Journal of
Information Systems Engineering
and Business Intelligence

Vol.10, No.1, February 2024
Available online at: http://e-journal.unair.ac.id/index.php/JISEBI

Evaluation of Success and Failure Factors for Maternal and Child Health in Integrated Healthcare Center Information Systems (IHCIS) Using the HOT-Fit Method

Cicin Hardiyanti [1)], Sri Kusumadewi [2)*], Rahadian Kurniawan [3)]

[1)2)3)] *Department of Informatics, Universitas Islam Indonesia, Yogyakarta, Indonesia*

[1)]cicin.p@students.uii.ac.id, [2)]sri.kusumadewi@uii.ac.id, [3)]rahadian.kurniawan@uii.ac.id

Abstract

Background: Maternal and child health in Integrated Healthcare Center Information Systems (IHCIS) has been implemented in several community health centers. Some have been implemented successfully, but others have failed. Many factors influence the success and failure of IHCIS implementation. Thus, knowing these factors can be used to assist the decision-making process in implementing IHCIS.
Objective: This research aims to determine the factors affecting the success and failure of IHCIS for maternal and child health using the HOT-Fit (Human, Organization, Technology, and Fit) model.
Methods: This research begins with preliminary research to identify the problem, determine research variables, and collect data. It uses quantitative and qualitative approaches. A quantitative approach is conducted at locations that have successfully implemented IHCIS. The data collection instrument uses a questionnaire. A qualitative approach was conducted in locations that were still experiencing failure in implementing IHCIS. Data collection techniques through direct interviews.
Results: Organizational factors do not fully determine the success or failure of the information system. Factors supporting the success of IHCIS are human (user satisfaction and system use) and technological factors (quality of information and the quality of service). However, technology (system quality and information quality) is the main factor in the failure of IHCIS implementation. Problems with system quality include the system login, limited access to the internet, and an information system that is not in accordance with requirements. The perceived information obstacle is that the system is not yet integrated, and the information produced is incomplete.
Conclusion: To satisfy requirements, the information and system qualities must be enhanced. Implementing IHCIS requires an appropriate strategy according to local circumstances and conditions. This approach involves human, organizational, and technological factors.

Keywords: Community Health Workers, Evaluation, HOT-Fit, Integrated Healthcare Center Information Systems, Success Factors

Article history: Received 5 September 2023, first decision 9 January 2024, accepted 20 February 2024, available online 28 February 2024

I. INTRODUCTION

In health services, computerized information systems are crucial for reducing errors in data processing and medical procedures [1] improving the quality of care, increasing efficiency in providing health services, making the right decisions [2], and facilitating every activity, especially in an Integrated Healthcare Center (IHC) [3]. Adopting a computerized information system in an IHC allows midwives and other community health workers to provide high-quality healthcare. Moreover, it allows an IHC to get the right information and take the right action.. However, since this data is frequently lacking, it can be challenging to spot issues, track development, and make wise decisions. Reliable and up-to-date health information is the cornerstone of public health efforts, but this information is often unavailable, making it difficult to identify problems, monitor developments, and make decisions [4]. Therefore, employing computerized information systems in healthcare systems is imperative to reduce the risk of data loss due to the manual recording process [5]. Thus, the data derived from an information system can be used to optimize healthcare systems from technological, organizational, and human aspects.

IHCs monitor toddler development, and pregnant women is conducted through monthly services [6]. By monitoring regularly and periodically, the growth and development of infants and toddlers can be assessed. IHC is an extension of a Community Health Center (CHC), which is supported by a group of people with special skills or qualifications in its operations, especially in the health sector. They are called IHC cadres. Meanwhile, health workers from CHC

* Corresponding author

ISSN 2443-2555 (online) 2598-6333 (print)
doi: http://dx.doi.org/10.20473/jisebi.10.1.152-166

assigned to supervise IHC are called midwives. IHC is important in improving maternal and child health. IHC activities refer to a 5-step system, namely registration, weighing, filling out a health card, counseling, and health services facilitated by cadres and health workers [6]. However, manual recording and reporting of IHC data remains a challenge, so its use is inefficient [7]. Cadres and CHC officers have difficulty analyzing health information data of pregnant women and toddlers with disorders [8]. Another problem is that inaccurate data collection can result in lost data and inaccuracies [9], affecting decision-making, especially in programs for maternal and child health [10]. Therefore, using a computerized information system in an IHC allows midwives and IHC cadres to readily provide quality health services, with appropriate and accurate information, resulting in appropriate actions.

This study aims to evaluate the system to discover the factors affecting its success and failure to improve its performance. Information system evaluation determines whether the system works properly and is useful for users [11]. Effective evaluation allows us to understand how the system works and see what is acceptable to users. The HOT-Fit (Human, Organization, Technology, and Fit) model can evaluate and explain the use of the system from technological, organizational, and human aspects [12].

II. METHODS

Deharja et al. [3] stated that the more appropriate the relationship between technology, humans, and organizations, the greater the potential for implementing information systems. The HOT-Fit model is one of the theoretical framework models widely used for system evaluation in the health sector. The HOT-Fit model was put forward by Yusof et al. [13] by using eight variables to determine the success of the system, namely, system quality, information quality, service quality, system use, user satisfaction, organization, environment, and net benefit to measure the success of information systems. The HOT-Fit theoretical framework can be seen in Fig. 1.

