

**ISSN 2597- 6052**DOI: <https://doi.org/10.56338/mppki.v7i7.5311>**MPPKI****Media Publikasi Promosi Kesehatan Indonesia**  
*The Indonesian Journal of Health Promotion***Research Articles****Open Access****Tuberculosis Information System: Evaluation Approach with HOT-FIT Framework****Yeni Riza<sup>1\*</sup>, Alva Dendy Doan<sup>2</sup>, Hilda Irianty<sup>3</sup>, Edy Ariyanto<sup>4</sup>**<sup>1,2,3,4</sup>Universitas Islam Kalimantan (UNISKA) Banjarmasin, Kalimantan Selatan\*Author's correspondence: [yeniriza@uniska-bjm.ac.id](mailto:yeniriza@uniska-bjm.ac.id)**Abstract**

**Background:** The increase in the number of pulmonary TB cases increases the risk of illness and death, which indicates the need for TB prevention and control efforts through online recording and reporting of cases using the Tuberculosis Information System (SITB). However, there are several challenges in implementing the use of SITB, which results in delays in reporting TB cases and disrupts TB prevention and treatment efforts.

**Purpose:** The purpose of this study was to describe the use of SITB with the HOT-FIT Framework in the UPT Puskesmas Lemo area, North Barito District, Central Kalimantan.

**Methods:** This research applies qualitative research methods with a phenomenological approach. The study population consisted of five informants who were selected deliberately (purposive sampling), including the Head of Puskesmas, TB Program Manager, TB Program Management Assistant, General Practitioner, and Laboratory Officer.

**Results:** The results highlight that the use of Tuberculosis Information System (SITB) applications faces a number of supporting and inhibiting factors, which eventually lead to delays in reporting. Although the availability of adequate human resources (HR) is one of the supporting factors for reporting tuberculosis (TB) cases through the SITB application, the unstable internet network and lack of facilities and infrastructure such as inadequate software are also inhibiting factors.

**Conclusion:** Puskesmas Lemo has participated in the successful implementation of TB case recording and reporting activities using SITB, but there are several aspects that still need to be improved and followed up. Thus, the Lemo Health Center still needs regular guidance and monitoring by the Health Office in carrying out its functions.

**Keywords:** Use of SITB; Hot-Fit Framework; Tuberculosis

## INTRODUCTION

Tuberculosis (TB) is a major global health concern that affects over 10 million people annually and is one of the top 13 causes of mortality worldwide(1–3). The presence of TB cases that have not been detected, identified, or even reported has the potential to be the cause of an increase in the number of recorded TB cases(4). Tuberculosis Information Systems (SITB) is an integral part of TB elimination strategies by recording and reporting cases online, enabling more efficient and targeted TB treatment and treatment(5,6). Globally, TB is the leading cause of death from infection. It is estimated that TB causes disease in about 10.6 million individuals and causes death in as many as 1.4 million people. In Indonesia, the number of TB cases reached 969,000, or about 9.2% of the total cases globally, making it the country with the second highest rank in the number of cases. The prevalence of TB in Indonesia has increased during 2020-2021 by 18% accompanied by an increase in mortality rate by 55%. The prevalence of TB in 2022 is estimated to reach 724,390 cases (75%) or there are still 25% who have not been notified; both unreached, undetected, and unreported(4). Given the magnitude of the impact caused by TB, an elimination strategy is needed to achieve certain targets by increasing the coverage of TB discovery and treatment through Minister of Health Regulation No. 67 of 2016 concerning Tuberculosis Control Recording and Reporting of TB Events, namely the Tuberculosis Information System (SITB)(6). Data from the Ministry of Health of the Republic of Indonesia (2020) states that CDR in Indonesia in 2019 decreased when compared to 2018, which was 67.2%, while in 2019 it was only 64.5%, but when compared to 2017, the discovery of TB cases was only 42.8%(7). SITB must be used by all stakeholders in health facilities, including UPT Puskesmas Lemo, North Barito Regency, and Central Kalimantan.

