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Journey On Flattening The Curve: The Actors And Networks Of Indonesian Contact Tracing System

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Abstract: The contact tracing system implemented in Indonesia is called SILACAK, a modified version of DHIS2. SILACAK as a contact tracing system platform created a dashboard following national guidelines, which is a tool to monitor the COVID-19 cases in Indonesia and support decision making. The role of SILACAK has throughout several journeys and some changes that can be implemented by several actors involved such as the developer team, government, health workers, and also society. To analyze the connection between all aspects that affect the SILACAK system, A framework is needed to deeply review which can be a historical artifact on the system. Actor- network theory (ANT) is the best practice to know about how networks come into being, to trace what associations exist, how they move, how actors are enrolled into a network, how parts of a network form a whole network and how networks achieve temporary stability.

Keywords: actor-network theory, contact tracing, networks.

1. Introduction

The pandemic has been affecting not only the health care system but also the Socio-economic sector that was built by overall county will be disfunction for a while because of Lock-down and other terms that limited socio-economic activities [1]. Hospitals and clinics will be overcrowded caused by patients that lack facilities and limited of health workers that support the patient. All the problem affects developing countries including Indonesia that have not responded well to the crisis because of COVID-19 in healthcare and socio-economic system [2]. After more than 18 months the COVID-19 was first declared in Indonesia, the country had reported more than 4 million confirmed cases of COVID-19 and more than 140.000 patients died [3]. The period of June to September 2021 is the worst situation in Indonesia that the confirmed cases reach the peak on more than 50.000 confirmed cases in one day¹, but COVID vaccines have been given since January 2021 and reached 73,04% for the first dose and 51,52% for the second dose by the period of December 2021².

In response to the COVID-19 pandemic in the beginning period, Indonesia government has signed and ratified regulations and decree to limit mobility of people to prevent other transmissions of the virus such as apply quarantine of international travel, Social restriction, form a taskforce for COVID-19. While implementing social restrictions, the government of Indonesia also issued regulations about contact tracing to detect the close contact of the confirmed-case patients. The contact tracing is important because the virus carrier who tests in positive results may have already spread the virus to the person who contracts with them, then this strategy will reduce the virus transmission [5-6].

The contact tracing system implemented in Indonesia is called SILACAK, basically an modified version of DHIS2 (COVID-19). The Indonesian government has confirmed SILACAK as the only official contact tracing tool in Indonesia in the Ministry of Health Decree Number HK.01.07/MENKES/4641/2021 on the Guidance on Testing, Tracing, Quarantine, and Isolation on Preventing COVID-19. SILACAK as a contact tracing system platform created a dashboard following national guidelines, which is a tool to monitor the COVID-19 cases in Indonesia and support decision making for stakeholders [7].

As the important system in again COVID-19 in Indonesia, the role of SILACAK has throughout several journeys and some changes in the system. The adaptation of the SILACAK system for Indonesia condition on the pandemic situation as an example the task force recruited more than 80.000 tracers to fulfil the target while the pandemic hit Indonesia in the worst situation, so the registration of the tracer will be exploded and the SILACAK development team innovate with the self-registration tool of WhatsApp chatbot and Web-App. The integration of SILACAK, NAR (National All Record), and Peduli Lindungin App is the other adaptation of SILACAK to simplify the record of the contact tracing [8].

The various changes and adaptation processes on the SILACAK system can be implemented by several actors involved in the process such as the developer team, government, health workers, and also society [9,-10].

To analyze the connection of all aspects that affect the SILACAK, A framework is needed to review which can be a historical artifact. Actor-network theory (ANT) is the best practice to know how networks come to trace what associations exist, how they move, how actors are enrolled into a network, how parts of a network form a whole network, and how networks achieve temporary stability. Actors are human or non-human entities that can make their presence individually felt by other actors, and ANT offers asymmetrical treatment between the technical and the social aspects of technology [10-11].

On this study aim to know any actors involved on Covid-19 contact tracing system which are the function, initiative, and support on process of develop the SILACAK system. Analyze the connection between the actors that affect SILACAK system is also the purpose of this work using ANT framework.

2. Method

The case study approach used in to describing collaborative phenomena between stakeholders, the role of organizations and communities in the development of covid-19 Contact Tracing System (SILACAK) in Indonesia [11] was applied because of it allows phenomena to be studied in natural setting to obtain better understanding rather than to find conclusive evidence. The actor-network theory (ANT) was applied as a lens in the analysis of the data. The ANT method can see factors that affect basis of system access [12-13].