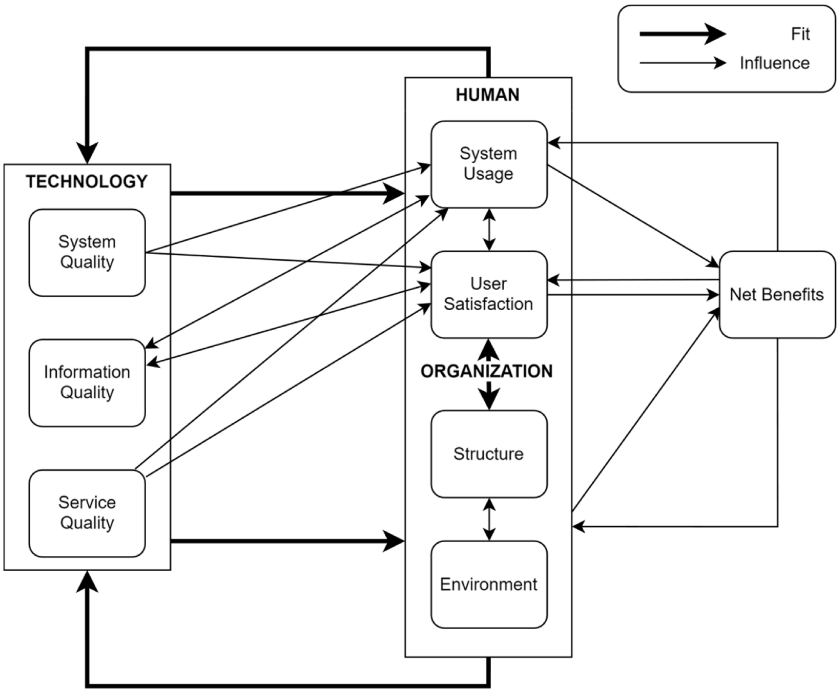

Fig. 1 HOT-Fit framework [13]

This research was conducted in two locations in Daerah Istimewa Yogyakarta (DIY) province. The DIY province was chosen as a research location because IHC information systems (IHCIS) was successfully implemented in one village but failed in another. The first location is in Tirtorahayu Village, Galur, Kulonprogo. The second location is in Bimomartani village, Ngemplak, Sleman. Currently, Tirtorahayu has successfully implemented IHCIS. A successful IHCIS implementation has been demonstrated in Posyandu, Tirtorahayu, since 2021 [14]. Even several other villages in the same subdistrict (Galur subdistrict) are starting to follow the implementation of IHCIS. Meanwhile, Bimomartani was familiar with IHCIS earlier than Tirtorahayu was. However, IHCIS implementation remained a failure. The research stages are shown in Fig. 2.

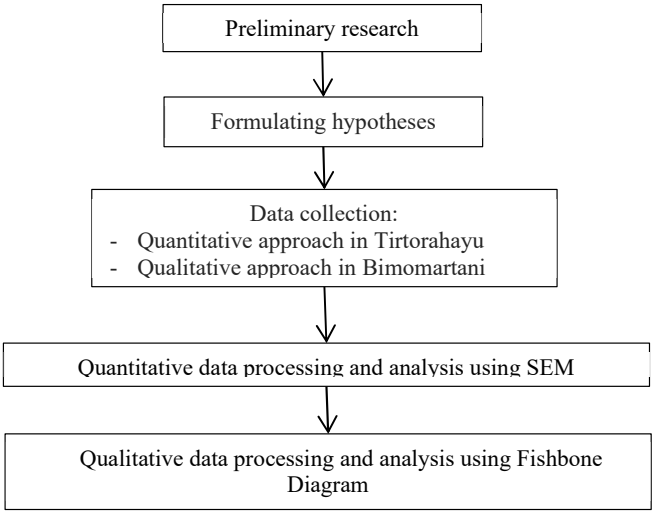

Fig. 2 Research stages

A. Preliminary Research

The first stage is preliminary research. The activity involves interviews with sources to collect initial data and information. Trials of website and android-based maternal and child health IHCIS have been conducted at the IHC in Bimomartani [15]. At first, the IHC in Bimomartani still recorded and reported IHC data manually. Thus, the recorded data was still prone to errors and data loss, making reporting the results of activities at a village level and reporting to the CHC difficult. This is because the recapitulation takes a long time to collect data from 12 hamlets in Bimomartani. The system implementation begins with training midwives and IHC cadres to operate the system. However, after a long process, midwives and cadres recorded data manually again, repeating the same problems attributed to manual recording. Meanwhile, the information system implementation in Tirtorahayu ran smoothly, allowing midwives and cadres to provide fast and accurate services. Moreover, data reporting to Puskesmas was efficient.

The first interview was conducted with the information system admin at IHC in Tirtorahayu. This interview aims to discover how extensively the information system is used, who is involved in using the information system, and how the computerized information system was first implemented. Based on the results of these interviews, the information system helped admin and cadres to easily report IHC data to the CHC. The information system has allowed quick data reporting to the CHC. Moreover, this is also due to the fact that cadres and midwives actively use the IHCIS to process IHC data. The second interview was conducted in the Bimomartani village. Based on the interview results, most cadres and midwives were found to have never tried using an information system because the recording was still done manually, so data collection takes long.

B. Data Collection

To analyze the results of these interviews, this study employed quantitative and qualitative research designs. Quantitative research was conducted at the IHC in Tirtorahyu, where an information system is actively used by cadres and midwives. Thus, a questionnaire can be used as a research instrument. The questionnaire referred to several previous research results, such as research by Yusof et al. [16], Tawar, et al. [17], Abda'u, et.al [18], Suwarno [19], for system quality and information quality factors; Yusof et al [16] for system usage and service; Suwarno [19] Hardiyana et al. [20] for user satisfaction factors; Suwarno [19] for net benefit factors and support of village officials factor [19].

Meanwhile, the qualitative research was conducted at the IHC, where most cadres have never processed data with an information system. Employing a questionnaire as a data collection instrument is impossible. Hence, interview techniques are used in this section.