Based on preliminary research results, the level of search and treatment of TB cases in the Lemo Health Center work area has only reached 70%, while the national target for search is at least 90%. Likewise, the success rate of TB treatment and Tuberculosis Prevention Therapy (TPT) has a minimum target of 90% and 80% respectively(4). There are several obstacles to the use of SITB at the Lemo Health Center, namely a slow system at a certain time that can cause input carried out outside the officer's working time, incomplete data, and incomplete features in presenting information forms. There are obstacles in the use of SITB, so more in-depth studies and evaluations of information systems are needed(8). Evaluation of the use of SITB can be explained through *the Human Organization Technology (HOT)-(Fit) Model*. The components in this model are human, organization, and technology. The use of the HOT-Fit Model is still rarely used to measure the success of information systems in local government activities, one of which is SITB(9). Research related to the use of the HOT-Fit Model in the use of SITB was conducted by Nur Syarianingsih Syam (2022) which revealed that the success of using an information system can be measured comprehensively from the user side and the organizational control provided as well as the balance of relationships in each aspect(6). There are obstacles in the use of SITB, so more in-depth studies and evaluations of information systems are needed. Based on this background, this study aims to evaluate SITB with the HOT-FIT Framework in the UPT Puskesmas Lemo area, North Barito Regency, Central Kalimantan.

## METHOD

This research uses qualitative methods with a phenomenological approach. This research was conducted at the Lemo Health Center, North Barito Regency, Central Kalimantan for 3 months (October-December 2023). The independent variable in this study is in the form of human factors (*man*), organization (*organization*), and technology (*technology*) with the dependent variable being the use of the SITB application. The determination of research informants using *purposive sampling* found 5 people who met the research inclusion criteria, including the Head of Puskesmas, TB Program Holders along with assistants, laboratory officers, and general practitioners. Data were collected using interview methods and analyzed using triangulation of sources, methods, and data. The research instrument uses interview guidelines. The question points developed refer to the domain of behavior according to Bloom's taxonomy (10). In addition, the equipment needed in this study is in the form of *mobile phones* and cameras to document data sources in the form of video.

## HASIL

This study found the characteristics of interviewed informants can be seen in the following table:

**Table 1.** Characteristics of informants

No	Informer Code	Types of Informants	Characteristic
1	I-01	Head of Primary Health Care (Puskesmas)	39 years old with the last educational background S1 Medicine. He will serve as Head of Puskesmas starting January 2023.

No	Informer Code	Types of Informants	Characteristic
2	I-02	TB Program Holders/Nurses	31 years old with the last educational background S1 Nursing. He will serve as TB Program Holder starting January 2023
3	I-03	TB Program Holder Assistant	25 years old with the last educational background S1 Public Health. He will serve as Assistant TB Program Holder starting January 2023
4	I-04	General practitioner	28 years old with the last educational background S1 Medicine. He will serve as a General Practitioner from January 2023. He plays a role in providing diagnosis of TB patients which then the data will be reported to laboratory staff
5	I-05	Laboratory Officer	22 years old with the last education background DIV Health Analyst. He will serve as a Laboratory Officer starting in January 2023. He plays a role in collecting and reporting TB case data

### Human Factor

The obstacle experienced in the human aspect is that the training activities carried out do not include all health workers who play a role in the use of SITB so SITB data input and reporting only rely on one person who received training and can operate the SITB application, namely the TB Program Holder. This affects the timeliness of report submission considering that the case data/information entered into the application is not small.

"...until now we are only one ODT" (I-01, Head of Puskesmas)

"...the new one in OJT (*On the Job Training*) is just me managing the program, for like (*like*) doctors, analysts, and data inputters are still not in OJT, sir, so that's my problem in the SITB application" (I-02, TB Program Manager)

"...So we are also inputs, yes in terms of input, doctors, and analysts, actually no one has received training..." (I-04, General Practitioner)

"...The problem is that I am still not OJT so I can't input the test results directly into the application. So far, those who input the results of the examination are the ones who manage the program" (I-05, Laboratory Officer)

Based on the results of the interview above, it can be concluded that the human factor (man) which includes the use of the SITB application system experienced problems in the form of delays in reporting caused by the lack of optimal implementation of the SITB use training program in the UPT Puskesmas Lemo area, North Barito Regency, Central Kalimantan. The factor that supports the success of using SITB is the availability of health workers who are considered capable of handling TB problems, starting from the examination stage, and diagnosis to finding TB cases.