This paper uses concept of translation from Actor Network Theory (ANT) to understand the complex social processes in implementation of health information systems. ANT is role as a way of telling stories about networks and actors - both human and non-human - and the processes by which technology is established. In the context of ANT, actors and networks cannot be independent of each other [14].

¹ covid19.go.id-petasebaran

² vaksin.kemkes.go.id

The core of ANT analysis is to examine the process of translation where actors align the interests of others with their own. Translation is explained as a four-stage transitional process that consists of problematization, interessement, enrolment and mobilization, through which events are carried out within a network of actors [14-15].

The first phase is problematization to initiate a problem as well as to propose a solution. The focal-actor renders itself indispensable by defining a process under its control that must occur for all actors to achieve their interests. Interessement is a process where the focal actor stabilizes the identity of other actors and creates links between them [16].

During the second phase of translation, interessement, the focal actor executes these strategies to convince other actors to accept its definition of their interests. Enrolment is the approaches through which the focal actor attempts to define and interconnect different roles that allow other actors to relate within the network. Enrolment also includes the definition of roles of each actor in the newly created actor-network. The last moment of translation is mobilization, when the focal actors ensure that all representatives or spokespersons act according to what have become their aligned interests [11,16].

3. Results

Figure 1 indicate analysis of SILACAK implementation process in Indonesia with four main periods. The periods describe main steps of SILACAK development addressing issues of contact tracing including increasing of data, users and actors involved.

3.1. Moments of Translation

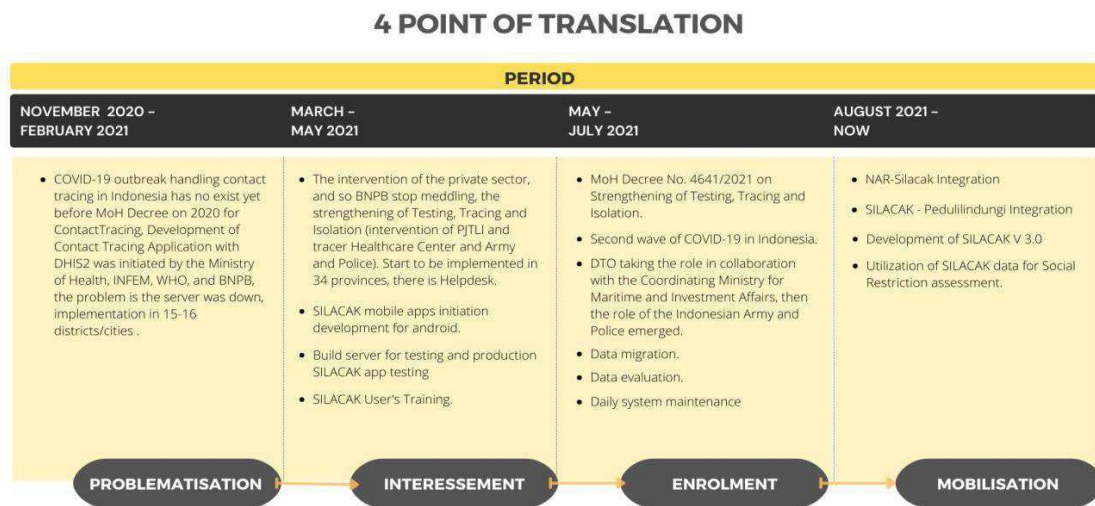


Figure 1. Series of events for the SILACAK implementation in Indonesia

3.1.1 Problematization Moment. This stage is critical in collecting, accessing and using Silacak because decisions regarding system development are informed and guided by authentic and historical information from users. the key in the initial communication has been established. Actors who make up the type of data set and ultimately influence and influence system development and response [16].

The Ministry of Health, in coordination with BNPB, was improving surveillance data reporting and laboratory capacity to better analyze the COVID-19 situation for more prompt response actions and optimal resource mobilization. Strengthen the surveillance system at primary health facilities. One of the points that has played a key role in breaking the COVID-19 chain of transmission is by contact tracing.

This activity requires contact tracers to continuously record and report cases. For this reason, the use of a contact tracking recording and reporting system (Silacak) is important in determining the policies to be made. Due to, server was remaining issues during this step, complaints from the users increased in this step. Fortunately, this issue was addressed in the next step.

3.1.2 Interessement Moment. It is essential In the SILACAK application development there were found some troubles as the unstable server and the unwhole implementation regions. these caused the MoH (through Emerging Infectious Disease unit or INFEM) took a decision by involving the HIS developer (Private Company/sector) in order to strengthen and stabilize SILACAK app, so that can be used optimally by the users. In line with the involvement of private sector, BNPBhas stopped being engaged in SILACAK project.