C. Formulating Hypotheses

DeLone and McLean [21] show the six variables that can influence the success of a system information: system quality, service quality, system usage, user satisfaction, and system benefit [22]. This study uses independent and dependent variables. The variables refer to the variables contained in the HOT-Fit model after the structure and environment variables. Next, it is replaced with the support of village officials variable. Structure variables include culture, politics, hierarchy, control systems, strategy, and management. The environment includes the environment

outside the organization, such as financial sources (owners of capital for system development), politics, government policies, and competition [13]. Based on this, the structure and environment variables are omitted due to broad coverage, making it inappropriate for information systems evaluation at IHC. Meanwhile, this study focuses on IHC at a village level, so the organizational factors focus on the support of village officials, the person in charge of IHC. The independent variables comprise system quality, information quality, service quality, and support of village officials. The dependent variables comprise system usage, user satisfaction, and net benefit. Apart from variables, the hypotheses were also developed using the HOT-Fit framework. The relationship stated in the hypothesis below can be described in Fig. 3.

1) The effect of system quality on system usage

Several studies show that system quality influences the intensity of use [21], [23], [24], [25], [26]. If a system is widely used, then this shows that the system helps users. Likewise, the system is of good quality. If system users perceive the quality of the information system as good, then their perception of the system's usefulness will be high.

H1 : System quality has a positive effect on system usage.

2) The effect of system quality on user satisfaction

Several studies show that high system quality indicates high system user satisfaction [21], [27], [28], [29], [30], [24]. System quality focuses on the absence of interference in the system, the consistency of the system, and the usability of the system. A quality system is expected to be user-friendly, making work easy. This is expected to improve performance and provide satisfaction for system users.

H2 : System quality has a positive effect on user satisfaction.

3) The effect of information quality on system usage

If the information available is of quality, system users will often utilize that information [25], [27], [29], [30]). DeLone and McLean [21] also showed a significant relationship between information quality and intensity of use. An excellent quality of the information system input encourages the intention to use the information system.

H3 : Information quality has a positive effect on system usage.

4) The effect of information quality on user satisfaction

Information quality is an important factor in determining user satisfaction [27], [28], [29], [30], [31]. Information quality refers to the value, benefits, and relevance of the information produced for system users. If the quality of the information is good, system users will benefit, impacting their satisfaction in using the information system.

H4 : Information quality has a positive effect on user satisfaction.

5) The effect of service quality on system usage

Service quality has a significant positive influence on system use [32]. If the party building the system provides good service to users, such as empathy and fast response, then users will feel comfortable using the system. Hence, excellent service from developers will increase system use.

H5 : Service quality has a positive effect on system usage.

6) The effect of service quality on user satisfaction

Service quality has been proven to have a significant positive effect on information system user satisfaction [29]. [33]. Service quality, like system and information qualities, influences user satisfaction. The user of the information system will likely feel satisfied with the system if he believes that the application program provider is providing good service. Therefore, the higher the quality of the service provided, the higher the level of user satisfaction.

H6 : Service quality has a positive effect on user satisfaction.

7) The effect of user satisfaction on system usage

User satisfaction shows liking or annoyance with interactions conducted with the system [27]. [30] If the profits obtained from the system exceed expectations, then user satisfaction will occur, and vice versa. If users are increasingly satisfied with using the system, the level of system usage will also increase.

H7 : User satisfaction has a positive effect on system usage.

8) The effect of user satisfaction on net benefit

User satisfaction has a significant positive effect on net benefits [25], [27], [29]. If someone feels satisfied with the information system used, then they will feel comfortable and safe while using the system, which will help them complete their work.

H8 : User satisfaction has a positive effect on net benefit.

9) The effect of system usage on net benefit

The intensity of system use has a significant effect on net benefits [26], [29]. When a user uses an information system frequently, the user's learning from the information system increases as well. This increase in learning indicates that the system influences the net benefits, namely the quality of users and the organization

H9 : System usage has a positive effect on net benefit.

10) The effect of village officials support on net benefit

IT capabilities, organizational readiness, training and education, top management commitment, competitive pressure, and trading partner support can explain organizational support [34], [35]. IT capability can be defined as the extent to which IT factors benefit the company. Therefore, leadership and top management support, training and education, and organizational culture are needed.

H10 : Support of village officials has a positive effect on net benefit.

