are quite complete and accommodate the needs of officers and officers get many benefits such as making it easier for officers to find the data needed [12].

The results of another study conducted by Nabilatul Fanny, Kusworor Adi, Sutopo Patria Jati at Dr. Moewardi Hospital (2020) on "Application of the Hot Fit Model to the Evaluation of the Occupational Safety and Health Information System at Dr. Moewardi Hospital" stated that with this system users feel that they can increase effectiveness and efficiency in doing work compared to working manually [17].

5. Results of Identifying the Implementation of Electronic Medical Records at Puskesmas in the East Surabaya Region from User Satisfaction

Based on table 6, user satisfaction in the application of Electronic Medical Records is categorized as good. This is in line with Erintan's research, syifa (2022) on "Review of Medical Record Management Using Hot-Fit Theory at Soeprapto Mental Special Hospital Bengkulu" states that SIMRS officers at RSJKO Soeprapto Bengkulu are satisfied because this SIMRS already has features that are quite complete and accommodate the needs of officers and officers get many benefits such as making it easier for officers to find the data needed. However, there are still obstacles found related to the operation of the information system because RSJKO Soeprapto Bengkulu does not have an adequate internet network [12].

The results of other research conducted by Mulyadi (22017) on "Application of the Human Organization Technology Method (HOT-Fit Model) for the Evaluation of the Implementation of the Inventory Information System Application (SIDIA) in the Bogor City Government Environment" that officers are satisfied with SIMRS because it makes it easy to help manage information [18].

6. Results of Identification of the Implementation of Electronic Medical Records at Puskesmas in the East Surabaya Region from Organizational Structure

Based on table 7, the organizational structure in the implementation of Electronic Medical Records is categorized as good. This is in line with research conducted by Nabilatul Fanny, Kusworo Adi, Sutopo Patria Jati at Dr. Moewardi Hospital (2020) on "Application of the Hot Fit Model to the Evaluation of Occupational Safety and Health Information Systems at Dr. Moewardi Hospital" states that the P2K3RS organizational structure at Dr. Moewardi Hospital has been well established, it's just that human resources are still lacking both in terms of number and profession. The division of labor has also been carried out in accordance with the duties of each section. In the aspect of organizational environment, monitoring and evaluation have been carried out regularly,

the budget comes from internal and external hospitals. Inter-organizational relations (communication between officers) also run well and smoothly, supporting each other's work. Support from both officers and managers can also be seen by each officer carrying out the work as much as possible even though each officer has a double job [17].

Another study conducted by Erintan, syifa (2022), "Review of Medical Record Management Using Hot-Fit Theory at Soeprapto Special Mental Hospital Bengkulu," states that communication between officers and officers is good [12].

7. Results of Identification of the Implementation of Electronic Medical Records at Puskesmas in the East Surabaya Region from Facility Conditions

Based on table 8, the condition of facilities in the application of Electronic Medical Records is categorized as good. This is in line with research conducted by Nabilatul Fanny, Kusworo Adi, Sutopo Patria Jati at Dr. Moewardi Hospital (2020) on "Application of the Hot Fit Model to the Evaluation of Occupational Safety and Health Information Systems at Dr. Moewardi Hospital" states that the provision of appropriate information for the workforce and all parties concerned can be used to motivate and encourage acceptance and general understanding in hospital efforts to improve occupational safety and health performance. Hospitals must have procedures to ensure that the latest occupational safety and health information is communicated to all parties in the hospital. Funding constraints on the P2K3RS information system at Dr. Moewardi Hospital are that there is no specific budget for the P2K3RS program, this is because the P2K3RS program budget design is part of the hospital subdivision which will then be adjusted according to needs, however this condition is not an obstacle to the implementation of the K2RS system because K3RS needs have become part of each work unit in the hospital so that everything is integrated with the hospital system [17].

8. Results of Identification of the Implementation of Electronic Medical Records at Puskesmas in the East Surabaya Region from Leadership Support

Based on table 9, leadership support in the implementation of Electronic Medical Records is categorized as good. This is different from puspitasari (2018) on "Evaluation of the Implementation of the Hospital Management Information System at Temanggung District Hospital Using the Hot-Fit Method," which states that the hospital is less concerned with the development and ability of officers [19]. In addition, research conducted by Manik Mahendra Sari, Guardian Yoki Sanjaya and Andreasta Meliala on "Evaluation of Hospital Management Information Systems (SIMRS) with the Hot-Fit Framework" states that the lack of leadership carried out by the hospital and communication with IT officers is not good, giving rise to the perception that the use of SIMRS is not a necessity which results in reluctance to use the existing system [20].

9. Results of Identification of Electronic Medical Record Implementation at Puskesmas in East Surabaya Region from Net Benefit

Based on table 10, the Net Benefit in the implementation of Electronic Medical Records is categorized as good. This is in line with research conducted by Nabilatul Fanny, Kusworo Adi, Sutopo Patria Jati at Dr. Moewardi Hospital (2020) on "Application of the Hot Fit Model to the Evaluation of Occupational Safety and Health Information Systems at Dr. Moewardi Hospital" states that the benefits of this system can increase the effectiveness and efficiency of officers who have been managing data manually. In terms of data input, officers become easier. Although there are still some parts done manually. In terms of output, data from the P2K3RS information system can be used for planning purposes to improve services, facilities, infrastructure, and quality of service to all employees at the RSUD. Dr. Moewardi [17].

Implications for practice or policy : The outcomes of this research indicate a significant contribution to health digitalization policies in Indonesia, particularly concerning the advancement of EMR implementation. By utilizing the HOT-Fit framework, this investigation clarifies the complex interaction among human factors, organizational dynamics, and technological competencies as crucial components for the success of EMR systems. The insights presented serve as a basis for policy enhancement to tackle existing issues, including improving system usability, expanding educational programs for healthcare professionals, and ensuring that comprehensive information is effectively incorporated into EMR.

Furthermore, this study highlights the vital role of infrastructure and technical support in cultivating an optimal environment for EMR utilization. Dependable networks and sufficient facilities are integral for maximizing the effectiveness of EMR systems. The research also points out the common use of hybrid methods in various health centers, which necessitates focused strategies to enable thorough integration of EMR systems and reduce inefficiencies linked to manual processes. These findings advocate for targeted investments in technological infrastructure to promote the extensive and effective implementation of EMR.

4. Conclusions

In conclusion, the study uncovers substantial net benefits associated with the adoption of EMR, including increased efficiency, lower operational costs, and enhanced accessibility to patient data. These results provide a strong foundation for policymakers to prioritize resource allocation for the expansion of EMR systems in healthcare facilities. Additionally, the research emphasizes the essential role of leadership support and policy dissemination as critical elements in fostering acceptance and utilization of EMR among healthcare personnel. In summary, these insights contribute to the formulation of comprehensive and influential health digitalization policies that align with national objectives aimed at improving healthcare service delivery.

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