MoH supported not only from Health Information System (HIS), but also obligated to implement and record contact cases found on SILACAK application as written in Minister Decree number 4641 guidance on implementing the Inspection, Tracking, Quarantine and Isolation For Covid-19 Acceleration of Prevention and Control.

The Health Workers, Data Managers [PJTLI], Army and Police were involved to trace the contact cases. Remind that the tracers should mobile easily and visit the contact cases, MoH and developer initiated the development SILACAK Mobile Application, Moreover, this mobile app can be used in offline mode to avoid any internet access issue.

When the system was ready to use, the Emerging Infectious Disease Unit of MoH conducted users training in each district. Actor process was intensively initiated using the system. Users utilized the apps as they got their username. Complaints around servers and apps used were also necessary during this step. The helpdesk team supported the users to learn more about the apps, deliver multiple trainings, as well as supported the users on data entry and developed manual book and video tutorials [18-19].

3.1.3 Enrolment Moment. This period indicated the strengthening of multisectoral collaboration by involving the ministry of maritime and investment affairs, Indonesian Army and Police. In addition, to address some technical infrastructure issues, data migration, evaluation, daily maintenance and strengthened system to address some issues were conducted during this period.

Not only policy, multi-sectoral collaboration from various stakeholders also was also strengthened in order to increase covid-19 contact tracing in Indonesia. The helpdesk team, on the other hand, supported to solve some technical issues on the apps [20-21].

3.1.4 Mobilization Moment. Increasing effort of reducing COVID-19 cases, some apps were developed to address certain issues such as NAR for swab and antigen test, peduli lindungi, and ISOMAN for health quarantine. During this period, all these related apps were integrated to SILACAK to easily support COVID-19 case detection and prevention. Facing some troubles.

As collaboration with ministry of maritime, TNI and Polri was strengthened, additional users and tracers from TNI and Polri also significantly increased during this period. However, as tracers found issues regarding the system, they cannot directly contact the helpdesk. They should first contact the PJTLI in the puskesmas level, city level and provincial level to be followed up to the helpdesk. Due to technical issues that supposed to get fastrespond, tracers sometimes directly contact the helpdesk [17,22-23].

The ANT connection shows on Figure 2 the types of actors and networks (units) that were present in Silacak at the time of this study. This includes how the actors were connected through various networks in the use of applications. Within networks, the actors carried out activities, were involved in events and employed processes by using Silacak. atone stage or another during the activities, events and processes were negotiated between the human actors, directly and indirectly, consciously or unconsciously. The connection also describes the role of non-human actors to support the whole activities on the technical and non-technical issues.

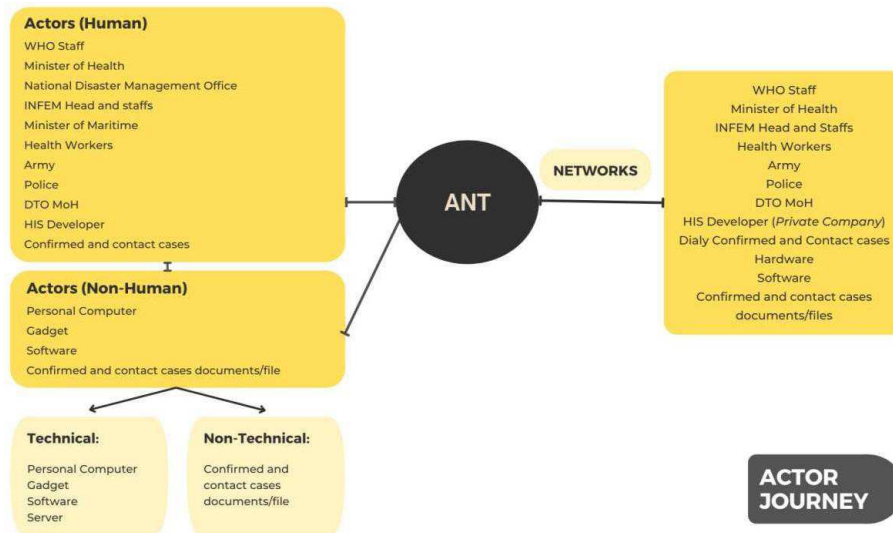


Figure 2. Actors and Networks of SILACAK

4. Discussion

4.1 Actors

The Ministry of Health consists of the Data and Information Center Department and Emerging Infectious Disease Substance Group (INFEM), Digital Transformation Officer, tracers, PJTLI at province, district/city, healthcare center level. Actors from the SILACAK app as follows:

4.2.1 Emerging Infectious Disease Substance Group (Infem), MoH. Ministry being proactive and able to lead the pandemic at national levels. Despite being heavily criticized for being reluctant by the informed public and academics from inside and outside the country, MoH has been one of the first ministerial level agencies to formally respond to COVID-19 since 4 February 2020. Infem is one of the working units at the MoH that is responsible for the rate of development of emerging infectious diseases in Indonesia, one of which is COVID-19.

