Evaluation of the effectiveness of SICANTIK innovationsystem utilization

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Abstract

SICANTIK is an electronic information system created to prevent maternal and child deaths. In 2017, 30 out of 36,313 women died of maternal causesin Sidoarjo Regency. The overall mortality rate was83 deaths per 100,000 live births. This study aims to analyze the effectivenessof SICANTIK utilization by the community health centerofficers asan effort to improve maternal and child health. SICANTIK information system was evaluated using Human, Organization, andTechnology-FitFramework(HOT-Fit Framework) concerninghuman factors. The evaluation wasdoneintwo weeks at four community health centers. The evaluation of SICANTIK health information systemutilization demonstrated thatthe users were midwife coordinatorson the age range of 30-40 years and have worked for more thanthree years. The user satisfaction variableindicated that the midwiveshave maximized the utilizationof SICANTIK application. However, most of the health workerswere not ready to use SICANTIK health information system in the community health centers.

Keywords: *health information system, maternaland child death, SICANTIK, Sidoarjo*

Introduction

Health information system is a system used to manage health information data in a systematic, integrated way to achieve health management standards and to improve health services (1). The regulations used as the legal bases for health information systemimplementation are the Ministry of Health decreesNo. 004/Menkes/SK/I/2003 on the policy and strategy of decentralization in health sectorand No.932/Menkes/SK/VIII/2002 on the development of the district/municipality health information system(2),(3). Health information system includes national and regional health information systems. A national health information system is an information system which directly integrates the existinginformation systems nationally and internationally as well ascombinesvarious systems asaunit to manage the national health system. In addition, the information system developed in each region is called a regional health information system(2),(4).

A regional health information system is a health information systemwhich is directly managed by health department and developed in district, city,or provincial level. Sincea regional health information system manages reports from all health facilities in the city or district, SICANTIK health information system, which is developed in Sidoarjo Regency, becomes a part of regional health information system. SICANTIK information system, in a form of web application, is an electronic information system created to monitor and prevent maternal and child deaths during pregnancy. Maternal death referstothe death of a womandue to complicationsduringpregnancy,childbirth, orpuerperium, except by accidental causes.In 2017, thematernal mortality rate in Sidoarjo Regencywas 82.62 per 100,000 live births, achieving the target of less than 87 per 100,000 live births. The maternal

mortality rate has increased compared to 2016, which was 66.34 per 100,000 live births. The leadingcauses of maternal deaths in 2017 include hemorrhage (40%), pre-eclampsia/eclampsia (34%), tuberculosis (10%), infections(7%), and infectious diseases (5),(6).

The significant number of maternal mortalities in Sidoarjo Regency can beemployed as a reference to analyze the effectiveness of the health information system programutilization tomonitor pregnant women in the regency fromthe beginningof pregnancy tothe delivery. The health information system developedas an innovative electronic system aims to monitor the process of pregnancy until delivery to reduce maternal mortality in SidoarjoRegency (7).Therefore, this study intendsto analyze the effectivenessof SICANTIK electronic information system utilization by community health center officers asan effort to improve maternal and child health.

Method

In analyzing SICANTIK health information system, Human, Organization, and Technology-fit framework (HOT-fit framework) was performedfor two weeks, from January 28 to February 8, 2019. Theinformants of this study werethe health officersofmaternal andchild health section at four community health centersin the Health Office of Sidoarjo Regency.