The results of research by Nur Syarainingsih Syam (2022) show a difference, namely the SOP or procedure for using the system attached to the program menu or not in the form of hardcopy (book)(6). In addition, SITB training activities were given to 3 people, namely programmers, assistant programmers, and laboratory officers but only ever held once, namely in 2020. The training provided to the 3 people is considered sufficient and is expected to be able to transfer knowledge if at any time there is a rotation or mutation of officers to other health facilities(6). However, the similarities in the research conducted by researchers have similarities with the research conducted by Yunita Ratnasari et al (2021), namely that the socialization of the TB program has only been carried out 1 time, and not all officers have participated in the socialization. Socialization is organized by the management with a pulmonary specialist as the speaker. Not all officers have received socialization about recording TB patients so they are not proactive in recording TB patients. In addition, not all doctors get socialization about the TB program in hospitals so there is no instruction for nurse assistants to record TB patients(5). According to Etlie (11), employees need to have innovative knowledge of IT to adopt more advanced information technology. Yep (12) emphasizes that within organizations, sectors that require a lot of information have a greater need to use Information Systems (IS). Porter and Millar emphasize that the greater the intensity of information, the greater the potential for better use of information systems (13)

Based on the results of the research, the recommended effort to deal with problems in human factors (man) is to provide training programs to all human resources who play a role in the success of TB reporting using the SITB application to be able to achieve national achievement targets and reduce the incidence of TB by maximizing treatment efforts for TB patients in the UPT Puskesmas Lemo area, North Barito Regency, Central Kalimantan based on the reporting carried out.

### Organizational Factors

The constraints related to the availability of infrastructure facilities to support the implementation of the

system are in the form of the availability of adequate computer equipment and a stable internet network to support reporting using the SITB application, according to the following interview excerpts by informants.

"...then there is a request for tools, facilities and infrastructure from the Health Office such as laptops still do not have for me to manage the program and install the internet network" (I-02, TB Program Manager)

"...Demand for facilities and infrastructure from the Health Office such as laptops and internet network installation." (I-03, TB Program Management Assistant)

"...Then the request for tools, facilities, and infrastructure from the Health Office, such as laptops and internet network installation" (I-05, Laboratory Officer)

Based on the results of the interview above, it can be concluded that the obstacles faced by the Lemo Health Center are not optimal training activities and the availability of inadequate facilities. Several informants said that they had provided submissions/inputs to the Health Office to be able to fulfill the completeness of facilities and infrastructure in supporting the successful use of the SITB system so that reporting TB case findings could be carried out optimally and meet the specified target targets. The results of research by Nur Syarainingsih Syam (2022) show a difference, namely there are sufficient health workers with a number that is by the needs of SITB users at Puskesmas. The use of the SITB application itself has been monitored and evaluated directly by the Health Office, every 3 months even though it is not routinely carried out due to pandemic constraints(6).

In addition, research by Yunita Ratnasari et al (2021) shows that there are differences, namely the facilities and infrastructure needed in recording and reporting, including manual recording books, daily patient visit registration books, patient medical records, and visit data from SIMRS(14). The person in charge of the internal network of each unit records the manual report book. Furthermore, the report will be entered into the SITT and SITB by the reporting officer. Inpatient recording in inpatient is carried out by the head of the room after getting a report from the nurse who was on duty at that time. The flow of special reporting for outpatient TB patients itself has not been regulated in hospital regulations, so the person in charge of the outpatient internal network has difficulty tracking TB patients. Nurses who are assistants in each poly also do not report the findings of TB patients to the person in charge of outpatient recording(5).

Based on the results of the research conducted, the recommended effort in dealing with this problem is to provide *backup data* if there are signal problems in sending TB case reports *online* so that reporting will continue to run and will be updated or re-inputted when the SITB application can be used. In addition, the planning stage for conducting training activities is expected to include all human resources or health workers who play an important role in reporting TB cases using the SITB application and ensure that all human resources or health workers understand the guidelines for using SITB so that the reporting system does not only rely on one or several people who have received training.

## Technology Factors

The use of the SITB application at the Lemo Health Center experienced problems in the technological aspect, namely signal interference and *the maintenance process* in the application resulting in delays in sending reports, according to the results of the following interview excerpts.