4.2.2 Pusdatin (Data and Information Center). A working unit at the Ministry of Health that acts as a central level health data trustee, has the task of collecting, validating, managing, disseminating and fostering data producers. In this case, Pusdatin manages all the healthcare data, including contact tracing data originating from the SILACAK application.

4.2.3 DTO (Digital Transformation Officer). This one is a new working unit in the Ministry of Health, they are responsible for integrating health systems.

4.2.4 Tracer and PJTLI (Data manager). The tracers are responsible to carry out the tracking and daily monitoring of close contacts in the healthcare center, and coordinated in stages by the Person in Charge of Tracing, Testing, and Isolation (PJTLI) at the healthcare center, Regency/City, Provincial and Central levels.

4.2.5 WHO Indonesia. NGOs that provide a lot of funding support and provide suggestions for the use and development of DHIS2 in contact tracing activities coordinated by the Ministry of Health and BNPB.

4.2.6 Private Sector (Castellum Digital Indonesia). The Private Sector here plays a role as part of the DHIS2-based SILACAK system developer. where there is a helpdesk and also a system technical team. The helpdesk has an important role in running the troubleshooting from the user's point of view of using the system. users still find hampers to implement SILACAK, especially for tracer on duty.

The helpdesk divides for each province in Indonesia. Meanwhile, the Technical Team of the Silacak System is tasked with solving technical problems posed by the Helpdesk (sourced from users).

4.2.7 The National Army and Police. The National Army and Police is part of COVID-19 Control Security Task Force, also involved in contact tracing activities. The units involved at the village and sub-district level (Babinsa/Bhabinkamtibmas) which are controlled and coordinated by the healthcare center as a community-based health authority.

The basis for the involvement of them at that time was to meet the adequacy of human resources at the healthcare center and structured in terms of tracking and monitoring close contacts, in the context of accelerating the control of COVID-19.

4.2.8 National Disaster Management Office (BNPB). Managing an epidemic is not a natural mandate of BNPB. However, given the presidential preference and decision, the Head of BPBP has been tasked as the Chief of the Task Force.

4.2 Networks

4.2.1 Multisectoral (Actors) collaboration during SILACAK implementation

The collaboration on multi-sectoral needs on all sector to strengthen coordination and reduce the loss whether cost or human lives. As example, addressing critical global health issues, such as antimicrobial resistance, infectious disease outbreaks, and natural disasters [26].

Investment in collaboration mechanisms enables open and regular communication, and facilitates the mutual understanding, trust, and accountability needed to achieve shared goals. Also important are mechanisms for all stakeholders to provide feedback throughout the process, to inform any adaptations needed. Aligned with a collective logic of inquiry, multisectoral collaboration enabled diverse evidence and ideas to be tested, and encouraged innovation to tackle long standing constraints and achieve greater impact [27].

The Silacak involved multi-sectoral collaboration including Indonesian covid-19 task force, data and information center (Pusdatin), center of infectious and emergency (Infem), world health organization and developer from private sector. WHO initiated to develop Silacak as an integrated tracing system. Encouraged by MoH, a private sector was responsible as a developer of Silacak and coordinated to Pusdatin to provide required server.

The Infem assisted to provide technical and conceptual framework for Silacak system. Infem also encouraged provincial and district office to implement Silacak, while developer trained them on how to operate Silacak, followed by training for tracers and puskesmas.

By July, DTO (Digital transformation office) initiated improvement by involving TNI (National Military of Indonesia) and Polri (National police of Indonesia) to become tracers. For Silacak improvement, coordination is needed between DTO, WHO, infem and private sector.

As the government officially launched the SILACAK as a tracing system, it encouraged all health offices from provincial level, city, district, sub-district, and primary health office (Puskesmas) level to use SILACAK. In the Puskesmas level, tracers were responsible for contact tracing.

They were coming from puskesmas officers, youth group (karang taruna), and TNI. While in the city, district and provincial level, PJTLI were appointed for testing, tracing, and isolation. PJTI also assisted for data entry, ensured data quality and shared the data to tracers for specific case monitoring.

4.2.2 Multiple Apps Integration into SILACAK

The definition of integration as a process of merging small parts or sub-systems into one system that functions as a whole. In the IT industry, integration is 'the end result of a process whose purpose is to connect the different sub-systems into one.