In this study, interview was conductedto evaluate SICANTIKapplication based on human factors. The interview focused on the readiness of the health officers at the Health Office of Sidoarjo Regencyas the end users of SICANTIK health information system.
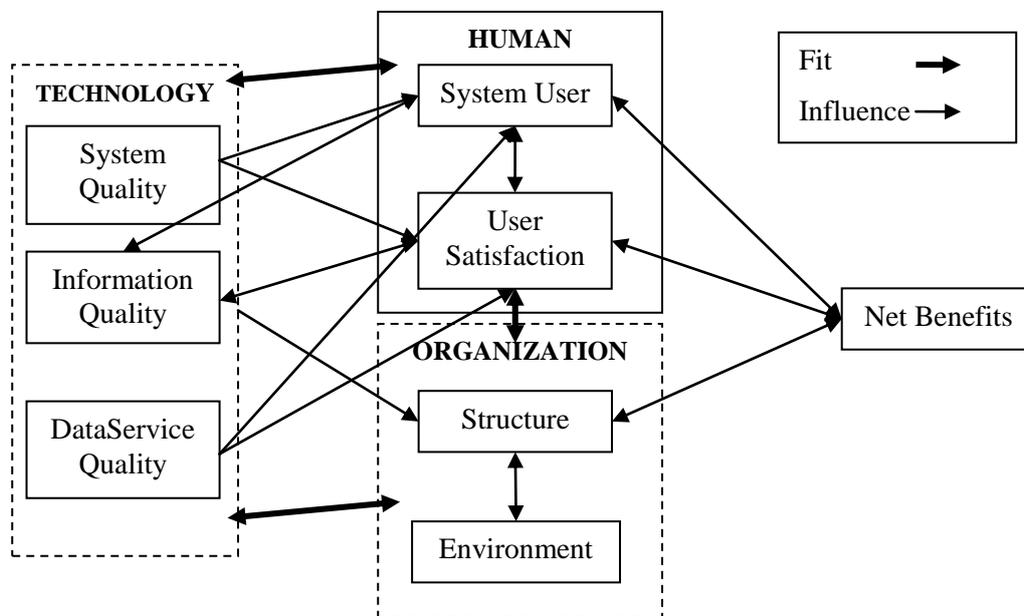

Figure 1.HOT-FitFramework(15)

Results

The findings obtained from this research are as follows:

System Usage

According to (8), a system use dimension is the utilizationof information system output by the system users. In this framework, the use of the system relates to 3 (three) things, including:

System Users

SICANTIK applicationwas utilized by midwives, and doctors in the age range of 30-40 years old and have been working for more than three years. They have been trained tooperatethis health information system.

Level of Usage

SICANTIK health information system had been implemented in the community health centers of Sidoarjo Regency for onlyone year after being socialized by the Health Office of Sidoarjo Regency. It was due to the occurrence of some errors which were directly repaired by the system developer.

Usage Acceptance

The result demonstrated that there were three indicators in the usage acceptance. The first indicator was self-confidence, which isrelated to the ability to use smartphones as supporting tools, the ability to input and store data, and the ability to search data about the high-risk pregnancy cases. The second indicatorwas complexity of the system,in which the midwives considered this application wasquite complex particularly in understanding the data format. In addition, the third indicator wastechnological innovation, which isrelated to the curiosity about the development of the system.

The following is astatement of an informant duringthe interviewthat supported the findings:
"I usually use SICANTIK to input data, butit takes about 30 minutesto finish it due to thecomplexity of the system andthe difficulty on the mobile phone reception. Even Wi-Fi does not help, I don't know why. When I am busy in the village and have to go to the community health center, I have to carry all the data of the pregnant women that I have examined at home and then input them into the system. Inputting data at the moment the patients being examined is impossible sincethere are many details Ihave to take note" (S, 45).

User Satisfaction

The issuemostly experienced by several midwives in some of the community health centersofSidoarjo Regency wascaused by the failure of SICANTIK health information system in supportingthe midwives to completetheir daily tasks, specificallymaking the reports on Local Area Monitoring for Maternal and Child Health (PWS-KIA). It happened due to the double reporting mechanism, the necessity to submit the paper-based manual reports apart from electronic reports using SICANTIK application. Even though, in fact, themanual reports were exactly the same as the electronic ones as stipulated and supported by the Health Office of Sidoarjo Regency. Thus,so far, there wasnosanction for violating the completion of the manual or the electronic PWS-KIA reports. The obligation to make double reports certainly burdened the midwives and caused work completion delays and work quality degradations.

The following are the statements of two informants given in the interview on the user support experience during the systemimplementation:
"I feel that SICANTIK provides great benefits to support my daily work and helps me produce good quality data" (A, 35).
"It surely takes longer time to complete the datamanually than to input them into SICANTIK, but completing both of them is required" (L, 41).