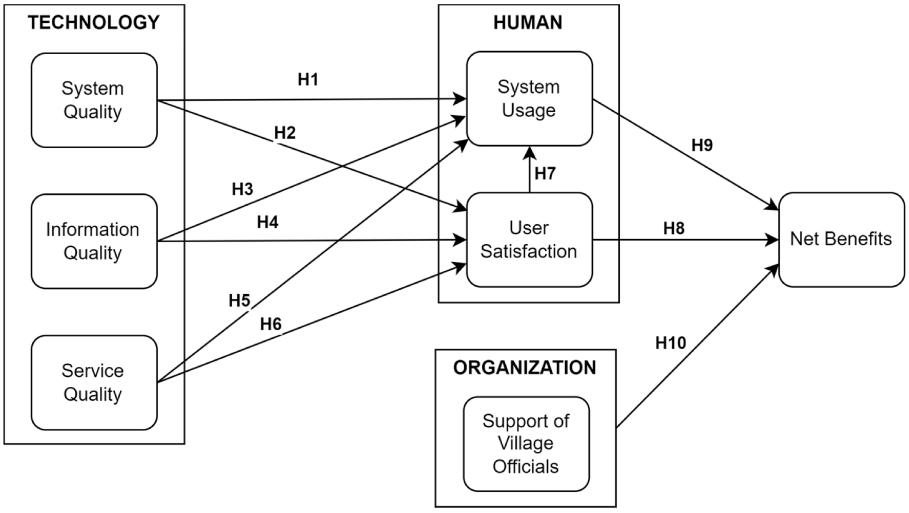

Fig. 3 Hypotheses Model

D. Data Collection

A total of 58 samples were used to collect quantitative data, involving midwives, cadres, members of the Family Well-being Program, and village officials. Respondents from IHC cadres were selected using a nonprobability sampling method, i.e., purposive sampling. This method is used to obtain appropriate and accurate information regarding the use of information systems. The criteria used in this study are cadres who actively use information systems. Based on the interview results, each cadre has their respective duties during IHC activities, such as registration, weighing, counseling, and data input. So, the selected cadres are those who input data or frequently use information systems. The questionnaire used is closed, i.e., the questions given are in the form of opinion-based answers using a Likert scale to measure the respondent's opinion on the problem under study. On a Likert scale, respondents are asked to choose five statement options measured on an interval scale of 1–5. The question options comprise Strongly Disagree (SD) = 1, Disagree (D) = 2, Neutral (N) = 3, Agree (A) = 4, and Strongly Agree (SA) = 5. Table 1 presents the variables, indicators, and questions examined in this study.

Meanwhile, the qualitative data in this study were collected using an unstructured interview technique with the village midwife of the IHC in Bimomartani. The village midwife was chosen as the resource person, considering that the village midwife knew the overall process of the information system trial conducted at the IHC in Bimomartani. Informed consent was obtained from all participants prior to their involvement in the study.

A. Quantitative Data Processing and Analysis

Quantitative and analysis data processing begins with preparing raw data, followed by transforming the data, testing its quality, and determining its validity. The variant-based PLS-SEM method can test measurement models for validity and reliability tests, including structural models for causality tests (hypothesis testing with predictive models). A two-stage examination is conducted to test the proposed model, which is carried out by evaluating the outer and inner models.

TABLE 1
VARIABLES, INDICATORS, AND QUESTIONS

Variable	Indicator		Question
Quality System (QS)	QS1	Ease of learning	Information systems are easy to learn
	QS2	Ease of use	The system display is simple and not confusing
	QS3		The information system is easy to use
	QS4	Security	The system has good security functions
	CS 5	Flexibility	Information systems can be used anywhere
	QS6	Stands the test	The system is very reliable and errors rarely occur in the information system
	QS7	Availability	The system helps me find information easily
	QS8	Response time	The system displays searches quickly
Information Quality (QI)	QI1	Relevant	The resulting information is reliable and in accordance with the data entered
	QI2	Accuracy	The information produced is precise and accurate
	QI3	Completeness	The information produced is very complete and detailed
	QI4	Easy to read	resulting information is easy to read
	QI 5	Quality	The system provides information that can be verified as true
System Usage (SU)	SU1	Training	I attended trainings held to use information systems
	SU2	Consistency of use	I often use information systems to record posyandu data
	SU3	Knowledge	I have good skills in using information systems
Service Quality (SQ)	SQ1	Service handling	Developers resolve the problems encountered until they are resolved
	SQ2	Quick responsiveness	Fast and responsive service from the information system developer
User Satisfaction (US)	US1	Satisfaction	The information system is in line with my expectations
	US2	User experience	I am satisfied using the posyandu information system because the information produced is relevant, very complete and detailed
	US3	System influence	Using information systems helps me complete tasks faster
	US4	Performance	Using information systems makes my job easier
	US 5	Enjoyment	I enjoy using information systems
User Satisfaction (US)	US6	Satisfaction	I am satisfied with the posyandu information system because the data provided is exactly what I need
	US7	Performance	The existence of an information system makes cadres' work easier
	US8	Performance	The existence of an information system makes cadre work results increase
	US9	Reporting	The Posyandu Information System is very helpful in reporting monthly Posyandu data
	US10	Adaptability	Cadres of various ages can use the system easily
Support of Village Official (SVO)	SVO1	Policy	Village officials support training in the use of information systems
	SVO2	Facility	Implementation of information systems supported by device village Device village provide resources, facilities and infrastructure (hardware, software, network infrastructure, maintenance and support technique) Which support use system information
	SVO3		
	SVO4	Planning	Implementation system information has planned with Good by the village
	SVO 5	Strategy	Village officials plan to use SIP to improve posyandu services
Support of Village Official (SVO)	SVO6	Management encouragement	I encourage cadres to use information systems
	SVO7	Knowledge	I know the benefits of using the Posyandu Information System
	SVO8	Strategy	I think that the use of the Posyandu Information System can improve the quality of health services at Posyandu
	SVO9	Policy	I feel that the posyandu in Tirtorahyu Village is ready to use the Posyandu Information System
	SVO10		I am ready to provide support and collaboration for the implementation of the Posyandu Information System in Tirtorahayu Village
	SVO11	Facility	I feel that the hardware and software (hardware, software, network infrastructure, maintenance and technical support) needed for the implementation of the Posyandu Information System is already available at the Posyandu in Tirtorahayu Village
	SVO12	Smooth activities	I think that the use of an information system will facilitate posyandu activities in Tirtorahayu Village
	SVO13	Satisfaction	I feel that the Posyandu Cadre of Tirtorahayu Village is satisfied with the posyandu information system
	SVO14	Training	I support cadres to take part in training in the use of information systems
Net Benefit (NB)	NB1	Job effects	Information systems help with daily work tasks
	NB2	Efficient	Information systems can improve work efficiency
	NB3	Effectiveness	Information systems help achieve goals effectively
	NB4	Communication	Information systems can improve communication between all parts
	NB5	Immediate benefits	Information systems can support the goals of posyandu