The data, which each of the sub-systems has, becomes part of one bigger system that will share the data easy and fast whenever needed. More specifically, integration is the process of connecting different IT systems, services and/or software so that they can function together [28]. The integration process also can combine into one big or complete system such as SILACAK for contact tracing Covid-19 suspect.

By June to September 2021, the covid-19 in Indonesia reached more than 50.000 confirmed cases in one day. Responding to these issues, SILACAK as a tracing system was strengthened and supported by all parties.

The NAR (New All Record) is an application to record and report Covid-19 confirmed cases including taking and examining specimens, confirmed death, and recovery from COVID-19. It tracks the examination result from 902 laboratories including SWAB PCR test, and antigen test. NAR has been utilized to strengthen migration surveillance of Covid in Indonesia that was fully accessible for all airports, stations, and terminals to ensure health and safe migration for all as well as preventing transmission within the transportation facilities.

Furthermore, SWAB and antigen tests reported through NAR were followed up by ISOMAN apps. As a telemedicine app, people with positive covid received automatic messages and free consultation during their self-quarantine. Prescriptions were provided and patients got medicine for free.

Another app that was also integrated into SILACAK was peduli lindungi. PeduliLindungi is an application developed to assist the tracking process to stop the spread of Coronavirus Disease (COVID-19). It relied on community participation to share location data that allowed the government to track contact history. Users also got a notification if they were in a crowd or in a red zone reporting infected people with positive COVID-19 or patients under surveillance.

To increase the close contact tracing rate from 1:0.9 to a minimum of 1:15, TNI, National Military of Indonesia and Polri, National Police of Indonesia also supported the tracing process using integrated systems of NAR, Peduli Lindungi, ISOMAN and Silacak. TNI and Polri responded to the confirmed cases by accessing NAR. They forwarded the list of confirmed cases to TNI and Polri tracers in each sub-district level. The tracer even supported the data entry into Isoman and Silacak app, ensuring patients to get medicine and to complete their self-quarantine by a negative result of PCR and antigen test.

Collaboration between helpdesk, PJTLI and tracers has supported the learning process where users learn on how IT implementation worked on covid-19 contact tracing, while helpdesk learn on users need. In addition, private sector supported to address any technical issues during system integration between SILACAK, NAR and peduli lindungi.

Not only as data user, Ministry of health has also supported contact tracing process by strengthening policies and daily monitoring conducted by infem. From non-human side, server stability was very important to ensure sustainability of the system [7,20,24]. The four main moments of translation during SILACAK implementation indicated the best practices on how various parties have translated and aligned their interest within the system to achieve goals [17,25].

As a final statement, Indonesia can learn from countries that have proved successful in controlling pandemics. Taiwan, for instance, has been considered successful in developing effective cooperation between government and business and in communicating transparently to control the pandemic. In collaboration with Taiwan's Centres for Disease Control, two technology companies – HTC and LINE – developed a chatbot that allowed people to report their health status and get advice on the virus. Taiwan's National Health Insurance Administration and National Immigration Agency worked together to identify suspected cases for COVID-19 testing, integrating their databases of citizens' medical and travel history [4].

5. Conclusion

IT use in the health sector has been utilized for certain context including app for covid-19 data based handling management. Indonesia developed apps for contact tracing called SILACAK using DHIS-2 platform. During initial phase, server became issues affecting the system. Fortunately, technical feedback solved the issues and gave better experience on SILACAK. Support from any parties would be required even for any small issues. Coordination between helpdesk is still challenges to ensure accurate information. Various systems have been integrated to strengthen contact tracing process. Fragmentation issues have been addressed within the SILACAK app.

This paper can conclude that inter-connected internal and external socio-technical facets of infrastructure influence the change of HIS. Besides this paper also demonstrates how improvements in one facet will influence other facets of infrastructure, in both negative and positive ways. The application of a different theory, would be of benefit to academics and the healthcare sector of Indonesia in general. There are two primary factors influencing an individual's intention to use this technology: perceived ease of use and perceived usefulness.

6. Limitation Research

There are few limitation on this paper based on the point on this purpose of this work about role of all actors for contact tracing system in Indonesia against Covid-19 outbreak. This study only described and explained what was happened and who was in charged (actors) for established the contact tracing system and the connection among them, and did not conduct the deep evaluation regarding the impact of each actor. The last limitation was this work focused on described and explained how multi-actors collaboration flattened the covid-19 curve in Indonesia.

7. Recommendation

The researcher could conduct deep evaluation regarding the impact of each actor involved in the process, elaborate more rigorous study method, and might be elaborated the multi-actor's role deeply.

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