"For problems, usually if it is late from the network, sir, there is application maintenance, sometimes usually up to 3 days or 1 week" (I-02, TB Program Manager)

"Yes, for inputting my data for e... in the application for its obstacles, it is usually a problem in the network, there is application maintenance for 3 days to 1 week," (I-03, Assistant TB Program Manager)

"If what makes it not optimal, the real thing is more to signal constraints, huh. Signal problems, the application is also often there, it can't be opened, so the input is disrupted" (I-04, General Practitioner)

Based on the results of the interview above, it can be concluded that the use of the SITB application experiences obstacles in technological aspects, namely signal interference and *maintenance processes* in the application so there is a delay in sending reports, even though manual recording is carried out as a data back-up. However, the process of sending reports to the Central Kalimantan Provincial Health Office takes time. This will affect the quality of reporting the discovery of TB cases in the Lemo Health Center area which ultimately cannot reach the target. The results of research by Nur Syarainingsih Syam (2022) show that there is an equation, namely that SITB is easy to operate, however, there are constraints in using the system, namely the speed in processing data decreases at certain times or hours due to too many users accessing SITB, but research by Nur Syarainingsih Syam (2022) states that there is support from the Yogyakarta City Health Office through a joint a group, so that obstacles related to the use of SITB can be directly conveyed at the forum, including obstacles in the form of loading or maintenance of the reporting system(6).

Based on the results of the research conducted, the researcher provides recommendations in the form of recording documents or case reports that can be sent via WhatsApp, considering the use of WhatsApp which is commonly used by various groups. The reporting document file can contain the same information as the information in the SITB application, so the Central Kalimantan Provincial Health Office will adjust the data received from the Lemo Health Center with a recap of the data in the SITB. This recommendation considers that manual recording that must be sent to the Central Kalimantan Provincial Health Office takes time and still has the opportunity to cause problems with reporting delays. In addition, considerations related to network problems affect the SITB application server so that it cannot function or maintain. It is expected that sending TB case discovery reports via WhatsApp can minimize the incidence of reporting delays.

Based on the analysis of research results compared with previous research results, it can be concluded in Table 2 below.

**Table 2.** Research Results

<b>HOT-FIT Model Framework</b>	<b>Research Results</b>	<b>Nur Syarainingsih Syam (2022)(6)</b>	<b>Yunita Ratnasari (2021)</b>
Manusia	Training is not fully provided to health workers who play a role in the use of SITB	Internet network disruption or application maintenance	Training is not fully provided to health workers who play a role in the use of SITB
Organisasi	The availability of facilities and infrastructure is inadequate, the lack of the number of devices owned by the puskesmas	There is support from the Yogyakarta City health office regarding training programs on the use and monitoring and evaluation activities	Not optimal reporting using journal books
Teknologi	Adanya gangguan jaringan internet ataupun maintenance aplikasi	Internet network disruption or application maintenance	-

## DISCUSSION

### Human Factor

The Tuberculosis Information System (SITB) is a system that must be used by Puskesmas to facilitate TB case recording and reporting activities so that disease handling is faster and on target. Although SITB has feasible and appropriate technology to be used as a form of recording and reporting TB cases electronically, it's just that its use has not been optimal in utilizing and using all available features which will then cause delays in reporting. The training provided to all health workers who play a role in using SITB is considered important so that it does not only rely on one or a few people who are considered capable of operating SITB because they have received training. This is because of the large amount of data that must be inputted and the input is not only from one unit but needs the help of related units such as pharmaceuticals or laboratories, even involving other parties to overcome problems that occur(15).

The human factor (*man*) in the use of the SITB application in the UPT Puskesmas Lemo area, North Barito Regency, Central Kalimantan, explains the use of an online reporting system using SITB. Some of the HR (Human Resources) who play a role in using the SITB application are the Head of the Puskesmas as a coordinator who validates the results of TB case discovery reports, the TB Program Manager who plays a role in handling TB problems in the Puskesmas area and is responsible for reporting case findings submitted to the SITB application, the TB Program Manager Assistant who assists the work of the TB Program Manager including the use of SITB, General Practitioners play a role in providing diagnoses to TB patients and Laboratory Officers who play a role in collecting and reporting TB case data. This obstacle in the form of non-optimal training activities occurred at the Lemo Health Center where training activities on the use of SITB were only given to TB program holders, even though the use of SITB relied on many parties so that the problem of delays could be avoided. This delay in reporting affects the quality of reporting which cannot reach the national target of only 70%(9). In addition, delays in reporting will affect logistical planning and other TB case-handling actions so TB treatment activities will also experience delays.