The outer model is used to assess the validity and reliability of the model. Validity testing was conducted to determine the ability of the research instrument. Outer model measurements are assessed based on three criteria: convergent validity, discriminant validity, and composite reliability [36]. Convergent validity is based on the loading factor value (correlation of item scores with construct scores) in each construct; the ideal loading factor value is > 0.7 [37]. Meanwhile, discriminant validity testing is assessed by comparing the AVE root value in each construct with the

correlation between one construct and another in the model; the minimum accepted AVE value is 0.50 [38]. Thus, latent variables above 50% can explain the indicators. Besides the AVE root value, discriminant validity also employs the Fornell–Lacker criteria value to see whether there are indicators in the variable that reflect more on other variables than the variable itself. Test reliability, or composite reliability, is used to prove accuracy and measure the consistency and accuracy of the instrument in making measurements. Reliability testing with PLS uses two methods, namely Cronbach alpha and composite reliability. Meanwhile, the inner model is evaluated using R-square to determine the effect of the independent variables on the dependent variable, with a value of 0.75 (strong model), 0.50 (moderate), and 0.25 (weak model) [39].

TABLE 2
CONSTRUCT VALIDITY AND RELIABILITY

Construction/item	Loading** 1	Loading** 2	Cronbach	CR	AVE
System Quality (SQ)			0.955	0.963	0.761
SQ-1	0.851	0.851			
SQ-2	0.804	0.804			
SQ-3	0.845	0.845			
SQ-4	0.942	0.942			
SQ-5	0.929	0.929			
SQ-6	0.878	0.878			
SQ-7	0.891	0.891			
SQ-8	0.829	0.829			
Information Quality (IQ)			0.924	0.936	0.943
IQ-1	0.838	0.838			
IQ-2	0.926	0.926			
IQ-3	0.846	0.846			
IQ-4	0.864	0.864			
IQ-5	0.905	0.905			
Service Quality (VQ)			0.741	0.756	0.793
VQ-1	0.910	0.910			
VQ-2	0.871	0.871			
System Usage (SU)			0.945	0.946	0.901
SU-1	0.923	0.923			
SU-2	0.976	0.976			
SU-3	0.948	0.948			
User Satisfaction (US)			0.910	0.913	0.735
US-1	0.887	0.893			
US-2	0.823	0.828			
US-3	0.843	0.849			
US-4	0.861	0.867			
US-5	0.843	0.849			
US-6	0.103				
US-7	0.108				
US-8	0.104				
US-9	0.095				
US-10	0.105				
Support of village officials (SVO)			0.968	0.991	0.885
SVO-1	0.841	0.943			
SVO-2	0.861	0.966			
SVO-3	0.844	0.947			
SVO-4	0.847	0.951			
SVO-5	0.798	0.895			
SVO-6	-0.385				
SVO-7	-0.390				
SVO-8	-0.438				
SVO-9	-0.346				
SVO-10	-0.415				
SVO-11	-0.404				
SVO-12	-0.421				
SVO-13	-0.438				
SVO-14	-0.411				
Net Benefit (NB)			0.915	0.922	0.745
NB-1	0.877	0.880			
NB-2	0.891	0.892			
NB-3	0.840	0.837			
NB-4	0.869	0.869			
NB-5	0.839	0.836			

B. Qualitative Data Processing and Analysis

Unstructured interviews with midwives were employed to collect data for qualitative processing and analysis. The interview was conducted on June 8, 2023. Based on the results of the interview, technology was found to be the main factor in the failure of information system implementation. The results of the interviews were identified and grouped using a fishbone diagram to help identify and map problems using cause-and-effect analysis.

III. RESULTS

A. Quantitative Data Analysis

Table 2 shows that all items in system quality, information quality, service quality, system usage, and net benefits have a loading factor exceeding 0.7. This means that convergent validity has a high correlation. Meanwhile, 6–10 on user satisfaction have a loading factor below 0.7, and items 6–14 on support of village officials also have a loading factor below 0.7. Thus, these items are omitted from further analysis [38]. All AVE values in the construct range from 0.735 to 0.943. It means that the construct has a satisfactory validity value. Based on Table 3, the Fornell–Lacker criteria values for each indicator reflect their own variables. Meanwhile, the Cronbach alpha and composite reliability values exceed 0.7 and 0.6, respectively. It means the instrument can prove good accuracy and precision in measuring. The results of the outer model analysis can be seen in Table 2, where the outer model in this study was proven to have very good validity and reliability values.

TABLE 3
VARIABLE DISCRIMINANT VALIDITY (FORNELL LACKER CRITERIA)

Factor	Support of village official	Information Quality	Service Quality	User Satisfaction	System Quality	Net Benefit	System Usage
Support of village official	0.941						
Information Quality	0.147	0.876					
Service Quality	0.228	0.652	0.891				
User Satisfaction	0.362	0.697	0.685	0.857			
System Quality	0.507	0.475	0.433	0.584	0.872		
Net Benefit	0.260	0.607	0.571	0.516	0.366	0.863	
System Usage	0.206	0.734	0.719	0.499	0.548	0.594	0.949

TABLE 4
DIRECT INFLUENCE BETWEEN VARIABLES

Path Hypothesis	Path coefficient	T-values	P-values	Results
H1: System Quality – System Usage	0.309	2.795	0.003	Significant
H2: System Quality – User Satisfaction	0.272	1.365	0.086	Insignificant
H3: Information Quality – System Usage	0.536	2.973	0.001	Significant
H4: Information Quality – User Satisfaction	0.345	1.733	0.042	Significant
H5: Service Quality – System Usage	0.515	2.187	0.014	Significant
H6: Service Quality – User Satisfaction	0.341	1.684	0.046	Significant
H7: User Satisfaction – System Usage	-0.408	2.127	0.017	Significant
H8: User Satisfaction – Net Benefit	0.267	1.784	0.037	Significant
H9: System Usage – Net Benefit	0.446	2.916	0.002	Significant
H10: Support of village official -Net Benefit	0.072	0.672	0.251	Insignificant

Hypothesis testing uses the bootstrap procedure, with 5,000 iterations [38] producing a path coefficient to see the direct effect. The hypothesis is accepted if the p-value is below 0.05 [38]. Thus, research results can be accepted if errors in the research process are ≤ 5%. The results of testing the hypothesis with direct influence show two hypotheses without any effect: the support of village officials for net benefits (p = 0.251) and system quality for user satisfaction (p = 0.086). This means that the two hypotheses have errors or do not have an effect of more than 5%, as shown in Table 4.