Discussion
Demographic factors in the acceptance of SICANTIK information system
The demographic factors in this study comprised two variables, that isage and length of service. Most of the midwivesparticipating in this study were adults (41-49 years) and have worked for a lengthy period (21-30 years). Sufficient age and adequatelength of service suggested that they wereadept in monitoring and recording pregnancy. Therefore, technological innovation wasexpected to simplify their works. Nevertheless, the implementation of SICANTIK health information system certainly became a stressor for the midwives, especially for those who were slow to adapt to technological developments.
According to a research conducted by (9),(10),sufficient age and length of servicecould affect someone's emotional maturity and adaptation process in accepting stressors. The statement is also supported by a research done by(11)suggesting that age had a significant influence on the intention to incorporate technological innovation. Itindicated that young generations had more interest in the development of technological innovation and in the sustainable implementation of the system

Personal characteristics in the acceptance of SICANTIK information system
The result presented three indicators of acceptance. The first indicator was self-confidence, which isrelated to the ability to use smartphones as work supporting tools, the ability to input and store data and the ability to look for data about high-risk pregnancycases. The self-confidence indicator was classified as moderate. The second indicator was complexity of the system,which is linked to the difficulty in understanding data format. This indicator was considered asquite complex because extra time were required to complete additional task. The final indicator was technological innovation, which isassociated tothe curiosity about the system development.This indicator was rated as moderate, since the new technology was well-accepted.Those perceptions probably occurred because midwives as the new users of SICANTIK application feltincompetent inrunning the system. The sustainable usage of SICANTIK health information system required training to improve the mastery of data input skills.The results of the frequency distribution analysis on those three indicators constituting the personal characteristics variable pointed that the highest indicator was complexity, indicatingthat the majority of the informants experienced difficulties when running SICANTIK health information system.
Research carried out by (12),(13)stated that the complexity of the system utilization wasidentified as a critical factor that mightinfluence one's decision inthe utilization of innovative technology. Complexity refers to the degree to which an innovation is considered as difficult to use due to the lack of skills and knowledge. Therefore, the preparation of the technicality and the complexity of the system needed to be considered more closely.

Difficulties in understanding SICANTIK information system
Midwives in the community health center of Sidoarjo Regency felt that SICANTIKapplication was difficult to learn and run. It was hard for them to remember the general system procedure in inputting the data and operating the system. This issueoccurred due to the fact that SICANTIKwas a new information system used to record pregnancyand maternal cases in the community health center,which caused a lot of difficulties. As an online healthinformation system, SICANTIKrequired a fast and stable internet connection to input the data into the system. However, lack of internet access might delay the data inputting process. To overcome the internet access problem, the community health center had actually providedgood quality Wi-Fi connection, but most of the midwives could notuse it optimally because there were too many patients visitingthe community health center, and thus they had to continue the process in their free timeat home. Sincethe data input process was hardly ever completed inonesitting, the possibility of data lost increased because theymight forget to input the data or have slow internet connection. Technical issues encountered by the new users became the most probable weaknessthat mighthold back the sustainability of SICANTIK health information system implementation.
Research done by (14)explained thattheissues previously mentioned were all experienced by the midwives when running SICANTIK health information system. It wasin linewith the previous research discussing the difficulties in studying the system, stating that the users of the system felt both physical and mental work burdens in learning information technology.

User support for SICANTIK information system
In clinical practice, health workers usuallyspend most of their time to take care oftheir patients, sothat they refuse to utilizethe health information system because they did not have extra time to record the data into the computer. Therefore, designing a user-friendly information system is necessary to facilitatehealth workers. When they thoughtthat an information system was easy to use and to understand, it wouldaffect their perceptions of the usabilityof the information system. Midwives in the community health center ofSidoarjo Regencyconsidered that SICANTIK health information system could notimprove their performances in completingdaily tasks, particularly those relatedto the PWS-KIA reports. It was because they hadto complete the double reporting mechanism, submitting both paper-based manual reports and electronic reports usingSICANTIK health information system, although both reports contained the exactly similar information. However, so far, no sanctions were given to those violatedthe completion of themanual or electronic PWS-KIA reports. The obligation to

do double report certainly burdened the midwives, resulting in work completion delays and negatively affecting the quality of work outcomes.

Conclusion

The evaluation carried out based on human factors in four community health centers incorporatingSICANTIK health information system demonstrates that the system isused by the midwife coordinatorsin the age range of 30-40 years with more than three years work period. The user satisfaction variable choosing them has maximized the use of the SICANTIK application. Therefore, afterevaluatingthe utilization of SICANTIK health information system based on human factors, it can be concluded that most of the health workers are not ready yet to utilize SICANTIK health information system in the community health centers.

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