### Organizational Factors

One of the determinants of the success of a program is the achievement of predetermined targets. The achievement of the target of a program implemented has an impact on the organization or agency because if the program has been able to achieve the target, the organization can plan or achieve other targets that are a continuation

of the program. The implementation of a program requires good planning and strategy to be able to achieve the targets that have been set, including the availability of adequate facilities and infrastructure to support the success of program implementation, including the implementation of the use of SITB as a TB recording and reporting system(16).

The organizational factor in the use of the SITB application explains efforts to maximize the use of online-based reporting using the SITB application in the UPT Puskesmas Lemo area, North Barito Regency, Central Kalimantan. The skills of human resources in using the SITB application will improve the quality of case discovery reporting which will then affect the determination of the number of drugs and treatment efforts for TB patients. The assessment of organizational components is assessed from the organizational structure and organizational environment in this case in the form of financing. From the organizational structure indicator, the number of SITB user officers at the Lemo Health Center is considered not optimal because there is a lack of devices in the form of laptops and computers to operate the SITB application. This will affect the quality of case reporting which will cause delays. In addition, the Lemo Health Center always carries out a monitoring and evaluation process from the North Barito Regency Health Office, namely verification of health data is usually carried out at the Health Office level periodically within 3 months. Supervision or monitoring carried out on the use of the system is considered important to determine the effectiveness of system implementation and produce knowledge that can be used to improve information systems(6).

### Technology Factors

Efforts that can be made to overcome TB disease nationally are recording positive trends that can be done through the TB Information System (SITB) because information or data related to the *Case Detection Rate* (CDR) can be accumulated from recording and reporting in SITB. In addition to being able to provide an overview of TB disease trends, the use of SITB will facilitate the monitoring function and ensure the treatment of TB patients is carried out(15,16). However, if there is a shortage in both the number of devices and other supporting factors, it will affect the quality of the reporting carried out, one of the obstacles encountered at the Lemo Health Center is the lack of computer equipment and adequate internet facilities will be related to the length of access time(15). Reporting that can only be inputted by one computer causes officers to often complain because of human error and reporting must be inputted at a later time(17).

Network constraints that occur at certain times in the process of inputting data are estimated to occur due to the large number of users accessing SITB at the same time. The results of this study are in line with previous research, namely, there are constraints on the system when many users in hospitals who access hospital information systems become more loading, thus hampering service delivery. In addition, the information available depends on the accuracy of the data inputted by health workers. Quality and well-integrated health service information is usually sourced from well-documented clinical data. The quality of information depends on 3 things, namely information must be accurate, timeless, and relevant. The information must be accurate, error-free, not misleading, and must reflect intent;(6). Based on the results of the research above, it can be concluded in Table 3 below.

**Table 3.** Discussion

<b>Component</b>	<b>Discussion</b>
<b>Human</b>	Training is not fully provided to health workers who play a role in the use of SITB so reporting using SITB only relies on those who have received reports. This causes delays considering that the data sent to the SITB page is not small
<b>Organization</b>	Facilities and infrastructure in the form of the amount of software (computer or laptop) are not sufficient.
<b>Technology</b>	There are signal problems and application maintenance that hinder the delivery of reports to the web even a week, so the puskesmas sends offline using manual reports to the Health Office of North Barito Regency and Central Kalimantan Province. But usually sending manual reports also takes time so that there will still be a risk of blockage.

This study has advantages and disadvantages. The advantage of this study is that it provides an overview of the use of the SITB application in the Lemo Puskesmas area using components of the HOT-Fit Model, while the drawback of this study is the limited information related to the use of the reporting system using SITB only in the Lemo Puskesmas work area so that the results of the picture obtained cannot be generalized to other places or puskesmas, considering geographical characteristics to policies that may be different between Lemo health center and other puskesmas in North Barito Regency.

## CONCLUSION

The problem of using the Tuberculosis Information System with the HOT-FIT Framework in Indonesia, which includes developing countries, namely limited resources, accessibility of communication infrastructure, public awareness, cultural diversity, data availability, institutional support, and regulatory policies that often change can be threats and opportunities, so health services must have a good response in this regard.

## ADVICE

This study recommends the Central Kalimantan Provincial Health Office and the North Barito District Health Office increase software availability and conduct training for all health workers involved in Tuberculosis Information System (SITB) reporting. Puskesmas Lemo is also advised to establish cross-sector cooperation and propose training programs in the use of SITB.

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