Based on the results of testing the direct effect of Hypothesis 1, system quality has a significant effect on system usage (p = 0.003). Hypothesis 2 shows that the system quality has no significant effect on user satisfaction (p = 0.086). Hypotheses 3 and 4 show that the information quality has a significant effect on system usage (p = 0.001) and user satisfaction (p = 0.042). Hypotheses 5 and 6 indicate that service quality has a significant effect on system usage (p = 0.014) and user satisfaction (p = 0.046). The results of hypotheses 7 and 8 show that user satisfaction has a significant effect on system usage (p = 0.017) and net benefit (p = 0.037). Hypothesis 9 shows a significant effect on system usage (p = 0.002). Hypothesis 10 shows that the support of village officials has no significant effect on the net benefit (p = 0.251). The results of the direct influence show that almost all variables have a significant influence except for system quality in hypothesis 2 and the support of village officials in hypothesis 10. The indirect test results show that

user satisfaction does not significantly affect net benefit (p = 0.339), although the direct effect shows a significant effect. The test results can be seen in Table 5. The system usage variable (0.730) is a strong model, while user satisfaction (0.634) and net benefits (0.422) are medium models (Fig. 4).

TABLE 5
INDIRECT EFFECT AND TOTAL INFLUENCE BETWEEN VARIABLES

Path Hypothesis	Indirect Influence			Total Influence			Results
	Path Coefficient	T-values	P-values	Path Coefficient	T-values	P-values	
Support of village official -Net Benefit				0.072	0.672	0.251	Insignificant
Information Quality – User Satisfaction				0.345	1.733	0.042	Significant
Information Quality – Net Benefit	0.269	2.519	0.006	0.269	2.519	0.006	Significant
Information Quality – System Usage	-0.141	1.314	0.094	0.395	1.714	0.043	Significant
Service Quality – User Satisfaction				0.341	1.684	0.046	Significant
Service Quality –Net Benefit	0.259	2.584	0.005	0.259	2.584	0.005	Significant
Service Quality – System Usage	-0.139	1.266	0.103	0.376	1.698	0.045	Significant
User Satisfaction – Net Benefit	-0.182	1.994	0.023	0.085	0.414	0.339	Insignificant
User Satisfaction – System Usage				-0.408	2.127	0.017	Significant
System Quality – User Satisfaction				0.272	1.365	0.086	Insignificant
System Quality –Net Benefit	0.161	2.618	0.004	0.161	2.618	0.004	Significant
System Quality – System Usage	-0.111	1.16	0.123	0.198	1.705	0.044	Significant
System Usage – Net Benefit				0.446	2.916	0.002	Significant

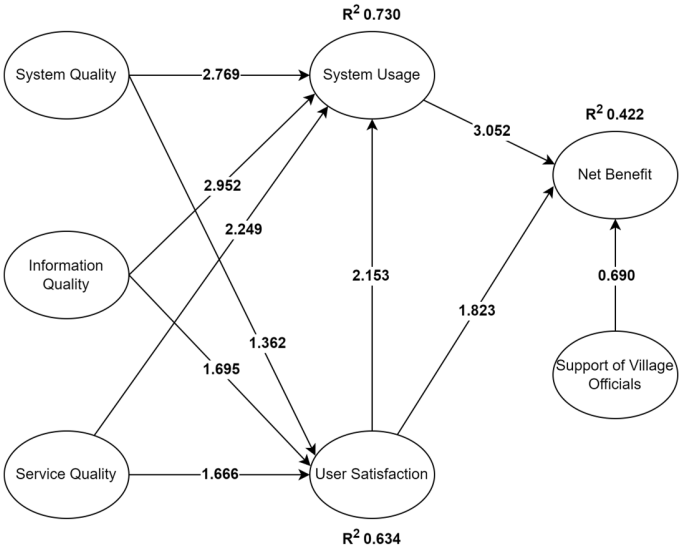

Fig. 4 R Square test results

B. Qualitative Data Analysis

Unlike the implementation in Tirtorahayu, which was initiated by IHC cadres, the IHCIS implementation in Bimomartani was initiated by the development team and village officials. Therefore, in its implementation, the development team must work hard to implement the system well. In the end, implementing IHCIS in this village could not be carried out well. Two main components influence the failure of IHCIS implementation: information quality and system quality. Each component contributes to some problem. A qualitative fishbone diagram is illustrated in Fig. 5.

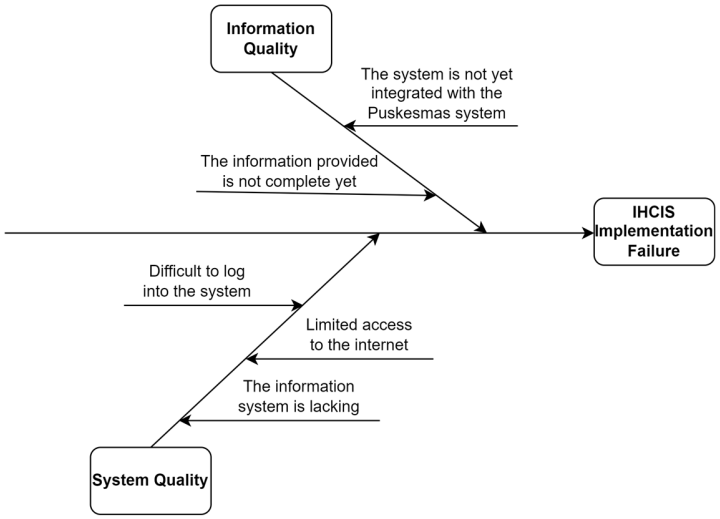

Fig. 5 Fishbone diagram

1) Limited access to the internet

The system being tested requires internet access. However, not all cadres have internet access. Only cadres with a wi-fi signal can access the system, which is one of the reasons why recording is done manually. Hardware, software, human resources, and internet communication networks are the main components of an information system; all components are interconnected to improve system performance [40]. Thus, if the communication network is difficult to access, then the information system cannot be used. Cadres also stated the same thing that limited access to the internet was one of the factors the system was not used.

2) Difficult to log into the system

Another obstacle experienced by cadres is difficulty in logging into the system because not all mobile phones support information system applications. So, cadres are reluctant to use the system. In line with research conducted by Goldfinch [41], a system that is not functioning properly is the cause of system failure, causing user reluctance to use the system. Cadres also expressed the same thing: that they found it difficult to log into the information system.

3) The information system is lacking

There are five main IHC activities: maternal and child health, family planning, immunization, nutrition, and prevention and control of diarrhea. Maternal and child health includes data on pregnant women, nursing mothers, infants, and children under five. There is still a lack of immunization features in the system, so cadres have to input data twice, namely data in the existing system and manual immunization data outside the system. This is also supported by the cadre's statement that the immunization feature is not yet available in the system. Information systems that lack or do not provide the expected benefits can cause information system failure because there will be resistance to using the system [42]. Therefore, it is important to know the system requirements so that the system can provide benefits for IHC.

4) The information provided is not complete yet

Sample information must be recorded when a mother gives birth, whether normal, spontaneous, or cesarean delivery. The data of mothers giving birth are reported to the CHC. Thus, complete information is needed to facilitate the data reporting process. However, this causes the information generated by the system to be incomplete and feeble in assisting the data reporting process to the CHC. According to Daryanto [43], information attending to user needs will help achieve user goals in using information systems. Hence, appropriate information is needed to assist users in reporting and decision-making when problems occur with maternal and child health.

5) The system is not yet integrated with the CHC system

Encoding data using the IHCIS becomes inefficient if the system is not integrated with the existing CHC system. At IHC Bimomartani, IHC cadres still fill out their CHC information system. Currently, IHC data recording is done manually. Then, the data is encoded into the Puskesmas information system. Therefore, IHC cadres hope that the IHCIS can be integrated with the Puskesmas system, allowing cadres to encode data once because the information system meets the needs of the IHC and CHC.

IV. DISCUSSION

The results of hypothesis testing show that support from village officials at Posyandu, Tirtorahayu, does not have a positive effect on net benefits. In this research, support from village officials refers to the provision of hardware, software, network infrastructure, maintenance, and technical support. There are no direct benefits obtained from the support of village officials, i.e., the success of implementing the system in Tirtorahayu does not depend entirely on the support of village officials. The results of initial interviews at the primary research stage show that the implementation of this system had not been planned in advance by the village but was based on the willingness and needs of cadres to facilitate the recording process. This is inversely proportional to the results of interviews conducted at IHC Bimomartani. In Bimomartani, village officials have provided good support by selecting cadres who understand how to use the system. This is done so that the system implementation process can run smoothly. However, even though the support from village officials is good, implementing the information system in Bimomartani remains unsuccessful. Thus, the support from village officials does not play an important role in determining the success or failure of information system implementation.

Information quality has a positive effect on user satisfaction; the better and more relevant the quality of information produced by the system, the higher the user satisfaction [44], [45]. Yusof et al. [16] stated that the quality of information is assessed based on completeness, accuracy, appropriateness, and consistency. Conversely, if the quality of information is poor, then it will reduce user interest because information needs do not affect user satisfaction [46]. This statement concurs with the results of interviews conducted at the IHC in Bimomartani, which indicate that the quality of the lacking information can thwart the implementation of the system because unmet information needs can affect the continued use of the system. The quality of the information also has a positive influence on the use of the system; the better the quality of the information provided, the higher the frequency of using the system. Accurate information quality is a top priority that can affect the success of the system [47]. If these criteria have been met, then the quality of the information is good. Other research states that the quality of information shows how well the system produces information and how presentable it is to users [48].

The quality of information also has a positive influence on system usage. The better the quality of the information provided, the greater the frequency of system use by cadres. Based on the results of data collection at IHC Tirtorahyu, cadres consider that the information produced is helpful due to completeness, precision, and accuracy. The quality of accurate information is a top priority that can influence the success of the system [47]. If these criteria have been met, then the quality of the information is good. Other research states that information quality shows how good the information produced by the system is and how understandable the information on the end users' perspective [48].

Service quality has a positive effect on user satisfaction; the better the quality of services provided, the higher the user satisfaction with information systems [49]. Service quality is a factor in the success of system implementation, especially for those who use internet signals [50]. In line with Lenny et al. [51], good service quality can meet user expectations and increase user satisfaction. Service quality also has a positive effect on the use of the system; providing good services to cadres, such as training in using the system, can improve cadres' skills in using the system. This allows them to consistently use the information system for the IHC data recording process [51].

User satisfaction has a significant effect on the net benefit. It is the feedback given by the user after using the information system. Moreover, other studies concur that user satisfaction is an important factor affecting net benefits [52]. Consistency in system use is a criterion that can be used as a benchmark to determine whether users are satisfied with information systems and whether systems provide benefits [53]. If the information system does not satisfy the user, then the user will not use the system further [1]. User satisfaction also has a significant effect on system use; the higher the user satisfaction, the higher the use of information systems [45]. Information systems are often used to record IHC data in Tirtorahayu. Thus, users are familiar with the system. The system that is often used shows that it is easy to use. If the system is easy to use, then it will satisfy the user.

This study failed to show that system quality plays an important role in determining user satisfaction. Based on the results of the analysis of the answers to the questionnaire, some were neutral regarding data security, system appearance, and accessible information systems. In line with Indrayati et al. [54] there is no effect of system quality on user satisfaction. This differs from Sebetci's research [1] stating that system quality is an important factor affecting user satisfaction. If system users feel comfortable using the system, particularly in terms of usability, system interface presentation, and smart features, then user satisfaction will increase and the system will continue to be used [55]. In line with the results of interviews conducted at the IHC in Bimomartani, the quality of the system has unsatisfactory remarks because it often has errors, especially when logging in to the system. Thus, users do not continue using the system due to the lack of features, such as immunization data and data on mothers giving birth recordings. Therefore, it is necessary to improve the quality of the system, especially in data security, ease of system login, system presentation, and other needed features. This improvement enhances system quality, providing features fully and as needed [56]. The results of this study show that the quality of the system is important in determining its use. Other

studies also reveal that the quality of the system significantly influences its direct use [52]. Even though the user is dissatisfied with the quality of the system, the user remains consistent in using the system because the system continues to provide benefits to the user and the information produced by the system is as expected. The use of the system also has a significant influence on the net benefit. This shows that direct benefits can be gained from using the IHCIS in Tirtorahyu, such as reducing the error rate and streamlining work.

This study has limitations. The qualitative data was gathered over an extended period of time, with a significant gap from the implementation of IHCIS in 2018 in Bimomartani, resulting in the loss of some information. Based on the analysis and discussion, some knowledge regarding IHCIS implementation can be shared with many groups. First, implementing IHCIS requires an appropriate strategy tailored to regional situations and conditions. This strategy considers organizational factors and resources (human and technological) existing at that time. Second, the strategy developed includes (a) readiness and ability to collaborate between the implementation team and the external parties involved, (b) leadership support, (c) support from all team members, and (d) the technical awareness and abilities of each individual on the team.

V. CONCLUSIONS

In general, this research has contributed to the evaluation of factors that influence the success and failure of IHCIS implementation. In particular, this research has shared experiences regarding a successful and failed implementation of IHCIS. This study can become a reference for other regions that wish to implement IHCIS. Based on the end user's perspective, it is revealed that user satisfaction and system usage have a positive effect on net benefit. They are factors that can support the success of the information system at the IHC in Tirtorahayu. Interestingly, user satisfaction and system usage influence each other, i.e., if users are satisfied with the system, the level of system usage will increase. Conversely, if the system does not satisfy the user, then there is no motivation to use the system anymore. Meanwhile, from an organizational perspective, this study revealed that the support of village officials did not play an important role in supporting the success or failure of the IHCIS implementation. This is because the human factor and technology play an important role in implementing the IHCIS. If IHC supports the system but cadres feel reluctant due to unsatisfactory technological factors, then the system will not be used. Conversely, even without the support of village officials, if the cadres have a strong desire to use the system, implementing the information system will be successful. From a technological perspective, system quality does not have a positive effect on user satisfaction. Thus, it is necessary to improve the system, especially data security. If the user feels comfortable using the system (in terms of user convenience, user interface, and other features needed), then user satisfaction will increase and the system will continue to be used. However, system quality has a positive influence on system use. Even though the users are dissatisfied, the cadres are still consistent in using the system because the system as a whole can provide benefits and the information produced satisfies the needs.

One of the limitations of this research is that qualitative data collection was carried out over a period of time quite far from the implementation in Bimomartani. The implementation of IHCIS in Bimomartani was carried out in 2018. This caused some respondents to start losing information. However, we can obtain some key information. Therefore, making an orderly and complete IHCIS implementation logbook is necessary. Further research that must be done is related to IHCIS implementation strategies. Appropriate strategies must be adapted to local circumstances and conditions to implement IHCIS. This approach considers technological, human, and organizational factors. The proposed strategy includes (a) leadership support, (b) readiness and collaborativeness, (c) team member support, and (d) the technical knowledge and skills of each member.

Author Contributions: *Cicin Hardiyanti*: Methodology, Investigation, Data Curation, Writing-Original Draft, *Sri Kusumadewi*: Conceptualization, Methodology, Writing-Review & Editing, Supervision. *Rahadian Kurniawan*: Software, Conceptualization, Methodology.

All authors have read and agreed to the published version of the manuscript.

Funding: This work was supported by the Ministry of Education, Culture, Research and Technology under the Student Thesis Writing Grant Program based on Decree Number 181/E5/PG.02.00.PL/2023 and Agreement/Contract Number 0423.1/LL5-INT/AL.04/ 2023; 004/DirDPPM/70/DPPM/PPS-PTM KEMDIKBUDRISTEK/VI/2023

Acknowledgments: Thanks are given to Mr. Rahmatullah as the Tirtorahayu village official and Mrs. Ritri Prihandayani as the Bimomartani village midwife who has helped provide data/information on the implementation of the IHCIS.

Conflicts of Interest: The authors declare no conflict of interest.

Data Availability: Data can be accessed through a request to the author.

Informed Consent: Informed Consent was obtained, and a detailed explanation was presented in the Methods section.

Animal Subjects: There were no animal subjects.

ORCID:
Cicin Hardiyanti: -
Sri Kusumadewi: https://orcid.org/0000-0002-3008-7253
Rahadian Kurniawan: -

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